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What's in store for last-mile logistics?

Futures scenarios for last-mile logistics in mid-size European cities

RESEARCH SUMMARY

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Introduction

Last-mile logistics on the path to sustainability

The rise of the on-demand economy has made last-mile logistics of crucial importance to the functioning of our cities and regions. In addition to recent growth, the number of last-mile deliveries is expected to further increase by 78% worldwide by 2030 (World Economic Forum, 2020).

A downside to this growth is the increased negative impacts of last-mile logistics on urban areas through increased congestion, noise and air pollution and unsafe traffic situations. As a result, logistics stakeholders such as local authorities, logistics operators, citizens and local businesses are starting to recognize the need to transition to more sustainable last-mile logistics. But realizing such a transition is highly complex: the many stakeholders involved have different interests, responsibilities and capacities. And contextual developments such as global crises, rapid technological innovation and changing customer behaviors impact supply and demand in unforeseen ways, resulting in high uncertainty regarding the near future.

With limited knowledge and information at hand, logistics stakeholders are required to act now to shape sustainable logistics of the future.

6 scenarios for the future of last-mile logistics

To inform policies and guidelines generally and last-mile logistics practices specifically, there is a need to better understand the different possible futures of last-mile logistics. The six scenarios presented in this report help do just that: they represent different future states of last-mile logistics, with varying levels of realism and desirability. By comparing and reflecting upon these scenarios, key themes are identified on which local logistics stakeholders should keep an eye when addressing the uncertain future of last-mile logistics.

In this booklet, six scenarios are formulated for last-mile logistics in the year 2035 with a focus on three themes: the **level of cooperation** between logistics stakeholders, the **level of technological innovation**, and the **role of local authorities** in shaping a sustainable future for last-mile logistics.

The work described in this document has been conducted within the ULaaDS project. ULaaDS sets out to develop sustainable and liveable cities through re-localisation of logistics activities and re-configuration of freight flows at different scales. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 861833.

About this study

Method and participants

The six scenarios presented in this study are based on the views of an expert panel of 26 logistics stakeholders residing in the three ULaaDS partner cities: Groningen (NL), Mechelen (BE) and Bremen (DE). Representatives from local authorities, logistics operators, citizens, business representatives and experts were selected and included in the panel.

Scenarios were developed using the Disaggregative Policy Delphi approach. A desk study of logistics trend reports yielded an overview of the key themes and developments likely to shape the future of last-mile logistics. The experts were then asked to reflect on the probability and preferability of these developments taking place between 2020 and 2035. Data was collected in multiple rounds using questionnaires and interviews. In between rounds, the experts were able to see the answers given during previous rounds—including their own and others' anonymized responses—allowing them to reflect on the views of other experts and reposition their own opinions accordingly. After multiple rounds of data collection, a cluster analysis of quantitative and qualitative assessments of possible future developments in last mile city logistics allowed for the identification of various scenarios. Storylines were written supported by the qualitative data and scenarios were named accordingly.

Themes and indicators

The following themes and indicators were addressed during data collection and used to operationalize logistics scenarios:

Theme: level of cooperation between logistics stakeholders:

- Business-to-business (b2b)-cooperation in supply chain operations
- Business-to-government (b2g)-cooperation in smart city logistics management systems
- Data-sharing, b2b and b2g
- Resource cooperation, b2b (storage, fleet, delivery)

Theme: level of technological innovation:

- Share of established operators remaining in business in 2035
- Last-mile operator newcomers in 2035
- Type of operator newcomers in 2035
- Future business-to-consumer (b2c)-delivery models
- Future b2b delivery models
- Role of stakeholders in deployment of new delivery models
- Types of motorized transport used in last-mile
- Types of non-motorized transport used in last-mile
- Level of autonomy in last-mile transport

Theme: role of local authorities

- Degree of regulation of logistics by authorities in 2035
- Types of logistics policies issued by authorities in 2035
- Role of authorities in deployment of new delivery models

Scenario 1

The Old Wild West

Sustainability in the last-mile logistics sector shows little progress in 2035 compared to the early 2020s. The level of cooperation and number of innovations introduced is generally low, and local authorities are largely absent from the logistics playing field.

If anything, policies issued by local authorities lack a clear vision and strategy. Classic measures are in place (e.g. time windows or vehicle restrictions) but no novel tools or practices have been introduced. Local authorities' failure to respond to or embrace logistics innovations is apparent in the development of delivery models. Operators and consumers increasingly opt for unattended delivery through parcel lockers or pick-up/drop-off points. Yet, policy makers fail to facilitate the development of a coherent network of parcel points. As a result, deliveries are still largely unconsolidated and door-to-door. Last-mile transport presents a similar case, as the transition towards zero emission is not fully made. Cargo bikes are widely used, but swamp inner city streets, negatively affecting traffic safety.

In the absence of new policy measures, logistics operators have no need to innovate in response to stricter policies, and only act in response to developing consumer preferences, as shown in the case of unattended delivery. Low cooperation shows in a limited number of supply chain partnerships, resource sharing and low levels of data sharing.

Key arguments

Local authorities are largely absent from the last-mile logistics playing field. This is due to a **lack of knowledge, budgets and dedicated manpower**, and a lack of felt urgency to bring about significant changes in the last-mile sector.

In the absence of long-term goals set out by local authorities, private actors feel **little urgency to innovate**. As a result, by 2035, an important share of the established players from the early 2020s have failed to meet little access restrictions that have actually been put in place. Those that remain guard their positions heavily. New entrants only successfully gain a market share when able to disrupt the landscape of existing operators with new operational models.

Private actors' operations are fully optimized based on their own customers, vehicles and facilities alone. **Cooperation is seen as making matters unnecessarily complex**. Results from pilot projects have insufficiently proven the added value of cooperation for business operations and societal benefit.

1. OLD WILD WEST



Scenario 2

The New Wild West

Like the Old Wild West scenario, little progress has been made in “greening” last-mile logistics in 2035 in the New Wild West scenario. Local authorities leave initiative to the private sector and facilitate developments where possible. But changes in the sector are triggered by changing customer demands rather than stricter policies aimed at sustainability and livability.

This is seen in the higher levels of innovation by the private sector, who leads advancement of the last-mile logistics system by introducing delivery models. Viable business models have been developed for consolidated deliveries to both businesses and consumers. In lack of clear policy goals, the transition to clean fuels has only partially been made. Amidst these changes, there is renewed attention to deliveries by foot enhanced by autonomous mail carts following mailmen. Established logistics operators cement their dominance by acquiring smaller logistics operators, and a third of last-mile logistics is conducted by new big tech companies or innovative start-ups.

Despite the high levels of innovation, cooperation between logistics stakeholders is sparse and opportunistic, and only occasionally considered from a perspective of cost-reduction. Private actors go the distance to preserve their individual reputations and client-bases, hindering more structural and intensive cooperation that might bring about sustainability benefits, such as supply chain partnerships or strategic alliances. In similar vein, data-sharing between private actors and between public and private actors is limited.

Key arguments

Local authorities **purposefully leave the initiative to the market**. This is due to a lack of knowledge, budgets, and dedicated manpower.

Private companies innovate amidst severe competition and high numbers of new entrants. Innovations strictly serve to improve their companies’ own business models and operations but **lack a broader societal purpose**. Cooperation is equally seen as a quick fix to reduce costs, but seldomly as a structural solution with wider potential benefits.

Low data sharing between local authorities and private actors is the result of a **lack of trust**. Local government does not trust its own capabilities to safely store and purposefully utilize the vast amounts of data involved.

2. NEW WILD WEST



Scenario 3

New Cool Collective

Logistics stakeholders share the same objective and strategies: realizing sustainable last-mile logistics through high levels of innovation and cooperation. Local authorities formulate ground rules concerning city access restrictions and types of transport modes allowed in inner cities, but private initiative is encouraged and facilitated to meet these demands.

Sustainability is notably realized in last-mile transport. In a joint effort involving all logistics stakeholders, the transition towards clean fuels is almost fully completed, with a strong orientation towards fuel cell vehicles, (e-) cargobikes and LEVs. Both deliveries to consumers and deliveries to businesses see a clear shift toward consolidation of parcel flows. The growth of e-commerce is accommodated through higher efficiency of logistics operators. Large and established CEPs cement their positions by acquiring smaller CEPs. Simultaneously, a large portion of last-mile logistics is carried out by new players, mostly innovative start-ups, who build their business models with sustainability as the premise.

To achieve higher efficiency, significant cooperation exists between logistics operators on storage space and delivery technology, although vehicle sharing remains limited. Strong cooperation is seen between logistics operators within supply chains and with local authorities in smart city management systems, which helps achieve significant sustainability benefits. This is supported by high levels of data sharing between individual private actors and the government.\

Key arguments

Local authorities are highly knowledgeable and data-savvy. As such, they are seen as **highly competent** and taken seriously by private actors and other logistics stakeholders. This gives local authorities confidence that laying out the ground rules is more effective in reaching policy goals than implementing restrictive measures or micromanaging last-mile logistics operations.

In business-to-business deliveries, consolidation of parcels is developed into a viable business model. Consolidation of deliveries to consumers happens in response to **public pressure** and decreased acceptance of congestion in inner cities.

Cooperation serves multiple purposes, and motivations to do so are both intrinsic and extrinsic. First off, logistics space in inner cities is scarce, and sharing assets such as storage space and delivery points **facilitates business operations** of a wide variety of logistics operators active in last-mile space. Furthermore, cooperation is cost-effective and contributes to local policy objectives, such as sustainability and liveability, to which both authorities as private actors are held accountable by the public.

3. NEW COOL COLLECTIVE



Scenario 4

Revolution by Design

Last-mile logistics has transitioned towards sustainable modes of operation in the Revolution by Design scenario because of active government intervention. Authorities have laid out a clear logistics policy vision and guide the developments by implementing restrictive measures. Classic access and transport mode restrictions are in place, but authorities have also implemented more innovative measures: to operate in inner-city areas carriers now must show that they can do so efficiently by demonstrating high delivery densities and consolidating loads. Authorities experiment with concessions, leaving one logistics operator winning the contract in charge of deliveries in dedicated city districts. As a result of these efforts, the transition to zero emission vehicles in the last-mile space is almost fully made.

Restrictive measures induce high innovation and new delivery models: business-deliveries are almost fully consolidated, and consumer-deliveries are done entirely through unattended pick-up points. Restrictions also drastically change the composition of the sector. A large share of parcel deliveries is now handled by newcomers. These newcomers cater to a renewed interest in alternative logistics concepts, such as niche services, combined and reverse logistics, and shorter (locally oriented) supply chains. Active involvement of authorities spurs high levels of cooperation across logistics operators, who are forced to cooperate to get their deliveries through to their customers. This is supported by high levels of data sharing between logistics operators and operators and local government.

Key arguments

Authorities take on an active role in last-mile logistics to force change upon the private sector. Strong guidance coupled with restrictive measures is **seen as indispensable** to reach sustainability in logistics.

High levels of innovation and cooperation among logistics operators are **needed to meet the high requirements** set to last-mile distribution by local authorities

New last-mile operators are successful as they can incorporate the innovations needed to comply with higher standards **into their business models from the start**, giving them competitive advantage over traditional operators who have had more difficulty making the transition.

4. REVOLUTION BY DESIGN



Scenario 5

Thriving, Individually

After implementing restrictive measures in the 2020s, local authorities have switched focus to facilitation of private initiative to stimulate innovation and cooperation in the Thriving, Individually scenario. Early restrictions have successfully triggered innovations in transport modes and business models. In response to growing demand and changing consumer preferences, unattended pick-up points are widespread. Supported by networks micro hubs, these points are crucial to process growing parcel volumes. Last-mile transport is almost entirely zero-emission, including a mix of motorized and non-motorized vehicles with various levels of automation. Strong growth in volumes has opened opportunities for a wide range of new operators: big tech companies, start-ups and community initiatives together process a quarter of deliveries.

Innovation rates and the high number of new entrants increase delivery capacity within the constraints of crowded inner-city areas and are sufficient to meet growing demand. But cooperation between private actors is rare. Operators have optimized their business models individually in response to early restrictions. To create synergies, the local authorities set up publicly funded initiatives, but these have limited appeal to the sector. Rare cases of cooperation are driven by efficiency gains and cost reduction, but sustainability gains are not a motive. Data is considered a major asset for creating competitive advantage. As such, data sharing between operators does not take place, although data is shared occasionally with local authorities for pilots or monitoring schemes.

Key arguments

Local authorities have gone through a “**learning curve**”: after the initial implementation of restrictive policies, which spurred the need for innovation among logistics operators, local authorities received many inquiries for support from private actors to facilitate the required changes. In response, the focus changed to facilitative policies to let innovations of private actors reach their full potential

The **innovations' 'arms race'** between individual companies induced by the initial restrictive policies did however swamp the attention to stakeholder cooperation, which is limited in this scenario. Technological innovations have led to fully optimized business operations, but for each stakeholder individually.

5. THRIVING, INDIVIDUALLY



Scenario 6

Good Intentions Abound

Local authorities actively work to realize sustainable last-mile logistics in the Good Intentions Abound scenario and exert firm control on logistics processes in inner cities. Restrictive measures apply to inner city storage, transportation and distribution. New developments that entrain significant logistics flows require mitigation strategies which need government approval beforehand. Local authorities exploit a system of hubs at city borders where parcels are cross docked from large to smaller carriers. Consequently, authorities also actively acquire logistics real estate for last-mile storage and distribution.

As a result, a full transition to clean fuels and new transport modes has been made. But cooperation between other stakeholders is low. Aside from the need to cross-dock goods at inner city borders, cooperation in supply chains and in logistics resources is sparse, and as a result, potential sustainability gains are not realized. Where possible, logistics operators operate from their own distribution centres and use their own vehicle fleets. This is underpinned by low levels of data-sharing between logistics players, but also between private operators and governments.

Innovation rates are mixed. Whereas regulations have forced innovation upon the last-mile transport fleet, a large share of formerly established players have failed to meet new demands and disappeared from the last-mile. Strict government policies make entry of new players the lowest of all scenarios, leaving smaller CEPs to handle most of last-mile deliveries in fierce competition and with limited inflow of new and innovative players.

Key arguments

Local authorities are convinced that private actors are not going to solve last-mile logistics' complex issues by themselves and have in response **taken on an active role** with a restrictive focus. Government intervention has led to partial success in 'greening' the last mile, but has also **smothered private sector initiative**, which falls behind on policy ambitions.

Amidst government activity, the logistics operators that remain are **eager to maintain what's left of their once dominant positions**. They shy away from cooperation with each other and with local authorities. Strict requirements to operate in the last-mile and fierce competition between remaining parties lead to a limited inflow of new players.

Significant changes in how last-mile logistics are operated have impacted profit margins. As a result, large logistics players from the 2020s have largely **reoriented their focus** to activities outside of last-mile logistics. Those that remain in the last-mile guard their positions heavily. Significant investments are needed by new entrants to gain market share. Their success is limited.

6. GOOD INTENTIONS AROUND



Conclusion: sustainability is far from given

What do scenarios tell us?

Logistics remains an integral part of inner cities, which makes acting now even more urgent. The growth of e-commerce is likely to increase the need for logistics space in inner cities. In not one scenario does e-commerce show signs of slowing its growth or are logistics activities relocated outside of the gates of inner cities. Logistics operations might change, but will remain a fact of city life.

Technological innovation is critical to a sustainable future of last-mile logistics. Techno-optimists see it as technology as the fix to most of last-mile logistics' problems. Solutions often already exist, but are prevented from realizing their full potential for instance by regulation. The other sees future technological innovation as a wild card, offering a way out of problems for which no solution has yet been found.

Pro-active local governments are a precondition to cooperation. Authorities can stimulate stakeholder cooperation through active facilitation (New Cool Collective) and through strict regulation (Revolution by Design), but an active role of local government is not necessarily a guarantee for stakeholder cooperation.

On the ground change comes from logistics operators. They maintain a key role in realization of sustainable last-mile logistics and livable inner cities.

Sustainability barriers and enablers

A transition to sustainability is only achieved in 2 out of 6 scenarios. A transition towards sustainable last-mile logistics is envisioned in two distinct futures. One in which public and private actors join forces to fundamentally re-organize logistics transportation, delivery modes, consolidation and data management (New Cool Collective). And one in which local authorities have set a comprehensive set of conditions and requirements that enforce the development of a more sustainable logistics systems (Revolution by Design). In other scenarios, the sustainability transition is not achieved due to a (combined) lack of government involvement, cooperation and innovation. The following barriers and enablers can be identified:

Barriers

- > Sustainability not the primary interest of private stakeholders
- > Lack of balance between private and public efforts
- > Lack of trust, knowledge, budgets

Enablers

- > More active local authorities
- > Societal pressure
- > Introduction of new technology and business models

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