International Transport Forum

Urban Logistics Hubs

Summary and Conclusions

195 Roundtable

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The International Transport Forum

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International Transport Forum
2 rue André Pascal
F-75775 Paris Cedex 16
contact@itf-oecd.org
www.itf-oecd.org

ITF Roundtables

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At the ITF, Parnika Ray organised the event and drafted the report with inputs from the Roundtable participants. Aditya Sharma provided desk research support. Apostolos Skourtas and Charlotte Bracke provided administrative support to the Roundtable. Suzanne Parandian (independent) copy-edited the report and David Prater prepared it for publication. Orla McCarthy reviewed the report. A special thanks to Jagoda Egeland for her support of the Roundtable event.

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Annex C contains a full list of Roundtable participants.

This Roundtable Report is part of the ITF's core Programme of Work for 2023–24, co-ordinated by Jagoda Egeland and Orla McCarthy, and has been approved by the ITF's Transport Research Committee.

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Glossary

Cross-dock terminal	A terminal where goods (e.g. parcels, letters or larger units such as pallets) are not stored but pass through in less than a day, usually within a few hours (also referred to as a sortation terminal where goods are sorted for distribution).
Distribution centre	A warehouse for storing and managing intermediate and consumer goods. It serves as a hub for receiving, storing and distributing products to their final destinations.
Dark kitchen	A kitchen facility without a storefront or direct customer interaction that operates as a delivery-only commercial kitchen, renting out shared or private kitchen spaces to food businesses (also known as a cloud kitchen, ghost kitchen, delivery-only restaurant or cyber kitchen).
Dark store	A small, micro-fulfilment centre designed specifically for quick commerce. Dark stores are typically located in densely populated areas and are stocked with a limited variety of high-demand products for fast delivery.
Freight village	A more integrated type of logistics park, providing additional services beyond warehousing such as fuel stations, truck maintenance service and sometimes multimodal transport services.
Fulfilment centre	A distribution centre specialised in e-commerce operations. It typically handles a large number of stock-keeping units and frequent order pickups to fulfil online orders efficiently.
Last-mile delivery	Refers to the final leg of the delivery process, where goods are transported from a distribution centre or fulfilment centre to the end consumer, i.e. delivering directly to homes or businesses.
Logistics hotel	A large, multi-story, mixed-use urban warehouse composed of logistics areas, offices, sports facilities and shops. It serves various purposes within the logistics ecosystem while also providing additional amenities and services.
Logistics park	A collection of several warehouses managed by a single entity (often the real estate developer/owner) offering additional services to users such as security, office spaces, retail facilities and more.
Microhub	Small facilities that are located close to the delivery area. These can be built-up structures, or a space located within the public or private right-of-way where goods are transloaded by multiple operators from larger freight vehicles to smaller, low-emission and electric vehicles, or human-powered modes (e.g. cargo cycles, hand carts) for final delivery in urban areas.

Pedestrian drive	A pick-up location where food or grocery orders made online are collected (includes parcel lockers and click-and-collect stores).
Quick commerce	Umbrella term for services offering grocery deliveries within 20 minutes or less, relying on a tight-knit network of small, store-like warehouses (see: dark store) and a readily available vehicle fleet and staff for rapid deliveries.
Stock-keeping unit	Represents a unique item or product variant held in stock. It serves as a distinct identifier for tracking and managing inventory levels.
Temperature-controlled warehouse	A type of distribution centre for goods that require cold or specific temperature storage (i.e. frozen and fresh goods).
Urban consolidation centre	A facility that aggregates goods flows of multiple carriers, consolidating delivery rounds in city centres typically under the umbrella of a single delivery company.
Urban logistics	The movement of goods and facility services within urban areas. It includes the transport of raw materials, the distribution of products between businesses and from businesses to consumers, the collection of waste, the return of goods and the movement of facility services.
Urban logistics hub	A multifunctional logistic node situated within an urban area that caters to diverse goods flows, ranging in size and activities from small-scale residential lobbies providing temporary storage to larger distribution or collection facilities. These hubs can provide additional facilities such as electric vehicle charging, rest areas for workers, and commercial spaces for rent.

Abbreviations and acronyms

3PL	Third-party logistics provider
ALICE	Alliance for Logistics Innovation through Collaboration in Europe
ANPR	Automatic number plate recognition
B2B	Business-to-business
B2C	Business-to-consumer
BTS	Bureau of Transportation Statistics
CBS	Central Bureau of Statistics
EV	Electric vehicle
FLOW	Freight Logistics Optimization Works
GDP	Gross domestic product
GHG	Greenhouse gas
GIS	Geographical Information Systems
ICE	Internal combustion engine
LEZ	Low-emission zone
PPP	Public-private partnership
UCC	Urban consolidation centre
ULH	Urban logistics hub
ULIP	Unified logistics interface platform
UVAR	Urban vehicle access regulations
VMT	Vehicle miles travelled

Executive summary

Key messages

Logistics is more than e-commerce

Urban logistics includes deliveries, distribution, returns, collections and servicing. A wide range of stakeholders with consumer and business demands are involved in the logistics ecosystem. Thinking about improving logistics started in e-commerce and now drives developments in the other segments.

Shift to sustainable logistics

Logistics is unlikely the most beneficial use of real estate considering sparse urban space. But the absence of sustainably designed and operated urban logistics hubs could lead to more vehicles or more polluting vehicles in cities as no transshipment space is available.

Strengthen understandings of logistics and hubs

Planning authorities should provide best-practice guidelines and frame policies for logistics and associated hubs without significantly increasing costs for operators and customers. The public sector should govern while the private sector should lead the construction, operation and management of logistics hubs.

Main findings

Urban logistics are a fundamental part of city life, involving far more than the delivery of goods purchased via e-commerce. Deliveries, collections and servicing in urban areas generate all kinds of non-passenger freight trips by trucks, vans, cargo bikes and other modes of transport. Supermarkets, restaurants, retail shops, construction companies, wholesalers and individual customers rely heavily on the distribution and return of goods, the collection of waste, and other services to fulfil their demands.

At the same time, the transport sector accounts for one-quarter of all energy related greenhouse gas (GHG) emissions, with freight transportation making up to 8% of global GHG emissions and as much as 11% if warehouses and ports are included. Global freight emissions are expected to continue to grow, with road freight accounting for most of this growth. Additionally, traffic congestion, road crashes, air and noise pollution associated with road urban logistics pressure authorities to act.

Given these concerns, the shift to sustainable urban logistics is essential. Urban logistics hubs can enable this shift by splitting urban and interurban traffic and providing transhipment space so that fewer vehicles (or less-polluting vehicles) circulate in urban areas. These hubs are spaces in which crucial logistical functions are carried out in the last leg of the supply chain. Examples of these functions include (de)consolidating shipments, storage (including cold storage), sorting goods, and facilitating the shift from larger to smaller vehicles, including low- and zero-emission vehicles, for distribution to close-by areas. They also facilitate reverse logistics and waste collection.

Although different sectors (e.g. retailers, grocery stores, or last-mile parcel hubs) have distinct profiles in terms of trip generation and impacts, hubs can help optimise the last mile of urban logistics in terms of better transport and environmental performance, mitigating some negative externalities.

In the context of sparse urban space and the need for affordable housing, logistics hubs may not represent the most economically or socially beneficial use of urban real estate. However, their absence could lead to more vehicles or more polluting vehicles (e.g. due to a lack of transshipment facilities). Hubs are more than just urban warehouses. They increasingly provide additional facilities, which are in fact essential for value addition, such as electric vehicle charging stations, rest areas for logistics workers, commercial spaces and other mixed-use functions. Ideally hubs should complement each other rather than compete for space.

An urban logistics hub need not be permanent, as in the case of large distribution centres. Temporary microhubs that can be quickly deployed, moved and re-converted, supporting the dynamic component of logistics demand, are increasingly desirable. Vacant parking lots and daytime empty bus depots in cities are examples where such microhubs for logistics activities such as transshipment from larger to smaller, more sustainable modes of transport, including cargo bikes or walking couriers, are already occurring.

Recent trends in logistics flows, as well as growing regulatory demands, make urban logistics increasingly complex. This complexity is driven by the vast range of activities resulting from various actors with different and often conflicting economic, social and environmental needs and goals. Logistics flows operate at different scales, interacting with various actors and processes, from global supply chains to local distribution networks, requiring authorities to strengthen their understanding of the sector's complexity.

Most of the recent developments in logistics and associated hubs are driven by private-sector investment and innovation. The public sector should focus on governance while the private sector should lead the construction, operation and management of logistics hubs. But the rapid and continuing changes in the sector pose challenges for public authorities in understanding and regulating the sector effectively. Policy makers should focus on ensuring that the development of urban logistics hubs, and better linkages between hubs and other parts of the logistics chain, improve the sustainability of the sector, while also offering economic efficiency gains.

Top recommendations

Increase knowledge of logistics across government to facilitate uptake of successful urban logistics hubs

Sustainable urban logistics depends on government expertise, particularly at the local and metropolitan levels. Planning authorities should create dedicated freight teams to guide the logistics sector. The focus on logistics should be at the forefront of political mandates and public debates. Authorities should understand different hub typologies, their relationships with global supply chains and logistics movements in urban areas. Policy makers can also develop guidelines for logistics hub development.

Facilitate productive dialogue between stakeholders to improve urban logistics outcomes

Given the diversity of stakeholders and their interests, collaboration is critical to the success and sustainability of urban logistics hubs. Governments at all levels must play a role in facilitating and regulating private endeavours in logistics. Innovative collaborations between municipalities, industry players, academia, non-profits and civil society, similar to passenger transport planning, can lead to urban logistics hubs that enable efficient and sustainable last-mile deliveries. Collaboration is also crucial to harmonising regulations across cities and regions to help the logistics sector navigate regulatory complexities. While context-specific differences in regulations will remain, national governments can facilitate standardisation across urban areas.

Integrate urban logistics into urban and transport planning

National governments should mandate lower levels of government to consider urban logistics within their urban and transport planning frameworks. Urban logistics is both a traffic and a spatial issue, and these must be co-ordinated. Freight transport should be more prominent in urban land-use and related planning procedures. As supply chains are regional, national and even global, hubs that are nodes in supply chains require attention at all levels. Horizontal and vertical alignment of planning policies and governing frameworks will be essential to tackling the complexity of logistics.

Incorporate flexibility, reversibility, and environmental performance as urban logistics hubs principles

The long time horizons of real-estate planning often clash with the dynamic nature of the logistics sector. The capacity to swiftly deploy, move and re-convert urban logistics hubs to support logistics demand is a critical element of sustainable urban logistics planning. There should be long-term planning for urban logistics, including the potential for multimodal and vertical development, even though it may be complicated by the changing nature of the industry. Moreover, authorities need adaptive policies that balance or mix operational requirements of logistics facilities with community interests (e.g. liveability, lower noise and air pollution, fewer emissions). Additionally, hubs should support environmental goals for energy efficiency by incorporating best practices for design and planning of such facilities.

Improve data collection and tools for simulating, modelling, and planning for urban logistics and hubs

National, metropolitan and local governments need better tools and data for simulation and modelling, to help plan and stimulate discussions on logistics. Universities should be better connected to local and metropolitan governments to help with research and data analysis. Existing urban logistics data can be scattered across research organisations and authorities. However, data on light electric vehicles, cargo bikes and certain types of urban logistics hubs (e.g. microhubs) may not be easily available or systematically collected. Privacy concerns pose significant challenges to collecting, disseminating, and applying data for effective urban logistics spatial and traffic planning. Policy makers need to establish guidelines that enable better use of existing, publicly available data while ensuring necessary new data is collected, and simultaneously addressing concerns around data security and interoperability across various systems.

Incentivise the development of mixed-use urban logistics hubs and value addition

As urban space becomes increasingly scarce, logistics vies with other stakeholders. Increasing real-estate values, varying vacancy rates and limited industrial land in urban locations are a concern for public authorities and logistics players. Authorities could enable the development of mixed-used buildings that provide office, commercial, recreational space along with logistics facilities. Moreover, dedicated urban logistics hubs can provide various other services to city inhabitants, such as repair facilities, electric charging stations, or rest areas for logistics service providers. Crucially, urban logistics hubs should provide added value to the neighbourhoods where they are located. Finally, measures for safeguarding industrial/logistics land to ensure sustainable and cost-efficient logistics are essential.

Understanding urban logistics

In a world marked by unprecedented urbanisation, the dynamics of urban freight movements are increasingly critical. More than two-thirds (68%) of the world's population is expected to live in cities by 2050 (UN DESA, 2018). Cities depend on the efficient flow of goods and services, yet the ever-increasing demand for urban logistics has given rise to numerous challenges.

Recent trends in goods deliveries, especially in e-commerce and reverse logistics, as well as growing regulatory demands – including urban vehicle access regulations (UVAR) in the European Union (EC, 2024b) and other environmental regulations – make urban logistics increasingly complex. This complexity is driven by the vast range of activities resulting from a variety of actors with different and often conflicting economic, social and environmental goals.

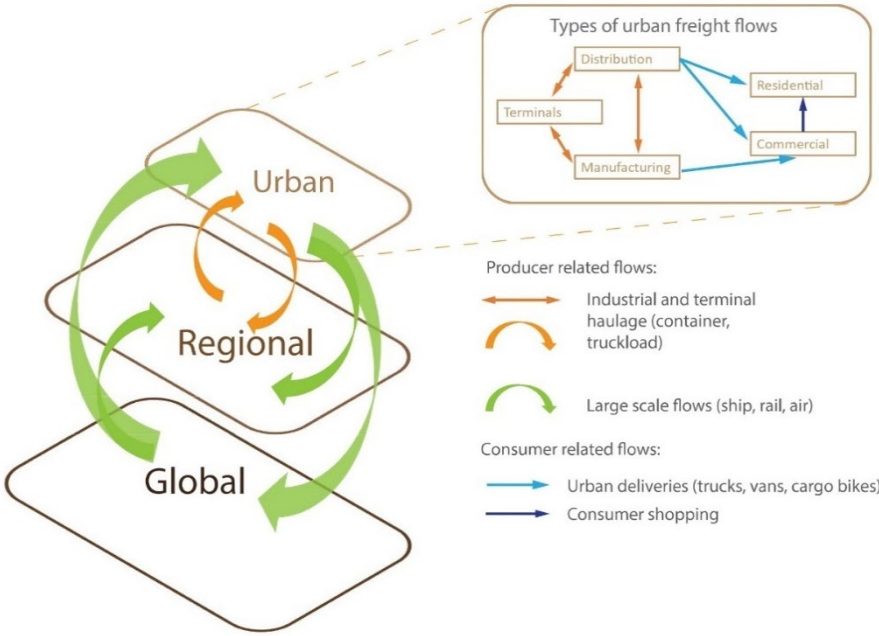
Urban logistics, as the name suggests, involves the movement of goods and facility services within urban areas, including activities such as the transport of raw materials, the distribution of products from business-to-business (B2B) and business-to-consumer (B2C), the collection of waste, the return of goods and the movement of facility services (e.g. carpenters and plumbers).

Urban logistics involves two main flows (see Figure 1):

1. Producer-related flows. These flows encompass industrial and terminal transport, interregional and global freight movements, often in unit loads such as containers or full truckloads. They typically operate on a large scale, leveraging economies of scale from terminals, manufacturing or distribution facilities (Rodrigue and Dablanc, 2020). Producer-related flows are often not considered when looking at urban logistics but are necessary as the impacts of these flows are different than consumer-related flows (i.e. they typically involve larger vehicles, but these vehicles spend less time in urban areas).
2. Consumer-related flows. These flows involve intra-urban or urban freight movements, usually comprising partial loads and parcels originating from distribution centres heading to commercial sites or residential areas. Urban freight flows, much like other freight movements, exhibit imbalances, especially in consumer-related flows that typically follow a one-way trajectory, often leading to empty backhauls. For example, deliveries to retail destinations, primarily from distribution centres, constitute one-way freight movements where the delivery vehicle often returns empty or carries minimal loads of returned goods or recyclable materials, such as cardboard boxes (Rodrigue and Dablanc, 2020).

Although part of the waste resulting from logistics flows (e.g. packaging) is returned within the same delivery chain, waste flows also make up a significant part of urban logistics. Urban logistics flows represent the movement of goods within urban areas, each with its own characteristics and challenges.

Figure 1. Types of distribution freight flows



Note: This diagram does not indicate reverse logistics, waste collection and facility services related movements that are also part of logistics flows.

Source: based on Behrends and Rodrigue (2018).

The transport sector accounts for 23% of the world's energy-related carbon dioxide (CO_2) emissions (ITF, 2023), with freight transport making up to 8% of global greenhouse gas (GHG) emissions and as much as 11% if warehouses and ports are included (IEA, 2020; Green, 2023). Global freight emissions are expected to continue to grow under the ITF's Current Ambition scenario, with road freight accounting for most of these emissions (ITF, 2023). Tailpipe CO_2 emissions from heavy-duty vehicles have increased rapidly since 2000, with trucks accounting for more than 80% of this growth (IEA, 2023). Additionally, traffic congestion, road crashes, air and noise pollution associated with road urban logistics and energy consumption pressure authorities to act.

Growing ambitions for the urban economy, circularity and better liveability are expected to lead to a shift in the way commercial spaces are allocated, designed and used for urban logistics flows. Urban logistics operations, including transport and the spatial infrastructure supporting logistics flows, are a critical component of urban sustainability as logistics operations lead to negative externalities and competition over the use of scarce urban space (ITF, 2022).

Urban logistics hubs (ULH) can facilitate the split between urban and interurban freight transport and thereby mitigate some of the negative externalities associated with logistics within cities, aligning urban freight with broader sustainability objectives. These objectives include enhancing the efficiency of urban logistics systems, sustainability and overall performance. ULH also emerge as a part of a simple business logic: if the cost of establishing and operating a hub is lower than the efficiency gains achieved in the last-mile delivery process (i.e. from the hub to the customer's doorstep), a logistics hub makes business sense. In other words, if the savings or benefits obtained from having the hub outweigh the costs, it is economically viable.

What are urban logistics hubs?

Urban logistics hubs (ULH) are strategically located facilities within urban areas that serve as crucial points for the consolidation, distribution and management of freight including reverse logistics (i.e. the return of goods and waste collection). They serve as nodes in the urban logistics network, typically facilitating the last mile of the supply chain, where goods can be consolidated, sorted and dispatched, ideally to facilitate and optimise last-mile deliveries (by reducing the number of vehicles or using environmentally friendlier vehicles), reducing negative externalities.

ULH also have a multifunctional nature (see Table 1). They cater to diverse goods flows, ranging in size and activities from small-scale residential lobbies that provide temporary storage to larger distribution or collection facilities. They can be dedicated facilities or involve consolidating goods from multiple operators. Depending on the function, location and spatial constraints, hubs may or may not offer long-term storage. ULH are integral to the city's distribution network as cargo is organised there for final delivery within the urban setting. The type of ULH depends strongly on the type of logistics flows (i.e. the type of collection or distribution of goods such as home delivery parcels, food or delivery to shops or shopping centres) and the type of vehicles used (i.e. small trucks, vans, cars, motorbikes or cargo bikes) including whether the fleet is electric or fossil-fuel dependant.

These hubs emphasise proximity to customers while prioritising connectivity, accessibility and volume consolidation as critical success factors. Typically, the closer the hub is to the end of the delivery chain, the smaller in size it is, as are the last mile delivery vehicles deployed. Potentially, the smaller the size of the hub, the larger the number of hubs that maybe required to cover the whole urban area, hence expanding the spatial footprint of urban logistics. As the last mile gets shorter and the vehicles used become more sustainable (and smaller), the need for overnight parking of these vehicles (such as light electric vehicles or cargo bikes) at the hub or nearby may add to the spatial footprint of an urban logistic chain.

ULH may not always be fixed or built structures. For example, logistics activities have long been taking place at the curbside in commercial loading zones designated for B2B deliveries. However, there is a growing trend of transhipment occurring on an ad-hoc basis at the curb that serves not only B2B but also B2C needs. Here transhipment of parcels occurs from larger trucks to last-mile providers, often using pedestrian spaces for quick exchanges, as seen in Figure 2. Such activities generate certain challenges and debates around the use of public space. Cities are regulating to manage such activities, which can be unsafe due to the potential disruptions they generate and to reduce the impact on the availability of public space.

Figure 2. Parcel transshipment directly at the curb, New York City, 2023

Source: Dablanc (2023b).

ULH can also act as service centres that not only cater to logistics but also provide various other services such as repair facilities, electric charging stations, resting spaces and toilet facilities for delivery workers (NYC Get Stuff Done, 2024), or even urban farming (e.g. Chapelle Logistics Hotel, Paris). Ideally, urban logistics hubs should provide added value to the neighbourhood where they are located rather than only serving one function, i.e. the storage and handling of freight. This concept has already been implemented in some cities (see example in Box 1).

The range of actors influencing ULH today goes beyond traditional freight shippers, carriers, receivers and the public sector. New stakeholders include app-based companies, owners and managers of emerging logistics facilities such as dark kitchens, dark stores, drop-off and pick-up points, click-and-collect facilities and collaborative logistics hubs. Examples of these types of stores in cities are shown in the images below (see Figures 3 and 4). Where investment returns are available, real estate developers that were traditionally involved in logistics hubs outside cities, are beginning to enter the urban logistics market.

Figure 3. Gopuff dark store with retail partners, New York City, 2023

Source: Dablanc (2023b).

Figure 4. Auchan click&collect and Deliveroo rest area for delivery workers

Source: Dablanc (2023b).

Table 1. Urban logistics is about more than parcels

General cargo	Temperature-controlled cargo	Parcels and express deliveries	Facility logistics	Waste logistics	Construction
Large retail chains Small independent stores Home deliveries	Supermarkets Wholesalers Specialists Home deliveries	Post and parcel E-commerce Quick commerce	Facility management Services	Home Business	Civil engineering New-build homes and other buildings Renovation

Source: Quak and Kin (2024).

Another essential aspect of urban logistics and the associated hubs is their direct relevance to urban traffic, necessitating a clear link between the traffic that urban logistics generate and the urban area they serve. ULH are not merely transit points for goods destined elsewhere but are intricately tied to the immediate local community, emphasising their role in serving the surrounding urban area. Different sectors (see Table 1) within logistics hubs (e.g. grocery stores, last-mile parcel hubs or waste collection) have distinct profiles in terms of trip generation, the type of vehicle used and impacts.

Recent data from the Netherlands based on traffic counts and automatic number plate recognition (ANPR) which examines the proportion of different types of vehicles across different logistics sectors (Ploos van Amstel et al., 2017; Topsector Logistiek, 2020) indicates that carbon dioxide (CO_2) emissions (estimated based on kilometres driven and type of vehicle) from the transport of general cargo and construction freight can be higher than other types of logistics freight, while CO_2 emissions from parcels and express services can be the lowest.

Given that parcel logistics uses smaller, more efficient vehicles (where many are electrified already), the data indicates that this sector has a lower percentage of CO_2 emissions compared to other flows, in this specific context.

However, the number of parcel deliveries and other types of deliveries (e.g. food and groceries) has increased globally since 2020 due to the growth in e-commerce, and it continues to expand (CBRE, 2022). Partial electrification of the fleet or the use of some sustainable modes (e.g. cargo bikes, walking couriers) for e-commerce deliveries may not compensate for the overall CO_2 emissions from increased e-commerce activities. Depending on the context, CO_2 emissions from e-commerce and other logistics flows will vary based on the types of vehicles and the number of vehicles used. Hence it is essential to take the most recent data into account to quantify emissions accurately from various logistics flows.

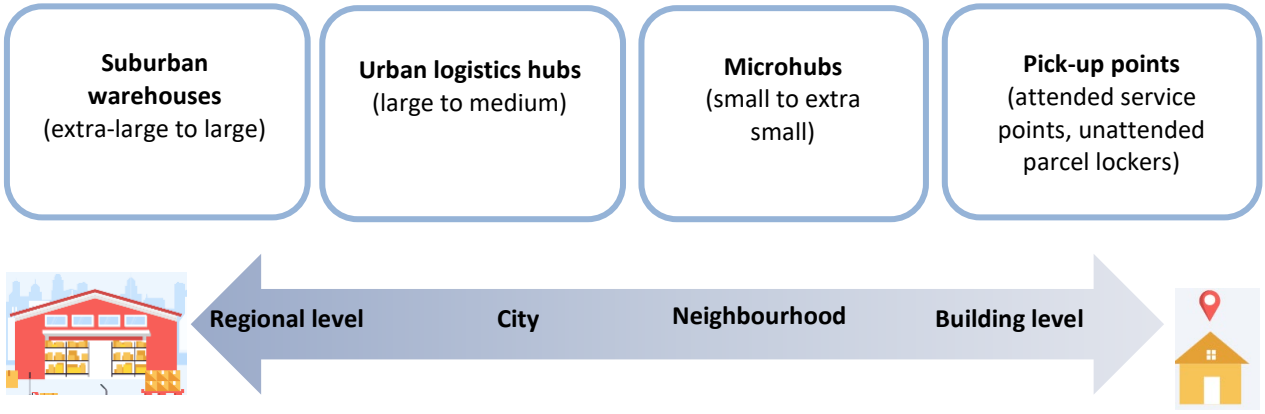
Policy makers must understand these differences to comprehend logistics operations and its effects in terms of traffic, emissions and spatial requirements.

Regarding spatial requirements, ULH can vary in size from quite small (e.g. 100m² for dark stores/fast delivery stations/microhubs) to very large (e.g. 200 000m² for vertical distribution centres) depending on the location, function(s) and sector(s) that they serve (see Annex A). These hubs can also have specific architecture and spatial footprints that respond to the urban environment. For example, hubs in dense mega-cities, where space is very scarce, typically tend to be multi-storeyed vertical developments. Some companies are exploring alternative energy sources within these hubs, such as incorporating solar panels on the roofs of multi-tenant facilities in Tokyo to embrace environmentally conscious practices.

One desirable feature of some microhubs is their temporary nature. They can be quickly deployed, moved and re-converted, supporting the dynamic component of logistics demand. In some cases, these small-scale hubs last just one day. For instance, in a cargo e-bike pilot study in Seattle, a United Parcel Service (UPS) van carrying a trailer containing cargo loads parked in an off-street parking area, essentially becoming a "hub" for a fleet of cargo e-bikes, who cycled to the parking location, loaded their cargo e-bikes and completed their deliveries for the day (Urban Freight Lab, 2020).

These hubs operate in a multi-scalar context where interconnectedness and complexity of operations are present across multiple sites and scales (Locus, n.d.). This necessitates understanding the dynamics of these hubs in relation to their spatial context, the variety of actors involved, and the different economic, social, and environmental needs and goals that influence their operation. For instance, a hub might interact with global supply chains (a larger scale) while also dealing with local distribution networks (a smaller scale, as shown in Figure 5). It might work with international shipping companies, local trucking firms, city planners, and local businesses. Decisions at one level can impact operations at another. Moreover, as urban freight dynamics evolve, it becomes essential to bring together the various stakeholders who can catalyse positive change. This includes public authorities, private companies, research institutions, civil society organisations and local communities.

Figure 5. Hub types



Source: based on Katsela et al. (2022); Locus (n.d.).

Functions of urban logistics hubs

ULH can undertake many different functions and operations with varying levels of complexity. This section outlines these functions. These functions are not mutually exclusive and many ULH often serve more than one function (Buijs et al., 2020). Typically (de)consolidation, cross-docking, and sorting serve the same purpose: last-mile optimisation. E-fulfilment, technological integration and reverse logistics are responses to some of the more recent trends or developments in logistics.

Consolidation and deconsolidation

ULH act as central points where goods from various suppliers are consolidated before being further distributed within the city. Conversely, they also serve as deconsolidation centres where incoming shipments are unpacked and distributed to their final destinations.

Cross-docking

Many ULH employ cross-docking where goods arriving from different sources are temporarily staged at the hub and then rapidly transferred to outbound vehicles without being stored in the facility. This process minimises storage time and handling, reducing transit times and costs.

Cargo sorting and routing

Within these hubs, goods are often sorted and routed efficiently. The process involves categorising products based on destination, delivery times and transport mode, streamlining the dispatch process.

E-fulfilment

E-fulfilment is typically associated with e-commerce activities with urban hubs specialising in fulfilling orders for e-commerce businesses. These hubs are responsible for assembling individual online orders from customers and for receiving, storing, processing and shipping items to customers. If these hubs have a high number of items held in stock, they tend to have high rack storage (Rodrigue, 2020). However, there are smaller e-fulfilment hubs associated, for example, with "instant" grocery companies that offer a limited product range.

Storage

ULH can provide short to medium-term storage for goods awaiting distribution. Storage is typically designed to be as space efficient as possible, reducing the land footprint in densely populated urban areas. Some hubs are monofunctional, i.e. only used for storage. These hubs can incorporate the flexibility to use storage space for other functions if required. The occupation rate of monofunctional storage space within hubs varies with the flow and depends on the number of users of the space.

For e-commerce and parcel deliveries, commercial shops, residential lobbies and parcel lockers in public spaces can provide temporary storage until pick-up.

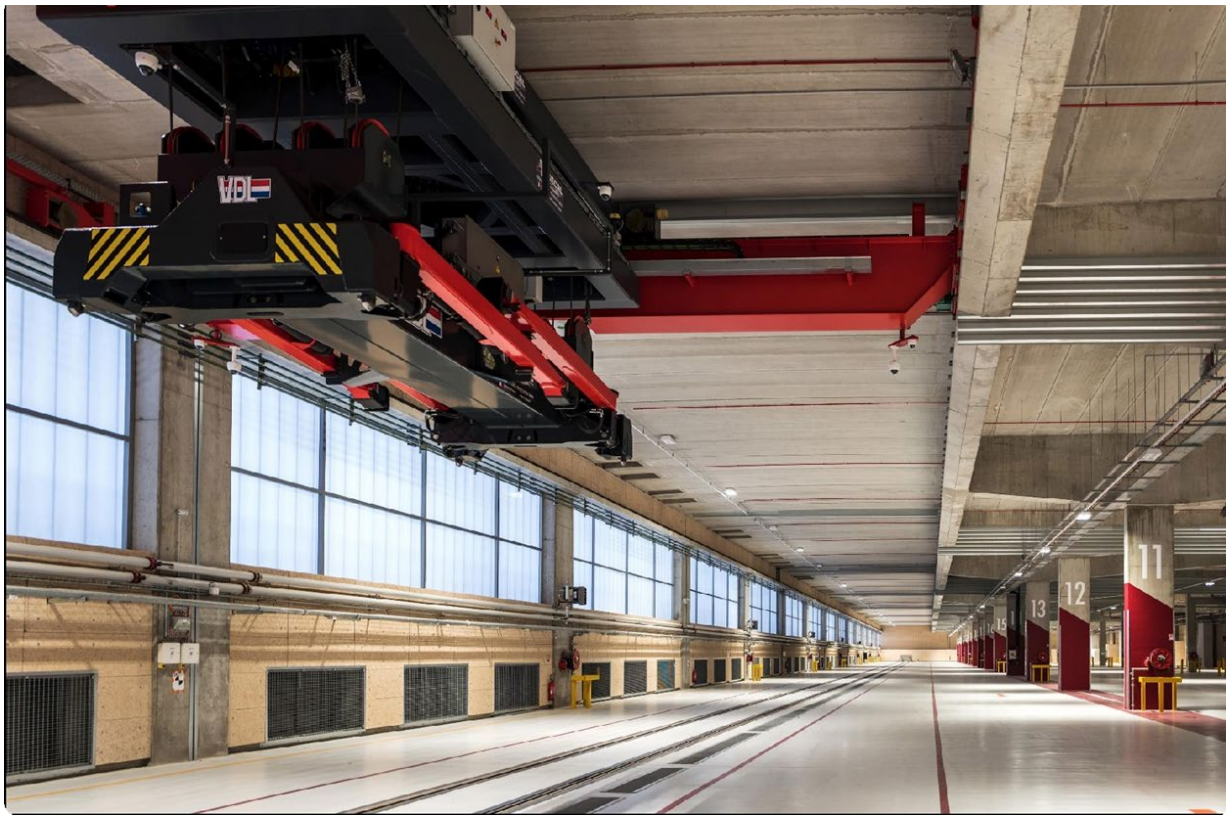
Last-mile delivery optimisation

ULH are strategically located to optimise last-mile delivery. Positioning these hubs closer to end consumers minimises last mile transport distances, enables faster deliveries and potentially reduces negative externalities by either reducing the number of vehicles or shifting to sustainable modes.

Modal shift and multi-modal connectivity

Hubs often facilitate the transition between different transport modes, enabling goods to be transferred from large trucks to smaller (electric) vehicles, cargo bikes, pedestrian couriers, or other carriers within the same facility for last-mile delivery. Freight movement, however, is not limited to road only. There are several examples of operations involving urban waterways and barges for freight transport. The barges can be electric and facilitated with onboard loading and unloading equipment with the last mile completed by a cargo bike (Fludis, 2019). These barges are being used for transporting building materials, parcels and pallets in Paris, for example, and for delivering beer and collecting waste in Utrecht, in the Netherlands. In some hubs, such as the Chapelle International hub in Paris, the possibility of connecting to the freight rail network also exists, although there are more existing operations involving urban waterways than rail in most urban contexts.

Figure 6. Logistics Hotel Chapelle International: Indoor rail terminal and cross docking



Source: Berthon (2023).

The "Logistics Hotel" Chapelle International, is a 42 000m^2 mixed-use logistics facility located in the north of Paris, that can be connected to the freight train network (see Figure 6). However, the rail service is not currently operational for several reasons, including being too expensive for potential clients (Dablanc, 2019). The indoor rail terminal is currently rented out to a parcel operator. Chapelle International serves as a hub for multiple logistics operators with requirements ranging from cold storage to cross docking for urban distribution. The facility also rents out retail space, offices and workspaces, an urban farm, a data centre, and a sports centre, and includes a heating power station thus serving the community around the facility.

Technological integration

ULH often integrate advanced technologies, such as automated sorting, optimising loads for delivery vehicles, real-time tracking and data analytics to monitor and manage the flow of goods, optimising routes, and improving overall logistics efficiency.

Reverse logistics

ULH can also undertake some reverse logistics functions. Reverse logistics is the movement of goods "upstream" through a supply chain, returning them from the customer back to a retailer or manufacturer. One common example for e-commerce businesses is product returns and packing materials. Reverse logistics also covers the recycling, repurposing, repairing and resale of products (DHL, 2023).

Who owns, leases and operates urban logistics hubs?

Depending on the location, purpose, and development model, various entities can own, lease or operate urban logistics hubs. This section lists some common types of entities associated with ULH.

Real estate developers

Companies such as British Land and Sogaris (a unique example from France; see Box 1) develop and own ULH properties (British Land, 2024; Partridge, 2021, Sogaris, 2023b). These developers build facilities that can be leased or rented by other logistics or distribution companies. This is by far the most common situation, whether for urban or for non-urban hubs. The other types of ownership explained in this section are increasingly less common (private logistics companies developing/owning their hubs) or very uncommon (public authorities developing urban hubs).

Private companies

Private logistics and transport companies can own or lease their hubs and manage operations to facilitate the distribution of goods in urban areas. Sub-categories that fall under this umbrella include retailers (e.g. Walmart), wholesalers (e.g. PepsiCo), and manufacturing (e.g. Hitachi) and transport (e.g. FedEx) companies that either lease or own logistics hubs for their operations. It also includes large, multinational e-commerce companies, such as Amazon, which primarily lease, invest in and operate urban logistics hubs to support their delivery and fulfilment operations in urban areas (Banker, 2021).

Third-party logistics providers

Third-party logistics providers (3PLs) may own and operate ULH to provide services to multiple businesses, helping them optimise their supply chain and distribution processes. Property ownership, however, often rests with a real estate company such as Prologis, while 3PLs lease hubs and manage operations. Large-scale freight companies, online retailers that offer home deliveries, or a group of customers (i.e. receivers, mostly shop owners) can contract 3PL companies and delegate efficient storage and deliveries to them. Third-party logistics providers offer comprehensive logistics and supply chain management services across various industries or with one specific industry. They can vary in size and services. “Third-party” signifies that 3PLs are external partners that manage some or all logistics operations in a supply chain. Third-party logistics providers use their large networks of warehouses and transport providers (trucking, freight, rail and more) to secure competitive rates and streamline operations (CBRE, 2024).

Government or public authorities

Local, regional or national governments may own and operate ULH, typically in the form of urban consolidation centres (UCCs), to improve urban logistics through consolidation and promote sustainable transport. However, UCCs have not been financially successful in most cases (Allen et al., 2012. Dreischerf and Buijs, 2022), with such hubs failing once public subsidies are reduced or lifted (Katsela et. al., 2022). While consolidation could result in fewer vehicles being needed to get the same volume in and out of urban areas, the value proposition of UCCs need to be evaluated especially if they depend on subsidies.

Governments can also have ownership of urban logistics hubs through publicly owned limited companies such as the La Poste Group in France. La Poste is owned by two shareholders: the Caisse des Dépôts et Consignations, a public sector financial institution (66% share), and the French government (34% share) (La Poste, 2019). The La Poste Group, which is in the parcel and post sector, aims to invest significantly in its urban logistics real-estate projects to cover a variety of logistics sites, from 5000m² urban logistics hubs

to under 500m² spaces in city centres as well as green fleets (Baker, 2022). This example is context specific and may not be possible to replicate universally. La Poste in France and Bpost in Belgium (a public limited liability company) have a dominant share of the parcel market in their specific contexts, and this may be the reason why they can more easily invest profitably in urban logistics real estate.

Public-private partnerships

Urban logistics hubs can also be developed and operated through public-private partnerships (PPPs) between private companies and government agencies. This collaborative approach can address urban logistics challenges while leveraging public and private resources and capital. However, strong collaboration between public players is essential for PPPs to succeed (Baron and Saryazdi, 2019).

The Cityporto in Italy, which is in essence a UCC, is an example of this approach (Interporto Padova, 2021). Another example comes from the RATP Group (a French state-owned urban public transport operator), that via its subsidiary RATP Solutions Ville, is continuing to develop its RATP Logistics segment by involving the private sector. For instance, the companies, Amazon and Ecolotrans, will invest in two new RATP sites located in the inner suburbs of Paris, joining the four sites already made available to Chronopost and Amazon by the RATP group, bringing the total surface area devoted to urban logistics to 7500m² (RATP, 2022). The Group also makes some of its sites, particularly bus depots, available to partners to facilitate last-mile deliveries. Unoccupied during the day when buses are running, these depots become areas to facilitate cross-docking (transfer of goods from heavy vehicles to light vehicles). Amazon is also partnering with RATP to leverage their bus depots as cycle logistics hubs.

Non-profit organisations

Nonprofit organisations or community groups may occasionally own or operate logistics hubs to address specific community needs or to promote social and environmental objectives. Although the footprint of such ventures is often very small, they are worth mentioning. For example, food banks and food pantries, operated by nonprofits such as Feeding America in the United States, that act as food storage and distribution centres for food donated from local neighbours, retailers, grocery stores and restaurants can be considered a logistics space (Feeding America, 2024).

To summarise, the ownership structure of urban logistics hubs can vary significantly. It often depends on the location, the nature of the logistics operations, the level of public sector involvement and the specific goals of the owners. Owners and operators of urban logistics hubs can be the same entity or different entities. The arrangement can vary based on the business strategy, financial considerations and the required operational expertise. Some owners prefer to outsource operations to experienced logistics providers, reducing their operating responsibilities and leveraging the expertise of logistics specialists. Others may maintain complete control over the hub's operations, especially if logistics is a core part of their business. Public-private ownership can also vary depending on local regulations and policies.

Box 1. Sogaris: A logistics real estate developer with public-private shareholders

Sogaris is a private French corporation, with public and private shareholders, which specialises in developing and managing urban logistics facilities in the greater Paris region. It is 70% owned by local governments and has over 200 clients in various logistics sectors. While it is profit-oriented and receives no subsidy, due to its mixed public-private shareholding structure, Sogaris accounts for the long-term public interest of bringing environmentally and socially responsible logistics to the city. This requires both its public and private investors to agree to long-term investments (20 years or more), which also increases profitability. The company's structure allows for easier public-private co-operation, for instance through partnerships with local governments to help define sustainable local urban logistics.

One example is the Grenier Saint Lazare Urban Hub in the Paris city centre. This former automated car parking facility has been converted into a 1 600m^2 service and storage space with six basement levels. It aims to provide the community with a logistics facility that combines micro storage with additional amenities such as reception/concierge services, order preparation and inventory management. The facility does not disrupt the urban heritage of the neighbourhood, as surface construction is confined to the entrance to the facility and the concierge desk (see Figure 7). This illustrates how urban storage solutions can be designed to serve the local community while ensuring operational and aesthetical integration.

Figure 7. Grenier Saint Lazare

Source: Berthon (2023).

Sogaris is also the developer of the "Logistics Hotel" Chapelle International. "Logistics Hotels" is a French term that refers to a mixed-use building that provides office and commercial space along with logistics facilitie a concept that is gaining popularity in Paris. The Sogaris model is a very specific example from France and may not be possible to replicate universally.

Sources: Berthon (2023); Sogaris (2023a); Sogaris (2023b).

Urban logistics real estate

Urban and sub-urban logistics real estate is a complex field influenced by various factors such as rent, land availability, transport costs and evolving consumer needs resulting in certain dual outcomes such as logistics sprawl and the return of logistics to the city. Logistics real estate is a dynamic arena that continues to adapt to changing market conditions and consumer demands.

According to market analysis, site selection for logistics spaces involves a calculation between land and property costs, and transport and labour costs relative to rent levels and possible delivery times (JLL, 2018; Logistics City Chair, 2023). Zoning codes and regulations also have an impact. Rising rents are a crucial driver steering logistics market dynamics. In recent years, logistics rents across Europe have surged due to intense demand and limited supply. This imbalance has been compounded by escalating costs, ranging from shortages in materials such as concrete and steel to labour supply (Cushman & Wakefield, 2023). Concurrently, land prices have soared due to heightened developer interest in introducing new products to the market, although there has been a gradual moderation in prices across several markets since 2022.

Moreover, there is a constant demand for housing in cities with limited land supply with housing providing a better return for investors than warehousing. For logistics properties there is increased competition for space closer to consumers, as retailers, e-commerce, 15-minute grocery and food delivery companies all encourage faster deliveries. The convergence of these factors has propelled rental rates to unprecedented highs across numerous European markets (Cushman & Wakefield, 2023). For 2023, Prologis expected logistics rents to grow by 10% in the United States and 9% globally (Maiden, 2023).

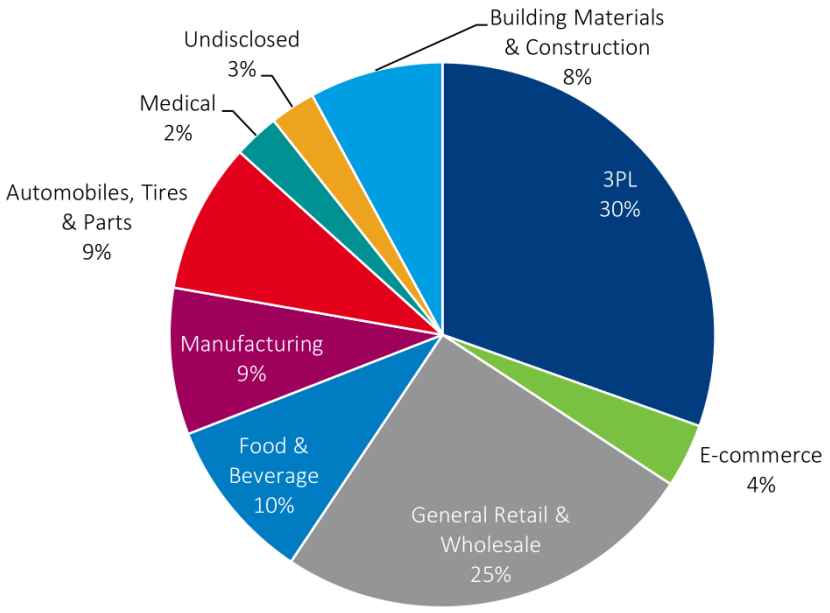
One of the drivers of logistics sprawl could be the greater economic power that other urban functions (e.g. housing might have in the claim for urban space. For example, rising rents, and scarcity of land and rental units, may drive large warehousing and distribution centres to sub-urban or peri-urban areas, which has led to logistics sprawl (Dablanc, 2023b). Yet, the rise of e-commerce (which has led to the segmentation and specialisation of the logistics facilities because of urban market conditions) and the demand for rapid replenishment operations are also driving logistics facilities closer to urban cores (Prologis, 2021).

Research also indicates that transport significantly impacts logistics costs. Transport comprises roughly 50% of supply chain costs compared with just 5% for logistics real-estate rent (not including labour costs) (Prologis, 2021; Prologis, 2023; Logistics City Chair, 2023). Labour costs, according to Prologis (2023), account for approximately 25–30% of overall costs. Logistics providers must consider the trade-offs between rent, labour, inventory and transport costs, depending on the sector. Without government intervention, trade-offs will mostly be based on economics. It is, therefore, important to add externalities to the trade-off equation to find a solution that considers positive environmental and societal impacts.

On one hand, logistics sprawl increases the distance travelled and hence the transport cost (Gardrat, 2021). It leads to higher CO_2 emissions and may impact delivery reliability. On the other hand, moving logistics to the city to improve the efficiency and sustainability of goods movement can help businesses through savings from reduced transport, while meeting some environmental goals. This, however, depends on the logistics sector and may not apply universally.

A mapping study of logistics in the Paris region confirms the emergence of a dual market for logistics warehouses. For example, there is a demand for peri-urban warehouses that are generally large with easy access to large, inexpensive plots of land. Simultaneously, there is a demand for smaller urban warehouses that are located within the city and are the mainstay of urban logistics and e-commerce deliveries (Logistics City Chair, 2023). Additionally, the scarcity of urban industrial land is a significant issue. This scarcity compels larger cities and municipalities to designate special urban and sub-urban areas for logistics, especially for last-mile facilities and fulfilment centres.

Figure 8. Lease transactions in the United States for spaces larger than 9 000m², 2023



Sources: CBRE (2023; 2024).

Figure 8 provides an overview of the main industrial and logistics leasing activity (for spaces 9000 m² and above) by occupier type in the United States in 2023. According to the CBRE US Real Estate Market Outlook, location optimisation was crucial to controlling supply chain costs in 2023. Domestic freight costs increased due to higher fuel costs and labour shortages, while rents increased nearly 20% in 2022, putting additional cost pressure on occupiers (CBRE, 2023).

As a result, occupiers sought locations near domestic transport hubs with high-quality infrastructure, and markets with strong labour dynamics and more affordable rents. Demand continues to be led by 3PLs, as companies continue to outsource to 3PLs to avoid labour shortages, rising transport costs and other supply chain challenges. However, economic uncertainty has resulted in softening short-term 3PL demand and a drop in overall market share (2023 compared to 2022). CBRE expects future growth in 3PL will likely be due to growth of e-commerce and as companies explore alternative strategies to store inventory and fulfil logistics requirements.

E-commerce specifically has had four major impacts on freight distribution in the United States. Besides changing distribution patterns and creating new logistics facilities, e-commerce has significantly affected real estate footprints and led to the vertical and horizontal integration of large e-commerce firms.

E-commerce has gained popularity partly due to real estate costs. Shifting inventory from stores to warehouses has altered the cost structure, leveraging reduced labour costs and rents. In the United States, the impact of e-commerce on the retail sector is more disruptive than in other countries because of the high retail space per capita (the highest in the world). Real estate valuation and the disruption of traditional retail structures is, therefore, significant in this context.

The Covid-19 pandemic also led to a surge in e-commerce, but growth seems to have plateaued post-pandemic in the United States and in Europe (CBRE, 2022). This stabilisation could have a long-term impact on e-commerce investment strategies and real estate needs. For example, companies that invested in urban logistics either through buying, renting, or leasing space to accommodate the surge in e-commerce activities during the pandemic may now have to adapt to the post-pandemic business climate to avoid unaffordable overheads. These insights from the United States underline the complex interplay between e-commerce, logistics, real estate, and urban development.

Balancing trade-offs

In general, optimising delivery times and costs while ensuring profitability and reducing environmental impact is challenging. Beyond the real estate pressures, transport costs and externalities, another aspect that impacts urban logistics is consumer behaviour. The race to shorter delivery times, in e-commerce for example, is partly demand driven by consumers. Consumers continue to demand affordable and readily available goods, leading to more frequent and customised deliveries, which in turn may necessitate certain hubs to locate closer to end receivers. Yet, it is also the supply side incentives which create the demand for this type of service, i.e. fast deliveries, often introduced at no extra cost, that leads to consumers expecting this service. “Free” deliveries and returns are widely available, creating incentives not only for more online shopping but for smaller, frequent orders (Giuliano et al., 2022).

Authorities need to understand logistics flows and the logistics sectors operating under their jurisdiction to find ways to balance trade-offs. This entails understanding all the variables including supply and demand pressures. Influencing logistics operations and consumer behaviour (which partly requires counteracting the influence of supply side actors) for net positive outcomes regarding liveability in urban areas remains a challenge. While influencing consumer behaviour, such as adjusting delivery time expectations, might be a potential avenue for reducing the logistics burden on cities, authorities can use land use planning, low emission zones and urban vehicle access regulations as tools to nudge industry in the right direction.

The link between e-commerce, out-of-home deliveries and parcel lockers

The growth of e-commerce and associated deliveries has put an intense spotlight on logistics in recent years with much of the thinking and regulations aimed to address the negative externalities associated with e-commerce. Along with home deliveries, a spectrum of out-of-home delivery options have also evolved specifically due to e-commerce. These include in-shop pick-ups, click and collect locations, drop-offs in residential lobbies, neighbourhood hubs, and parcel lockers in public spaces.

E-commerce

The emergence of e-commerce logistics hubs marks a significant shift in the traditional logistics paradigm. With the surge in online retail, hubs for post and parcels have evolved from conventional warehouses into sophisticated centres strategically located in urban and sub-urban areas. These locations are meticulously chosen to ensure proximity to consumer bases, expedite the final stage of the supply chain, i.e. last-mile deliveries, and enhance operational efficiency (Buldeo Rai et al., 2022).

E-commerce as a technological advancement and business model is an undeniable accelerator of “proximity logistics”, i.e. logistics close to the end consumer, although not the only reason (Buldeo Rai et al., 2022). The rise of e-commerce has amplified the need for dedicated urban logistics hubs due to

increased parcel volumes, shorter delivery times and personalised services. E-commerce logistics hubs serve the evolving demands of urban consumers. As e-commerce continues to expand, the evolution and innovation of these hubs remain central to meeting customer expectations, sustaining the viability of online retail in competitive urban settings and meeting environmental goals.

E-commerce hubs range from small-scale local pick-up points or microhubs within neighbourhoods to larger fulfilment centres managing higher parcel volumes. Their operations include order processing, inventory management, sorting and dispatching. Some hubs can store products and act as strategic points for coordinating inbound and outbound logistics. E-commerce businesses can rapidly and efficiently dispatch orders through specialised centres such as e-fulfilment, sortation and last-mile delivery stations.

Each component of the e-commerce system is intricately and hierarchically linked, enabling companies such as Amazon (see Box 2) to exert precise control over their supply chains. E-fulfilment centres serve as storage and order-processing hubs, while sortation centres facilitate the categorisation and routing of packages. Last-mile delivery stations, strategically dispersed, ensure swift and efficient delivery to the end consumer. The proliferation of e-commerce logistics hubs significantly impacts urban landscapes and real-estate dynamics. They drive demand for warehouse spaces, prompting the transformation of industrial areas and the re-purposing of existing structures. Moreover, their strategic placement influences real-estate valuations, with companies seeking locations that optimise coverage and minimise operational costs.

The need for spaces to accommodate parcels between delivery and pick-up times within residential buildings challenges urban real-estate design. The growth of e-commerce is forecasted to account for 32% of total retail sales in the United States by 2032 (CBRE, 2023), and this will increase deliveries to residential buildings. A 2022 study in California indicated that the primary location for delivery of online purchases is a person's private residence (Giuliano et. al., 2022). The time difference between parcel delivery and pick-up in multi-storeyed residential buildings averages around eight hours.

A study in Seattle, on how long residents take to pick up a package from a parcel locker installed inside a residential building (from the time the package was delivered) indicated the median time to pick up was 4.2 hours, and the mean was 12.5 hours (Ranjbari et al., 2023). This highlights that space to store parcels within residential buildings is required and will most likely grow in the future, affecting building design and potentially leading to repurposing residential spaces for parcel storage. It is critical for building managers and locker provider companies to collect information on residents' online shopping behaviours before deciding on storage space or a locker size and configuration for a residential building (Ranjbari et al., 2023).

E-commerce deliveries impact urban logistics differently from traditional logistics. Trips are shorter and more frequent, carrying smaller deliveries and operated by smaller vehicles, with a focus on areas that may not have been previously served with the same intensity or frequency, particularly residential areas. Understanding this impact – whether it stimulates new warehouse development, leads to retrofitting or redevelopment of existing spaces, or merely utilises current warehouses differently – is vital for sustainable logistics systems.

However, depending on the level of e-commerce penetration in a market, parcels may not be significant compared to other urban freight activities. While parcel logistics have an impact, other sectors such as waste logistics, construction or general retail logistics can impact the city significantly more in terms of vehicle movements and emissions (Ploos van Amstel, Walther et al. 2017, Topsector Logistiek, 2020). Policy makers tend to focus more on parcels due to their visibility and growth in recent years. It is useful to place parcel operations in the context of all urban freight activities to avoid overemphasising parcels in policy considerations. That said, some of the innovations and regulations developed to address e-commerce can be applied to other logistics sectors as well for better outcomes.

Box 2. E-commerce, freight distribution and real estate: Amazon's strategies in the United States

Amazon's strategies further serve as a case study of how large e-commerce firms are reshaping supply chains and the urban landscape in the United States:

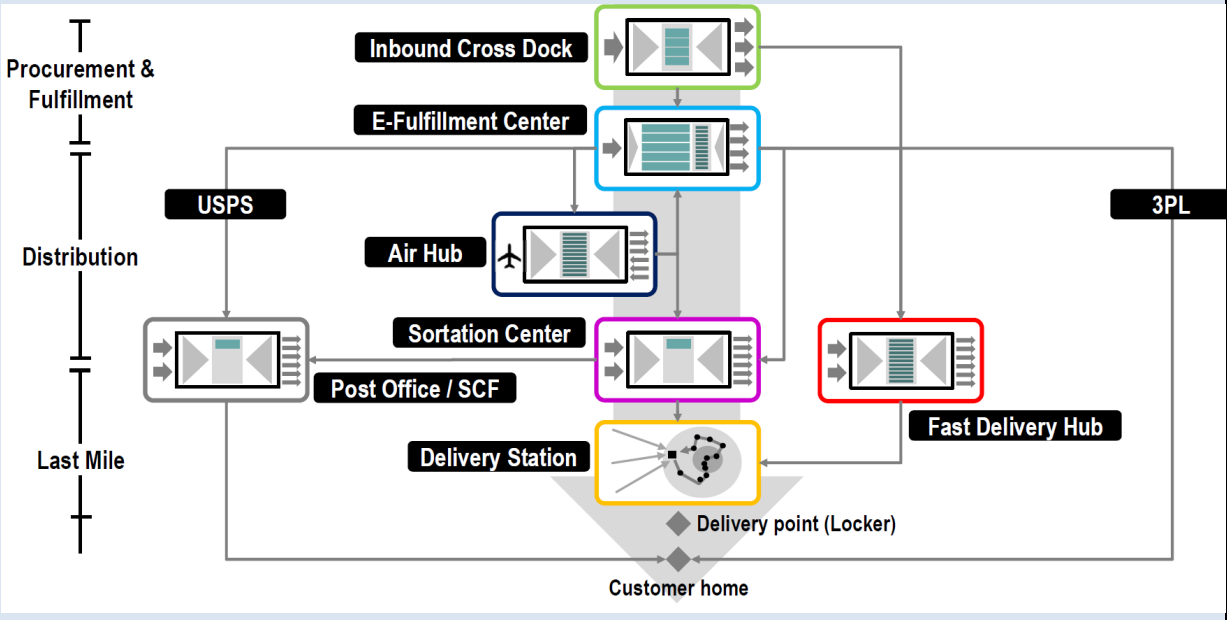
Amazon has established a complex distributional hierarchy (as shown in Figure 9), ranging from inbound logistics to e-fulfilment centres, sortation centres, and last-mile delivery stations. Controlling freight allows Amazon to optimise efficiency and resource utilisation across its facilities. Its real estate footprint consists predominantly of e-fulfilment centres, but the last-mile logistics facilities have grown substantially, representing about 40–50% of their footprint, costing billions annually.

Amazon's distribution facilities are strategically positioned across the United States, reflecting the country's population distribution and demographic centres, allowing maximum spatial coverage for efficient delivery. Its logistical facilities are specialised, each having a distinct role in the supply chain. The hierarchy replicates the supply chain, with different locational strategies for each element. Amazon's approach towards acquiring spaces for its facilities primarily involves leasing, with a preference for repurposing brownfield sites to limit its operations' environmental impact.

These insights further underscore the profound impact of e-commerce growth on real estate and logistics, especially with the rise of delivery stations and their spatial demands. There is a need for comprehensive planning considering owner and partner-operated delivery stations and sort centres in the logistics network.

There is a recognition, however, of the differences in consumer behaviour between regions, such as Europe and the United States, influencing the potential peak levels of e-commerce.

Figure 9. Internalising parcel deliveries: The distributional places of Amazon



Source: Rodrigue (2023).

Innovations and challenges in e-commerce

Innovation within e-commerce logistics hubs is pivotal for competitiveness. Focusing on enhancing efficiency and sustainability, these hubs rely heavily on technological integration. Automation and data analytics are deployed to optimise order processing, inventory management and sorting processes, ultimately enhancing operational speed and accuracy. Advancements in route optimisation algorithms and predictive analytics aim to minimise environmental impact by assisting parcel carriers in planning their routes better and reducing fuel consumption delivery costs. It also helps companies easily track, co-ordinate, and make on-time deliveries in dense urban areas with the available resources (Locus, n.d.).

As the e-commerce landscape continues to evolve, these hubs face the challenge of adaptability. Rapid changes in consumer behaviour, market dynamics, and technological advancements necessitate constant evolution and flexibility in operations. The future of e-commerce logistics hubs lies in their ability to adapt swiftly to meet changing demands, integrate new technologies and remain resilient in the face of evolving market trends.

Not all e-commerce activities take place in a hub. For example, the transhipment of e-commerce can occur on pedestrian pathways and curb sides. Receptions in residential buildings can act as storage space for e-commerce deliveries destined for residents, high-street shops double up as e-commerce distribution centres and can act as relay points where parcels are delivered to be picked up by customers. Parcel lockers placed in public spaces can temporarily store e-commerce deliveries for customers. Additionally, e-commerce has accelerated the uptake of alternative modes of transport, from walking deliveries to cargo bikes, motorbikes and mopeds (even in cities where mopeds did not exist before, e.g. New York) to private cars (e.g. Amazon Flex in US cities).

However, along with innovation, e-commerce also brings challenges. Challenges facing e-commerce logistics hubs revolve around land use, traffic congestion, sustainability and equity. The need for space in densely populated urban areas poses infrastructure and real estate concerns. Traffic congestion and environmental impacts due to increased delivery vehicles require shared delivery networks, micromobility options, and sustainable delivery methods. Alternative modes such as walking deliveries, mopeds, and private cars generate their own challenges – for example, road safety for vulnerable street users, or bicycle lanes clogged with cargo bikes. Collaboration between public and private actors can address some of these challenges around urban land-use planning, zoning and traffic.

One specific challenge concerns the speed of delivery for e-commerce versus emissions. The rise of faster delivery demands, from next-day to same-day or instant (within a couple of hours), stems from consumer behaviour and supplier offerings that have led to the expectation of shorter lead times and free delivery. These quicker deliveries necessitate different strategies for efficient logistics, which might conflict with reducing carbon emissions. However, the speed of delivery may not always be correlated with carbon emissions. Rather it depends on how logistics are organised and optimised. Speed can be achieved with proximity, since well-positioned facilities, including ULH, can reduce lead times and last-mile distances. Big Data in logistics helps anticipate consumer demand, leading to the positioning of inventory effectively, especially for large retailers or e-commerce companies (Holman and Creswell, 2023). As systems become more sophisticated, they enable more precise inventory management and potentially reduce carbon impact by storing products closer to consumers.

According to e-commerce companies such as Amazon, this strategy is adopted for fast deliveries: only items already stored in the nearest fulfilment centre, a few kilometres away from the destination, are offered for quick deliveries. While for items that are stored farther away, the option of fast delivery is not provided. Consumers may assume or perceive that products for which delivery takes longer are

transported sustainably. However, that may not always be true. Long-distance trips are particularly hard to decarbonise for freight and passenger transport compared to the last mile (ITF, 2023). Deliveries that are transported over a longer distance could have a higher carbon footprint than products transported over a short distance from a hub close to the consumer, especially if the mode is sustainable.

Nevertheless, an in-depth analysis is required to get an accurate picture of the carbon footprint of e-commerce deliveries, including the first and last miles. If the first mile involves long-distance transport from manufacturing centres or international shipping (even with large volumes of goods consolidated), it might contribute more to the overall carbon footprint, despite the product being stored close to consumers and delivered sustainably for the last mile. Additionally, if a large e-commerce company leases a warehouse closer to an urban centre to ensure faster deliveries regardless of the origin of the products, other retailers may then be expected to offer the same lead times, as consumers perceive that to be normal, resulting in more fragmentation of deliveries.

While there is no definitive answer to whether the first mile or the last mile has a larger carbon footprint for a product, the last mile is generally considered to produce more emissions due to the fragmentation of loads and deliveries. Even if the last mile may be easier to decarbonise than the first mile, there is still the need for in-depth analysis over the entire supply chain. Beyond emissions, there is an agreement that the last mile is more impactful from a health and safety standpoint, since the operations are in urban areas, where people live, shop and work. The impact of fast deliveries must also be analysed vis-a-vis government initiatives promoting active travel, congestion reduction and curb management in city centres.

Out-of-home deliveries and parcel lockers

The spectrum of out-of-home delivery options include in-shop pick-ups, click and collect locations, drop-offs in residential lobbies, neighbourhood hubs and parcel lockers in public spaces. When urban logistics is consumer driven, there are two forces at play: retailers and their logistics service providers bring goods into the city (and potentially to a consumer's home); consumers collect the goods (potentially without any movement right at their doorstep, or to where the retailer dropped off the goods). Less transport by one force may result in more transport by the other force. Depending on the sustainability of mode choices by either force, the net effect can be positive or negative. Most research typically tends to include only one force, leading to an incomplete and incorrect view on the overall situation. This will be demonstrated further in this section in case of parcel lockers.

Parcel lockers have emerged as another option for out-of-home deliveries, addressing consumers' evolving expectations for convenient, secure, and flexible delivery options. These lockers serve as nodes strategically positioned in public spaces, train stations, retail establishments and residential areas, offering a secure intermediary point for parcel pick-ups and returns.

One of the major advantages of parcel lockers is their versatility and accessibility. They cater to evolving consumer preferences for flexible delivery options by providing a convenient alternative to home deliveries, suiting busy lifestyles and eliminating the challenges of missed deliveries. Proponents claim that parcel lockers contribute significantly to optimising last-mile logistics by reducing delivery times (Ranjbari et. al, 2023a), potentially reducing the total number of stops in a delivery vehicles' route, consolidating delivery points, as well as minimising the environmental impact of multiple delivery attempts. Their integration into public spaces and retail environments potentially enhances customer convenience and presents opportunities for businesses to increase foot traffic and customer engagement by serving as additional service points (Dobber and Buijs, 2023).

However, research also challenges the suggestion that pickup points are a universally sustainable alternative to home delivery. One study, from the Netherlands, analysed the impact of out-of-home delivery options on customer travel. This study reveals that mode choice is strongly influenced by distance. For example, if the trip to a parcel locker is more than 400 metres, more than 10% of customers take the car and may collectively emit more carbon than the delivery vehicle saved (Niemeijer and Buijs, 2023). Such travel behaviour is also confirmed in studies from France (Gardrat, 2022; 2024) and the United States. (Giuliano et. al., 2022). In the US study, shoppers who use parcel lockers in the Los Angeles area were surveyed and it was found that 67% drive to a locker. Ultimately, the increased customer travel by automobile to reach pick-up points could outweigh the efficiency gains in delivery routes regarding CO_2 emissions and vehicular movements. Hence, it is crucial to factor in consumer travel to pick up parcels when assessing the overall impact of out-of-home delivery options (ULaaDs, 2023). Additionally, the request by businesses to install parcel lockers in public spaces has also raised concerns among municipalities regarding the use of public areas, emissions and vehicle nuisances.

Nevertheless, there are opportunities associated with parcel locker implementation. Studies suggest that while parcel lockers offer a promising solution, their success relies on strategic placement, efficient management and integration into broader urban logistics frameworks to maximise their effectiveness and sustainability. One example is a project in the city of Groningen involving a holistic analysis of existing infrastructure for out-of-home delivery options. By mapping existing and potential delivery points, urban density, potential hotspots for delivery demand, frequently used pedestrian and cycle routes, and how this all connects with the city's preplanned mobility hubs, the city aims to identify suitable locations for lockers, considering various factors such as accessibility and social impact (ULaaDs, 2023).

TO summarise, there is a need for thoughtful planning and collaboration between municipalities, different departments within local government, private companies and stakeholders to address concerns regarding utilising public spaces, emissions and vehicle congestion. Moreover, the evolving landscape of consumer behaviour and the impact of parcel locker usage on travel distances and carbon footprints emphasise the necessity of comprehensive assessments to ensure the net environmental benefits of these systems. Some indicator is necessary to quantify the combined effects of increasing urban density, accommodating ever shorter delivery times and circularity ambitions to know how necessary and how possible it is to regulate urban logistics.

Policy insights

- E-commerce and parcel deliveries are only one part of urban logistics, which also includes facility services, waste logistics, construction and other general cargo movement. Policy makers need to take into consideration all aspects of urban logistics.
- While much of the thinking about improving logistics started in e-commerce, this can now drive developments in the other segments.
- An in-depth understanding of the complexities associated with urban logistics hubs is essential for policy makers and authorities in order to find potential solutions.
- Logistics providers transport goods into cities, while consumers either receive goods at their doorstep or travel to pick them up from designated locations. Less transport by one party may result in more transport by the other party. Depending on the sustainability of mode choices of providers and consumers, the net effect can be positive or negative. For a complete analysis researchers and policy makers must consider the travel by both.

The benefits and challenges of urban logistics hubs

Although every city has its unique characteristics, many encounter comparable logistical hurdles. As population density and economic activities grow, the need for goods and services escalates within urban landscapes. Moreover, the rise in e-commerce has been rapid. In the United States, the market share of online shopping has increased from about 3.7% in 2008 to 9.5% in 2018 and 13.5% in 2021 (Giuliano et. al., 2022). The annual rate of growth of online shopping sales has been around 11–13% since 2011, much greater than the rates for total retail sales of 3–4%. The global market share of online shopping among retail sales was estimated to be nearly 20% in 2021 with a value of nearly USD 5 trillion (Giuliano et. al., 2022). Consequently, this increases the demand for transport infrastructure and the acquisition of land for logistics operations and warehousing.

Getting closer to consumers can be costly – urban industrial properties near population nodes often tend to have higher land values and compete for alternate uses or redevelopment. However, having the right last-mile location could potentially have enormous savings for businesses, realised by delivery and transport efficiencies. The last-mile locations could also reduce the negative externalities associated with urban freight movement either by reducing the number of vehicles or enabling the switch to more sustainable modes of transport, making the case for urban logistics hubs (ULH) compelling. This chapter will further discuss the benefits and challenges associated with ULH.

Firstly, it is necessary to acknowledge that challenges are embedded within urban logistics itself and these are perceived differently by various stakeholders. For example, from the public authority perspective, one of the main challenges is the issue of negative externalities associated with logistics. Global freight emissions are expected to continue to grow, with road freight accounting for the majority of the emissions (ITF, 2023). Tailpipe CO_2 emissions from heavy-duty vehicles have been increasing rapidly since 2000, with trucks accounting for more than 80% of this growth (IEA, 2023). While nearly three-quarters of the world's cargo is carried by ocean-going ships, road freight can emit more than 100 times as much CO_2 as ships carrying the same amount of freight the same distance (Greene, 2023). Additionally, traffic congestion, road crashes, air and noise pollution are associated with road urban logistics that authorities feel pressured to address. Although only 15–25% of urban transport kilometres travelled can be attributed to goods vehicles, they occupy 20–40% of motorised road space and are responsible for 30–50% of air pollutants (Smart Freight Centre, 2017, Logistics City Chair, 2023).

Other considerations include the logistics industry's slim profit margins, leading to choices among different operators that may not always align with broader liveability goals. There is also the question of the urban real estate market's impact on logistics which includes issues of inflexibility and lack of adaptability. Additionally, the trend-driven nature of logistics, driven by factors such as sudden viral product demands, often influenced by retailers or a global response to a pandemic, highlights the sector's uncertainties in some cases.

From a business perspective, the final link in the logistics chain is the costliest. For parcel deliveries, the last mile usually accounts for about 50% of distribution costs (Rodrigue and Dablanc, 2020). High consumer expectations for fast delivery and the supply side push to generate and accommodate such demands are increasing pressures on wholesale distributors to shorten the last-mile delivery timescales (Shah, 2023). Delivering in high-density urban areas also poses the challenge of longer delivery times, increased transport energy consumption and navigating urban regulations such as the Urban Vehicle Access

Regulations (UVARs) in the European Union. Moreover, while some last-mile deliveries can be completed by cargo bikes and light electric freight vehicles, larger logistics demands for shops, construction sites and waste collection often necessitate larger trucks (TNO, 2023).

Authorities sometimes assume that logistics service providers are not organising existing flows efficiently if they do not drive into cities with a full cargo. However, most logistics service providers will organise logistics as efficiently as possible within their existing constraints, such as the commodity being transported, operational requirements (return of packaging), customer time windows and commercial agreements (TNO, 2023). Conflicts of interest arise due to seemingly different objectives. The rise in emphasis on zero-emission zones and urban liveability increases the awareness of logistic vehicles in cities and the perception of their impact on liveability. Some concerns around urban logistics are emissions, congestion and space requirements. Even if there is a complete shift to zero-emission vehicles, spatial concerns remain both in terms of real estate and road space. Hence, urban logistics is not only a traffic issue but also a spatial issue. This is where urban logistics hubs, as a potential solution, come into play.

The benefits of urban logistics hubs

ULH in urban areas can facilitate the bundling of freight and the use of zero-emission transport services. For example, from 2025 onwards, nearly 30 major urban areas in the Netherlands will be pushing for a gradual ban on fossil-fuel-powered commercial vehicles (TN0, 2023). ULH can support this transition by providing a platform for carriers to purchase zero-emission transport services for deliveries inside urban areas. In this case, individual carriers may not need to deploy electric vehicles themselves (TNO, 2023). In fact, ULH are not just a benefit but are essential for the introduction of small scale zero-emission vehicles and cargo bikes for multimodal urban distribution.

Hub location can also play a role in reducing CO_2 emissions. A case study regarding Chronopost (a post and parcel service provider) in France highlights the importance of hub location. The comparison between a Chronopost hub inside Paris and one in a sub-urban location showed significantly reduced emissions (74 tonnes CO_2/year versus 151 tonnes CO_2/year) due to fewer vehicle kilometres travelled (Dablanc, 2023b).

From the city's perspective, ULH seem to be the optimal way to organise supply in the city and improve liveability. For example, the Municipality of Rotterdam utilised a toolbox, developed by a non-profit research organisation, TNO, to project the spatial needs for hubs by 2030 (TNO, 2024). This estimation relied on identifying trips that feasibly could bypass entering the city through measures such as bundling while considering factors such as access regulations, barriers faced by carriers, and the value these hubs provide to end customers. Their analysis indicated potential reductions in van trips (about 12% of total urban traffic) by around 12% and lorry trips by about 5%.

To determine the space requirements of hubs, TNO differentiated between various types of goods and services flows. For instance, hubs catering to fresh goods differ in spatial needs from those catering to construction and services sectors or construction hubs. Moreover, many logistics hubs are increasingly being used as urban distribution centres, especially following an increase in the home delivery of both parcels and groceries (TNO, 2024). This underscores the necessity of developing hubs with precise functions in suitable locations.

Ideally ULH should offer value proposition beyond mere transhipment of goods and develop multifunctionally to offer broader services to users and the immediate neighbourhood. (TNO 2023).

The challenges of urban logistics hubs

Despite ULH in all its forms providing a potential solution for minimising the adverse impacts of urban freight activities, they have their own unique challenges, some of which are summarised below.

Competition for urban space

As urban space becomes increasingly scarce, logistics represents one of the numerous stakeholders vying for a slice of the pie. Increasing real estate prices, low vacancy rates and limited industrial land in city locations are a concern for public authorities and logistics players. While dedicating public urban spaces to logistics may not yield the highest revenue, its absence could lead to adverse transport externalities.

Liveability challenges

While reducing regional freight traffic overall, ULH tend to make local impacts more visible and more concentrated in cities, including noise and emissions from vehicles that supply them, especially larger trucks. Noise is particularly an issue for residents, and it partly explains why dark stores have been expelled from many city centres in Europe.

Flexibility in long-term planning

Real estate planning, characterised by long horizons, often clashes with the highly dynamic nature of the logistics sector. The capacity to swiftly modify or dismantle urban logistics hubs becomes a critical element in sustainable urban planning. Moreover, the time required for getting building permits from authorities and upgrading infrastructure for brownfield and greenfield sites, which can take several years, is also an impediment to swiftness.

Harnessing urban logistics data

The integration of technology and data usage in logistics operations raises concerns about data privacy, cybersecurity and data sharing. A wealth of data on urban logistics exists but remains scattered across various research organisations and local authorities. Privacy concerns, especially in the EU context, pose significant challenges to collecting, disseminating and applying this data for effective urban logistics spatial and traffic planning. On the one hand, public authorities can ask for very precise data from logistics companies, raising challenges in terms of business sensitive data and the sheer volume of different companies. On the other hand, using readily available (public) data is also challenged at times by the private sector, citing privacy concerns, even though much of that data is gathered through public funding. Policy makers need to establish guidelines that navigate these challenges, especially for the use of readily available public data, by ensuring data security, ethical data use, and interoperability across various systems.

Value creation

Another challenge involves aligning the hubs' value proposition with the needs of logistics chains and integrating them effectively into existing logistical systems to increase revenue streams. While current hubs might offer limited value in existing logistics chains, they should evolve to provide broader services appealing to various users, not just carriers. This could involve processing return flows, generating energy, and implementing charging strategies for zero-emission logistics.

Co-ordination and collaboration

Effective urban logistics often requires collaboration among multiple stakeholders, including logistics companies, local authorities, infrastructure owners, transport operators and civil society. Academia and think tanks can also provide valuable research for the sector. Policy makers need to facilitate and incentivise such collaboration, which might not be straightforward due to divergent interests among stakeholders.

Balancing regulations

The complex regulatory landscape governing urban logistics hubs poses challenges for policy makers trying to adapt regulations to meet the dynamic demands of ULH. Policy makers need adaptive policies that balance operational requirements of logistics facilities with community interests, i.e. considering noise, traffic, environmental impacts, and land use policies.

Regulatory considerations

Adapting regulations to accommodate the dynamic demands of urban logistics hubs poses several challenges for policy makers. Some of these regulations and their associated challenges include:

Zoning and land use

Existing zoning and land use regulations might not align with the need for specific spaces for micro-mobility hubs or last-mile distribution centres. These hubs require specific infrastructure and spatial requirements that might conflict with existing zoning regulations especially in dense urban areas. For example, zoning regulations may prohibit logistics activities in buildings that include housing, even though commercial activities are sometimes permitted on the ground floor.

Infrastructure and accessibility

Urban logistics hubs need accessible locations for efficient operations, which might conflict with existing infrastructure layouts or accessibility norms, such as the height of a vehicle delivering to an ULH, or overnight truck deliveries that facilitate daytime cargo bike delivieries, or the installation of electric vehicle (EV) charging points.

Emission standards, vehicle usage and noise pollution

As the industry shifts towards low-emission or zero-emission vehicles for last-mile deliveries, regulations around emissions standards, vehicle usage, noise pollution and access to certain areas based on vehicle type become essential. Policy makers face challenges in updating and legislating these standards to promote greener transport modes.

Regulatory flexibility and innovation

Regulations can at times lag behind technological advancements in logistics, while at other times authorities may set deadlines or timetables, for instance related to zero-emission vehicles, that may be difficult for some subsets of the logistics sector (e.g. truck operators) to comply with due to the lack of zero-emission vehicles available at scale or inadequate charging infrastructure. Policy makers face the challenge of crafting flexible regulations that encourage innovation while ensuring safety, fairness, and compliance.

Fragmentation of traffic regulation

Traffic regulations, varying by location, heavily influence logistics operations, from vehicle specifications to delivery times. These regulations can be fragmented, i.e. different cities/metropolitan areas adopting varying regulations, as is seen in the EU single market context. The fragmentation of regulations, rather than their harmonisation, poses challenges for logistics operators in terms of operational compliance. In the European Union, logistics operators often demand the harmonisation of regulations, while cities demand the right to develop context-specific policies (Halpern and Ray, 2022) which can lead to disputes between stakeholders. In addition, information on vehicle restrictions from local authorities should be made easily accessible online on municipal websites so that those can be integrated into logistics navigation systems to optimise routing.

Supply chain and delivery models

The dynamic nature of supply chains and evolving delivery models, such as the integration of river-based deliveries or micro-mobility solutions, requires regulatory frameworks that can accommodate diverse and evolving business models.

Beyond the above-mentioned challenges, it is also important to highlight that logistics issues can vary between large cities and smaller urban conglomerations, as well as between high income countries and low- and middle-income countries. For example, last-mile delivery in the European Union is typically undertaken by trucks. Last-mile delivery trucks, such as parcel delivery vehicles, represent one of the most significant heavy-duty vehicle segments by sales volume in Europe, as vehicles with a gross weight between 3.5 and 7 tonnes recorded an 11% market share in 2020 (Hussein et. al., 2022). In contrast, in countries such as Vietnam the number of motorbikes involved in last-mile delivery can be significant (VLI, 2021; Hoa, 2023).

Policy insights

- While urban logistics hubs face challenges, if planned and managed appropriately, they can offer many benefits.
- City authorities spend public money but are chronically underfunded for the range of tasks they perform; they therefore need to be equipped to fully understand freight and logistics.
- Authorities should be clear about their desired sustainability outcomes and adopt a collaborative model of engagement with logistics providers.
- Governments should build capacity to understand freight and logistics fully and facilitate a productive dialogue between stakeholders for improving urban logistics outcomes.

Learning from existing frameworks

In addition to the challenges discussed in the previous chapter that can apply to urban logistics in general, urban logistics hubs (ULH) also face some specific challenges. However, these can also be part of the solution for the challenges faced by urban logistics. While there are no universal solutions, this chapter discusses insights that can guide the development of ULH. These insights are gained from case studies from global cities and regions, feedback from experts and desk research. Context-specific challenges, however, would need to be analysed and addressed accordingly.

Strategies adopted by global cities and regions

Existing logistics frameworks can provide potential guidance for public authorities in their respective contexts.

The case studies outlined in this section include advanced economies and emerging markets and hence showcase a variety of context specific challenges and solutions adopted by authorities. In some contexts, the emphasis is on integrating land-use planning with transport strategies to create efficient urban logistics hubs. Some cities have already implemented zoning policies and regulations to encourage the use of low-emission vehicles and have designated specific areas for logistics activities.

Other examples of measures that address the increasing demand for urban logistics hubs include developing brownfield sites, incentivising mixed-use development, retrofitting and repurposing existing buildings, and using unused spaces in cities (e.g. spaces under elevated highways). Authorities in some cities have also deployed reduced parking, congestion charging and curbside management to manage urban freight traffic more effectively while encouraging the development of microhubs within core urban areas. For detailed descriptions of the case studies see ITF (2024).

Tokyo, Japan

Tokyo copes with the increasing demand for logistics by strategically allocating land. The city utilises traditional port areas, industrial zones and locations along sections of the city's ring road for logistics facilities. Tokyo's zoning regulations prioritise last-mile delivery facilities in various land use zones, including residential areas, encouraging smaller delivery stations that employ cargo bikes and hand carts.

Strict parking laws, enforced by private companies, push for non-vehicle modes of transport, reducing reliance on traditional polluting vehicles. While the location of delivery stations is not strictly regulated, parking and curb use are monitored to influence logistics activities. Tokyo's logistics management involves collaboration between national, metropolitan and local authorities. Municipalities handle permits for large logistics facilities, and there is shared co-operation in addressing the growing demand for urban logistics land use. Innovations include national laws supporting the renovation of existing logistics facilities for improved energy and operations efficiency and the development of autonomous vehicle technology for deliveries (Sakai, 2023).

Paris, France

The City of Paris does not directly invest in land for logistics use but uses regulatory zoning tools such as zones urbaines de grands services urbains (UGSUs, major urban services zones), plans locaux d'urbanisme (PLUs, urban zoning plans) and périmètres de localisation logistiques (logistics location perimeters) to stimulate private sector development and manage the scarcity of urban logistics space. These tools designate areas for mixed-use logistics hubs, encourage modal shifts and specify locations promoting urban logistics spaces within real estate developments.

The city allows the development of underused areas, such as under elevated road structures or unoccupied parking facilities, into logistics spaces. Paris allows flexibility by requiring logistics structures on public land to be built in such a way that they can be dismantled and recycled at the end of the lease period, if required. The city retains ownership of the land, which is leased for 12 years. It is possible to dismantle and recycle the structure at the lease's end if the city decides against continuation. This tool allows flexibility in a dynamic logistics market that evolves quickly, and success depends on adaptability.

However, these tools have limitations. Not all sites pre-identified for logistics use are developed as such. For instance, in the PLU, 62 sites were identified for logistics facilities in 2016, leading to 15 applications. Only seven projects with a logistics component were developed (APUR, 2020). Nevertheless, the city promotes multimodal transport, using the river Seine for freight and cargo bikes for last-mile delivery. The city's zoning laws emphasise last-mile stations in mixed-use sites and offer combinations with housing or offices, demonstrating a proactive approach to logistics integration into urban areas (Nicol, 2023).

London, United Kingdom

London's last-mile logistics sector faces challenges related to the overall scarcity and uneven geographical spread of industrial land and logistics space. Last-mile hubs in London, particularly in sectors such as parcel delivery, meal delivery and grocery centres, have expanded significantly, driven by increased online orders, especially in the post-pandemic period. However, the lack of existing (and available) facilities, coupled with limited urban land availability and the high costs of new development, make effective management and development of urban logistics sites even more challenging.

Current planning regulations treat all industrial and logistics uses as one broad category, separated from other land use categories, and applying for any change of use is time-consuming and costly. The "Spatial Development Strategy for Greater London" or London Plan 2021 (Mayor of London and London Assembly, 2021) aims to address these challenges by promoting diverse industrial functions, protecting strategic industrial locations, assessing industrial land release based on vacancy rates, designating locally significant industrial sites, and encouraging industrial intensification, co-location and substitution to ensure sufficient industrial and logistics capacity to support the city's growth (Allen, 2023).

Rotterdam, the Netherlands

Rotterdam manages logistics within limited city space, integrating it with long-term planning and emphasising efficient hub space utilisation. As a framework, efficiency takes centre stage. This efficiency extends beyond traffic management to the optimisation of commercial spaces for logistics. The city of Rotterdam requires quantifying hub space requirement with the guiding principle being as little as possible, but as much as necessary.

In addition to reducing logistic traffic, the focus is on increasing resource and asset utilisation efficiency. For example, the framework encourages commercial urban space to be used primarily to serve the city,

rather than regional distribution. Co-ordinating across city departments, Rotterdam dedicates human resources to urban logistics. Moreover, experimental initiatives such as high-frequency waste collection and development of small hubs test diversified logistics approaches, balancing different hub sizes and vehicle frequencies while considering public space usage. The city aims to integrate logistics with urban functions and differentiate between logistic and passenger vehicles, understanding the essential role of certain logistics vehicles (Streng, 2023).

São Paulo, Brazil

São Paulo grapples with rising e-commerce demands and the need for urban logistics hubs while facing challenges due to administrative hurdles, land scarcity and labour shortages. Real-estate developers proactively respond to the need for logistic spaces by acquiring and repurposing properties on brownfield sites, for example by retrofitting old factories and properties into spaces suitable for sorting, cross-docking and last-mile operations.

This has become a preferred strategy due to its speed and efficiency compared to starting lengthy greenfield construction projects. According to the non-profit Brazilian Association of Logistics (Abralog), São Paulo currently has 300 000m^2 of retrofitted buildings but anticipates an additional 500 000m^2 by the end of 2024. Collaboration between public, private and academic sectors is seen as crucial for logistics innovation in Brazil (Moreira, 2023).

Viet Nam

The logistics industry in Viet Nam is rapidly growing, with an annual growth rate of around 16%. The sector contributes significantly to the country's gross domestic product (GDP), currently around 4%. The central government has a master plan to develop the logistics sector further to increase its contribution to GDP. According to a Vietnam Logistics Research and Development Institute study (VLI, 2021; Hoa, 2023), three predominant operational models exist within Viet Nam's urban logistics sector: traditional retail, e-commerce and manufacturing/construction. Each has its unique challenges related to cargo flows, stakeholder involvement and space utilisation.

According to the study, warehouse space within urban areas is limited due to a scarcity of land. Rapid urbanisation also creates high demand for cold storage facilities in major cities. Big companies tend to own some large-scale warehouses and outsource small warehouses to increase flexibility and reduce warehouse investment costs (VLI, 2021). Additionally, property owners serving the logistics industry typically do not want to sign long-term warehouse lease contracts, preferring to be able to switch to other real-estate businesses, leading to very high risks for warehouse tenants. Trucks and motorbikes are the primary modes of transport for urban logistics, accounting for 69% and 25% of modal share, respectively. Bicycles account for approximately 3% (VLI, 2021).

The number of motorbikes involved in last-mile delivery is significant. Traffic congestion, load limits, time constraints and lack of storage space in big cities pose challenges for urban logistics activities (VLI, 2021). To overcome these challenges the solutions recommended by the Vietnam Logistics Research and Development Institute include the adoption of new technologies, incentives, and subsidies from the government to develop infrastructure. The adoption of road pricing in urban freight transport, developing city access regulations and last mile solutions such as deploying environmentally friendly vehicles as potential solutions are also being developed by the national logistics sector (Hoa, 2023).

Location, spatial and infrastructure requirements

To effectively serve urban areas while minimising congestion and environmental impact, ULH require strategic placement and spatial proximity to consumers. Choosing the right location for urban logistics hubs, including microhubs, is an important part of logistics hub planning. Ideally the location of ULH should minimise operational costs and logistical challenges while ensuring alignment with municipal regulations and community needs. The decision involves considering various factors such as demand (how many people live, work or shop in the proximity of a hub), infrastructure (roads, paths for pedestrians/bicycles, traffic control measures, EV charging), land-use rules and the equity aspects of investing in (underserved) communities. These factors should then be balanced against logistical factors such as delivery distances, speed, costs and the types of vehicles used.

Several studies have investigated the optimal places to set up logistics hubs, specifically microhubs within cities that cater to national or local chain stores, local retailers and restaurants, and small online retailers that have no other choice but to offer rapid and flexible delivery options to compete with major e-commerce retailers (Katsela et al., 2022). These studies reveal that choosing the right location is not just about minimising costs. Optimal solutions frequently intersect with constraints such as lease expenses, ease of access for delivery vehicles and space for loading/unloading. Considerations also extend to amenities including utilities, internet connectivity, environmental protections as well as rest spaces/break rooms for workers. Road access, particularly concerning commercial vehicle operations, remains a critical aspect. Moreover, logistics hubs function not solely as goods consolidators but also as nodes for various vehicle types, wherein the choice of last-mile mode significantly influences localised impacts. Hence, a comprehensive approach entails accommodating cargo bikes within the hub infrastructure, necessitating safe and integrated infrastructure provision in the proximity of hub locations.

Some studies pertaining to microhubs indicate diminishing returns in terms of reductions in vehicle miles travelled (VMT) and pollution-related social costs, and marginal benefit following the initial establishment of a microhub, thereby suggesting limitations regarding subsequent scalability (Arrieta-Prieto et al., 2022). Conversely, alternative research suggests that establishing networks of microhubs in high-density market areas can reduce emissions rates from truck-based resupply trips (Urban Freight Lab, 2020).

The process of choosing a location often involves collaboration among city planners, delivery companies, and local residents. This involves rigorous analysis, including stakeholder inquiries, Geographical Information Systems (GIS) data assessment, and on-site inspections. Various frameworks have been proposed, for example, focusing on parameters including relevance, suitability, and feasibility, which determine the appropriateness of a ULH location vis a vis market demand, logistical ease of access, stakeholder buy-in, and resource availability (Janjevic and Ndiaye, 2014). Real world examples of ULH projects indicate that their chosen locations are based on several criteria. Some consider the preferences of transport providers or negotiate with landlords, while others opt for commercial districts or repurpose unused urban spaces such as parking lots (Katsela et al., 2022). Each location choice comes with its own advantages and challenges, catering to specific delivery needs or constraints of the businesses they serve.

While practical constraints occasionally supersede ideal placements of urban logistics hubs, these compromises do not necessarily harm the overall goals of the project, i.e. reducing VMT while completing on-time deliveries.

Stakeholder partnerships and community engagement

ULH initiatives bring together a diverse mix of players from different sectors – public, private, and civil society – to facilitate efficient urban logistics. Stakeholders such as retailers, transport providers, urban residents and end receivers, all share physical space within the urban context and interact even though some stakeholders may lack direct business ties to the hubs. Each of these partners plays a specific role in the hub framework and are exposed to both potential benefits and negative externalities. While the negative externalities are well documented, some positive externalities of ULH are discussed below.

For example, in the case of urban microhubs, which are defined as "facilities that are located closer to the delivery area and have a more limited spatial range for delivery than classic UCCs" (Janjevic and Ndiaye, 2014), retailers gain access to a cost-effective same-day delivery network that ideally uses sustainable modes of transport. This allows them to compete with larger e-commerce entities without the hefty upfront costs of establishing their own rapid delivery services. The microhub setup particularly benefits national or local chain stores, small-scale retailers and online shops striving to offer swift and adaptable delivery options (Katsela et al, 2022). Moreover, transport providers and third-party logistics providers stand to make multiple deliveries per run, potentially increasing their earnings, if logistics hubs with the required inventory are located closer to end consumer (Katsela et al, 2022). End receivers, on the other hand, can anticipate more accurate and flexible delivery schedules. Meanwhile, the broader society can benefit from reduced emissions, pollution and congestion, ultimately enhancing quality of life in cities. Additionally, improved active mobility infrastructure that caters to both freight and passenger movement, can increase safety for pedestrians and residents, and contribute to sustainable and liveable urban spaces.

Given the diversity among stakeholders and their interests, collaboration emerges as a critical factor for the success and sustainability of these projects. Early collaboration, especially between public stakeholders and transport providers, proves crucial, as transport providers might face disruptions and financial challenges due to costly transshipment operations in urban areas (Katsela et al, 2022).

The significance of community involvement in the planning process must not be ignored. Authorities, especially at the local level, must find strategies for engaging citizens. Addressing citizens' concerns, soliciting feedback, and integrating community perspectives into the planning and development of urban logistics hubs is necessary for long-term success, mitigating conflicts and even getting buy-in for public subsidy schemes for logistics.

Data for decision making

Robust data and metrics are necessary to inform urban logistics planning and decision making. While a wealth of data is already available on urban logistics, it remains scattered across various research organisations and local authorities. Although much of this data collection is publicly funded, it is not always readily available or used by public authorities. Getting a better picture of "what is" based on existing sources and through traffic counts or camera surveillance could be a top priority for authorities rather than requesting private companies for more new data (which could potentially be met with resistance over privacy issues or lead to overwhelming amounts of new data that may not always be relevant and local authorities may lack the capacity to analyse).

Research indicates some of the current gaps in data that exist. For example, in the EU context, vans account for a significant proportion of road traffic, particularly in urban areas especially due to the growth of e-commerce. However, within European countries there is a lack of national statistics on the type of use by vehicles with a maximum weight not exceeding 3.5 tonnes, commonly referred to as vans or LCV's (light

commercial vehicles). Most countries have figures on the number of vehicles and vehicle mileage but there is no information on what they are used for (e.g. for services, construction or parcel delivery), which companies and individuals drive vans, which elements determine vehicle choice, the tonnage or number of stops (Visser, 2023, Bokhorst et al., 2017). Unlike the use of trucks, the data collection on the use of vans is not an obligation for national bureaus of statistics. Hence this data is not always collected, and little is known about van use. Due to this lack of adequate statistical data, it is difficult to pursue an effective policy in the areas of road safety, the greening of freight transport, and the accessibility of urban centres.

The same goes for data on light electric freight vehicles – an umbrella term that refers to electrically powered or electrically assisted vehicles, including cargo bikes, that are smaller than a van and have a maximum loading capacity of 750 kg (Balm et al., 2018). Almost no data on total fleet size, the mileage driven, the number of stops and the use of these vehicle types is available. Data is also missing on deliveries done by private cars (e.g. Amazon Flex). Another gap is understanding how the increase in van movements compares to potential decreases in passenger car movements that are the direct result of e-commerce.

To overcome these gaps ideally national authorities can develop annual statistics to cover these areas. In the absence of national statistics, collection and aggregation of the data by local governments through traffic counts and camera surveillance (ANPR-data) can solve the data gap.

From a business perspective, quantifying the environmental impact of different delivery options to support transparency and consumer education could also influence sustainable logistics and consumer behaviour. However, the scarcity of data and standardised metrics currently makes validating claims on the sustainability of delivery methods challenging. For larger retailers, optimising stock management and anticipating consumer demand through AI and Big Data could help position goods close to consumers, resulting in shorter delivery distances ideally carried out by sustainable modes.

Consolidation and value addition

In principle, the transfer of goods should not incur additional costs without creating value or enabling consolidation, as costs will ultimately be passed on to the consumer. Consolidation at urban consolidation centres, microhubs or lockers is also crucial for the liveability of cities. However, challenges such as high costs (that include strategic planning, upfront investments, labour, vehicles and overheads), slim profit margins and low barriers for new entrants may undermine consolidation efforts. While microhubs within cities might alleviate some overheads due to the smaller space needed, focusing on value-added activities remains crucial for sustained financial health (Katsela et al 2022). Even with smaller hubs, when the number of premises and cross-docking increases, the total real estate required increases.

In urban consolidation projects, achieving break-even relies on parcel volumes or delivery densities to generate cost-effectiveness and economies of scale. The challenge is making costs comparable to regular last-mile distribution. Long-term sustainability becomes uncertain, especially when projects depend on public subsidies that eventually phase out. Empirical evidence shows that such projects fail when subsidies are lifted. Long-term implementation planning, and a comprehensive cost–benefit analysis should be conducted for urban consolidation projects whether they depend on subsidies or not (and more so if they do). It is important to note that not all urban consolidation hubs are operated by public agencies. One study conducted in 2019 of 62 active urban consolidation projects indicated that the majority of those that remained sustainable and economically viable were privately owned and operated (approximately 60%). The study emphasised the contribution of the private sector's expertise to the success of the projects, with many of them being operated by experienced logistics carriers, including DHL (Giampoldaki et. al., 2021).

Katsela et al. (2022), drawing on 17 empirical cases of microhubs from Europe and North America, identify the main activities necessary for sustained financial viability in urban consolidation projects, inckuding efficient collaboration between relevant agencies and stakeholders for project scalability; eco-friendly solutions to mitigate urban freight's environmental impact; streamlined freight handling; proper storage to maintain goods in perfect condition until distribution; quality control measures ensuring implemented solutions meet project scaling requirements; and tactical and operational planning for traffic, infrastructure, and logistics management to ensure safe, efficient operation and optimal resource utilisation. This research distinguishes microhubs from UCCs as having shorter distances to the end-customer and a smaller facility footprint appropriate to the spatial constraints in dense urban environments and includes both government supported and private led initiatives.

Value-added services play a critical role in the success of urban logistics hubs projects regardless of the type of hub. These services not only generate additional revenue but also enhance a hub's appeal, attracting more users. Examples of services include selling storage space, warehousing, managing fulfilment for retailers, reverse logistics, waste handling, charging stations for EVs, repair facilities and offering advertising space on vehicles or containers (Katsela et al., 2022). Other projects incorporate rest areas or locate logistics hubs near mobility hubs to attract users and enhance convenience.For example, B-Line, a Portland-based private cargo bike service, offers flexible warehousing and fulfilment services (including refrigerated storage) to third-party retailers. It also offers advertising space on their cargo bikes, capitalising on their environmentally conscious business model (B Line, 2024).

If zoning, land-use and access regulations are in order, private-sector initiatives can work even without much collaboration.

Last-mile delivery

As urban logistics, and especially last-mile deliveries, grows within cities, freight vehicles are shifting towards zero emissions and alternative modes such as cargo bikes and walking couriers. However, last-mile deliveries necessitate different strategies for efficient logistics, which might conflict with urban initiatives promoting active travel or curb management.

The allocation and use of curbside space play a role in urban logistics efficiency and sustainability. Cargo bikes and smaller vehicles occupy less curb space compared to larger vans on a vehicle-to-vehicle comparison, but not when considering the volume of goods being delivered. Depending on the drop volume, one van may drop more in one delivery compared to a cargo bike. For a larger volume, several cargo bikes maybe required. Moreover, vans generally park on the street (or at designated loading/unloading zones), whereas cargo bikes can be parked for loading/unloading in pedestrian areas. These issues prompt cities to consider how to manage curb space effectively.

Regulating different types of vehicles, from cargo bikes to larger vans, can impact the design and operation of logistics hubs, particularly microhubs, in cities. Regulations can dictate vehicle types, affecting consolidation efforts, real estate demand and logistics efficiency. While cargo bikes might be more suitable for some deliveries, they also require nearby hubs. At the same time, larger vehicles may be more efficient in certain areas but might intrude too much in others.

Nevertheless, the increase in online shopping and an overall change in urban lifestyle have greatly impacted the way last-mile logistics have shaped up in the last few years. Traditionally, these last miles are often traversed by fossil fuel-powered larger vehicles. These vehicles add to urban congestion, emissions and are associated with an increased likelihood of fatality in vehicle crashes (Dalla Chiara et al., 2023a).

Moreover, a study indicated that delivery drivers spend 80% of the time parked at the curb, while most deliveries are then completed by foot only for the final part of the last mile (Dalla Chiara et al., 2021). Carriers and cities are considering alternatives to traditional motorised vehicles to deliver goods due to the increased complexity of travelling the last mile and the pressure to reduce vehicle emissions in urban areas. The cargo bike is one of these alternatives (Dalla Chiara et al., 2023b).

Cargo bikes

Cargo bikes are bicycles that are specifically designed to carry cargo and lie at the intersection between micro and electric mobility (Dalla Chiara et al., 2023b). Cargo compartments come in a variety of sizes and shapes, such as open baskets, containerised boxes, heavy-duty panniers, and attached trailers (Dalla Chiara et al., 2023a). There is also variance in the load capacity and prices of these bikes (CCCB, 2019).

Cargo bikes have several advantages over motorised vehicles, especially in urban areas. They are more agile and manoeuvrable, allowing them to navigate traffic congestion and park closer to their delivery destinations (Dalla Chiara et al., 2023b). Depending on national and local traffic regulations, cargo bikes can also use bike lanes and pedestrianised roads, further reducing travel time. A pilot study in Seattle found that cargo bikes spend less time searching for parking than commercial vans and park closer to their delivery destinations, making more stops per tour and with shorter dwell times (Dalla Chiara et al., 2021, Rudolph and Gruber, 2017).

Additionally, cargo bikes are more affordable to operate and maintain than motorised vehicles (Dalla Chiara et al., 2023a). Another key advantage of cargo bikes is that they are zero-emission. This is important for reducing air pollution and GHG emissions in urban areas (Dalla Chiara et al., 2023a; Hettesheimer et al., 2021). One UK study has shown that cargo bikes have a much lower total social and environmental cost than motorised vehicles (Just Economics, 2022).

Conversely, one of the biggest disadvantages of cargo bikes is their limited cargo capacity (Dalla Chiara et al., 2023a). Cargo bikes can only carry a certain amount of weight and volume of goods, which means that they may not be suitable for all applications. Another disadvantage of cargo bikes is their limited range due to their reliance on batteries (Dalla Chiara et al., 2023b; Gruber and Kihm, 2016). This means that cargo bikes may not be suitable for long-distance deliveries. Cargo bikes also need to be stored closer to customers due to their limited driving range (Dalla Chiara et al., 2023b). This may require specialised infrastructure, such as secure parking areas. An increase in the usage of cargo bikes may also contribute to congestion on already existing bike lines and sidewalks (Dalla Chiara et al., 2023b). Additional disadvantages include the cost of maintenance, and their low attractivity to many potential drivers (it is already difficult to hire for freight deliveries in general, and for cargo bike deliveries in particular). Finally, cargo bikes may not be suitable for all weather conditions. Cargo bikes are typically open-air vehicles, so they can be uncomfortable or dangerous to use in bad weather or harsh summer/winter conditions. This creates a seasonal volatility that is not conducive to investments.

An innovative model of integrating cargo bikes into the transport system can be observed in Switzerland, where a company named Carvelo has enabled a system of e-cargo bikesharing all over the country (Heinrich-Böll-Stiftung, 2021). They have a fleet of more than 400 e-cargo bikes and electric minivans, available in more than 330 locations and a mobile application-based platform that facilitates the search, pick-up and return of cargo bikes (Carvelo, 2023). Another example is the “Commons Cargobike” concept, which provides cargo bikes to local communities for free, based on voluntary donations (Freie Lastenräder, 2024). The fLotte project in Berlin builds on these ideas and has made over a hundred cargo bikes available free of charge for local communities (fLotte, 2024).

Cargo e-bike adoption faces several challenges and barriers to entry, including limited infrastructure and unclear or hostile regulation (Dalla Chiara et al., 2023a). For example, in France, unlike other EU countries, bikes with more than three wheels are excluded from riding in bike lanes. This means that quadricycles, although widely used in EU countries within the logistics sector, are at a disadvantage in France, and face the same congestion as vans.

A first step for regulatory authorities would be to adopt and standardise a definition for cargo bikes and govern them with a framework different from the ones for standard bikes and e-bikes. This will enable local authorities to target cargo bikes with specific incentive programmes and policies (Dalla Chiara et al., 2023a). Moreover, regulation of the riders – both as gig workers and in terms of their road-safety training – must be considered. For example, there is no clear separation between food delivery riders and a large quadricycle (let alone a legal definition) and there are incentives for the riders (e.g. speed of delivery) which encourage riding on the sidewalk.

There is also a need to formulate routing algorithms for cargo bikes which differ from those used for trucks and vans, and such algorithms must take into account (Dalla Chiara et al., 2021): the availability of bike lanes to promote their use; avoidance of major routes for transport; avoidance of downhill driving on roads without bike lanes; avoidance of hilly streets with gradients impractical for cargo bikes with a full load; the width of sidewalks; and, the location of ramps to access the sidewalks. This may not be the most difficult challenge to overcome as some companies (see e.g. Cyke, 2024) are already providing such tools.

While this section focuses on cargo bikes, different modes for delivering freight are emerging that policy makers must consider. For instance, cars, mopeds and motorbikes are used increasingly for urban freight deliveries today. One of the other potential challenges faced by cargo bikes are in fact electric vehicles that are becoming ever more efficient and cheaper. Hence in the long term all these modes for freight delivery need to be considered, not just cargo bikes. All modes generate both positive and negative externalities including issues such as road safety, bike-lane traffic management, overuse of bike sharing schemes and so on.

Policy insights

- Authorities should integrate land-use planning with transport strategies to create efficient urban logistics hubs that provide consolidation, value-added services and facilitate the switch to sustainable modes of transport rather than mere transhipment of freight.
- Long-term planning for urban logistics should incorporate flexibility and reversibility as key principles to adapt to a fast-changing industry.
- All levels of government, especially local and metropolitan levels, should prioritise the use of existing data, collect additional data where necessary and develop better tools for simulation, modelling and planning for urban logistics.

Drivers of innovation in urban logistics

The private sector, aided by technology, is driving innovation in the logistics sector generally and in urban logistics hubs particularly. Economic factors and demand are driving "proximity logistics" in urban areas more than policies and regulations (Buldeo Rai et al., 2022). There are two opposing forces at play – sprawl and proximity logistics. These are context dependent, with technological innovation also influencing the balance. Nevertheless, city, metropolitan and national authorities must play a role in guiding the sector's sustainable development. This chapter will focus on the role of authorities, particularly cities, in sustainable logistics.

A recurring question is whether the public sector should take on more responsibility for logistics management, similar to public transport networks. This would include the role of procurement and the broader context of managing goods and consumer behaviour rather than just vehicles. Experts recommend that the public sector should not be involved in logistics management or the building and operation of hubs, where the private sector has the expertise to take the lead. Rather, the public sector should focus on governance, regulations and facilitate collaboration between stakeholders to address the negative externalities of logistics operations. The following sections elaborate on the roles of different levels of government in driving sustainability in logistics.

Cities as footprint managers

Since cities are the main centres of consumption and drivers of logistics, city authorities need to play the crucial role of "urban space managers" (Halpern and Ray, 2022) or footprint managers. While not all cities have the governance and technical capacities required to take on this role fully, some cities are already orchestrating the complex dynamics of urban logistics, managing space, regulations, infrastructure, innovation and societal needs to create an environment where logistics can operate and the quality of life for residents is not compromised. This does not mean that cities control all activities. Rather the market dictates activity in terms of how much space is dedicated for logistics compared to other uses such as housing.

Nevertheless, cities manage and plan space allocation within their boundaries. They decide how areas are zoned, including designating spaces for residential, commercial, industrial and logistical purposes. They also develop long-term policy and vision documents to guide development. Additionally, cities can regulate to optimise logistics efficiency and minimise negative externalities. For instance, external costs, not accounted for in logistics, can impact operational efficiency. Operators might not optimise their operations due to not bearing the full cost of externalities. External costs can be internalised through policies such as time and access restriction zones or waivers, influencing more efficient operations. Sometimes these may be a trade-off, especially with the "softer" elements of liveability. For example, time windows free up public space for people, but may negatively affect logistics efficiency (and CO_2 emissions if using polluting vehicles).

Urban logistics rely heavily on transport infrastructure. Cities invest in and maintain their transport networks that facilitate the movement of goods within their boundaries. Cities also manage road-space allocation within their jurisdiction (MORE, 2020). They can establish regulations and policies governing

urban logistics operations (Dablanc, 2023b). These can include curb space management, designation of (un)loading zones and delivery hours, vehicle size restrictions, emission standards, or congestion pricing, to manage traffic flow and environmental impact (MORE, 2020). Further, as the electrification of freight vehicles increases, cities may have to collaborate with the private sector to address the infrastructure requirements for charging such vehicles. Regulatory frameworks must ensure that logistics operations align with city goals related to sustainability, safety and liveability.

Cities can use financial tools for encouraging sustainable logistics operations. These can include long-term structural backing, favourable loans and infrastructure provision including electric charging, along with indirect support such as facilitating fleet electrification or digital innovation. Regulatory incentives, including preferential licensing, infrastructure access and delivery time windows, also play a significant role. While companies prefer incentive-driven strategies, regulatory mandates may be effective in steering some sustainable freight practices. Such regulations could encompass fee exemptions for sustainable practices or restrictions targeting non-compliant vehicles, encouraging freight consolidation (Katsela et al., 2022). However, policy makers need to consider that regulatory mandates may not always be effective in practice.

Lack of government awareness and early engagement with transport providers are hurdles to garnering public and private support for consolidation efforts (Katsela et al., 2022). Hence, cities must articulate clear sustainability goals and adopt collaborative engagement models with logistics providers for successful consolidation efforts.

The goal is to balance the needs of logistics operations. This could be achieved through collaboration, to increase understanding about the complex dynamics in logistics. City authorities must collaborate with various stakeholders, including businesses, logistics companies, community groups and national transport authorities. Collaboration helps in understanding diverse perspectives, develop effective solutions and implement initiatives that benefit logistics operators and city residents.

Urban logistics can impact residents in terms of noise, pollution and congestion, and therefore can be rejected by local communities (Buldeo Rai et al, 2022). Balancing these opposing needs requires an understanding of characteristics that are spatial (e.g. location in relation to residential and commercial areas, location that encourages multimodality), operational (e.g. management that supports multimodality, sharing, and consolidation), architectural (e.g. design to enable local acceptance and to support energy transition), and economic (e.g. financial evaluation of sites that are multi-tenant and multi-activity). (Buldeo Rai et al, 2022).

While cities should play a proactive role in adopting such policies and developing collaborative models, they need to be supported nationally. National governments can incentivise and empower city authorities. Cities should be encouraged to experiment locally through tactical urbanism and specific policy initiatives such as road pricing, ultra-low-emission zones or diesel bans. Cities could limit access rights in a variety of ways without additional barriers or regulations, for example through urban design, road-space allocation or reducing parking (Halpern and Ray, 2022). However, harmonisation of regulations and dialogue at the regional or national level is also essential for logistics operations.

Beyond traffic management, cities can play a role in supporting the development of logistics spaces by identifying sites where such operations can be carried out, as is being done by the city of Paris. Cities can also develop strategies similar to the London Plan 2021, which provides a framework for urban logistics in London through specific policies (ITF, 2024).

Cities that do not have sufficient technical and governance capacities can learn from other cities where such capacities exist. They may need additional support from their national governments or supra-national

entities such as the European Union to build capacity. In the European Union this is already being done through projects under the CIVITAS framework (CIVITAS, 2024). For example, the transformative role of cities is being examined in the context of the European Green Deal (Abdullah, 2021). Cities also receive funding through grants such as those under Horizon2020 (e.g. ULaaDs, 2024; MORE, 2020) to address specific issues of urban logistics and road space reallocation. Cities in the European Union are also encouraged to integrate their Sustainable Urban Logistics Plans (SULPs) with their Sustainable Urban Mobility Plans (SUMPs) to support harmonisation (Halpern and Ray, 2022). Unfortunately, there is no long-term repository of EU-funded projects focusing on lessons learnt, outputs or reports.

Logistics operations are dynamic and constantly evolving. The logistics landscape can vary within short periods due to changes in clientele, partnerships, or market dynamics. This variability complicates decision making concerning ULH locations. Hence, there is an ongoing need for comprehensive planning that considers various sectors, sustainability and future trends in both logistics and city planning. There needs to be some flexibility in the planning system (e.g. for the 12-year lease period offered for sites in Paris). From a business perspective, companies need flexibility to adapt to changing regulations and customer demands. While regulations can drive innovation and adaptation, a lack of flexibility might lead to companies facing significant challenges in adjusting their operations. Additionally, fragmented traffic regulations and logistics policies varying from city to city can hamper logistics operations. Public sector co-ordination (between cities and nationally) and public-private co-operation is essential for developing harmonised regulations and policies that benefit both logistics players and support boarder sustainability goals.

Research highlights the importance of considering the entire supply chain, not just urban logistics. It is essential for city authorities to align with how logistics operate in the global supply chain, particularly concerning the importation of goods. One possibility is to use simulation tools to understand how changes in logistics operations impact urban functionality and to define and measure efficiency.

Combining different planning scales, from urban land development to regional planning, is crucial from a public sector perspective for effective logistics planning, especially considering the impact of real estate markets and their influence on logistics. Additionally, the growth of e-commerce significantly impacts urban logistics demand. Understanding this impact – whether it stimulates new warehouse development, leads to redevelopment of existing spaces, or merely utilises current warehouses differently – is vital for sustainable logistics systems.

Cities can seek to optimise the potential mix of strategically positioned land owned by public authorities (e.g. unused railway tracks and yards, former warehouses or industrial sites, parking areas) or by logistics service providers in urban areas for developing a comprehensive strategy integrating transport, logistics, and land use (Horizon Europe, 2022).

Efficient policy making on urban freight logistics also requires cities to enhance their data management capabilities which includes collection and analysis of data. Understanding barriers and opportunities as well as developing local capacity related to data collection within the urban and peri-urban transport system is a first step in encouraging private and public organisations to share transport data (Horizon Europe, 2022). This data could be used to optimise sustainable urban logistics planning (SULPs), implementing Urban Vehicle Access Regulations (UVARs), including low-emission zones (LEZ), smart parking, dynamic space management and better traffic planning.

However, opportunity costs and the value of certain types of data should be considered carefully. Local authorities have limited resources. Trying to obtain highly detailed data from a vast number of private companies may be resource intensive, result in opposition from private companies or hesitation to share,

and may not be that useful without a broader framework for analysing the data. For many cities, getting a grasp of the logistics sector based on high level, readily available data may be a more fruitful avenue.

In essence, cities must act as footprint managers – managing road-space allocation and land use under their jurisdiction. They must enhance their data management capacities and upskill their understanding of freight dynamics and the complexity of integrating logistics into the urban fabric. Cities must frame logistics policies that effectively utilise political mandates and laws, as well as civil society concerns regarding logistics. Authorities can collaborate with industry partners, universities and think tanks to leverage knowledge and build dedicated in-house "freight teams" with expertise in logistics.

The role of national governments and supra-national institutions

The role of national governments in urban logistics hubs is to provide guidance, support and funding to lower levels of government, and give directives to the private sector to ensure that urban logistics and associated hubs are developed and managed in a sustainable manner. Currently there seems to be lack of adequate national support in some cases and understanding for local freight and logistics needs.

National governments can also play a role in defining and implementing urban policies and legislation for sustainable urban development (Urban Agenda Platform, 2024). They can set overarching policies and regulations that affect transport, infrastructure, trade and commerce. For example, in Viet Nam the national government has a master plan for developing the logistics sector further to increase its contribution to national GDP. In Japan, the national government and local municipalities co-operate and share ideas about accommodating the growing demand for metropolitan logistics land use.

Harmonisation of regulations is important to facilitating logistics operations. National governments are crucial in the process of harmonisation. They can recommend best practices to address concerns from the private sector without taking decision making away from local authorities. While logistics operators may prefer harmonised regulations to be set nationally or supra-nationally, it is also essential for national governments to empower city authorities to adopt context-specific policies where required, along with implementing national/supra-national policies. National and supra-national authorities can facilitate the discussion between all stakeholders as to how certain regulations can be harmonised across urban/metropolitan areas and across regions.

Encouraging collaboration between public and private sectors is another role for national governments. Governments can facilitate public-private partnerships to leverage resources and expertise for the development, maintenance and management of logistics hubs. Governments can offer incentives, tax breaks or subsidies to attract businesses to hubs. They might also provide support in terms of training, research and development to enhance the capabilities of logistics services. Addressing environmental concerns is increasingly important. National governments and supra-national institutions can encourage the adoption of eco-friendly practices, such as promoting green transport, reducing emissions, or creating regulations to ensure sustainability within these hubs. For example, the Trans-European Transport Network (TEN-T) policy is a crucial instrument for the development of coherent, efficient, multimodal and high-quality transport infrastructure supporting the efficient transport of people and goods within the European Union. The policy aims to make the network greener, more efficient and more resilient, in line with the European Green Deal and the Sustainable and Smart Mobility Strategy (EC, 2024a).

Facilitating data sharing among various stakeholders is another role for national governments. This could involve creating platforms or systems that enable the sharing of information relevant to logistics operations, promoting efficiency and co-ordination. Data protection laws can cause companies to be

hesitant in sharing data, however efforts to co-ordinate between public and private actors are still being made. For example, in 2022, the Indian Government launched its Unified Logistics Interface Platform (ULIP) as part of the National Logistics Policy (NLP) initiative (ULIP, 2024). ULIP aims to enhance efficiency and reduce the cost of logistics in India by creating a transparent, single window digital platform that provides real-time information, including monitoring of freight, to stakeholders. It ensures data confidentiality through end-to-end encryption. There is a public-private aspect to ULIP whereby the digital infrastructure development and governance is under the national authority, while the private sector develops the platform's end user interface (ULIP, 2024). In addition to enhancing logistics efficiency, ULIP can serve environmental goals by optimising routes and reducing the idle time of delivery vehicles. The national logistics policy also promotes multimodality, i.e. reducing the dependency on roads and shifting to railways and waterways that are currently underutilised and can potentially augment warehousing capacity by bringing products closer to consumption centres (Khan, 2022).

Another example of a data platform is Freight Logistics Optimization Works (FLOW), a public-private partnership among industry and government to build a forward-looking, integrated view of supply chain conditions in the United States. The programme was launched in March 2022 in response to supply chain disruptions and helps participants forecast how current capacity and throughput will fare against future demand. According to the US Department of Transportation (US DoT), participants use FLOW data to develop more responsive operations strategies to improve their supply chain throughput and resilience. The Bureau of Transportation Statistics (BTS) serves as the independent steward of FLOW participant information, ensuring data is confidential and secure (Bureau of Transportation Statistics, 2024).

Many traffic data platforms typically share open data collected by authorities, which is then made accessible to the public. This essentially involves data flowing from government entities to the private sector and broader public, rather than the reverse. For example, in the Netherlands, the Centraal Bureau voor de Statistiek (Statistics Netherlands) collects data from transport companies with fleets exceeding a certain size. These companies are required to provide these data. They include details such as origin and destination points, routes taken and the types of goods transported. However, the dataset is currently limited to trucks and larger vehicles. There is also an ongoing initiative for vans, but participation is voluntary and the project is still in its early stages.

Some Dutch cities also use automatic number plate recognition (ANPR) cameras to enforce access urban logistic regulations in zero-emission or low-emission zones. This practice has been in place since the introduction of such zones in cities. These cameras are linked to a database and can identify vehicle types entering the zone. To categorise vehicles by industry, their registration addresses are compared with addresses in the Chamber of Commerce database. However, such actions are subject to strict privacy regulations. Despite having information on vehicle types and industry, there is still a lack of data regarding the specific goods being transported, their quantities, and their origins and destinations. This gap underscores the importance of utilising modelling techniques.

In conclusion, national governments need to work in collaboration with local authorities, academia, think tanks and the private sector to align policies and visions, with the aim of improving liveability, reducing GHG emissions from freight transport and maintaining a competitive economy. Lastly, national governments need to increase knowledge, expertise and capacity, to support and guide other levels of government.

Policy insights

- While the private sector, aided by technology, is driving innovation, different levels of government have specific roles to play in the sustainability of urban logistics hubs.
- The public sector should ideally leave logistics management, the building and operation of hubs to the private sector, which has the expertise in these areas and can take the lead. The public sector should instead focus on governance and regulation, facilitating collaboration between stakeholders to address the negative externalities of logistics operations.
- While cities should be encouraged to experiment locally through tactical urbanism and context specific policy initiatives, harmonisation of regulations at the regional or national level is also essential for logistics operations.
- National governments are crucial in the process of harmonisation of regulations. They can recommend best practices to try to address concerns from the private sector without taking decision power away from local authorities.
- Dedicated freight teams with expertise in logistics are essential at all levels of government to frame policies and regulations that guide sustainable logistics operations.

Shared infrastructure and models of co-operation

This chapter discusses examples of collaboration between different stakeholders that underscore successful models for sustainable logistics operations. Experts suggest that the role of the public sector is to govern while the private sector should lead the construction, operation and management of logistics hubs. Nevertheless, there is potential for public-private collaboration for freight consolidation which is ultimately essential to mitigate some of the negative externalities of logistics.

Despite industry competition, carriers and third-party logistics companies (3PLs) can find advantages in consolidating shipments through shared resources and facilities. This usually tends to be individual shippers working with other shippers in a non-exclusive way. For example, the consolidation process in certain logistics sectors such as e-commerce requires specific areas where transport providers can organise and break down their shipments into smaller delivery units. Urban areas with limited curb space often necessitate shared staging areas due to limited parking or (un)loading infrastructure. Local authorities can facilitate improvements in staging areas that are commonly known in the literature as "shared drop zones", "proximity logistics spaces" or "nearby delivery areas".

One public-private cooperation initiative that aims to address this is New York City Department of Transportation's (NYC DOT) pilot programme that started in 2023 and aims at reducing the environmental and safety impacts of truck deliveries (NYC DOT, 2023). The programme involves setting up local delivery hubs, or microhubs, where delivery trucks can unload items onto smaller, low-emissions vehicles, electric vans, cargo bikes and hand carts for the final delivery leg. This initiative is part of a larger effort to optimise curb space for the growing demands of e-commerce in New York City. At the time the project started close to 90% of the city's goods were moved into and around the city by truck. The goal is to reduce traffic congestion, improve safety and lessen the environmental footprint of deliveries by encouraging shifts to smaller, sustainable modes of transport as well as to the city's ports. The city has won a USD 5 million federal grant to upgrade and improve six harbour landings for waterway freight movement.

The programme is informed by feedback from community organisations and freight operators, and technology, vehicle, and infrastructure providers help shape the programme and pilot locations. The programme aims to equitably support both small and large businesses through monitoring hub operations, collecting data and refining strategies.

In addition to this pilot project, NYC DOT is focusing on the expansion of loading zones across the city, showcasing the agency's rapid efforts to enhance traffic safety and streamline delivery operations (NYC DOT, 2023). Since 2022, NYC DOT has installed over 2 000 loading zones citywide, exceeding the legal requirement to install 500 loading zones annually for the first three years. These locations are now accessible through a new map on the DOT's website. Key stakeholders, including borough presidents and council members, support this initiative.

There are other examples where parking areas, vacant or underutilised spaces in urban areas have been repurposed for logistics use due to public-private collaborations. For instance, Amazon in Paris has partnered with RATP, the state-owned public transport operator, to use their bus centres during non-operational hours as microhubs for cargo bike deliveries, optimising existing assets. Amazon's

collaboration with RATP for microhub usage demonstrates mutualisation of facilities and hints at potential collaboration between logistics companies and different stakeholders. Amazon has also tested multi-modal delivery by using the Seine river, highlighting the importance of micro-logistic hubs for transshipment between boats and bikes in urban areas. However, challenges with river-based deliveries, while more reliable in travel time, include higher costs associated with boats compared to road-based operations and complexities in the logistics chain.

The city of Paris also offers underused spaces for logistic functions through calls for projects. One successful example is an area under the ring road at Porte de Pantin transformed by Sogaris into a logistics space and leased under a public domain occupation agreement. The city retains ownership of the land, and it is leased for 12 years. It is possible to dismantle and recycle the structure at the end of the lease if the city decides against continuation. Similar leases on other plots are given to Sogaris and other real estate developers. This tool allows flexibility in a dynamic logistics market that evolves quickly, and success depends on adaptability (APUR, 2022).

Further examples where flexibility in land use or collaboration between public and private actors have led to innovative solutions include the Beaugrenelle “logistics hotel”, a former parking area turned into a multi-use, multi-storey urban warehouse in the centre of Paris (EC, 2023), Bordeaux's proximity logistics space, a joint effort involving freight companies, the Bordeaux Chamber of Commerce, and the Bordeaux metropolitan authority (Janjevic and Ndiaye, 2014), and city authorities in Montréal are collaborating with the private sector to implement mini-hubs to decarbonise parcel delivery (City of Montréal, 2022).

This public-private collaboration can also extend to digital spaces, such as ULIP and FLOW mentioned in the previous chapter. Other examples at city level include a distribution platform in Belgium (see Box 3). While it may not be ideal for cities to directly operate physical logistics hubs or digital platforms, they do have a role in regulating, and supporting private initiatives.

In another example of collaboration between cities and supra-national institutions, the POLIS network actively encourages European cities and regions to collaborate on EU-funded city logistics projects and within its own Urban Freight Working Group (UF WG). The POLIS UF WG provides cities and regions with a platform to address challenges, share best practices, and enhance collaboration with companies and civil society (POLIS, 2022).

Box 3. The Wij.Leveren urban logistics system

Leuven is a fast-growing city in Belgium with a burgeoning student population. Wij.leveren is an example of an innovative public-private digital solution involving the city of Leuven (leader and initiator), the neighbouring municipalities and local traders. Wij.leveren is a local distribution platform that delivers packages from local shops to customers in the Leuven region. The platform uses emission-free vehicles and bundling to provide both a smooth shipping service and a more sustainable distribution. The service is accessible to local traders across retail sectors, with and without their own online sales channels. The platform only arranges for shipment via sustainable modes and at affordable rates, while local traders retain their own sales channels. To use the platform, traders can register on the website and indicate when they have a package to send by registering it on the platform. The project team takes care of attracting sustainable carriers, negotiating fair prices, and providing the software platform to register packages.

Sources: Vannieuwenhuyse (2023); wij.leveren (2024).

Two examples of current POLIS projects that have a ULH component are the MOVE21 and MoLo Hubs projects that focus on multimodal and logistics hubs. The main objective of MOVE21 is to transform European cities and functional urban areas into climate neutral, connected multimodal urban nodes for smart, clean passenger mobility and logistics. MOVE21 does this by addressing both goods and passenger transport in an integrated manner in three Living Labs (Oslo, Gothenburg, Hamburg) and three replicator cities (Munich, Bologna, Rome). For example, Hamburg has transformed a vacant building into a multifunctional neighbourhood hub for both logistics and passenger use. The hub aims to reduce emissions and traffic by providing integrated solutions for the movement of people and goods (MOVE21, 2024).

The MoLo Hubs project focuses on the initiation and implementation of logistics services integrated into mobility hubs to reduce commercial traffic in urban areas, and increase their attractiveness and use. The solutions tested in the hubs include the implementation of smart parcel lockers, waste management and recycling (e.g. packaging material or old batteries). The five cities in which this will be tested are Aalborg, Amsterdam, Borås, Hamburg and Mechelen (MoLo Hubs, 2024)

At the supra-national level, the European Technology Platform ALICE (Alliance for Logistics Innovation through Collaboration in Europe) has been set up to develop and implement a comprehensive industry lead strategy for research, innovation and market deployment in the field of logistics and supply chain management in Europe. European Technology Platforms (ETPs) are industry-led stakeholder mediums that develop short to long-term research and innovation agendas and roadmaps for action at EU and national level, supported by both private and public funding. Members of ALICE include shippers and logistics service providers, transport companies, terminal operators, support industry, research and education partners.

A strategic dialogue has been in place between ALICE and POLIS since 2019. The common vision of this venture is to support each other's members by continuous gathering and sharing of initiatives, and networking activities facilitating collaboration. In 2021, they published a joint guide, "Advancing together towards zero emissions urban logistics by 2030" (ALICE, 2022) to bring together the views of a wide range of stakeholders and experts to guide local and regional authorities, national and EU governments, companies, civil society and citizens to contribute to more sustainable and liveable cities.

All these examples represent different ways in which stakeholders can collaborate to improve the efficiency of urban logistics, address environmental concerns and the liveability of cities. The bottom line is that governments at different levels must play a role in facilitating and regulating private endeavours in logistics. In the urban context, innovative collaboration between municipalities and industry players should aim for efficient, eco-friendly last-mile deliveries and consolidation of freight to mitigate negative externalities. Collaboration can also ease pressure on cities from disruptors such as new products or new companies or even from existing companies that are rapidly expanding. City authorities need the capacity and funding to understand freight and logistics fully.

Lastly, concerns about the lack of civil society participation in discussions around mobility hubs and urban logistics, especially in contrast to their robust involvement in passenger transport planning, need to be addressed by policy makers. Implementing co-creation concepts and involving civil society in decision-making processes related to mobility hubs, particularly in the context of increased urbanisation and densification around these hubs, is a possible way forward.

Policy insights

- Despite industry competition, carriers and 3PLs can find advantages in sharing facilities in dense urban areas with limited space. There is potential for public-private collaborations on developing shared infrastructure which is essential to mitigate some of the negative externalities of logistics.
- There are different ways in which stakeholders can collaborate to improve the efficiency of urban logistics, address environmental concerns and liveability of cities.
- Local, national and supra-national governments must play a role in facilitating and regulating private endeavours in logistics. The role of the public sector is to govern while the private sector should lead the construction, operation and management of logistics hubs.
- Civil society participation in discussions around logistics must be encouraged by policy makers.

Conclusion

The interplay between logistical requirements, spatial planning, traffic management and regulatory challenges is complex, and requires innovative solutions. It also demonstrates the multifaceted nature of developing urban logistics hubs and the overarching logistics system within global supply chains. Given the large variety of ULH types, it is likely that there is no one-size-fits-all solution; rather, there is a need for different types of ULH for different logistics flows.

However, there is some benefit if different logistics hubs complement each other instead of competing. If possible, governments can have a more leading/conducting role to guide the consolidation and/or spatial concentration of ULH-activities at the right locations. The role of the public sector is to govern while the private sector should lead the construction, operation and management of logistics hubs. Hence, governments at different levels must play a role in facilitating, regulating and supporting private endeavours in logistics hubs.

Urban logistics hubs are a means to optimise the last mile of urban logistics in terms of better transport and environmental performance. Several major conclusions from this report can guide policy makers tasked with the development of logistics hubs in urban areas.

The diverse formats of urban logistics hubs, from small, private facilities to larger, hybrid retail-warehousing models, challenge traditional definitions. The borders between retail and warehousing are becoming increasingly blurred, with new concepts such as dark stores and ghost kitchens emerging. Policy makers need to understand different hub types, the logistics activities that hubs support, their relationship with regional and global supply chains and the movement of goods within cities to articulate policies that foster a sustainable and effective logistics network.

Hence, upskilling of different levels of government is essential to manage the complexities of urban logistics, and to facilitate the uptake and success of hubs. National governments should give mandates to lower levels of government to consider urban logistics within urban and transport planning frameworks. City authorities are spending public money and are often underfunded for the range of tasks they perform. They need to be equipped to understand freight and logistics fully.

Spatial requirements emerge as another crucial aspect, signalling the need to articulate the link between the impact of freight trips and land-use planning clearly. Urban logistics is not only a traffic issue but also a spatial issue. Urban space allocation and long-term land use planning are critical challenges, with logistics facilities competing for space alongside other land-use and mobility needs. Incorporating flexibility and reversibility are key principles for urban logistics hubs.

The dynamic nature of the logistics sector and hubs necessitates flexibility in planning due to changing demands over time. It is important to account for the end-of-life cycle of urban hubs and spaces, as well as costs of investment in infrastructure (e.g. for electric vehicle charging). The clause in leases for hubs on public land in Paris requiring them to be easily dismantled at the end of the lease period provides one example of such a measure. Additionally, policy makers must give due importance to shared infrastructure to avoid overwhelming numbers of separate hubs.

It is also important to utilise existing data while collecting specific new data (e.g. on the numbers of cargo bikes or other light electric freight vehicles or private cars/vans used for deliveries). Getting a better picture of "what is" based on existing (publicly available) sources and through simple traffic counts or camera surveillance should be a top priority for authorities. Demanding data from private companies may not always work due to privacy concerns. Even if private companies provide additional data, authorities must be prepared to manage enormous amounts of new data that may not always be useful. Hence, public authorities, especially for those with limited resources, must focus on what is essential.

Moreover, policy makers need to set clear goals and minimum requirements for companies to adapt to environmental demands, which in the future may shift from transport-related emissions to transport efficiency. Balancing stringent regulations, based on robust data and metrics, with opportunities for innovation and adaptation will be crucial. It will be particularly vital to allow space for industries to undergo necessary transformations without excessive restrictions.

There is an interrelationship between hubs and zero-emission modes of freight transport. As more logistics operators convert their last-mile fleets to smaller, greener vehicles (e.g. electric vans, walking couriers or cargo bikes) and adopt sustainable business models, there is an increasing need to move logistics closer to demand. But the transition to low- and zero-emissions urban freight cannot happen without urban logistics hubs.

In the context of sparse urban space, logistics is unlikely the most economically or socially beneficial use of real estate. However, the absence of logistics hubs will have negative effects on urban liveability, particularly if more vehicles or more polluting vehicles enter the transport network because transshipment hubs are unavailable. Moreover, authorities must incentivise the development of mixed-use hubs. Urban logistics hubs should provide added value to the neighbourhoods in which they are located rather than only serving one function (i.e. the handling of freight). Hubs should also incorporate high environmental and energy performance principles for positive impact.

Policy makers and authorities need to recognise opportunities alongside challenges in developing urban logistics hubs by acknowledging the potential for innovation and technical advancements. Collaborations with the private sector, academia, think tanks and civil society can result in long-term solutions, even if new challenges arise while trying to solve current issues. Given the diversity of stakeholders and their interests, collaboration emerges as a critical factor for the success and sustainability of urban logistics hubs. The complexity and importance of freight, which are sometimes avoided due to the lack of easily visible accomplishments, should be acknowledged in political mandates.

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Annex A. Hub typologies

Table A1. Hub types and formats: Traditional logistics facilities

Logistics facility type	Size	Functions	Facility location	Service area
Distribution centre	M to XXL XXL warehouses	Storage, fulfilment, cross-docking	Peri-urban, urban	Regional, national, international
Temperature-controlled warehouse	M to XXL	Storage, fulfilment, cross-docking	Peri-urban, urban.	Regional, national, international
Fulfilment centre	M to XXL	Storage and fulfilment	Peri-urban, urban	Regional, national, international
Cross-dock terminal/ Sortation terminal	S to XXL	Cross-docking	Peri-urban, urban	Regional
Logistics park/ Freight village	L to XXL	Storage, fulfilment, security, administration	Peri-urban	Regional, national, international

Notes: S = small, M = medium, L = large, XL = extra-large, XXL = extra-extra-large. An XXL warehouse is defined as 50 000 to 200 000m^2. M to L can be between 1 000 to 5 000m^2. XS to S can be less than < 2 000m^2.

Source: Dablanc (2023a).

Table A2. Hub types and formats: New real-estate formats catering to urban areas

Logistics facility type	Size	Functions	Facility location	Service area
Logistics hotel	M to L	Storage, cross-docking	Urban	Urban
Urban consolidation centre	M to L 1 000-5 000m^2	Cross-docking, consolidation	Edge of urban areas, Urban	Urban
Logistics microhub	XS to S < 2 000m^2	Cross-docking	Urban	Local
Dark store / Fast delivery hub	XS to S	Storage and fulfilment	Urban	Local
Pick-up location/ Local freight station	XXS	Collection	Urban	Local

Notes: XXS = extra-extra-small; XS = extra-small; S = small; M = medium; L = large; XL = extra-large; XXL = extra-extra-large. An XXS space can be 100m² for dark stores/fast delivery stations/microhubs.

Source: Dablanc (2023a).

Annex B. List of Roundtable participants

Laetitia DABLANC (Chair), Université Gustave Eiffel, France

Julian ALLEN, University of Westminster, United Kingdom

Juliette BERTHON, Sogaris, France

Susanne BOHLER-BAEDEKER, Rupprecht Consult, Germany

Paul BUIJS, University of Groningen, the Netherlands

Giacomo DALLA CHIARA, Urban Freight Lab, University of Washington, United States

Jagoda EGELAND, International Transport Forum

Reece FISHER, Sogaris, France

Chinatsu HANI, CBRE Japan

Ho Thi Thu HOA, Vietnam Logistics Research and Development Institute, Viet Nam

Tomoya KAWASAKI, Tokyo University, Japan

Pedro MOREIRA, ABRALOG, Brazil

Michèle-Angélique NICOL, Agence de la Mobilité Paris, France

Joy PASQUET, Amazon, France

Nicolas RAIMBAULT, Nantes Université, France

Parnika RAY, International Transport Forum

Jean-Paul RODRIGUE, Hofstra University, United States

Takanori SAKAI, Tokyo University of Marine Science and Technology, Japan

Hans SCHURMANS, ALICE, Belgium

Claire SCHARWATT, Amazon, France

Jos STRENG, Traffic and Transport Department, City of Rotterdam, the Netherlands

Alex VAN BREEDAM, TRI VIZOR, Belgium

Bart VANNIEUWENHUYSE, TRI VIZOR, Belgium

Raffaele VERGNANI, POLIS, Belgium

Johan VISSER, Netherlands Institute for Transport Policy Analysis (KiM), the Netherlands

Ian WAINWRIGHT, Future City Logistics, United Kingdom

Participants provided their affiliations at the time of their attendance at the Roundtable meeting.

International Transport Forum

Urban Logistics Hubs

Urban logistics are fundamental to city life. However, freight transport is responsible for around half of local air pollutants in cities and generates congestion and other emissions. Moreover, urban logistics involves more than just e-commerce. Recent trends in goods distribution, reverse logistics, the emergence of dark kitchens and dark stores, and growing regulatory demands, have made logistics more complex. The dual trend of logistics returning to the city and growing demand for larger sub-urban warehouses must also be considered. This report provides targeted advice to policy makers on proactive measures to manage the complexities of urban logistics and facilitate the uptake and success of urban logistics hubs.

International Transport Forum
2 rue André Pascal
F-75775 Paris Cedex 16
+33 (0)1 73 31 25 00
contact@itf-oecd.org
www.itf-oecd.org

OECD

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