Last mile (transportation)

Figure 1: Bicycle sharing systems such as Washington's Capital Bikeshare have been cited as a way to alleviate the "last mile problem".

In supply chain management and transportation planning, the last mile or last kilometer is the last leg of a journey comprises the movement of passengers and goods from a transportation hub to a final destination. The concept of "last mile"was adopted from the telecommunications industry, which faced difficulty connecting individual homes to the main telecommunications network. Similarly, in supply chain management, the last mile describes the logistical challenges at the last phase of transportation getting people and packages from hubs to their final destinations.

Last-mile delivery is an increasingly studied field as the number of business-to-consumer (b2c) deliveries grow, especially from e-commerce companies in freight transportation, and ride-sharing companies in personal transportation. Some challenges of last-mile delivery include minimizing cost, ensuring transparency, increasing efficiency, and improving infrastructure.

History

"Last mile"was originally used in the telecommunications industry to describe the difficulty of connecting end users'homes and businesses to the main telecommunication network. The last "mile"of cable or wire is only used by one customer. Therefore, the cost of installing and maintaining this infrastructure can only be amortized over one subscriber, compared to many customers in the main "trunks"of the network.

In supply chain management the last mile describes a similar problem for transporting either people or freight. In freight networks, parcels can be delivered to a central hub efficiently via ship, train or other means, but they must then be loaded into smaller vehicles for delivery to individual customers. In transportation networks, "last mile"describes the rising marginal cost of getting people from a transportation hub such as an airport or train station to their final destination.

In 2018, Amazon developed a comprehensive logistics network by employing thousands of last-mile delivery vehicles. This had notable effects on the logistics and retail industry, and introduced a new type of competition to both industries. FedEX CEO Fred Smith was quoted, "We basically compete in an ecosphere that' s got five entities in it. There's UPS, there's DHL, there's the U.S. Postal Service, and now, increasingly, there's Amazon."

Usage in distribution networks

Transporting goods via freight rail networks and container ships is often the most efficient and cost-effective manner of shipping. However, when goods arrive at a high-capacity freight station or port, they must then be transported to their final destination. This last leg of the supply chain is often less efficient, comprising

up to 53% of the total cost to move goods. This has become known as the "last mile problem". The last mile problem can also include the challenge of making deliveries in urban areas. Deliveries to retail stores, restaurants, and other merchants in a central business district often contribute to congestion and safety problems.

A related last mile problem is the transportation of goods to areas in need of humanitarian relief. Aid supplies are sometimes able to reach a central transportation hub in an affected area but cannot be distributed due to damage caused by a natural disaster or a lack of infrastructure.

One challenge faced in last-mile delivery is unattended packages. Shipping companies, like UPS, FedEx, USPS, DHL and others, leave a parcel unattended at a business or home which exposes the item(s) to weather, and the chance of theft by "porch pirates"(a person who steals packages off of customers'porches or front door areas). One solution to this problem is setting up lockers in urban centers. Amazon in the United States has deployed lockers where customers can pick up packages rather than them being left at their home. This protects them from theft and damage as well as allowing companies to deliver to one location, rather than a number of individual homes or businesses. Similarly, in Taiwan, some online vendors offer the option of delivery to a convenience store of the customer's choice, for pickup from the store by the customer. Not only does this reduce the chance of theft and consolidate packages but also payment of the purchase at the store may also be offered.

To reduce cost retailers have researched using autonomous vehicles to deliver packages. US-based Amazon and China-based Alibaba have researched deploying drones for delivering goods to consumers. Europe, Germany, Britain, and Poland have experimented with services that provide automated parcel delivery.

Usage in transportation networks

Figure 2: The Hiriko folding two-seat urban electric car was intended to be deployed in Germany in 2013 to provide the last mile of the journey to Deutsche Bahn's railway customers to their final destinations.

"Last mile"also describes the difficulty in getting people from a transportation hub, especially railway stations, bus depots, and ferry berths, to their final destination. When users have difficulty getting from their starting location to a transportation network, the scenario may alternatively be known as the "first-mile problem". In the United States, land-use patterns have moved jobs and people to lower-density suburbs that are often not within walking distance of existing public transportation options. Therefore, transit use in these areas is often less practical. Critics claim this promotes a reliance on cars, which results in more traffic congestion, pollution, and urban sprawl.

Solutions to the last mile problem in public transit have included the use of feeder buses, bicycling infrastructure, and urban planning reform. Other methods of alleviating the last mile problem such as bicycle sharing systems, car sharing programs, pod cars (personal rapid transit), and motorized shoes have been proposed with varying degrees of adoption. Late in 2015, the Ford Motor Company received a patent for a

"self-propelled unicycle engageable with vehicle", which is intended as a last mile commuter solution. Bicycle sharing programs have been successfully implemented in Europe and Asia, and are beginning to be implemented in North America. Starting in late 2017, micro-mobility services that provide shared vehicles such as dockless electric kick scooters or electric-assist bikes entered the marketplace. Dual-mode vehicles, which can operate on infrastructure and outside of infrastructure, are also considered as a solution to the first mile and last mile problem. The same dual-mode vehicle can make the journey to a station and from the station on using infrastructure.

The last mile problem

The last mile problem refers to last mile being the most expensive stage of the entire logistics journey. In fact, it accounts for 53% of total delivery costs. The factors for the high costs of last mile delivery are numerous:

- Dense urban areas lead to more stops and navigation challenges.
- The surge in e-commerce increases small-scale delivery expenses.
- Customer expectations for rapid deliveries add pressure for costly express options.
- Maintaining a skilled delivery workforce.
- Rising fuel prices, vehicle maintenance.

The last mile problem is exacerbated in rural areas due to dispersed populations and lower demand.

The last mile problem is usually addressed by route optimization methods that lead to reduced mileage, fuel consumption and working hours. Businesses in the last mile sector can either optimize routes manually or use a delivery management technology platform.[better source needed]

Last mile technology platforms

Due in part to demand on retailers and product manufacturers to provide expedited (same and next day) deliveries, tech-enabled last mile technology platforms have emerged. Increased demand for last-mile fulfillment has put pressure on shippers to manage many types of delivery companies, which range from traditional parcel carriers to couriers, to on-demand service providers that execute an "Uber for delivery"model utilizing contractors.[citation needed]

Small delivery robots may also be used to perform last-mile delivery of small packages such as food and groceries.