



THE GREAT DISTRIBUTION EXPERIMENT: ADVANCED LOGISTICS

Last year, to retool its online and offline operations in order to offer next-day delivery, A.S. Watson Group, one of the world's largest beauty-product retailers, ordered a dozen robots from IAM Robotics for a fulfillment center in the Netherlands. The retailer was not alone in its investment in robotics. In 2020, for the first time since records were kept, in 1984, orders for nonautomotive robots surpassed those for automotive robots (*i.e.*, those used in the automotive sector) in North America, according to the Robotic Industries Association. The growth was driven by a strong fourth quarter, which was the second-best quarter ever for North American robotic sales, with a 63.6 percent increase over the fourth quarter of 2019. We do not yet know how many of those robots were purchased for logistics purposes, but we do know that between 2018 and 2019, sales of logistics robots increased 110 percent. Over the last few years, retailers, manufacturers, and logistics providers have experimented with different modes of distribution to align with changing consumer expectations of faster delivery speed and easier pickup options. As those expectations continue to increase, so will spending on advanced logistics technologies, including warehouse and delivery robots, supply-chain software with artificial intelligence, drones and autonomous trucks. Reducing delivery times, while at the same time increasing operational efficiencies, is becoming necessary to compete for the digitally trained consumer in an omnichannel environment. (*IFR.org*, 10/28/20; *Automotive News Shift*, 3/21; *Forbes*, 4/1/21)

The Original Context

In a November 2017 *inFocus* we offered a second look at "The Great Distribution Experiment," writing, "The Digitally Trained Consumer desires convenience and ease, which for retailers means it is increasingly essential to deliver its products how, when and where customers want them...[M]any retailers and logistics providers are continuing to experiment with omnichannel solutions and how to best get orders quickly and easily into consumers' hands. The ones that do it best will have a competitive advantage" (see [inF 801](#) and [inF 1210](#)).

New Observations: Automated Fulfillment

Automation is being applied to repetitive processes as to manage orders to increase the speed of fulfillment while reducing labor needs.

- In March, Kroger opened an automated fulfillment center, featuring digital and robotic capabilities that allow Kroger to assemble an order of approximately 50 items in six minutes with robots instead of approximately 30 to 45 minutes with a Kroger employee picking them from various areas of the store. It is the first of 20 planned automated warehouse/distribution facilities to be created as part of a partnership between Kroger and Ocado Group, a software, robotics and automation company.
- Japanese retail group Aeon is building an automated warehouse in Chiba Prefecture, near Tokyo, also in partnership with Ocado Group. The warehouse will utilize artificial intelligence (AI) and robots to help manage stock and deliveries of online shopping.

- Japanese supermarket chain Siyu is debuting an automated fulfillment center, which will triple the shipping capacity of its current facility and will cut employees by 60 percent.
- Walmart's new local fulfillment centers use automated bots to retrieve items from within the center and bring them to a picking workstation, where the order is assembled.
- Last year, U.S. pet retailer Chewy opened its first automated fulfillment center in Archbald, Pennsylvania. It plans to open a second one this year before retrofitting current facilities in 2022. The company said the new locations will result in an estimated 45 percent improvement in the time it takes from a customer order to when a box gets to a truck. It is also expected to reduce fulfillment costs by an estimated 30 percent.
- Last November, Fabric, which builds automated micro-fulfillment centers, opened its first U.S. facility in Brooklyn, which will begin service with a general merchandise retailer. The smaller fulfillment center, which is ideal for more urban areas and reduces the distance a purchase needs to travel, will be used to provide same-day delivery to the New York City area. The retailer was previously fulfilling orders in 3 to 5 days via a fulfillment center in Pennsylvania. Fabric has contracts for at least 14 other sites in the U.S.
- Takeoff Technologies, which offers automated fulfillment centers, currently has 13 sites in the U.S. and will have more than 40 by the end of this year. Takeoff has partnerships with retailers including Albertsons, Ahold Delhaize, and Carrefour.
- Start-up grocer and technology provider Urbx offers an automated fulfillment system using robots that travel vertically and horizontally along fixed tracks and use predictive picking software to optimize their routes. The Urbx system can retrieve 50 items in 135 seconds.
- Pickle Robots offers a robot named Dill that can unload boxes from trucks at a peak rate of 1,800 boxes an hour. The fastest humans doing the same task can pick about 800 boxes an hour.
- Last year, Instacart sent out proposal requests to at least five companies that offer robotic picking systems for the purpose of building "dark" warehouses, or warehouses "without people."
- Chinese home appliance company Midea is investing in a three-year plan to incorporate sensors and robots in its 34 factories. In the company's two factories that have integrated such technology, efficiency has increased by nearly 30 percent.
- JD Logistics' smart-logistics park in Beijing enables real-time monitoring and analysis, as well as intelligent decision-making software. Operational efficiencies at JD's automated warehouses have increased 10 times compared with traditional warehouses.
- JD Logistics is building an underground smart-logistics systems using magnetic levitation technology. Packages are put into 5G-enabled capsule and transported through subterranean tunnels.

(*China Daily*, 3/25/20; *Nikkei Asia*, 8/18/20 and 8/19/20; *Fortune*, 11/20; *Winsight Grocery Business*, 11/4/20; *Financial Times*, 2/23/21; *ABC.com*, 3/5/21; *Grocery Dive*, 3/22/21; *CNBC*, 4/9/21; *Pymnts*, 4/15/21)

New Observations: AI in Logistics

Artificial intelligence is being applied to various stages of sales and logistics processes, greatly enhancing efficiency.

- XPO Logistics is using artificial intelligence to determine how to reroute shipments and to build redundancy into operations through multiple distribution facilities. AI is also being used to optimize the placement of distribution facilities. XPO also uses machine-learning algorithms to help forecast where demand is going to come from and how to optimize certain parts of the supply chain.

- In 2019, Koninklijke Philips NV started using AI to improve the accuracy of its supply-and-demand forecasting.
- Last year, JD Logistics partnered with U.S.-based software developer Blue Yonder to provide supply-chain management solutions to Chinese merchants.
- DHL Supply Chain is collaborating with Blue Yonder to integrate robotics systems into warehouse operations.
- Retailers including Walmart, Target and Amazon are using AI to determine whether it is cost effective for customers to send back returns, or if it is less expensive to have them simply keep items.
- Optoro's SmartDisposition platform uses machine learning to understand future demand for returned items and suggests how to route returns to their most profitable channel. Ikea is among the retailers using Optoro's AI software.

(*South China Morning Post*, 4/16/20; *Wall Street Journal*, 11/23/20; *Women's Wear Daily*, 1/13/21)

New Observations: Drone Delivery

With smaller parcels, drones can facilitate faster deliveries while reaching otherwise challenging delivery locations and potentially reducing ground deliveries.

- Audi is piloting an indoor drone at its Ingolstadt (Germany) plant. The drone navigates via sensors and autonomously transports parts up to two kilograms in weight directly to the required step in the manufacturing process.
- The FAA designated Amazon Prime Air as an "air carrier," which allows Amazon to begin its first commercial drone deliveries in the U.S. under a trial program. Amazon joins Wing and UPS as companies that have received FAA approval to operate such devices. Amazon said it plans to make deliveries within 7.5 miles of a warehouse, reach customers within 30 minutes and carry packages weighing as much as five pounds.
- UPS said it has made more than 3,800 drone delivery flights since it created its drone unit in 2019.
- Verizon's Skyward unit and UPS Flight Forward are using drone delivery for retail products using Verizon's 4G LTE and 5G networks. The companies claim that 5G will allow them to fly more drones at once.
- Walmart is testing home drone deliveries that will carry select grocery and household items from Walmart stores.
- Pizza Hut Israel is trialing a new program that will enable drones to bring orders for delivery to pre-approved hubs. Pizza Hut claims that drone delivery will let it service 7,000 additional households that can't otherwise be reached for delivery.
- JD.com and SF Express both have been issued commercial licenses for last-mile parcel delivery by the Civil Aviation Administration of China (CAAC).
- Last August, SF Holdings completed China's first cargo trial operation of a large unmanned aerial vehicle. SF's giant drones are capable of flying with a maximum takeoff weight of 5.25 metric tons, and they are designed to reach a maximum flight distance of 1,200 kilometers at a speed of 180 kilometers per hour.
- JD has completed drone deliveries of more than 250 kilometers between islands in Indonesia.
- German drone technology start-up Wingcopter currently operates in Vanuatu, Tanzania and Ireland. The Wingcopter drone can fly up to 75 miles, at speeds up to 100 miles per hour and can carry payloads up to 13 pounds.
- EHang has released an unmanned logistics drone that has a payload capacity of 440 pounds. The company is working with customers in Norway on offshore platform deliveries, in the Netherlands' Port of Rotterdam on ship-to-shore transports and in Canada on organ transport.

- Since 2014, drone delivery company Zipline has delivered more than 16,000 packages in Rwanda and Ghana. Medical goods can be ordered via cell phone, and drones can be launched in just 10 minutes.

(*Nikkei Asia*, 8/18/20; *Aviation Week*, 9/30/20; *China Daily*, 12/25/20; *TechCrunch*, 1/24/21; *Pymnts*, 1/12/21, 1/18/21 and 1/29/21)

New Observations: Autonomous Delivery Vehicles

While contactless delivery was under development before 2020, the global pandemic illustrated its value and provided momentum to autonomous delivery bots.

- Ghost kitchen company Reef is working with robotics start-up Cartken to provide delivery from Reef's network of parking-lot-based hubs in Miami. Cartken's electric-powered, six-wheeled rovers are currently covering a three-quarter-mile radius around the city's downtown, with more locations planned.
- Food delivery aggregator MealMe is testing semi-autonomous Kiwibots to fulfill orders in Los Angeles. So far, two restaurants have signed up to use Kiwibots. Kiwibot also has partnerships with Ordermark and Shopify in San Jose.
- Rakuten is trialing delivery robots in parts of Kanagawa Prefecture, south of Tokyo. During the first half of 2021, Seiyu supermarket shoppers from the local area can order online and get products delivered via robot.
- During the pandemic, JD.com started using robots to deliver medical supplies to hospitals in Wuhan.
- This year, Walmart is launching a pilot in Scottsdale (AZ) with self-driving car company Cruise to offer non-contact home delivery. Last year, Walmart tested unmanned Nuro R2 delivery vehicles, which carry only products and have no onboard driver or passengers.
- In March, Chipotle invested in Nuro.
- In March, Uber invested in Serve Robotics. Serve bots are designed specifically to navigate sidewalks and are currently being tested in Los Angeles.

(*Nikkei Asia*, 8/18/20; *Supermarket News*, 11/10/20; *Restaurant Business*, 3/9/21 and 3/26/21)

New Observations: Autonomous Trucks

Because their travel is point-to-point, autonomous trucks face fewer hurdles than autonomous passenger cars and will likely be among the first applications of driverless technology.

- San Diego-based TuSimple has a fleet of 40 autonomous trucks and is working with UPS and truck manufacturer Navistar to make deliveries. The company has been conducting test operations in Arizona and Texas, including depot-to-depot autonomous runs. These runs take place under "supervised autonomy," in which a person rides in the cab and is ready to take the wheel if needed.
- Later this year, TuSimple plans to allow the trucks to drive themselves from pickup to delivery without anyone on board.
- TuSimple claims that its trucks use their brakes less often than trucks operated by human drivers, leading to a ten percent improvement in fuel economy.
- In 2019, autonomous-trucking start-up Ike became the first company that is not actually testing on public roads to file a safety self-assessment with federal regulators. Last September, the company said it would begin limited

testing along Interstate 280 in the Bay Area. Ike has partnerships with logistics companies, including NFI, Ryder and DHL.

- Waymo, Aurora Innovation, Daimler, Volvo, Embark, Locomotion, Plus.ai, Kodiak Robotics and Gatik all are attempting to offer autonomous trucking capabilities.

(*Wall Street Journal*, 9/19/20; *Automotive News*, 9/21/20; *IEE Spectrum*, 1/4/21; *CNBC*, 4/8/21)

"I have a need. A need for speed." Those words from Tom Cruise in the movie *Top Gun* could now easily be coming out of the mouths of retailers, warehouse operators and logistics providers as they attempt to meet the expectations of the Digitally Trained Consumer. Getting packages to where they need to be in the most efficient manner possible is going to lead to more experiments with, and further investments in, automated fulfillment centers, supply-chain software, drones, delivery robots and autonomous trucks, while also changing the labor needs for the logistics industry. The Great Distribution Experiment has reached a new phase, but it is still just beginning.