TEKX04-20-23
Urban Consolidation Centres

Background

Urban logistics constitute both an extremely important and a rather disturbing activity for cities. On the one hand, efficient deliveries ensure the supply of goods at stores and at home, and for firms they form a vital link with suppliers and customers. On the other hand, delivery traffic contributes to congestion, emissions of greenhouse gases, local air pollution, accidents and noise that impact adversely on the quality of life. Reversing the perspective, freight vehicles are delayed by congestion and are constrained to carry out deliveries because of insufficient parking spaces and long dwell times when accessing receivers, reducing the efficiency of urban logistics operations. Urban logistics therefore presents one of the major challenges for both urban sustainability and freight transport efficiency. As the world continues to urbanise, the conflicts between urban freight efficiency and urban sustainability is getting more significant.

In response to these growing urban freight challenges, many cities around the world have implemented Urban Consolidation Centres (UCC) close to the urban areas enabling the separation of trunk movements from local deliveries. In this way, UCCs avoid the need for vehicles to deliver part loads into urban centres, and instead enable the use of fewer but better utilised vehicles for the transport on urban access roads into the urban areas. The establishment of a further cross-dock terminal in the city centre, a “city hub”, enables the use of small electric vehicles or cargo bikes i.e. Light Electric Freight Vehicles (LEFVs) for deliveries in the more sensitive city centre environments. UCCs in combination with the city hub thereby reduce congestion on urban access roads and contribute to better air quality, less noise and improved safety for pedestrians and bicyclists in city areas (Figure 1).

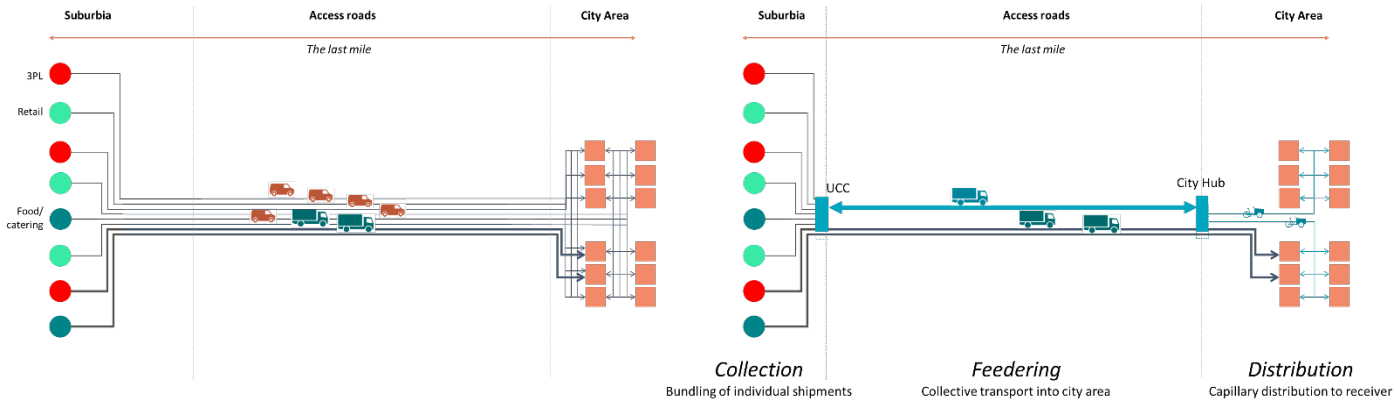

Figure 1: Non-integrated goods flow in to a city area (left); Consolidated goods flow via larger shuttles between sub-urban consolidation center and a city hub.

The results of UCC implementations, however, are disappointing as many solutions show unwanted side effects or have struggled to operate on a commercial basis and are therefore either terminated or depend on government subsidies. These disappointing results are mainly due to the fact that consolidation schemes do not take into account the differing characteristics of urban freight flows and distribution trips. Factors that they tend to ignore include the existing consolidation of centralised distribution systems served by freight forwarders and the geographical coverage of distribution trips serving areas outside the consolidation zone. Channelling these flows through a UCC would lead to detours and additional handling adding both cost and environmental impact.

The research project

The thesis is linked to the SMOOTh (System av system för hållbara urbana godstransporter) research project. The project addresses the challenges for UCCs outlined above and aims to deliver tools and methods which enable freight forwarders and transport companies to implement effective consolidation systems which increase logistics efficiency and quality and at the same time reduce the environmental impact of urban deliveries. To achieve this the project will

IVL Swedish Environmental Research Institute Ltd
Org.nr: 556116-2446
VAT no: SE556116244601
Registered Office: Stockholm
www.ivl.se
Box 21060, SE-100 31 Stockholm
Valhallavägen 81, 114 27 Stockholm
Tel: +46 (0)10-788 65 00
Box 53021, SE-400 14 Göteborg
Aschebergsgatan 44, 411 33 Göteborg
Tel: +46 (0)10-788 65 00

establish a living lab in the Nordstan Shopping Center of Gothenburg enabling the co-creation of innovative collaborative logistics services with viable business models driving behavioural changes, through the active engagement of partners from public authorities, businesses, and research organizations. Project partners include (among others) Volvo Group, RISE, IVL Swedish Environmental Research Institute, City of Gothenburg, Nordstan Shopping Center, DHL, and Pling Transport.

The thesis

The goal of this thesis is to assess the socio-economic improvement potential of the UCC/city-hub solutions developed in the project, if implemented in a full-scale in the city of Gothenburg. To achieve this, the following data needs to collected/calculated:

1. Today's freight demand: amount of goods delivered to the city center of Gothenburg
2. Today's freight traffic: amount of vehicle movements in the city of Gothenburg to deliver the estimated freight demand from step 1 with today's delivery solutions.
3. Consolidated freight traffic: amount of vehicle movements in the city of Gothenburg to deliver the estimated freight demand from step 1 if delivered with UCC/city-hub solutions
4. Improvement potential of UCC/city-hub solutions: amount of externalities generated by today's freight traffic (as estimated in step 2) and amount of externalities generated by consolidated freight traffic (as estimated in step 3).
5. Analysis of problems and challenges in the design and operation of UCC/city hub solutions

Contact person

Sönke Behrends, IVL Swedish Environmental Research Institute
sonke.behrends@ivl.se

Supervisor Chalmers

Erik Bohlin, erik.bohlin@chalmers.se
Division Science, Technology and Society