50% – share of last mile delivery in typical cost of distribution

15% – percentage of sales that fulfilment costs Amazon

Optimising last mile delivery

Seamless, integrated and shared last-mile delivery replaces inefficient competition and duplication of goods distribution. Greater efficiency in moving things is as important as in moving people and so a major focus for innovation.

In the complex world of logistics, vast improvements have already been made in the efficiency of moving goods around the world. The speed at which packages are sorted, loaded and transported has increased substantially over recent years. The main efficiency challenge is in the last mile – from distribution centre to final destination, be that a home, an office, a car or an individual. This, costing typically up to 50% of distribution, is the most difficult and expensive leg of a package's journey. Proposed solutions lie mostly in drones or autonomous delivery vehicles.
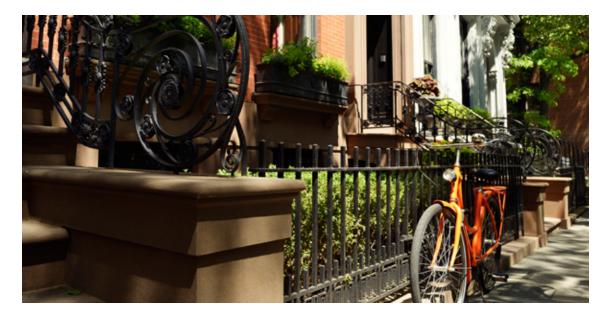
Amazon Prime Air videos are already showing how a 30-minute drone delivery system might work, and the company has filed patents for several advanced vehicle systems. But other, equally nimble players are also making bets on future options, Uber, for instance. With its rapidly extending infrastructure and heavy investment in algorithms to help route deliveries, be that people or things, Uber is the only newcomer who can match up to the size and scale of incumbents such as UPS, FedEx and their counterparts. UPS delivers 35m parcels a day and is investing heavily in new technologies to make these deliveries cleaner and more efficient. Meanwhile, shared capacity models have been tried out as other organisations have collaborated in Uber-esque networked business models that also seek to bring down driver and vehicle costs per delivery. Amazon's Flex programme in the US is one of the more recent of these, allowing independent drivers to make between $18 and $25 an hour delivering packages.

A core aim, no matter what system is deployed, is to deliver goods the same day that they are purchased. Whether through using its own fleet of trucks, rather than delivery firms like UPS and FedEx, or even drones, the ability to offer timed delivery 24/7 is seen as a major drive for customers – but a low cost. Fulfilment costs currently account for 15% of sales for Amazon and so reducing these whilst improving service is a fine balance. But it is not only Amazon looking to make an impact; Alibaba and Google are also in the mix. Google's 'Project Wing' is aiming to have a commercial drone business up and running by 2017. Whilst gaining approval from the FAA, CAA and other regulators is currently in negotiation, many see these and similar activities starting to have significant impact by 2020.

Back on the ground, interest lies in the adoption of autonomous vehicles. Warehouses and fulfilment centres for years have been using autonomous vehicles, moving products and packages around as directed. While in the past they have largely followed pre-determined routes (so requiring a fixed infrastructure), the next generation of vehicles uses 3D vision guidance systems. These vehicles not only transport goods, and can load and unload packages quickly and safely, they also automatically join together to transport large products - and whenever an obstacle is encountered instinctively re-plan routes.

Shared capacity models have been tried out.

Changing business

What many find interesting is how this technology can migrate from inside buildings to the outside, and start to change how goods are moved around cities. If multiple white vans can be replaced by a swarm of autonomous electric delivery vehicles then the efficiency improvements can be significant. Although they will be slow moving for safety reasons, supporters argue that they can navigate through urban districts, choose routes that avoid causing congestion, and deliver goods when and where required.

This will work not just for deliveries to end consumer but also in the B2B environment. Offices, restaurants, retailers and even manufacturers, it is argued, can gain from the network efficiencies that will be realized. Evidently the elimination of the need for drivers has social and economic implications, but within the logistics arena would lead to significant cost savings. Although there are a number of regulatory hurdles to be overcome, supporters, including many in the logistics sector, see that the technology is fast-becoming scalable; the business case is compelling and the environmental benefits attractive.

At one extreme these vehicles can be so small that effectively they are only slightly larger than the parcels themselves and we end up with the fully automated system with self-driving parcels. One such example is the Starship project from the founders of Skype. This is a self-driving robot that can hold up to 10kg of goods and travels along pavements at a sedate 4mph so as not to disrupt pedestrians.

The business case is compelling and the environmental benefits attractive.

Another option being explored is to make self-driving passenger vehicles also carry packages. As we move into a world of driverless taxis and autonomous cars, many see an opportunity to use them for moving goods around whenever they are not moving people. So, rather than sitting stationary in a car park or on the street, when not required by human customers they can be seen as a shared resources and provide a crowd-sourced fulfilment of first mile and last mile delivery. Another level up in complexity, but one even more attractive in terms of overall system efficiency, is to coordinate the simultaneous movement of people and goods. If someone is using a taxi to take them home, then the same vehicle can deliver a package to a neighbour. Coordinating putting the right package into the right vehicle in this scenario is no easy task but Volvo for one has already developed its On Call app to give access to shared vehicles and not just driverless ones. By overlaying package distribution with known customer journey plans and routes, Volvo sees that delivery companies will pay for access to cargo space, put the packages in the car and the customer would use a digital key to open the car and collect their parcel when it has arrived at its destination. Audi have already taken a different but related approach. Trials in Munich have allowed Audi owners to use their car as a shipping address for

online orders. Using the Audi in-car communications system, delivery drivers track the location of the vehicle and use a one-off digital access code to unlock the boot and deliver a package. The trails to date have been in partnership with Amazon and DHL but the principle can clearly extend.

Whether in Mumbai, Shanghai, Dubai or New York, the potential is evidently one attracting much attention.

Volvo for one has already developed its On Call app to give access to shared vehicles.

Related insights

Full Cost

Increasing transparency of society's reliance on nature, intensify requirements for business to pay the true cost of the resources provided by 'natural capital' and so compensate for their negative impact on society.

Open supply webs

The shift from centralised production to decentralised manufacturing drives many to take a 'smaller and distributed' approach: Global supply chains are replaced by more regional, consumer-orientated supply webs and networks.

Key resource constraints

Economic, physical and political shortages of key resources increase and drive increasing tension between and within countries. As we exceed the Earth's natural thresholds, food and water receive as much focus as oil and gas.

The real sharing economy

Increasing collaboration drives organisations to reconfigure based on social networks and impact. Real sharing enterprises, not driven by profits, seek to share resources, knowledge, and decision-making responsibilities.