



PEAKLOGIX

AN ALTA MATERIAL HANDLING COMPANY

WHITEPAPER

Rattled Supply Chains, a Consequence of Ill-Preparedness

In 1996, a highly contagious genotype of H5N1 – an avian flu – was first discovered in birds. By 1997, it was detected in people and, for the next 20-plus years^{1,2,3} analysts, academics, and experts warned of the effects this and other avian flus could have on businesses and the global supply chain.

With so much advanced warning, it might be asked from a post-COVID-19 viewpoint, “What went wrong? Why weren’t we better prepared?”

The problems in the supply chain building up to December 2019 – when the novel Coronavirus was first detected – weren’t that anything was going wrong. Instead, the biggest problem was that so much seemed to be going right that an entire breakdown of the system was unthinkable.

In the earliest months of 2020, the last great puzzle of the global logistics chain was down to a single proverbial mile. From a consumer’s perspective, with the convenience of a few clicks on their phone, anything from an auto part to pet food could be

ordered in minutes and, at little cost, delivered to their door within 24 hours.

Just-in-Time (JIT) logistics made this possible. As a management strategy, JIT logistics predicts what items will be needed and where. When employed globally, it’s a complicated weave of supply networks that reach from the end consumer back to the raw-material suppliers. These materials are harvested, processed, and ultimately shipped to the consumer as a finished product in a “lean” system designed to maximize efficiencies and minimize waste.

Pre-pandemic, JIT logistics was incredibly optimized. Decades of cutting waste had created a system so lean that the focal point of a global supply chain had narrowed down to that last mile of delivery. Delivery—from densely packed urban sidewalks to sprawling country roads – was still time- and resource-intensive. Delivery windows were often missed, goods were increasingly stolen from porches, and too many customers were left dissatisfied.



While last-mile logistics is still an important puzzle to solve, COVID-19 proved to be a stress test that the global supply chain – in all its leanness – failed. The global supply chain had become so lean that its very efficiency became its greatest weakness. So many resources had been cut that the system lost its resiliency to demand shocks.

The pandemic's disruptions to the supply chain left entire aisles of major retail stores bare. Consumers, unable or unwilling to find merchandise in their local stores, turned so sharply to eCommerce that even the world's largest retailers – once famed as leaders of efficiency and leanness – couldn't keep up⁴ with the sudden demand. Without much explanation, delivery estimates that had been hours became weeks, or orders were outright cancelled.

Perhaps the good news is that much of the supply chain's nightmare that played out in 2020 had been predicted since the avian flu of 1996. More than that, solutions were already at hand. Many companies could have spared themselves the worst of the pandemic's ramifications with the right investments and foresight.

“
Pre-pandemic, JIT logistics was incredibly optimized. Decades of cutting waste had created a system so lean that the focal point of a global supply chain had narrowed down to that last mile of delivery.





While last-mile logistics is still an important puzzle to solve, COVID-19 proved to be a stress test that the global supply chain – in all its leanness – failed.

Analysts, academics, and experts are still warning about the effects of the next pandemic, or continued outbreaks of COVID-19, on the global marketplace. A complete return to pre-COVID business practices is unsustainable.

This paper will review the state of affairs in order fulfillment and warehousing before the COVID-19 pandemic and after the lockdowns of 2020. We'll discuss the current state of a recovering supply chain. And we'll offer hope in how businesses can improve their existing systems while at the same time preparing for the next demand shock.

The State of Brick-and-Mortar Businesses

On Thursday, December 19, 2019 – 12 days before the first reported case of COVID-19 – CNN reported⁵ on the record 9,300 store closings in the previous 12-month period. In what Business Insider called a “retail apocalypse,”⁶ this nearly doubled the number of closings seen in 2018.⁷ Much of this disruption was caused by the inability of brick-and-mortar stores to meet the competition of the online market or to adjust physical storefronts to take better advantage of eCommerce.

If the outlook for brick-and-mortar stores was grim before the pandemic, things only worsened in 2020.

The country saw 12,200⁸ store closings, against a mere 3,300 store grand openings.

While the pandemic had many ramifications, the single reason for the dramatic uptick in store closings was the lack of resiliency in the supply chain. COVID-19 was a demand shock that the global logistics network was too lean to overcome. Customer needs became too unpredictable for JIT logistics to deliver goods, and materials could no longer move quickly from processing to end-user.

No one in January 2020 could have predicted the sudden demand for hand sanitizer, face masks, and basic essentials that came in March. The supply chain managers who'd helped create the lean, efficient, global supply network saw their shelves suddenly emptying. Ironically, some of the companies that fared best in this phase of the pandemic had adhered the worst to lean business practices – they had warehouses of inventory stored on-shore.

As shelves emptied in the leanest businesses, the only hope for meeting customer demand was being restocked by the global supply chain. However, as early in the pandemic as February 2020, Fortune reported that 94% of Fortune 1000 companies saw supply chain disruptions caused by COVID-19.⁹ By early March, driven in part by the panic buying that no one had predicted, major retailers were out of stock of essential goods.¹⁰

The disruptions faced by the global supply chain included factories the world over being temporarily shuttered to slow the spread of the illness locally; lockdown orders of governments that forbade anything but essential work and activities; and the closings of ports, airports, and even entire borders to prevent the spread of the disease internationally.

Over the next months, the re-opening of these factories, ports, jurisdictions, and borders was haphazard at best.

Often, even those organizations that could open in theory found themselves unable to meet the practical criteria necessary. Many factories, for example, were designed so that employees worked close together or even as partners. But among the guidelines meted out by the CDC and others, employees were required to stay a minimum of 6' apart. To accommodate this, many factories had to re-design their layouts and processes. Employee schedules had to be staggered so that break rooms, entranceways, and lobbies could accommodate the new social distancing rules. Making these adjustments on the fly, with little preparation and a lack of infrastructure, took time.

Adjusting to these “new normals” was further hampered by the global shortfall in Personal Protective Equipment (PPE).¹¹ Key elements of the supply chain couldn't field the necessary face

masks, face shields, hand sanitizer, and other PPE to maintain operations.

Later in 2020, as the supply chain adjusted and factories and suppliers reopened, brick-and-mortar businesses still faced complications. Many municipalities still enforced lockdown orders that kept many shoppers home. And many of those consumers who could get out chose not to place themselves at risk of illness by shopping in brick-and-mortar stores.

For both of these demographics, online shopping represented the most viable and safest alternative. eCommerce, however, suffered many of the same difficulties as its brick-and-mortar counterparts and, as we discuss below, had a few problems of its own.

The good news for many brick-and-mortar companies is that, with the rollout of vaccines and the proven success of preventative measures such as face masks and social distancing, business is rebounding. For the first time in years, 2021 has seen more store openings than closings.¹²

Retail megaliths like Walmart, Home Depot, and Target were no more prepared than anyone else for the pandemic. However, they had the resources to turn what was seen as a weakness – their expensive infrastructure – into a benefit.



COVID-19 was a demand shock that the global logistics network was too lean to overcome. Customer needs became too unpredictable for JIT logistics to deliver goods, and materials could no longer move quickly from processing to end-user.



“
This reliance on Just-in-Time logistics meant that eCommerce companies were even less resilient, and more affected, by the disruption of the supply chain than brick-and-mortar stores.

Big-box stores beefed up their internet presence and turned to online ordering. Customers who didn't want to shop in-store could order directly from the company's website or app. Items could be shipped to their homes and offices, or picked up at curbside or from conveniently located lockers at the stores' entrances.

To support this, whole teams of employees were created to process these orders, walking the stores with a handheld terminal in what was essentially a person-to-goods picking operation. Smart lockers and other warehousing solutions were employed in ways that matched consumer needs at a greater scale than ever before.

To more directly compete in eCommerce settings, Walmart also expanded its online Marketplace – a service very similar to the Amazon storefront that most consumers are familiar with.¹³ Among the differences helping to make Walmart's Marketplace succeed are the physical locations of its stores, which serve as key pickup and delivery points for both sellers and buyers.

Smaller businesses will have neither a big-box-sized warehouse in every city nor the resources that enabled these large retailers to adjust quickly to these expensive problems.

However, as we'll discuss below, the adjustments made by these major retailers hold important lessons for businesses of every size and across many industries. The changes they've made were expensive to enact in a post hoc fashion – but could have been part of an economically successful remodeling of old business practices. By embracing these technologies and business practices and implementing them in a planned and structured way, even small- and mid-sized companies can find success in a global, post-pandemic market.

The Viral Growth of eCommerce

Before the coronavirus pandemic, online shopping was in a slow ascendancy. Adjusting fulfillment strategies to match that pace was a challenging but obtainable goal. The year-over-year growth from



After the rollout of vaccines and the end of lockdown orders, over one-third of online grocery shoppers do not expect to change their online grocery shopping habits once the crisis eases.

2018 to 2019 of 15.8% was respectable.¹⁴ It did not, however, prepare companies, or their supply chains, to meet the 93% growth seen in May of 2020.¹⁵

The disruption of the global supply chain that hamstrung brick-and-mortar stores didn't spare the online markets; closed factories, ports, and borders were closed for everyone. Workers in distribution centers, warehouses, and factories all faced the same restrictions – new demands for social distancing that couldn't always be met, and new requirements for PPE that couldn't always be found.

Before the pandemic, eCommerce companies were defined – even more than brick-and-mortar stores – by their ability to receive a customer's order, process it, and deliver the goods in strikingly little time. Their processes were as lean as they could be, limited most by the still-nascent predictive analytics and the Command-and-Control (C2) algorithms of artificial intelligence.

This reliance on Just-in-Time logistics meant that eCommerce companies were even less resilient, and more affected, by the disruption of the supply chain than brick-and-mortar stores. Where a store is essentially a warehouse in which customers do the work of picking, eCommerce companies kept only





as much inventory on-hand as they needed to ship directly to customers.

The sudden, unpredicted spike in demand caused by COVID-19 did more than cost companies like Amazon some business. It also lost them a great deal of the trust and loyalty they'd spent years developing in their customer base. Beyond inconveniencing their customers with delayed or cancelled orders, the entire online market was exposed as a place where predators could thrive – which, for many customers, made the security brick-and-mortar companies all the more appealing. Going to a local store looking for an essential item and being confronted with an empty shelf was frustrating but easy to understand.

Running an internet search for the same item and being confronted with marginally relevant search results, over-priced merchandise of questionable quality, or even outright scams, felt exploitative.¹⁶

As with brick-and-mortar stores, large players in eCommerce had enough resources to invest to overcome the pandemic's challenges. After losing money in the first quarter of 2020, for example,

“
Before 2020, warehousing was seen strictly as a cost, and the goal was to eliminate that cost as much as possible. Today, warehousing is understood to be more than necessary insurance against demand shock.

Amazon apportioned \$4 billion toward “COVID-related expenses.”¹³

Amazon hired hundreds of thousands of employees in its fulfillment sector alone. It removed thousands of seller accounts that seemed to be engaged in illegal or unethical activities, including price gouging. And, to compete with the infrastructure advantages held by brick-and-mortar businesses, Amazon is building 1,000 warehouses in suburban neighborhoods around the US.¹⁷

As outbreaks have slowed nationally, this re-investment in their organization helped drive Amazon’s numbers to a 44% increase in year-over-year sales and a 220% increase in profit.¹⁸

While some brick-and-mortar businesses have found a niche in eCommerce with services like Buy Online PickUp in Store (BOPIS) and are doing well, the pandemic largely drove people away from physical stores and to the online markets. During the peak of the pandemic, more than half of customers shopped for groceries online.¹⁹

Even fresh groceries, once a hard market for eCommerce companies to break into, saw tremendous gains in internet sales. Online purchases of perishables in 2020 grew by 157%.²⁰ Services that included delivery of fresh groceries grew by 300%.

And in-store pickup of fresh groceries ordered online grew by 200%.

After the rollout of vaccines and the end of lockdown orders, “over one-third of online grocery shoppers do not expect to change their online grocery shopping habits once the crisis eases,” Coresight Research found in a recent study of over a thousand households.²¹

As with brick-and-mortar businesses, not every online retailer has the resources of Amazon. But there are lessons for every business in how Amazon adapted to the pandemic. Amazon has continued to drive its business by increasing its ability to meet consumers where they are. They’ve worked to build more trust with both buyers and third-party sellers, and have put more automated warehousing space close to the consumer to meet the ever-increasing demand for low-cost, rapid delivery, and to add resiliency to their systems.

As the Supply Chain Recovers, More Warehousing Space is Needed

While one effect of the pandemic was to rattle global supply networks, the demand for goods hasn’t been evenly distributed across industries. Especially early in the pandemic, essentials – toiletries, groceries, and medicine – moved more



The problems faced in 2020 – that billions of dollars solved for these companies – had been predicted since at least 1996. And the solutions were already at hand.



Integrating automation into a distribution center, warehouse, or manufacturing facility is known to improve accuracy to upwards of 99%, increase throughput, reduce errors, and lower labor costs through better scheduling and moving workers to value-adding tasks.

quickly than they could be supplied. However, luxury goods – high-end clothing, electronics, luggage, and briefcases – were left to languish in warehouses.²²

These variables merged in a manner and time that created gaps in the ability to supply goods and to store them efficiently.

The drive toward lean, Just-in-Time logistics drove the inventory-to-sales ratio through a decades-long decline.

Early in the pandemic, panic buying emptied stores and warehouses of essential goods. Retailers looking to protect themselves from future demand shocks needed to stock more of these items closer to their customers – but found themselves in the veritable warehousing desert created by just-in-time logistics. Not only was space limited, but, too often, it was also filled with luxury items that hadn't moved since January 2020.

The upshot of this is that retailers have had to adjust how they understand warehousing. Before 2020, warehousing was seen strictly as a cost, and the goal was to eliminate that cost as much as possible. Today, warehousing is understood to be more than necessary insurance against demand shock.²³ Those businesses based entirely in the US, or with large US-based warehouses, proved more resilient in the face of the pandemic. They were able to continue supplying their customers with goods and to earn more customer loyalty by doing so with the speedy delivery online shoppers expect.

In the wake of the worst of the pandemic (or, possibly, in the current lull between outbreaks) the country still faces shortages caused by failures in the supply chain. This includes framing lumber,²⁴ semiconducting microchips,²⁵ diapers, cereals, and “nearly all other consumer goods,” according to Business Insider.²⁶ Shipping delays, continued disruptions in the global supply chain network, and changes in demand that suppliers can't yet predict are all to blame.



For most warehouses – even highly automated warehouses – labor is still the single largest monthly expense, accounting for between 50-70% of the operational budget.

Part of the solution to these problems will be keeping more inventory closer to consumers. This will create a more resilient supply chain that can better withstand demand shocks. And it's being made possible by new construction, space-saving advances in warehousing design, a changed perspective on what buildings even constitute a warehouse, and the continued adoption of intelligent automation that enables the dense storage of goods combined with fast, accurate storage and retrieval.²⁷

Lessons Learned: Increase Resiliency by the Integration of Automation

As we said, for Amazon, adjusting to the pandemic took billions of dollars in new investment. We can imagine the numbers were similar for major brick-

and-mortar retailers. For the eCommerce sector, COVID-19 created growth they weren't yet prepared for. For traditional retailers, it hastened the time when they had to adapt or die.

These companies didn't weather the pandemic by inventing new technologies or engineering new systems. The problems faced in 2020 – that billions of dollars solved for these companies – had been predicted since at least 1996. And the solutions were already at hand.

Integrating automation into a distribution center, warehouse, or manufacturing facility is known to improve accuracy to upwards of 99%, increase throughput, reduce errors, and lower labor costs through better scheduling and moving workers to value-adding tasks.



Using scaled-down versions of the robotics that have helped make Amazon and Walmart successful, a space the size of a single-car garage can be turned into an automated or semi-automated fulfillment center.

Realizing the ROI on a project is complicated by the number of challenges a particular business might face and the number of possible solutions available. But when a company integrates the right solution, they can add resiliency and efficiency to their operation, while lowering costs.

Command and Control (C2) Solutions

The impact digital process automation has had in the fulfillment industry should not be underestimated. Today's Warehouse Management System (WMS), Warehouse Control System (WCS), and Enterprise Resource Planning (ERP) software are key components of lowering costs and increasing efficiencies in nearly every corner of a warehouse.

For most warehouses – even highly automated warehouses – labor is still the single largest monthly expense, accounting for between 50-70% of the operational budget.²⁸ Integrating the right digital automation into a warehouse's processes streamlines how employees interact with physical automation. The real-time tracking and data supplied by a WMS, along with RFID or similar technologies, allows the seamless movement of merchandise between warehouse zones – from receiving through put-away and picking, all the way to shipping.

Intelligent integration of the right C2 software for a warehousing or manufacturing facility begins with

an honest look at realistic goals for the site and its current operations. Implementing the software can save a warehouse as much as 50% on its labor costs. Depending on the facility, these savings are realized by minimizing staff and maximizing their output; redeploying under-used staff to value-added services; instantly providing workers with the information they need to perform a task; and providing real-time feedback to supervisors. During times of outbreak, when schedules have to be created for individuals instead of whole shifts, the right C2 software can help fine-tune the timing so that entrances, exits, lobbies, and breakrooms aren't overcrowded.

WMSs increase picking and shipping accuracies to upwards of 99% – reducing the human error factor and increasing consumer happiness and loyalty.

Because the WMS can track each item in a warehouse, how and where items are stored can also be maximized, and the amount of space required to store items minimized. This gives supply chain managers more flexibility in deciding how much inventory is right for their business to keep; keeping inventory can raise costs but creates a more resilient system.

Better handling future demand shocks means better balancing warehousing costs versus inventory on-hand. Experts predict that manufacturers and sellers alike will increase the inventory they hold

by as much as 10% to increase their resilience.²³ In addition, suppliers to some retailers may find that future contracts will negotiate the amount of inventory the supplier keeps warehoused locally.²⁹

For smaller companies and start-ups, the same big data analytics that can streamline a facility's operations can also be used to predict where their customers are based geographically. Small companies don't have a big-box store in every major city but can use big data to pinpoint hot spots of loyal customers.

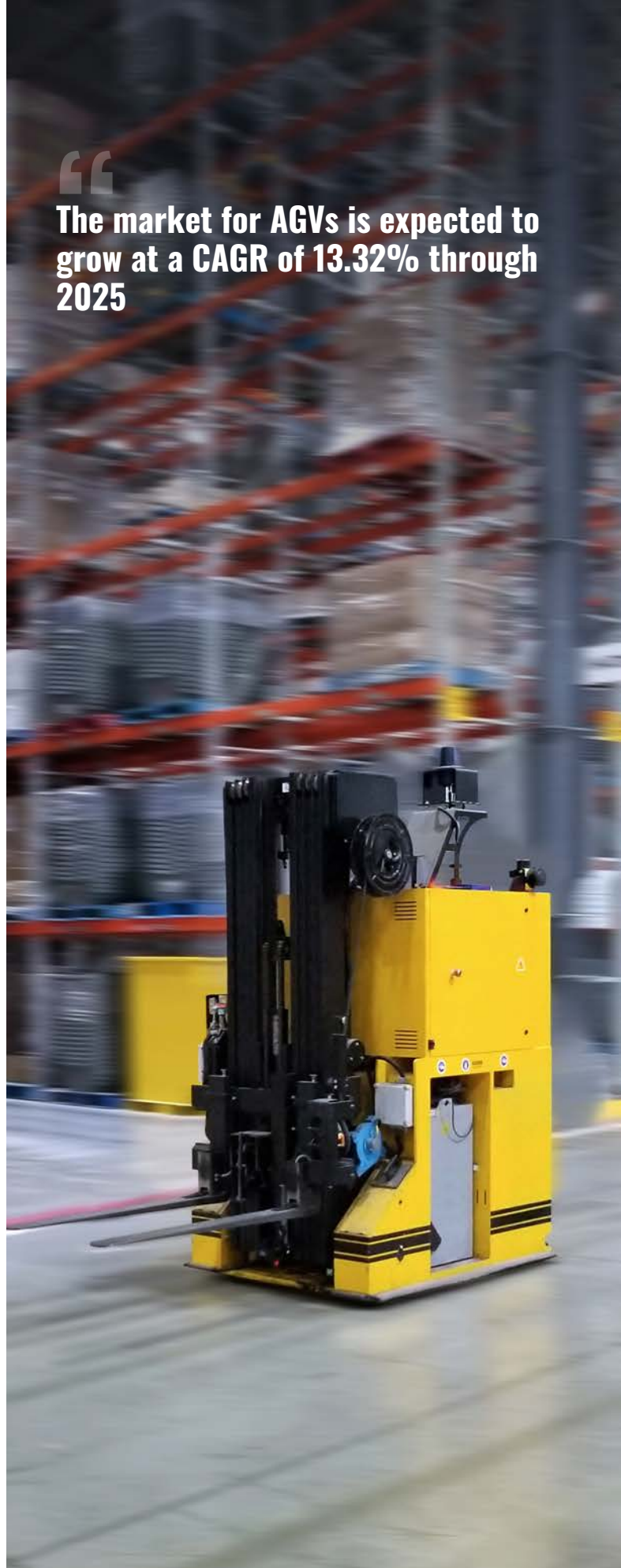
Once these hotspots are located, the seller can evaluate creating a micro-warehouse, or warehousing space in a co-location with other businesses interested in the area. Using scaled-down versions of the robotics that have helped make Amazon and Walmart successful, a space the size of a single-car garage can be turned into an automated or semi-automated fulfillment center.

ASRSs

Before automated storage and retrieval systems (ASRSs), warehouses and distribution centers were squat, sprawling complexes. Goods were stored no higher than a forklift could reach, and how items were stored was more determined by their physical qualities – their height and weight – than the priority of the good's retrieval.

The early storage and retrieval machines of the 1960's allowed storage to reach new heights. By attaching a retrieval system to a mast suspended between aisles, racks could be taller and more tightly packed than ever.

“
The market for AGVs is expected to grow at a CAGR of 13.32% through 2025





Since then, innovations to ASRS technology have moved in two directions.

First, ASRSs became a cornerstone of the vast, tall warehouses that are still a mainstay of the global supply chain. Each unit-load ASRS can run 25 cycles—storing and retrieving pallets and loads that weigh up to a ton – per hour. Loads can be taken to a manual pick station or unloaded fully automatically, depending on the system, the nature of the goods, and the required throughput.

Second, ASRSs have become available in a variety of sizes and costs. This flexibility broadened the market for ASRSs, making them viable for smaller organizations and organizations of any size dealing with sub-pallet loads. These smaller systems have a smaller cost and footprint, and more efficiently handle smaller totes, buckets, cartons, or cases than can unit-load ASRSs.

While implementing the right ASRS – be it a unit-, mini-, or micro-load system – is crucial to realizing its ROI, all of these systems reduce labor costs, increase accuracy and customer satisfaction, improve safety, and maximize the use of a facility's cubic space. They are the densest and most accurate storage and retrieval options available.

In the new, post-pandemic warehousing paradigm, these systems are a crucial component of adding resiliency and increasing on-hand inventory while maintaining the supply chain's flexibility and ability to deliver goods to the consumer quickly and economically.



The growth of eCommerce, and the trend for brick-and-mortar stores to move toward omnichannel business models, are leading to a growth in the warehousing industry that is predicted to increase by 1 billion square feet of warehousing space – including 100 million square feet of cold storage – by 2025.



AGVs

Automated Guided Vehicles (AGVs) offer many of the same benefits as other automation – such as conveyors or ASRSs – and have some unique benefits. Because of this, the market for AGVs is expected to grow at a CAGR of 13.32% through 2025³⁰ (compared to a CAGR of just 4.4% through 2026³¹ for ASRSs).

One benefit AGVs have over other automation is that they are more easily implemented into already operating facilities. Among the costs factored into integrating any new automation are the costs of slowdowns and shutdowns during the installation and implementation processes.

For something like an ASRS, an entire section of a facility will be non-operational while the racks, masts, and supporting infrastructure are installed. Conveyors, while a great option for some, have their own problems, including the obstruction of

floorspace that may have been a throughway. AGVs, on the other hand, are more flexible than other automation and cause little-to-no impact on an operation during their implementation.

At their heart, AGVs are load carriers. They move goods throughout a facility without oversight. This offers many benefits.

AGVs do more than cut down on the personnel needed to do repetitive tasks, who can be re-assigned to more value-adding tasks. AGVs also increase accuracy, throughput, safety and even customer satisfaction.

AGVs don't get distracted, tired, or ill, and they don't need vacation pay. This makes a facility's labor costs more predictable and eliminates costs associated with structural damage and damaged goods. While there are many brands and styles of AGVs, they all have a suite of sensors and safety mechanisms to keep both employees and facilities safe.

Combined with a robust WMS, AGVs can help with inventory controls and line balancing in both manufacturing and warehousing facilities. This helps ensure the accuracy and timeliness of processes, including storage, retrieval, and shipping.

Cold Storage

In the past, the online sale of perishable goods was problematic. Buyers were concerned about food safety and quality, and narrow profit margins challenged sellers.

Improvements in automation have increased accuracies and throughput in ways that are perhaps especially suited to perishable goods. Adopting the right automation in food delivery services is helping to drive the industry to an estimated 1.6 billion users and 151.5 billion dollars by the end of 2021.³²

In repetitive manual tasks – such as labeling, case erecting, and packing – human error is “the most frequent cause of inventory fulfillment issues,” according to a survey conducted by Stitchlabs.³³

Removing people from these repetitive, non-value-adding tasks – or augmenting them with automation that increases their accuracy and speed – is a primary goal of automation.

Something as simple as an automated box erector, coupled with a robust WMS, can increase throughput while better ensuring quality. The WMS selects the right-sized box for each parcel, which the robotic case erector quickly and efficiently

constructs without error. The parcel and box are automatically paired, and the box is filled with the exact amount of packing material to keep its structural integrity during transit.

Maintaining that structural integrity is key in delivering bananas that aren't bruised, eggs that aren't broken, and meat that's kept frozen.³⁴

Automatic labeling is also particularly valuable when dealing with perishable goods. The increased accuracy of an automatic labeler means that buyers and sellers can better trust the food safety labels applied to their parcels. And sellers can be sure that the address printed on the box is accurate and legible. An inaccurate or illegible shipping address in the perishable market leads to spoiled goods, unhappy customers, and lost profit.

Automation is also beneficial in something like the sub-zero environment of a meat locker. Automation doesn't make questionable decisions because they want to hurry out of a freezer. And in food preparation – while robots do need to be kept clean – they don't have to wear the thin rubber gloves that provide zero warmth but interfere with a person's manual dexterity.

Throughout 2020, a frequent topic of cold storage in the news was the ultra-low temperature needs of the Pfizer-BioNTech vaccine.³⁵ Maintaining temperatures between -112 and -76°F is itself a technological challenge – but working at those temperatures is extremely hazardous, and can result in hypothermia or frostbite in minutes.

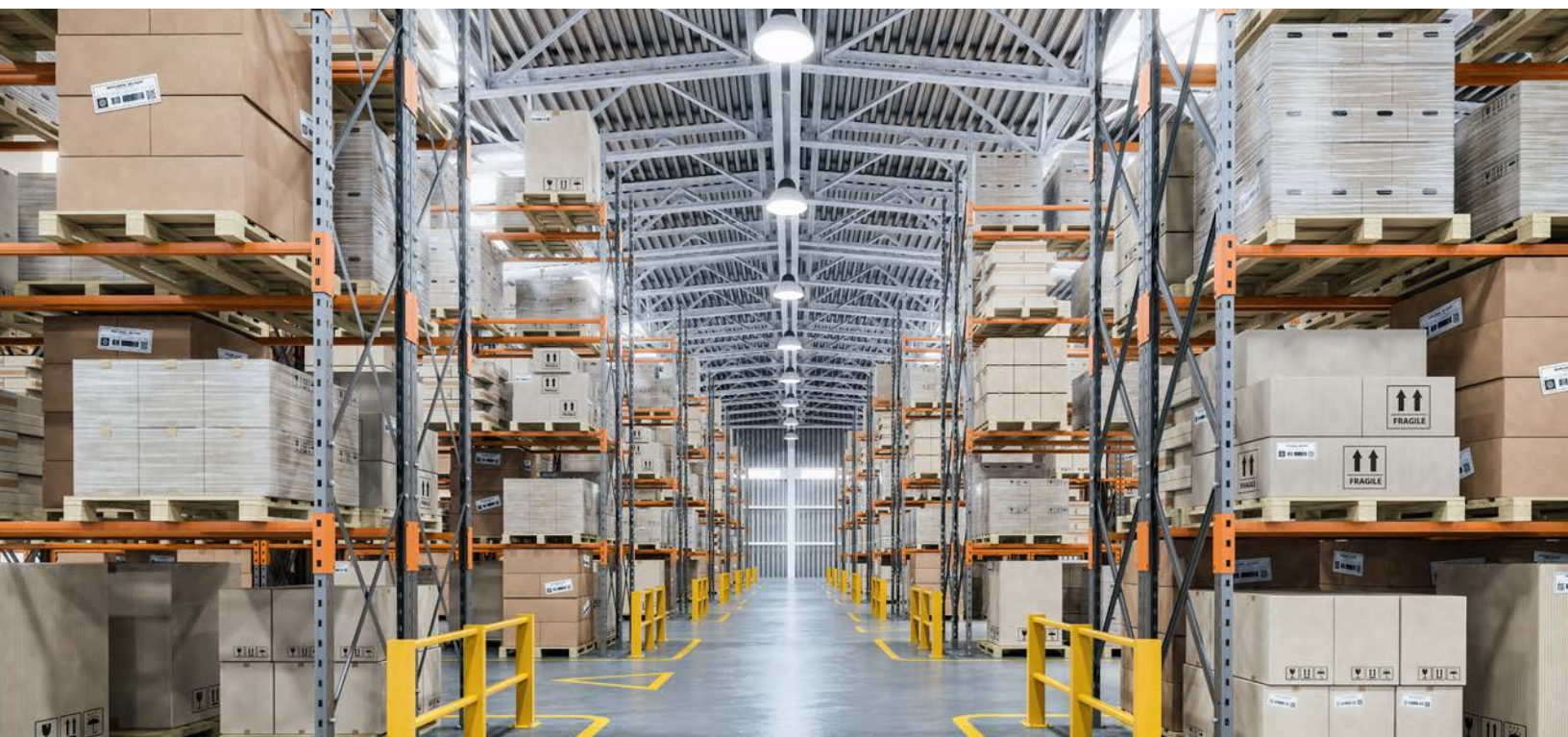
The effectiveness of an organization's cold chain management is a critical component of the successful rollout of these vaccines. The appropriate cold storage warehousing and distribution solutions, paired with the right Command and Control software, can ensure the good's temperature is maintained throughout production, packaging, and delivery.

Perhaps more than any other sector, cold storage benefits from the accuracies and throughput gained from properly implemented automation. Automation can increase accuracies upwards of 99%, while lowering operational costs and increasing food safety. Figuring out what automation is right – and how best to implement it – are key factors in this burgeoning industry.

The New Norm? Increased Disruptions and Preparedness

COVID-19 has so often been compared to the 1918 flu that it's easy to forget the last major pandemic wasn't a century ago. In 2009, an H1N1 influenza virus – the 'swine flu' – infected as much as 20% of the global population.³⁶ At the time, we were lucky that it wasn't more virulent. The kinds of disruptions experts had been warning about since the 1996 avian flu outbreak didn't materialize.

Supply chain experts are still warning of future pandemics and the potential effects of natural disasters. The major players – the Walmarts and Amazons of the world – have finally taken note and



are working to add resiliency into their systems. The retail landscape is changing. To maintain their success, brick-and-mortar stores are becoming an important part of an omnichannel experience, providing both an online marketplace as well as secure drop-off and pick-up points.

At the same time, eCommerce companies are moving toward a model that places more physical infrastructure, like automated warehousing, close to the end-user. This will enable same-day delivery and create stockpiles of inventory that will protect these companies from future demand shocks to the supply chain.

However, these changes in both brick-and-mortar and eCommerce business models demand warehousing space. Space that, because of our previous reliance on Just-in-Time logistics, simply doesn't exist. JIT logistics was such a lean, efficient system that any extra warehousing space was a cost that was long ago cut.

But fulfillment for online orders demands three times more warehousing space than for brick-and-mortar retailers. For each \$1 billion in sales, eCommerce companies need 1.2 million square feet of warehousing and distribution space.³⁷ Online stores carry a greater variety of SKUs that are entirely kept within their warehouse instead of being kept on store shelves. Warehouses must be well designed to control the flow of goods from receiving, through storage, and out to shipping.

The growth of eCommerce, and the trend for brick-and-mortar stores to move toward omnichannel business models, are leading to a growth in the

warehousing industry that is predicted to increase by 1 billion square feet of warehousing space – including 100 million square feet of cold storage – by 2025.³⁷

With the disruptions to the supply chain caused by the COVID-19 pandemic, it quickly became evident that changes need to happen. However, supply chain managers too often took a “wait-and-see approach” to how their business would fare.³⁸ This reactive stance predated the pandemic. Any company that wasn't proactively considering how automation could improve their business had already accepted the status quo – an approach that cost money and lost business.

The effects COVID-19 had on the supply chain had been predicted. Solutions were available and continue to advance and innovate.

The industry knew that a more resilient supply chain would have better handled COVID-19's disruptions. Creating that resiliency means increasing warehousing space to have more inventory close to consumers. And it means greater adoption of the same automation that is already lowering costs and driving throughput throughout the industry. *





About PeakLogix

PeakLogix, an Alta Material Handling company, is a leader in material handling, excelling at making manufacturing facilities, distribution centers, and warehouses more efficient and more profitable by streamlining operations. PeakLogix specializes in concept design and engineering; automation, systems integration and equipment solutions; turnkey project management and implementation; and service and support. PeakLogix has experience within a number of industries, including healthcare/medical, food and beverage, fulfillment, third-party logistics, secured data centers, document storage, and the U.S. government. You can find case studies highlighting specific projects online at www.peaklogix.com.

Works Cited

1. "Preparing for a Pandemic." Harvard Business Review. (May 2006). Retrieved June 28, 2021 from <https://hbr.org/2006/05/preparing-for-a-pandemic>
2. Smith, Philip W., Keith Hansen, Lori Spanbauer, and Duane F. Shell. "Pandemic influenza preparedness: A survey of businesses." American journal of infection control 35, no. 7 (2007): 484-485.
3. Kumar, Sameer. "Planning for avian flu disruptions on global operations: A DMAIC case study." International journal of health care quality assurance (2012).
4. Herrman, John. "Amazon's Big Breakdown." The New York Times Magazine (May 27, 2020). Retrieved June 28, 2021 from <https://www.nytimes.com/interactive/2020/05/27/magazine/amazon-coronavirus.html>
5. Meyersohn, Nathaniel. "More than 9,300 stores closed in 2019." CNN Business (December 19, 2019). Retrieved June 28, 2021 from <https://www.cnn.com/2019/12/19/business/2019-store-closings-payless-gymboree/index.html>
6. Peterson, Hayley. "More than 9,300 stores are closing in 2019 as retail apocalypse drags on – here's the full list." Business Insider (December 23, 2019). Retrieved June 28, 2021 from <https://www.businessinsider.com/stores-closing-in-2019-list-2019-3>
7. Keyes, Daniel. "A new high of over 9,300 stores closed in the US in 2019, almost double the number that closed in 2018." Business Insider (January 6, 2020). Retrieved June 28, 2021 from <https://www.businessinsider.com/store-closures-reached-new-high-in-2019-2020-1>
8. Wahba, Phil. "A record 12,200 U.S. stores closed in 2020 as e-commerce, pandemic changed retail forever." FORTUNE (January 7, 2020). Retrieved June 28, 2021 from <https://fortune.com/2021/01/07/record-store-closings-bankruptcy-2020/>
9. Sherman, Erik. "94% of the Fortune 1000 are seeing coronavirus supply chain disruptions: Report." FORTUNE (February 21, 2020). Retrieved June 28, 2021 from <https://fortune.com/2020/02/21/fortune-1000-coronavirus-china-supply-chain-impact/>
10. Wiczner, Jen. "The case of the missing toilet paper: How the coronavirus exposed U.S. supply chain flaws." FORTUNE (May 18, 2020). Retrieved June 28, 2021 from <https://fortune.com/2020/05/18/toilet-paper-sales-surge-shortage-coronavirus-pandemic-supply-chain-cpg-panic-buying/>
11. Chaib, Fadela. "Shortage of personal protective equipment endangering health workers worldwide." World Health Organization (March 3, 2020). Retrieved June 28, 2021 from <https://www.who.int/news/item/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide#:~:text=The%20World%20Health%20Organization%20has,-coronavirus%20and%20other%20infectious%20diseases.>
12. Thomas, Lauren. "Rent is cheap, vacant space is everywhere: Retailers seize the moment to open stores." CNBC (March 18, 2021). Retrieved June 28, 2021 from <https://www.cnbc.com/2021/03/18/retailers-are-opening-more-stores-than-they-close-aided-by-cheap-rent.html>
13. Naidu, Richa. "How the pandemic helped Walmart battle Amazon Marketplace for sellers." REUTERS (April 14, 2021). Retrieved June 28, 2021 from <https://www.reuters.com/business/retail-consumer/how-pandemic-helped-walmart-battle-amazon-marketplace-sellers-2021-04-14/>
14. Ali, Fareeha. "US ecommerce grows 44.0% in 2020." Digital Commerce 360 (January 29, 2021). Retrieved June 28, 2021 from <https://www.digitalcommerce360.com/article/us-ecommerce-sales/>
15. Leonard, Matt. "Prologis: Demand for Warehouse space will rise alongside e-commerce growth." SUPPLYCHAINDIVE (June 18, 2020). Retrieved June 28, 2021 from <https://www.supplychaindive.com/news/warehousing-e-commerce-prologis-report/580075/>
16. Herrman, John. "Amazon's Big Breakdown." The New York Times Magazine (May 27, 2020). Retrieved June 28, 2021 from <https://www.nytimes.com/interactive/2020/05/27/magazine/amazon-coronavirus.html>
17. Soper, Spencer. "Amazon Plans to Put 1,000 Warehouses in Suburban Neighborhoods." Bloomberg (September 16, 2020). Retrieved June 28, 2021 from <https://www.bloomberg.com/news/articles/2020-09-16/amazon-plans-to-put-1-000-warehouses-in-neighborhoods>
18. Weise, Karen. "Amazon's profit soars 220 percent as pandemic drives shopping online." The New York Times Magazine (June 18, 2021). Retrieved June 28, 2021 from <https://www.nytimes.com/live/2021/04/29/business/stock-market-today>
19. Coresight Research. "US Online Grocery Survey 2020: Many More Shoppers Buying More Categories from More Retailers." Coresight Research. Retrieval June 28, 2021 at <https://coresight.com/research/us-online-grocery-survey-2020-many-more-shoppers-buying-more-categories-from-more-retailers/>

20. Park, Emily. "Online grocery sales increased exponentially during pandemic." Meat+Poultry (March, 12, 2021). Retrieved June 28, 2021 from <https://www.meatpoultry.com/articles/24672-online-grocery-sales-increased-exponentially-during-pandemic>
21. Coresight Research "US Online Grocery Survey 2021: Post-Surge Prospects." Coresight Research (May 20, 2021). Retrieval from <https://coresight.com/research/us-online-grocery-survey-2021-post-surge-prospects/#title17>
22. Jones, Katie. "The Pandemic Economy: What are Shoppers Buying Online During COVID-19?" Visual Capitalist (April 8, 2020). Retrieved June 28, 2021 from <https://www.visualcapitalist.com/shoppers-buying-online-ecommerce-covid-19/>
23. REDWOOD Logistics. "CBRE Group Shows High Warehouse Demand Amid Pandemic Reset." Redwood Logistics. <https://www.redwoodlogistics.com/cbre-group-shows-high-warehouse-demand-amid-pandemic-reset/>
24. Moore, Andrew. "Ask an Expert: Why Is There a Lumber Shortage?" NY State University College of Natural Resources News (May 19, 2021). Retrieved June 28, 2021 from <https://cnr.ncsu.edu/news/2021/05/lumber-shortage/>
25. Reuters Staff. "Explainer: Why is there a global chip shortage and why should you care?" REUTERS (March 31, 2021). Retrieved June 28, 2021 from <https://www.reuters.com/article/chips-shortage-explainer-int/explainer-why-is-there-a-global-chip-shortage-and-why-should-you-care-idUSKBN2BN30J>
26. Meisenzahl, Mary. "Diaper prices were already soaring and now 2 diaper giants just announced they're about to get even more expensive." Business Insider (April 26, 2021). Retrieved June 28, 2021 from <https://www.businessinsider.com/diaper-prices-will-go-up-proctor-and-gamble-kimberly-clark-say-2021-4>
27. Smith, Jennifer. "Smaller Is Big in New E-Commerce Warehouses." The Wall Street Journal (November 8, 2020). Retrieved June 28, 2021 from https://www.wsj.com/articles/smaller-is-big-in-new-e-commerce-warehouses-11604840400?mod=searchresults_pos8&page=1
28. Stark, Alex. "Want to Reduce Warehouse Costs? Think Warehouse Labor Management." Kane Logistics (December 11, 2014). Retrieved on June 28, 2021 <https://www.kanelogistics.com/blog/reduce-costs-warehouse-labor-management>
29. CBRE. "U.S. MarketFlash | Post-Coronavirus Industrial Real Estate." CBRE (March 23, 2020). Retrieved June 28, 2021 from <https://www.cbre.us/research-and-reports/US-MarketFlash-Post-Coronavirus-Industrial-Real-Estate>
30. PR Newswire. "Global Automated Guided Vehicle (Indoor-Outdoor) Market Analysis and Forecast, 2020-2025 - Digitalization Push of the COVID-19 Pandemic Crisis Acting as an Opportunity." PR Newswire (March 25, 2021). Retrieval June 28, 2021 from <https://www.prnewswire.com/news-releases/global-automated-guided-vehicle-indoor-outdoor-market-analysis-and-forecast-2020-2025---digitalization-push-of-the-covid-19-pandemic-crisis-acting-as-an-opportunity-301256088.html>
31. MarketWatch. "Automated Storage and Retrieval System (ASRS) Market Size 2021 with CAGR of 4.4%, Top Growth Companies: Daifuku Co., Ltd, SSI Schaefer Group, and, End-User, SWOT Analysis in Industry 2026." MarketWatch (June 16, 2021). Retrieved June 28, 2021 from <https://www.marketwatch.com/press-release/automated-storage-and-retrieval-system-asrs-market-size-2021-with-cagr-of-44-top-growth-companies-daifuku-co-ltd-ssi-schaefer-group-and-end-user-swot-analysis-in-industry-2026-2021-06-16#:~:text=The%20global%20Automated%20Storage%20and,4.4%25%20during%202021%2D2026.>
32. Kranjec, Jastra. "Online Food Delivery Market to Hit \$151.5B in Revenue and 1.6B users in 2021, a 10% Jump in a Year." StockApps (January 5, 2021). Retrieved on June 28, 2021 from <https://stockapps.com/blog/2021/01/05/online-food-delivery-market-to-hit-151-5b-in-revenue-and-1-6bn-users-in-2021-a-10-jump-in-a-year/>
33. Lance, Bryan. "What Is the Most Frequent Cause of Inventory Fulfillment Issues?" Stitchlabs (March 10, 2016). Retrieved June 28, 2021 from <https://www.stitchlabs.com/blog/what-is-the-most-frequent-cause-of-inventory-fulfillment-issues/>
34. Hallman, William K., Angela Senger-Mersich, and Sandria L. Godwin. "Online purveyors of raw meat, poultry, and seafood products: delivery policies and available consumer food safety information." Food Prot. Trends 35 (2015): 80-88.
35. Simmons-Duffin, Selena. "Why Does Pfizer's COVID-19 Vaccine Need To Be Kept Colder Than Antarctica?" NPR NEWS: Morning Edition (November 17, 2020). Retrieved July 8, 2021 from <https://www.npr.org/sections/health-shots/2020/11/17/935563377/why-does-pfizers-covid-19-vaccine-need-to-be-kept-colder-than-antarctica>
36. Roos, Robert. "Study puts global 2009 H1N1 infection rate at 11% to 21%." University of Minnesota Center for Infectious Disease Research and Policy (August 8, 2011). Retrieved June 28, 2021 from <https://www.cidrap.umn.edu/news-perspective/2011/08/study-puts-global-2009-h1n1-infection-rate-11-21>
37. Thomas, Lauren. "U.S. may need another 1 billion square feet of warehouse space by 2025 as e-commerce booms." CNBC (July 9, 2020). Retrieved June 28, 2021 from <https://www.cnbc.com/2020/07/09/us-may-need-another-1-billion-square-feet-of-warehouse-space-by-2025.html>
38. Kim, Rae Yule. "The impact of COVID-19 on consumers: Preparing for digital sales." IEEE Engineering Management Review 48, no. 3 (2020): 212-218. Retrieved June 28, 2021 from <https://ieeexplore.ieee.org/abstract/document/9076858>