

# SPECIAL DELIVERY

Chinese logistics companies are beefing up efforts to apply unmanned technology to logistics and delivery activities

By Mark Andrews

# Will drones, driverless vehicles and other unmanned technology form a part of the future of logistics in China?

One of the most talked-about movies in China in 2020 was *Coffee or Tea*, the story of three young men who leave the big city to set up a parcel delivery service back in a remote village, fundamentally changing the role of the local market through connecting local residents to the world of online shopping. The movie addresses one of the country's major logistics developments of recent decades—the creation of an army of at least three million people involved in delivery of packages at the most basic level, either on motorbike or on foot.

But while much of Chinese logistics landscape is still incredibly low-tech, behind the façade of motorbike-riding couriers lies a high-tech world of warehouses and package tracking which leverage automation and data at a level seen nowhere else—the country now has some of the best logistics systems in the world. “China is slightly ahead of the leading Western companies like Amazon and years ahead of most other companies and nations,” says Sofya Bakhta, China market analyst at Daxue Consulting.

China is also the largest logistics market in the world, worth an estimated RMB 14.8 trillion (\$2.3 trillion) in 2020. In 2019, it represented 14.7% of the GDP with its compound annual growth rate projected at 5.3% until 2025, according to the listing documents for JD Logistics, a subsidiary of JD.com which debuted on the Hong Kong Stock Exchange in May 2021.

China's enormous size has been spurring that growth—both in geographic as well as population terms—along with the fact that the country is the world's second-largest economy and has, for many years now, been the “factory of the world”. And one of the key ingredients of China's high-octane economic growth over the past 15 years has been e-commerce.

In the mid-2000s, e-commerce retailers received huge numbers of complaints from customers because logistics companies were unable to meet the coverage and speed demanded by the business model. So e-commerce company JD.com responded by founding JD Logistics in 2007, and Alibaba founded its own logistics unit,

Cainiao, in 2013. Cainiao is now a major player and is growing faster in revenue terms than any other part of Alibaba's empire. Cainiao aims to deliver anywhere in China within 24 hours and anywhere in the world within 72 hours, and partners with 3,000 companies around the world to achieve this.

## Holding the controls

An inspection of the documentation for the JD Logistics IPO reveals the huge fragmentation of the logistics market. Despite being the largest integrated supply chain logistics services provider, JD Logistics only accounts for 2.2% of the market by revenue, and the combined market share of the top ten players is just 7.9%.

There are 400,000 logistics companies in China, most of them very small. “You have a swathe of medium and small-sized logistics providers which are laggards and you have a handful that are gargantuan in size and truly world-class,” says Martin Lockstrom, a senior associate professor at Xi'an Jiaotong-Liverpool University and founder of International Business Consultants.

But the high-tech players are gaining ground and the logistics industry in China looks like a candidate for restructuring. “Obviously there are some national champions which are winning at the game because they leverage technology and capital investments and others that are falling behind, but that would hold true in any major market,” says DHL Hong Kong & Macau Managing Director, Mark Slade.

Although there are foreign players such as DHL in China, their operations are limited partly due to an inability to compete with the low cost of many local services. Lockstrom characterizes them as largely confined to international shipping, and Bakhta adds that although DHL is the largest of the foreign players by revenue, it fails to register among the top ten delivery companies for the whole China market.

The drive toward intelligent logistics is coming from some of the largest players, and predominantly those with their roots in technology companies. “All of them



started out pretty much as B2B buyer-supplier matchmaking platforms and then they diversified into various directions such as payment services, cloud computing, and they started handling logistics as well. They branched off into this direction and then spun off into separate companies like Cainiao from Alibaba,” says Lockstrom. Their technology-driven nature sets them apart not only from small domestic competitors, but also the international logistics companies which, Lockstrom says, may well have started out a century ago with a horse and cart and are still to some extent constrained by legacy issues.

Cainiao, for instance, uses machine learning and predictive analytics technology to pre-order items for China’s massive 11.11 “Singles Day” shopping event each year in November. “This enabled us to pre-stock many popular items and respond more quickly to orders, reducing the delivery time and improving customer experience in the process,” William Xiong, chief strategist at Cainiao, told Parcel and Post Technology International, a daily tech news platform. The company has created a number of proprietary technologies such as Apollo and Sky Eye, cloud-based video monitoring systems that use Internet of Things (IoT) technology, in order to handle large volumes of parcels and streamline delivery in the most efficient manner.

In 2020, the pandemic caused a general shift from offline to online shopping the

world over, which gave a huge knock-on boost to the logistics industry in China. As in the US, there was also a big push for contactless solutions.

“During the lockdown amid COVID, in particular, JD.com deployed driverless vans to deliver vital supplies such as food and medicine to hospitals, residential areas, and offices,” says Jenny Chan, assistant professor at the Department of Applied Social Sciences, Hong Kong Polytechnic University. JD Logistics did the first commercial deployment in the world of a Level 4 autonomous delivery vehicle (AV) into virus-hit Wuhan. Level 4 certification means that a vehicle operates on the road entirely autonomously, and JD.com’s Wuhan van travelled 6,800 km and delivered 13,000 packages over a period of 107 days. It was the first time that such a vehicle had been used in China outside of a controlled environment.

### Taking off!

Within intelligent logistics, drones and autonomous vehicles have garnered the most headlines, but development is happening in many other areas with varying degrees of current deployment.

“China is the world leader, I just don’t see another country with a higher frequency and intensity of new technological innovations in the logistics space and also where the government is supportive and developing policies to support that change,”

says Lockstrom.

JD.com is one of the companies already utilizing drones, having started drone development in 2015 and initiated customer trials in 2016. Currently the company has seven different drone types which can carry packages of between 5 and 30 kg over distances ranging from 7 to 100 km. They operate on 100 different routes and have accumulated over 6,600 hours of flight time, largely in the northern province of Shaanxi. Drone deliveries connect villages to nearby distribution hubs that support the government’s efforts to relieve rural poverty. Drones land at a fixed point in a village for final delivery by hand or scooter.

A big limitation on the use of drones for delivery is that the payloads, so far, have to be light. “It’s just a concept right now, maybe it can be useful for some emergency situations but for daily business it’s not worth it,” says Michael Hu, General Manager of Zhongyuan Express, an Anhui-based B2B logistics company.

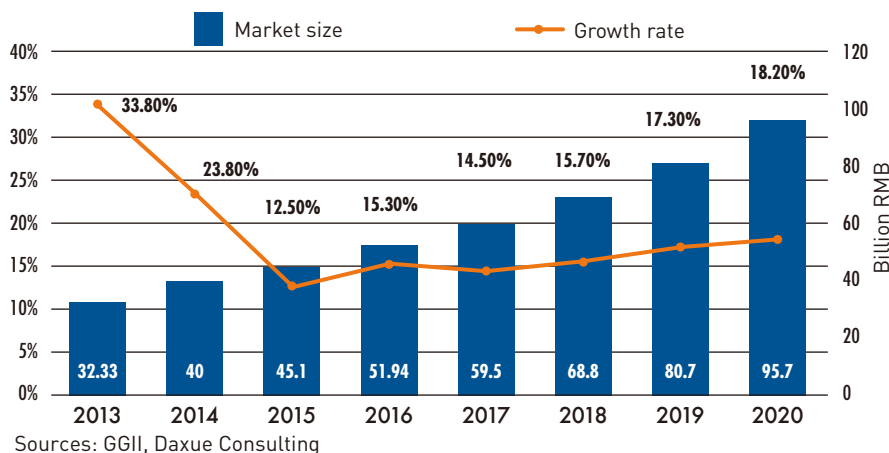
Following on from Wuhan’s utilization of autonomous delivery vehicles, a major manufacturing center in eastern China, Changshu, became the first city to widely use them for regular deliveries, with 100 vehicles already in use. Each vehicle carries a number of swappable configurable boxes, and parcel recipients get a call or a text message with a code to open the box containing their parcel.

“The costs of unmanned delivery vehicles have been coming down but it is still more cost-effective to use manned delivery methods,” says Bakhta. “JD.com has said it has reduced the cost of driverless delivery vehicles by 90% over the last few years, from \$88,000 to \$7,500. This points to more widespread use of wheeled driverless vehicles in the future.” Wang Zhenhui, CEO of JD Logistics, has said the company will deploy 100,000 driverless vehicles within the next five years.

The leader in intelligent logistics, however, is Cainiao, certainly in warehousing, says Bakhta. Cainiao now operates more than 30 Cainiao intelligent warehouses covering 1.7 million square meters. Such warehouses undertake almost all functions without human input. “I think

## INTELLIGENT STORAGE

The market size and growth rate of smart warehouses in China have both surged



that will really be mainstream within a few years from now,” says Lockstrom. “It already exists, it’s just a matter of getting a wider foothold in the market and replacing existing manual warehouses.”

On top of these innovations, and arguably more important, is the revolution in smart supply chains. At its most basic, this involves the hugely expanded use of technology such as QR codes and the IoT. JD Logistics says its AI-driven logistics systems have resulted in a 10% reduction in transportation costs, a 23% reduction in failed-delivery runs and a 37-day reduction in inventory turnover time. Using the system, JD Logistics’ customer Nestlé boosted its in-stock service level, the amount of product required to ensure all orders can be met, from 73% to 95% while cutting delivery lead time from 5-8 days to 2-3 days.

“There is this ability to leverage new technologies,” says Slade, explaining the Chinese market lead. “China’s not just good at automating physical processes, but also automating clerical processes in terms of using data from different websites, platforms to build a dataset around a shipment or a history of shipments or generate reports and analysis.”

Cainiao warehouses make heavy use of automated guided vehicles (AGV). There are 700 AGVs working in Cainiao’s Wuxi warehouse alone. Guiding them and improving the overall efficiency are IoT components. “The self-charging AGV robots reduce staff walking by an average of approximately 50,000 steps per working day, improving personnel efficiency by 30%,” said Xiong.

Coupled with the use of more technology in the warehouses is the roll-out of local collection centers. By the end of 2020, there were more than 80,000 Cainiao Post stations in places such as supermarkets, convenience stores and schools which act as both pick-up and drop-off points.

### Not-so-faraway future

As for the three million people, mostly young men, employed in parcel delivery in China today, Hong Kong Polytechnic University’s Chan sees the future of their



**A 3D rendering of an automated warehouse**

profession as bleak, but precisely how soon humans will be replaced by machines as the primary delivery mechanism is not yet clear given the major limitations of drones—both in terms of range and payload size. JD.com is partnering with Northwestern Polytechnical University in Xi’an to develop a drone with a one-ton payload, but use of drones for delivery is still likely to be largely restricted to the Chinese countryside. “I don’t think we will see drones in very dense urban environments,” says Lockstrom. “There are so many issues with the range, and very complex three-dimensional routes. There are a lot of obstructions and obstacles, you can’t really have a drone flying into an apartment building or landing on someone’s balcony.”

He does, however, feel there is more potential with autonomous vehicles (AV). Bakhta notes the relatively high wages (RMB 7,000-10,000/month) for delivery drivers make AVs financially attractive, but a top speed of 16 km/h versus 45 km/h on an electric scooter means humans are still far more flexible.

Lockstrom estimates that the industry is likely to lose 30-50% of its labor force in five years’ time. “Automation in warehouses and distribution hubs has greatly sped up sorting and reduced

manual laborers,” says Chan. “At the same time, a few new positions on logistics management and engineering are being created.” However, with certain logistics companies, the manning level may not change significantly—Zhongyuan Express’ Hu does not expect to reduce his workforce.

While China is pushing ahead fast on the technology of delivery, it is not alone—there are many self-driving delivery vehicle trials in progress elsewhere. But much of the real-world pioneering work does seem to be in China. “China will probably be the first to replace human beings when it comes to courier services,” says Lockstrom, adding that data privacy laws and strong labor unions could slow adoption of such technologies in Western countries.

That would provide China with a huge opportunity in terms of developing and putting into use intelligent logistics technologies both at home, and in time to the world.

“China already drives that innovation because of the massive size of the market—population and vastness of the area to cover—companies that can leverage technologies are the ones that are winning and also able to deliver extremely low price points,” says Slade.