Urban Consolidation Centres

A Sustainable Solution for Modern City Logistics

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Summary

Urbanization is leading to an increasing concentration of people in cities, with about 56% of the world's population living in urban areas, projected to rise to 70% by 2050. This urban growth creates challenges for infrastructure, including housing, transportation, and services, and contributes significantly to global CO2 emissions. Freight carriers face additional strain due to Just-In-Time (JIT) demands and the rise of e-commerce, which has led to retail closures while digital infrastructure expands faster than physical infrastructure.

Urban Consolidation Centres (UCCs) offer a solution to many urban logistics issues. UCCs act as hubs that consolidate goods from multiple suppliers before distribution, reducing traffic congestion, carbon emissions, and operational costs. UCCs also enhance urban infrastructure by reducing wear on roads and freeing up space for other uses. Additionally, UCCs benefit local businesses by offering shared logistics services, enabling cost savings and more efficient deliveries.

While UCCs present many benefits, challenges remain, including high setup costs and the need for public-private collaboration to ensure their success. Despite these hurdles, as urban populations grow and sustainability becomes a priority, UCCs are expected to become integral to urban logistics systems.

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Introduction

The global trend of urbanization is leading to an increasing concentration of people in cities. Currently, about 56% of the world's population lives in urban areas (Satterthwaite, 2007), and this amount is projected to rise to nearly 67% by 2050 (Kohlhase, 2013). This rapid growth poses challenges for urban infrastructure, such as housing, transportation, and basic services. In addition, the growing concentration of populations in urban areas has led to an increase in activities that contribute to climate change. For example, cities are now responsible for over 70% of global CO2 emissions (Ahn et al., 2023). Freight carriers are facing increasing challenges due to Just-In-Time (JIT) requirements and smaller, more frequent orders, which makes the situation worse. This trend coincides with the wave of retail store closures driven by the rise of e-commerce (Colla & Lapoule, 2012). While the digital infrastructure is already in place, the physical infrastructure still needs to catch up. In response to these pressures, city logistics (CL) will play a crucial role in improving the mobility, sustainability, and liveability of cities in the future.

Smart Cities initiatives aim to "provide more efficient services to citizens, to monitor and optimize existing infrastructure, to increase collaboration amongst different economic actors and to encourage innovative business models in both private and public sectors" (Marsal-Llacuna et al., 2015). Malindretos and Abeliotis (2015) have presented 11 CL models in Europe, to make a city "smarter". The majority of these models are primarily linked to changes in transportation methods (see Table 1).

Tabel 1 - City Logistics models presented by Malindretos and Abeliotis (2015)

CITY LOGISTICS MODEL	Type of goods	Basic type of change	Main transport. means involved	Applicability	
Freight Transport Centers	commercial	infrastructure	intermodal schemes	high	all cities with developed railway system
Floating Distribution System	commercial	means of transportation	boats and bicycles	small	cities with 'water routes' (canals, rivers, lakes) & historical center
Cargo Bus	commercial	means of transportation	Bus and walking couriers	high	all cities with historical center
Night deliveries	commercial & waste	organizational	trucks	high	all cities
Multiple Use Lanes	commercial	organizational	trucks and cars	high	all cities
Environmental / Low emmision Zones	commercial	organizational	trucks and cars	high	all cities
Packstation systems	mailing, commercial	infrastructure	-	high	all cities
Underground Freight	mailing, commercial	infrastructure	dual mode trucks	small	all cities
City Cargo tram	commercial	means of transportation	tram and electric vehicles	small/ medium	cities with tram network
VW Cargo tram	automotive parts	means of transportation	tram	medium	cities with tram network
Waste tram	Bulky and electric/electronic waste	means of transportation	tram	small/ medium	cities with tram network

Urban Consolidation Centres

Freight Transport Centres, also known as Urban Consolidation Centres (UCCs) function as hubs, capitalizing on economies of scale, rather than sending deliveries directly between every origin and destination (Figure 1). By concentrating flows, UCCs reduce the need for multiple individual deliveries between different points, streamlining transportation and improving efficiency (Malindretos et al., 2018).

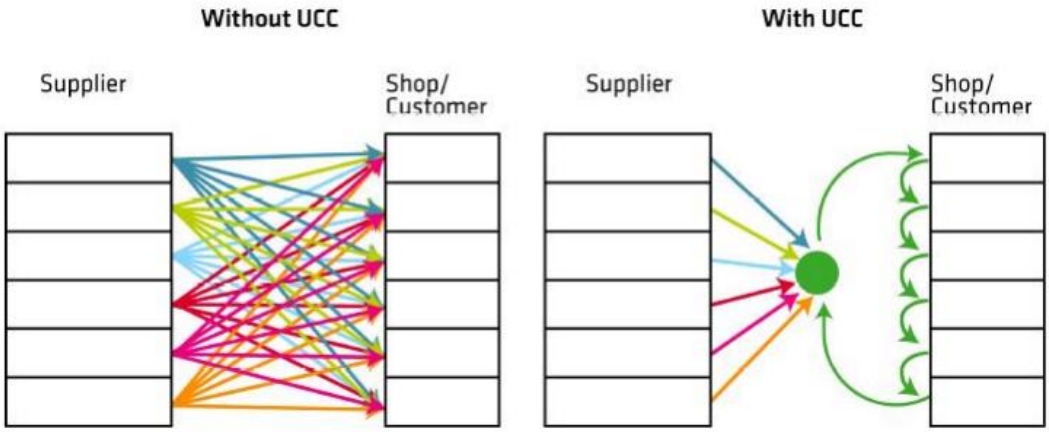

Figure 1 http://www.bestfact.net/wp-content/uploads/2014/02/BESTFACT_Brussels_

In Gothenburg, Sweden, this concept has already taken root. Leading to less congestion, improved traffic safety and reduced noise level, improved attractiveness of the area, due to strong reduction of heavy traffic in the area and shorter time period in the city area for stops and unloading/loading by heavy traffic (López & Cáceres, 2020).

Another example of an UCC, but on smaller scale, designed for a particular city are the DHL boats (Figure 2). This 'Floating Distribution System' is an example of a city logistics model where boats sail through the canals of Amsterdam and serve bicycle couriers, equipped with telecommunication devices that are online with computers on board. Sadly, this innovative concept, to reduce the amount of delivery vans in the city, has been canceled in 2020 due to the replacement of newer technologies. Nevertheless, this innovative concept shows us that more ways of UCC's and other environmentally friendly city logistics solutions are possible. However, the "landscape" of the city needs to be taken into consideration when designing the most fitting UCC for your city.

Figure 2 - Floating Distribution System from DHL

Benefits

Urban Consolidation Centres (UCCs) are increasingly viewed as critical in managing the complexities of urban freight logistics. These hubs consolidate goods from multiple suppliers before distributing them into urban areas, providing numerous benefits to cities.

Reduction of Traffic Congestion
UCCs significantly reduce traffic congestion by minimizing the number of delivery vehicles entering urban areas. By consolidating goods, fewer trucks are needed, alleviating urban traffic (Allen et al., 2012). Furthermore, many UCCs use low-emission or electric vehicles for final deliveries, contributing to reduced congestion and emissions, especially in low-emission zones (Browne et al., 2011).

Lower Carbon Emissions
Cities are responsible for over 70% of global CO2 emissions, and UCCs contribute to mitigating this by lowering the number of delivery trips, leading to reduced fuel consumption and emissions (C40 Cities, 2020). UCCs using electric vehicles have been shown to reduce freight-related emissions by up to 25% (Browne et al., 2011).

Enhanced Efficiency and Cost Savings
By consolidating deliveries, UCCs optimize vehicle loads and reduce operational costs by decreasing the number of empty trips (Browne et al., 2011). This efficiency helps retailers, especially in high-rent urban areas, by allowing them to receive more frequent and smaller deliveries, reducing the need for large inventories (Allen et al., 2012).

Improved Urban Infrastructure and Space Utilization
UCCs also alleviate the strain on urban infrastructure by reducing the number of heavy vehicles on city roads, lowering road maintenance costs (van Rooijen & Quak, 2010). Additionally, by minimizing the need for on-site storage, they free up urban space that can be repurposed for public infrastructure or community projects, supporting sustainable urban planning (Allen et al., 2012).

Support for Local Retailers
Local businesses benefit from UCCs through shared logistics services, which reduces distribution costs and improves delivery efficiency without requiring significant investment in their own networks (van Rooijen & Quak, 2010). UCCs can also serve as distribution hubs for local goods, helping small retailers reach customers more efficiently.

Challenges and Future Potential

Despite these benefits, implementing UCCs poses challenges, including high setup costs and the need for strong public-private partnerships and regulatory frameworks. However, as urban populations grow and cities focus on sustainability, UCCs are expected to become an integral part of urban logistics systems (Browne et al., 2005).

But as we have seen, UCC's are only one example of many sustainable city logistics ideas. With evolving technologies, we will see different ideas in the future. What if we were to have a underground system of moving goods like in the tv-show "Futurama"?

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