

THE GREEN LAST MILE

Three trends that will shape sustainable last mile deliveries



Executive summary

Last mile is a term used to describe the final part of the transport of goods to end customers or retail shops. The United Nations defines sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”.

In this paper, we seek to outline how the three emerging trends such as mobile depot hubs, AI and drones will promote sustainable last mile deliveries. Whereas mobile depot hubs in urban areas decrease road wear, CO₂-emissions and air pollution, AI technology has the potential to improve all dimensions of the logistical chain, including the last mile. Similarly, drones could effectively improve last mile deliveries with less negative environmental footprints.

Today the transport sector releases just over 15 million tons of greenhouse gases in Sweden.ⁱ The amount has decreased in the previous 5 years thanks to increased use of renewable fuel but more needs to be done to reach the UN target of max 6-7 million ton greenhouse gas from domestic transport in 2030.ⁱⁱ Last mile transports are not just environmentally costly, they account for 28% of the total cost of moving goods, which makes it the least efficient part of the transport chain.ⁱⁱⁱ

But last mile deliveries are vital for society and bearing in mind that consumers like to shop online they will most certainly only increase. It's easy, comfortable and less time consuming. Online retail grew 15% during 2018 on the Swedish market alone^{iv} and in neighboring Denmark, 3 out of 5 Danes turned to online shopping each month this same year.^v We also see that expectations for services has increased, i.e. customers expect to receive fast and reliable services.^{vi}



We found that circumstances today such as customer expectations versus what they're willing to pay along with infrastructure and regulative issues makes it somewhat hard to fully utilize the trends and innovations presented below. However, strengthened collaboration both between public institutions and private companies, heavier investments in infrastructure and even more focus on technical elaboration and innovation, could enable sustainable last mile deliveries. Those that succeed in offering their customers a lean shopping experience and an efficient last mile delivery while being sustainable will win.

■ Three trends that will shape sustainable last mile deliveries

We have been looking at three trends that will help shape the last mile of tomorrow and enhance sustainability without compromising customers' expectations. Mobile depots which work as dynamic distribution hubs, AI which optimizes routes and enables autonomous movement, and drones that ease up deliveries from point A to point B.

MOBILE DEPOTS

Mobile depots fill the gap between distribution warehouses located outside the urban area, and city center deliveries, by acting as a dynamic delivery hub. They're fully

equipped with warehousing facilities and a loading dock. The mobile depot gets loaded at a distribution centre and carries the goods to a strategic spot within or close to an urban area. Deliveries

can then be carried out from that spot using environmentally friendly alternatives, e.g cargo bikes, electric vehicles, drones or other means.^{xiii}



Mobile depot trialed in Brussels. Source: TNT Express

The mobile depot concept was tested in a project initiated by Novelog, a research and innovation organization funded by the EU, in cooperation with local partners in Barcelona. The project resulted in a tremendous traffic reduction of 45% while accidents also decreased by 42%.^{vii} TNT Express placed a mobile depot in Brussels already in 2013.^{viii} A study found that this resulted in 24% less CO2 emissions due to the number of diesel kilometers per stop that went down from 1,3 km to 0,5 km.^{ix} The same study also found that people were very positive towards the mobile depot solution and thought of it as having a pleasant neighborhood impact, giving better accessibility and higher traffic safety compared to diesel vans.^x Ford recently initiated a trial with a similar mobile depot solution in cooperation with Gnewt in London, where drivers are being redirected to consolidation points for offloading. The last mile of delivery is then carried out by pedestrians, bicycles and now also Gnewt's electric vans equipped with Ford software.^{xi}

Mobile depots have the following advantages:

- They contribute to less congestion, as well as cleaner and safer city centers
- They have a positive societal impact
- Loading capacity is optimized
- Orders are brought closer to the customer
- They reduce the need of manually handled service points which tend to be costly for retailers both in terms of resources and space

However, there are challenges connected to large and heavy goods which electric vehicles and cargo-bikes still have to deal with. Electric vehicles are unable to transport heavier loads and charging stations are too spread out. Cargo-bikes have limited space which makes it difficult to carry large packages. The trial with TNT Express in Brussels showed that on-time deliveries decreased by 7%.^{xii}

Despite these challenges, we believe that flexible logistic solutions like mobile depots are the future of a sustainable last mile.

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... consumers are not prepared to pay for the actual work being done

- Rickard Slettnyr, PostNord



AI IN LOGISTICS

AI is emerging as a game-changer in many industries today and we keep seeing new ways to make use of its power; retail and logistics are

“Last mile will become increasingly fragmented as volumes increase

- Julian Lee, Airmee

no exception. In logistics, the network-based structure of the industry provides a natural framework for implementing AI. Both physical and digital networks must function harmoni-

ously alongside high volumes, low margins, lean asset allocation and time sensitive deadlines. A context which would benefit significantly and generate valuable returns by the complex optimizations that AI can provide.

Many logistics companies around the world are transforming their business with advanced analytics, increased automation, robotics, and mobile computing. The next step in the increasingly digital supply chain is to implement AI.^{xiv} With AI and machine learning, the whole delivery chain could, and probably will, be fully automated with autonomous vehicles responsible for the last mile deliveries. However, this would require significant regulatory changes in order to be implemented at a larger scale, which is why we believe this change to be further in the future.

In the near future, AI could for example be used to optimize transportation routes by consolidating information regarding traffic patterns, GPS data, brick and mortar collection points, couriers etc. With the help of AI, companies can make the deliveries

and returns smarter and more efficient. Last mile deliveries in cities can be both time- and energy-consuming, trying to get past obstacles like road-closures, construction, heavy traffic or newly implemented low emission zones. By optimizing transportation routes, companies could significantly reduce fuel, personnel, and other overhead costs while at the same time ensuring a positive environmental impact.^{xv}

“More collaborations between different [transport] actors [enable cost-effective and sustainable deliveries]”

Another example where AI is being used in logistics in new ways is intelligent caravanning or platooning groups of semi-trucks. A human driver drives the lead truck while the rest of the trucks follow and communicate machine-to-machine. This allows multiple trucks to drive in formation while lowering the fuel consumption (it has the potential to cut fuel consumption by 12%).^{xvi} These trials also generate data, which could be beneficial for future fully autonomous deliveries.

Furthermore, AI could be used to move logistics processes to a predictive operating model rather than a reactive one. This would be revolutionary in a world characterized by uncertainty and volatility.

D R O N E S

Autonomous drones delivering parcels directly to consumers' doorstep is no longer a scene from a science-fiction movie. The technological possibilities are already in place. The question is rather if it is a means of delivery that will be broadly used, or if it will be a niche that only serves small segments of the last mile delivery area. Wing, owned by Google parent Alphabet Inc, started delivering with drones earlier this year in Helsinki, Finland. The customer can buy from a store and a restaurant, and deliveries are carried out in one of Helsinki's most crowded districts after a successful pilot period in 2018.^{xvii}

The advantages of using drones are clear. Autonomous drones don't need a pilot, which leads to lower labor costs for the companies shipping the parcels. Since they're airborne they aren't confined to physical infrastructure such as roads which makes them useful in geographical areas where that would otherwise be a problem. In more populated areas such as cities, they could relieve traffic congestions since the need for truck or car deliveries would be reduced. And last, but not least, studies have found that electric or hybrid-electric drones are more environmentally friendly than traditional ways of delivering parcels, even when including the production of the drone.^{xviii}



Given these advantages, are there still hurdles that could delay this new technology becoming mainstream? The answer is yes. There are many regulations in place that currently stop drones, especially autonomous ones, from flying around in populated areas.^{xix} These regulations will probably be contested and discussed going forward since companies such as Amazon^{xx}, Google^{xxi}, UPS^{xxii} and DHL^{xxiii} are pushing for this technology. Another hurdle is the acceptance of drones by the public. What would the city skyline look like if thousands of drones were constantly buzzing around?

Addressing all these hurdles will require strong collaboration between industry, government, and knowledge institutions. The technology is here; we'll have to wait and see whether the drones actually take off.



Industry insights

We reached out to representatives from three companies to get their view on the future of last mile deliveries; Julian Lee, CEO at Airmee, Kaj Jones, online retail business developer at Apotek Hjärtat and Rickard Slettmyr, Head of Corporate Clients and Business Development at PostNord.

A P O T E K H J Ä R T A T

Apotek Hjärtat offers home delivery to their online customers. They see that customers' expectations on last mile delivery are increasing, especially regarding sustainability, flexibility and speed. They face a challenge connected to customer awareness regarding last mile climate footprint, and strive to explain the difference of climate impact between different delivery options. There is also a challenge in offering environmentally friendly delivery options in rural areas, compared to bigger cities where there are often startups focused on offering sustainable transportations.

Apotek Hjärtat outsources last mile delivery transportation to third parties, and regularly follows up that the transportations are in line with their expectations and the contracts in place. Two measures they see could improve the environmental impact of last mile deliveries are better cooperation between transportation companies, and higher utilization of electric vehicles and bicycles. They believe that higher expectations from consumers on sustainable solutions will make it hard for companies that do not provide such alternatives.

P O S T N O R D

PostNord offers solutions within logistics, communication and mail deliveries throughout the Nordic region. Individual customers can track and trace deliveries through the PostNord App, and business clients can connect through their digital client platform. They operate from Denmark and Sweden with a large distribution network under continuous development. Right now, they run a pilot with digital lockers and boxes. PostNord does the main part of all deliveries using their own fleet, but does, at times, contract third parties.

PostNord experiences challenges to optimize delivery routes while avoiding congestion when multiple orders with few items need to be delivered. One way going forward could be to consolidate orders and use alternatives, such as service points and boxes, but with flexibility and transparency towards the customer as well as optimizing routes with new technology.

■ AIRMEE

Airmee provides digital solutions for last mile delivery with services that can be integrated on e-commerce sites or booked solely for instant local deliveries. They strive to achieve delivery excellence by offering fast, convenient and customer-centered deliveries at low costs for both individual and society, using the latest technology and environmentally friendly vehicles.

Airmee outsources the physical operations of last mile deliveries to external contractors, and they aim to gradually replace current vehicles with zero-emission vehicles. Sustainability is seen as a holistic approach by Airmee, and by focusing on innovative and technical solutions, such as optimizing deliveries in real-time, they continuously contribute to a sustainable future. The main challenge Airmee faces is that most retailers still have very limited technological capabilities, making their inventory management an obstacle in providing innovative last-mile delivery solutions. Other challenges Julian Lee sees are that electrical vehicles do not last long enough on one charge and that transport companies work in silos which leads to half-empty trucks.



— Our insights

There's a wide range of challenges companies are facing related to sustainable last mile deliveries and providing what consumers expect which is sustainable, flexible and fast last mile deliveries at low or no cost. Some of which we believe can be solved using new technology, while others can be overcome by better use of existing technology and inter-company collaboration.

UTILIZE TECHNICAL CAPABILITIES



Optimizing routes and avoiding traffic congestion is a good example of a case where all the trends earlier described could work together. Investments in technology and AI is crucial to better optimize routes, predict congestions and connect networks of mobile depots and drones, of which some can be steered autonomously.

STRENGTHEN COLLABORATIONS AND OVERSEE LAWS & REGULATIONS



Other hurdles such as regulations and physical infrastructure challenges probably have to be solved through collaboration between legislative and regulatory authorities, public institutions and the private sector. For example, regarding infrastructure, if we expect the use of electric vehicles to increase then there has to be an infrastructure of charging stations and other benefits to support electric vehicles. Moreover, laws and regulations have to be adapted to enable the use of drones and AI. Tightened inter-company collaborations would benefit sustainable last-mile deliveries too by utilizing load capacity and ease of traffic congestion.

INCREASE TRANSPARENCY



Consumers are not offered different types of delivery options nor explained the impact of their decision. This is a transparency issue which will become critical. How will consumers act when they know exactly what the difference in environmental impact is between a number of delivery options? Will they be more inclined to wait a day or more, or even pay more if they knew that they were choosing the most sustainable last mile delivery option?

INNOVATE AND DEVELOP



Retailers and transport companies that continuously develop and find innovative ways in meeting their customers' expectations are setting themselves up for a greater chance of succeeding and taking market leadership. Offering the customer a faster, more flexible and more sustainable delivery will bring retailers their customers' loyalty.

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