Are Robots the Answer to Pandemic-Proofing Warehousing and Logistics Operations?

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Initiatives: Logistics Strategy and Operations and 2 more

Fallout from COVID-19 is increasing demand for robotics in warehousing as companies seek to pandemic-proof operations in the event of disruptions in the future. Supply chain logistics leaders must fully determine whether their primary objective is operational efficiency or strategic innovation.

Overview

Impacts

- The pandemic caused major staffing disruptions in warehouses and distribution centers, delaying deliveries and placing a renewed focus on robotics.
- During the recovery stage and postpandemic, companies will be required to social distance warehouse employees and alter cleaning procedures.

Recommendations

Logistics leaders responsible for strategy and operations should:

- Map how robotics can eliminate bottlenecks during future supply chain disruptions by determining where slowdowns occurred during the pandemic.
- Develop an understanding of the capabilities of various robotic solutions before rushing to deployment by determining if you have the internal knowledge required and a solid understanding of what use cases are appropriate in your environment.

Strategic Planning Assumption

The fallout from COVID-19 will drive a double-digit increase in demand for robotic goods-to-person (G2P) systems through 2023.

Analysis

The global pandemic revealed how susceptible warehousing and distribution operations are to major disruptive events. During the pandemic, warehouses were slowed by the need to reduce...
workforces to accommodate social distancing. Labor shortages were amplified as some workers became ill or were afraid to come to work out of fear of contracting COVID-19.

The result hit e-commerce companies particularly hard. The pandemic led to increased online shopping. At the same time, fulfillment operations were struggling to staff their operations. Online retailers, who have long pushed aggressive delivery cycle times and often free delivery, resorted to adding disclaimers that shipping dates could not be guaranteed for many orders. Amazon suspended its highly popular same-day and two-day day delivery services due to daily demand that resembled consecutive Black Fridays, and a warehouse team that struggled to keep up with demand. ¹ Amazon allowed workers to take time off during the pandemic if they felt unsafe, which compounded absenteeism and further delayed shipments. Shipping windows expanded from a couple of days to as many as three or four weeks. Other online retailers experienced similar delays.

In the wake of COVID-19, some companies are rushing to virus-proof their supply chains by turning to automation and robotics. U.S. apparel chain Gap took quick action, asking its robotics vendor to accelerate a delivery planned for later in the year so it could limit human contact in its warehouses during the pandemic. ² The issue was dire for Gap. With stores closed and difficulty fulfilling online orders, it burned through $1 billion in cash during the pandemic and warned the U.S. Securities and Exchange Commission that it was running out of money. ³

Supply chain and logistics leaders responsible for strategy and operations can use this research to learn about the pros and cons of deploying robotic solutions (see Figure 1).

**Figure 1: Impact Appraisal for Supply Chain Logistics Leaders Considering Robotics**

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Top Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pandemic led to staffing disruptions in warehouses, placing renewed focus on robotics.</td>
<td>• Increase productivity by piloting robotics now or expanding already successful deployments.</td>
</tr>
<tr>
<td>Postpandemic, companies will be required to social distance employees.</td>
<td>• Seek areas with strong value propositions for robots by conducting warehouse redesign exercises and simulations by engaging with a warehouse consultancy or building internal expertise.</td>
</tr>
</tbody>
</table>

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**Impacts and Recommendations**

Gartner, Inc. | 728470
The Pandemic Led to Major Staffing Disruptions in Warehouses and Distribution Centers, Placing an Intensified Focus on Robotics

Even before the pandemic, operators of warehouses and distribution centers were investigating robotics as a solution to the shortage in skilled labor (see Figure 2). The problem was compounded during the pandemic when workers became ill, had to stay home to care for family members or were simply scared to come to work.

### Figure 2: Labor Availability Is the Top Driver for Automation and Robotics

#### Labor Availability Is the Top Driver for Automation and Robotics
Percentage of Respondents. Sum of Top 3 Ranked and 1st Choice

<table>
<thead>
<tr>
<th>Factor</th>
<th>1st Choice</th>
<th>Sum of Top 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Availability Constraints</td>
<td>18%</td>
<td>61%</td>
</tr>
<tr>
<td>Increasing Velocity, Volume and Throughput of Work in the Warehouse</td>
<td>16%</td>
<td>55%</td>
</tr>
<tr>
<td>Addressing New or Changed Business Requirements</td>
<td>13%</td>
<td>34%</td>
</tr>
<tr>
<td>Cost of Labor</td>
<td>11%</td>
<td>32%</td>
</tr>
<tr>
<td>We Are Modernizing Existing Warehouses or Plants</td>
<td>13%</td>
<td>26%</td>
</tr>
<tr>
<td>We Are Building New Warehouses or Plants</td>
<td>13%</td>
<td>26%</td>
</tr>
<tr>
<td>Supporting New Business or Operating Models (e.g., Omnichannel Commerce)</td>
<td>13%</td>
<td>26%</td>
</tr>
<tr>
<td>Competitive Pressures or Threats</td>
<td>3%</td>
<td>16%</td>
</tr>
<tr>
<td>Replacing Aging or Technically Obsolete Existing MHA Systems</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Expanding Use of MHA Into New Locations</td>
<td>3%</td>
<td>8%</td>
</tr>
<tr>
<td>Upgrading Existing MHA or Adding New Functionality</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>

n = 38
Q: Top three factors motivating your organization to invest in holistic MHA over the next three years?
Source: Gartner Warehouse Automation 2019 Survey
Base: Buyer Branch

In some cases, workers from several retail warehouses in the U.S. and in Europe held one-day protests about work conditions, further delaying shipments because picking orders remains a highly manual process. In late June, German labor union Verdi said that employees at six Amazon sites in that country would strike for at least two days to emphasize the need for better health safety responses and personal protection equipment (PPE) during the pandemic. Should the pandemic aggressively spread again and employees react with more vigor against working conditions, a prolonged labor strife would have a crippling effect on the global economy.
Robots are becoming more humanlike every day and algorithms are now capable of better distinguishing between objects, enabling faster automation. Many robotics firms expect orders to surge based on inquiries from the last several months from companies seeking to pandemic-proof their supply chains by expanding their tech infrastructure.

That trend is evident in the grocery sector, where many retailers now offer curbside pickup of online orders, a practice that gained momentum during the pandemic and is likely to remain popular in a postpandemic environment. In order to fulfill orders more cost-effectively, retailers will likely consider robots for pick and fulfillment operations, especially in grocery where margins are razor thin. Grocery giant Meijer, for example, is building a fully automated dry grocery distribution facility in Tipp City, Ohio. And Kroger is partnering with tech firm Ocado to build three highly automated grocery fulfillment centers, leveraging advanced robotics to redefine the customer experience. In South Korea, KT recently began using self-driving carts at its logistics center, nearly cutting in half the employee travel range for loading and transporting inventory. KT, a telecommunications company, says this will help minimize personal contact between employees and boost throughput at large-scale distribution centers and smaller warehouses. Additionally, KT agreed to acquire 10% of Hyundai Robotics to pursue robotics solutions centered on consumer service, autonomous driving and smart factories.

“In preparation for the post-COVID era, technologies to minimize person-to-person contact are increasingly demanded throughout industries.”

— Choi Kangrim, Head of KT’s Connected Car Biz Center

It is crucial to evaluate various use cases before committing to a particular robotics platform in order to choose the right technology and integrate it properly. Expect some lag time between the initial order to the actual go-live date, especially with current high demand. Prior to the pandemic, nearly 60% of buyer organizations belonging to the Material Handling Association believed that vendors were not completely ready to help them with material handling automation (MHA) systems over the next five years (see Figure 3). Those survey numbers, part of Gartner Warehouse Automation 2019 Survey, were prepandemic and this will only be a bigger challenge with current working environments and increased demand.

Figure 3: Most MHA Members Do Not Believe That Vendors Are Completely Ready to Help Them Over the Next Five Years
The benefit of robots versus conventional MHA systems is that robots can often be up and running in several weeks or less, where large-scale conventional MHA systems could take years. Furthermore, the payback time for robots is likewise measured in weeks or months, while conventional MHA systems often have payback periods of five to seven years. By comparison, companies seeking to emerge from COVID-19 with a highly automated material handling solution likely won’t turn those systems on until late next year or 2022 at the earliest.

The advantage of the rapid onboarding and a quick time to value proposition for robots is that this allows companies to test a variety of use cases with low risk and upfront costs. Companies might find some very simple use cases that address low-hanging fruit, such as simple product transport, that can be up and operational quickly. Meanwhile, they experiment with other use cases, such as collaborative robotic pick to cart, which might require more time and effort. Even so, these more complex use cases will be operational significantly faster than conventional MHA systems.

**Recommendations:**

- Increase productivity by piloting robotics now or expanding already successful deployments.
- Take immediate action if evaluation is complete, as demand for robotics will likely outstrip future capacity, creating backlogs that could last for years.
Identify appropriate use cases for autonomous mobile robots (AMRs) within your operations by studying travel patterns in each of your warehouses, specifically looking for backlogs caused by the pandemic that will be easy targets for AMRs.

Conduct due diligence and be pragmatic in your approach to robotics and understand that deploying in an iterative and agile way will accelerate time to value.

**Postpandemic, Social Distancing Will Be the New Normal in Warehouses and Distribution Centers**

Early reports from Gartner clients indicate some increases in productivity due to social distancing requirements. The belief is that this results from fewer employees requiring less downtime for chatting at the water cooler and other unproductive events. However, the flip side is also true. Throughput remains slowed at many companies as new PPE guidelines and social distancing requirements decrease overall efficiency and productivity.

Honey Can-Do International, a provider of home decor products, has seen overhead costs climb despite minimal disruption in shipments from its manufacturing base. CEO Steve Greenspon said the company's operations are less efficient now because of social distancing strategies. For instance, only one worker is allowed to unload shipping containers, rather than the two that worked together before the pandemic. 10

“Containers take twice as long to unload.”

— Steve Greenspon, CEO of housewares company Honey Can-Do International

It is likely that social distancing will remain a required best business practice. Gartner has witnessed various proposed approaches to social distancing. Some are more invasive, such as using technology to track every location and movement of every employee at all times by using the technology to force limits on groups of employees.

Others are far less invasive and are also much more easily deployed, such as goods-to-person systems. COVID-19 will accelerate demand for robotic G2P systems because they are an easy and economical way to enforce social distancing in a warehouse. By their very nature, G2P systems enforce social distancing by keeping the person in one fixed place and allowing the robots to be mobile and deliver goods to the human.

Warehouses and distribution centers have options when considering new spacial requirements. The most reasonable and realistic from a time, money and effort perspective include:
Robotic goods-to-person systems, such as GreyOrange (an Amazon/Kiva knockoff.) This approach carries low upfront costs and the ability to deploy within a few weeks with minimal infrastructure impact. Goods-to-person strategy enables soft enforcement of social distancing by placing people six feet or more apart, while robots pick goods and bring them to a person. In addition, plexiglass can be installed between workers to make conditions even safer. AutoStore, Attabotics, and shuttle systems such as KNAPP also provide goods-to-person solutions. E-commerce fulfillment provider eStore Logistics is investing in up to 200 AI-enabled robots at two distribution facilities it is building. The robots will pick items on warehouse shelves before they are packed by humans.  

Collaborative robotic picking solutions from Locus Robotics, Fetch Robotics, 6 River Systems and others can assist with social distancing by letting the robots do the bulk of the movement while humans do isolated picking, such as zone or aisle picking. This way, one person works one or a few aisles and robots come to and from the worker.

Transport AMRs can automate low-value-added movement activities, such as shuttling items from the plant floor to the warehouse, or robotic conveyance or replacements of aging dumb automated guided vehicles (AGVs). Robotic vendors, such as Seegrid, Balyo, MiR, Brain, Vecna Robotics, Fetch Robotics, OTTO Motors and others, can reduce the number of employee interactions by leveraging their autonomous transport robots to move goods around, again helping to socially distance humans.

Fully autonomous lift trucks that can handle both transport and high-lift are getting closer by the day, but are still a few years off. Today, some lift truck vendors, such as Raymond, are partnering with Seegrid for its AMR technology. Similarly, Yale and Hyster are partnering with Balyo. These partially offer autonomous lift trucks that do a good job with two-dimensional transport (e.g., moving product from A to B) and have lift capacity of a meter or so. Even though some vendors claim to do this, a high-reach solution of 20 feet in the air is just not fully realistic yet, although the technology is improving rapidly.

DB Schenker has introduced an autonomous forklift truck for its operations to transport empty containers 150 meters at a site in Germany. The operation, which was previously carried out with conventional forklift trucks, is now done without any warehouse associates. The AGILOX solution lifts and lowers containers using its height-adjustable fork and eliminates the need for the warehouse staff to place the containers manually onto automated guided vehicles.  

Goods-to-robot-to-robot-to-robot takes social distancing to the next level by eliminating the human altogether. A Gartner client is piloting this technology, which is currently available for only narrow use cases. The solution being tested is a goods-to-person system, such as AutoStore or Attabotics, which delivers a tote to a station manned by a robot that picks the items then places them on a sortation robot. The robot delivers it to a packing station, where a robot picks the items and places...
them in a box. The technology components are there again for select items, but these will typically be larger system integration efforts.

Large-scale conventional material handling automation is not new and there are hundreds, if not thousands, of good examples where it is an appropriate solution for companies. Conventional MHA has advantages of speed, density of storage and solutions designed to address the specific end-to-end needs of an individual customer. These are all good things. However, conventional MHA comes at a steep price, takes a long time to deploy, has long payback periods, and because of the tight fit for purpose design, they are inflexible and hard to adapt to change. However, some companies are getting close to the notion of the “dark enterprise,” where the systems operate autonomously and with lights out.

Typically, reducing labor costs has been the main driver for automation, but labor availability constraints are now a compelling challenge for companies. Add the after-effects of the pandemic, labor issues are quite likely to remain the primary driver moving forward.

According to the MHI report on the supply chain in 2020, the adoption rate for robotics and automation increased more than any other supply chain technology between 2019 and 2020. Adoption clocked in at 32% and 39% adoption, respectively.\(^{13}\)

COVID-19 has accelerated the need for automation technologies that prevent transmission of the virus. As companies consider robotics, they need to determine whether their objective is operational efficiency or strategic innovation.

Recommendations:

- Identify appropriate AMR use cases for your operations by studying travel patterns in warehouses, targeting excess and wasted travel times that are easy targets for AMRs.

- Seek areas with strong value propositions for the robots by conducting warehouse redesign exercises and simulations — via either engaging with a warehouse consultancy or building internal expertise.

- Conduct experiments to identify how current processes can be directly compared with new processes designed specifically around AMR capabilities. Seek creative solutions by experimenting with many AMR scenarios — some adaptations of current processes and others possibly radical, new approaches. Given the low cost of entry, evaluate multiple AMR providers simultaneously.

Evidence


2. “Gap Rushing More Robots Into Warehouses,” CNBC.

“Workers to Protest Conditions at Amazon, Instacart and Other Retailers Friday,” USA Today.

“Amazon Warehouse Workers Go on Strike in Germany Over Coronavirus Infections,” CNBC.


“KT Corp. Using 5G Autonomous Carts at Logistics Center,” Green Car Congress.

“KT Signs $41M Pre-IPO Deal With Hyundai Robotics for Partnership In Robotics,” Pulse.


“E-Store Logistics Sinks Au$40 Million to Roll Out Robotic-Powered Fulfillment Centres,” ZDNet.

“DB Schenker Driverless Forklift Truck,” DB Schenker.


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