Institute of Transport Economics
Norwegian Centre for Transport Research

From niche to mainstream?

The role of a mobility hotel in advancing the commercial use of cargo bikes

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Summary

Mobility hotels can contribute to reduced car use by offering services removing barriers for commercial use of cargo bikes. Critical barriers for cargo bike use are unreliable and fragile bikes, organizational burden, and high implementation costs. There are indications of technological maturity of cargo bikes improving, and this could become an important driver for cargo bike adoption. The mobility hotel KAIA in Oslo provides services that can remove or reduce critical operational barriers for last mile, mobile and on-demand services. The combination of leasing and maintenance of bikes is especially important. The City of Oslo has a critical role in shielding and nurturing the cargo bike niche towards becoming mainstream through supportive policies. Backing initiatives like KAIA Mobility Hotel can help strengthen this niche. A strategic approach to supporting cargo bike adoption should include a combination of measures, such as procurement policies, land use planning, financial incentives, urban infrastructure, and integration of cargo bikes in municipal operations.

Kort sammendrag

Mobilitetshotell kan bidra til redusert bilbruk ved å tilby tjenester som fjerner barrierer for kommersiell bruk av lastesykler. Kritiske barrierer for lastesykkelbruk er upålitelige og skrøpelige sykler, organisatorisk byrde og høye implementeringskostnader. Det er indikasjoner på at den teknologiske modenheten til lastesykler forbedres, og dette kan bli en viktig driver for økt bruk av lastesykler. Mobilitetshotellet KAIA i Oslo tilbyr tjenester som kan fjerne eller redusere kritiske driftsbarrierer for last mile-, mobile og on-demand-tjenester. Kombinasjonen av leasing og vedlikehold av sykler er spesielt viktig. Oslo kommune har en kritisk rolle i å skjerme og pleie lastesykkelnisjen mot å bli mainstream gjennom støttende politikk. Å støtte initiativer som KAIA Mobility Hotel kan bidra til å styrke denne nisjen. En strategisk tilnærming for å støtte innføring av lastesykler bør inkludere en kombinasjon av tiltak, som innkjøpspolitikk, arealplanlegging, økonomiske insentiver, byinfrastruktur og integrering av lastesykler i kommunal drift.

Preface

This report provides insights into how a mobility hotel can provide services that contribute to the uptake of cargo bikes for commercial use.

The mobility hotel KAIA opened at Filipstad, in the centre of Oslo, in September 2024. The initiative is part of the Horizon 2020 project MOVE21, which is coordinated by the City of Oslo. As part of the Oslo Living Lab within MOVE21, the City of Oslo has entered a joint venture with the companies Mobility Solutions, Wolt, Nordic FM Group, and Posten to develop, test and evaluate the KAIA Mobility Hotel pilot. This report is financed by the Horizon 2020 project MOVE21.

The researchers from the Institute of Transport Economics are grateful for the KAIA Mobility Hotel partners being forthcoming in helping to make this report. They have participated in interviews, shared data, allowed observations and invited TØI researchers to various meetings and events.

The report is written by Howard T. Weir IV, Toril Presttun, Sidsel Ahlmann Jensen and Cyriac George from the Institute of Transport Economics (TØI).

Oslo, March 2025
Institute of Transport Economics

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ENGLISH Summary

From niche to mainstream?

The role of a mobility hotel in advancing the commercial use of cargo bikes

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- Mobility hotels can contribute to reduced car use by offering services removing barriers for commercial use of cargo bikes, especially for on-site mobile services and on-demand transport.
- Critical barriers for cargo bike use are: unreliable and fragile bikes, organizational burden, and high implementation costs. There are indications of technological maturity of cargo bikes improving, and this could become an important driver for cargo bike adoption.
- KAIA Mobility Hotel provides services that can remove or reduce critical operational barriers for last mile, mobile and on-demand services. The combination of leasing and maintenance of bikes is especially important.
- The City of Oslo has a critical role in shielding and nurturing the cargo bike niche towards becoming a mainstream part of the urban logistics regime. Supportive policies are needed, and backing initiatives like KAIA Mobility Hotel can help strenghten the cargo bike niche.
- A strategic approach to supporting cargo bike adoption should include a combination of measures, such as procurement policies, land use planning, financial incentives, urban infrastructure, and the integration of cargo bikes in municipal operations.

The mobility hotel KAIA was established in 2024 as part of the Horizon 2020 MOVE21 project, coordinated by the City of Oslo. Located at Filipstad in the center of Oslo, KAIA provides services that support the commercial use of cargo bikes with the aim of reducing the reliance on vans and other motorized transport. This report assesses how the services provided by a mobility hotel can address barriers to cargo bike adoption, facilitate operational efficiencies, and contribute to broader transitions in urban logistics. The report is set in the context of Transitions Theory, which can be used to look at how niche innovations can become more mainstream and thus be more widely adopted.

Urban logistics systems remain dominated by vans and trucks, despite growing concerns over congestion, emissions, and limited urban space. Cargo bikes present a potential alternative for some last-mile deliveries, mobile services, and on-demand transport, offering increased accessibility and parking flexibility. On-site mobile services and on-demand transport are considered especially promising to replace vehicle trips with cargo bikes due to the short distances, limited volumes of equipment/goods and the accessibility requirements for parking. However, a wider adoption of cargo bikes faces significant barriers. KAIA Mobility Hotel seeks

to mitigate some of these barriers by offering integrated services for cargo bikes, including leasing, maintenance, parking, and charging.

The case study of KAIA involves three types of commercial cargo bike users: last-mile distribution (Posten), on-demand delivery (Wolt), and on-site mobile services (Trippel). Each of these have unique requirements, influencing service demand at KAIA. However, a strong service agreement and access to a workshop has proven critical in ensuring cargo bike uptime, a major concern for commercial users.

The report identifies three critical barriers to the broader adoption of cargo bikes:

1. Robustness/reliability – Many cargo bike models remain immature, requiring frequent maintenance, which impacts operational feasibility due to down time.
2. Organizational effort – Businesses integrating cargo bikes must reconfigure logistics operations, spending time and effort to develop and adopt new routines
3. Implementation costs – Initial costs, including costs of acquiring bikes, equipment, and space in dense urban areas, pose a financial barrier.

KAIA Mobility Hotel's service offerings directly address these barriers by providing:

- Leasing and Maintenance Services – Reducing the financial risk of cargo bike adoption while ensuring operational reliability.
- Charging and Parking Facilities – Enabling overnight storage and readiness for daily operations.

As of January 2025, KAIA was also in the process of implementing battery swapping and a mini-warehouse into their service offering which is expected to further address barriers to cargo bike adoption.

Mobility hotels like KAIA are a relatively new phenomenon. The services offered by KAIA are able to reduce barriers to the use of cargo bikes and it is likely that upscaling these services would lead to expanded use of cargo bikes. However, financial sustainability for mobility hotels remains uncertain. Policy measures could be implemented to support KAIA and similar mobility hotels and include:

- Extending financial support beyond the initial pilot phase.
- Incentivizing cargo bike use through procurement policies, urban logistics planning, and integration into municipal operations.
- Improving urban infrastructure to prioritize cargo bikes, using modal filters or other access restrictions to larger vehicles

By addressing critical operational barriers, KAIA Mobility Hotel shows potential to facilitate cargo bike adoption. It enhances the commercial feasibility of cargo bikes for logistics and service industries. However, continued public support and strategic policy interventions are necessary to ensure cargo bikes transition from the niche to a more mainstream position in commercial operations. The findings suggest that sustained municipal engagement will be crucial for upscaling cargo bike logistics in Oslo.

1 Introduction

1.1 Background and purpose of the report

The central innovation in this study is not the cargo bike but the mobility hotel KAIA, the primary novelty of which is not the physical space itself, but the collection of services that are offered.

The purpose of this report is to provide insight into the following question:

How can a mobility hotel contribute to reducing car use through up-take of cargo bikes?

With this overarching question as a backdrop, we explored three primary questions:

1) *How can a mobility hotel help remove barriers that hinder, or empower drivers that support, the commercial adoption and use of cargo bikes?*
2) *What is the potential for upscaling and replication for KAIA Mobility Hotel?*
3) *How can the City of Oslo support a mobility hotel?*

The goal is to provide insight into each of these questions, though, due to limitations in data collection, scale and length of the study, and other elements of uncertainty, we do not purport to provide a definitive answer to each question.

KAIA Mobility Hotel was used as a case study and lens through which to examine the concept of a mobility hotel and its ability to support the commercial use of cargo bikes.

The commercial use of cargo bikes on a larger scale is both influenced by and influences urban logistics in general. By urban logistics we mean the movement of goods, equipment, and waste to, from, within and through an urban area or city center. Today the cargo bike niche is very small. Our work is set in the context of *socio-technical systems and transitions theory* which looks at the adoption of niche innovations and technologies into the mainstream through different pathways. In this case, how cargo bikes can make the transition from being a niche technology to being more widely adopted with the support of a mobility hotel. The perspective is to position cargo bikes within the logistics chain they are part of and to be aware of the changes and opportunities this entails for the various actors in urban logistics.

1.2 MOVE21

The initiative KAIA Mobility Hotel is part of the Horizon 2020 project MOVE21.

MOVE21 (Multimodal and interconnected hubs for freight and passenger transport contributing to a zero emission 21st century) is an innovation project funded by the European Commission. It aims at transforming European cities and their surroundings into smart zero emissions nodes for mobility and logistics. The project helps participating cities achieve a 30% reduction of transport-related emissions by 2030 via the implementation of 15 transport-related innovations.

The project coordinator is the City of Oslo – innovator city in C40 and European Green Capital in 2019. The cities involved are Oslo, Gothenburg, Hamburg, Munich, Rome, and Bologna. The partnership is composed by 24 partners, including six public authorities, two public transport companies owned by municipalities, six industry partners, six research organizations (including TØI) and four network organizations.

1.3 What is a mobility hotel?

The efficient transport of people and goods within cities is a constant challenge. To meet that challenge, it is essential to encourage the use of transport that is less energy and space demanding. One way to support this goal is to facilitate the changeover between different modes of transport at specific locations, usually from cars, vans, and trucks to public transport, micro mobility, and cargo bikes and other light electric freight vehicles. Such locations are frequently called mobility hubs, points and/or hotels and are an increasingly common feature in European cities where they are actively being researched, piloted and implemented. However, the nomenclature is still somewhat fragmented, and the varying terms are applied imprecisely, so it is not always clear what is being discussed or what types of services are connected to a given mobility hub/point/hotel.

In this report, we are looking at the concept of a mobility hotel, as defined by the MOVE21 project: a hub providing enabling services for the shift towards sustainable urban mobility and logistics practices (Trapp & Stančec, 2025). More specifically, we define a mobility hotel as an array of services localized at a specific location with the goal of facilitating the use of light electric freight vehicles (such as cargo bikes) commercially. The services can be in the same building or in separate places near each other. Available services will vary depending on the local context and needs of the customers, but can include battery swapping, maintenance, rest facilities, safe parking, gear storage, transshipment, and weather protection. A mobility hotel can be a private venture or a partnership between the public and private sectors.

Mobility hotels for commercial use of cargo bikes is a new concept that also conveys new types of services. To our knowledge, there are no studies on this concept outside the MOVE21 project. MOVE21 has initiated two mobility hotels with services aimed at enabling a shift from cars to cargo bikes: KAIA Mobility Hotel in Oslo, which is studied in this report, and Nordstan Mobility Hotel in Gothenburg. Nordstan Mobility Hotel opened in May 2024 and is located at Nordstan business and shopping center (Stepanova et al., 2024). This mobility hotel has multiple functions, such as shared vehicle fleet (including bikes), shared spaces for mobility companies, battery swaps, an unmanned warehouse, a cargo bike hub and a co-working space. It is a collaboration between the companies Ahsell, Pling Transport, BikePath, Urbancorner and GoCIMO. Nordstan Mobility Hotel was the inspiration for KAIA Mobility Hotel.

1.4 KAIA Mobility Hotel

KAIA Mobility Hotel was established at Filipstad, in the centre of Oslo on September 5th, 2024. As part of the Oslo Living Lab within MOVE21, the City of Oslo has entered a joint venture with the companies Mobility Solutions (Fleet Bikes and KAIA), Wolt, Nordic FM Group (Trippel), and Posten to develop, test and evaluate the Mobility Hotel. In addition to these actors, Mobility Solutions is also actively seeking to include services from other companies at KAIA. These services are presented and discussed in greater detail in sections 3.6 and 4.2.

Mobility Solutions is responsible for developing and operating KAIA and contributes in-kind resources during the pilot phase. Wolt, Trippel, and Posten are customers. During the pilot phase, running until April 2025, Wolt and the City of Oslo share the costs of renting and developing the premises. Trippel, a smaller operator, also provides a small cash contribution. Posten contributes in-kind resources.

The three customers represent different use cases for KAIA, linked to the types of transport they conduct and the mobility hotel's role in their logistics solutions: on-demand transport (Wolt), last mile distribution (Posten), and on-site mobile services (Trippel).

As of January 2025, the primary service available at KAIA is leasing and maintenance/repair services for CityQ cargo bikes, in addition to charging and parking of the bikes for some customers. Other

services that are either under consideration, in development or in the process of being installed include charging and battery-swapping services, rest facilities, workshop facilities for Wolt couriers using regular bicycles, overnight bicycle storage, storage space/mini-warehouse for frequently used tools and materials, and transshipment areas.

Photo 1.1: KAIA Mobility Hotel. Some services visible on the building exterior from left to right: rental car key-swap, parcel lockers, and battery swapping station. Photo: Howard Weir

1.5 Method

The study of KAIA Mobility Hotel is carried out using a *transitions theory* lens. This is to say that we take a socio-technical approach, which views the adoption of niche innovations and their contribution to broader societal change as being the result of both technical and social factors. As such, we examine the many factors contributing and inhibiting the adoption of cargo bikes in urban logistics and consider the mobility hotel to be the central niche innovation that is 'attempting' to break into the mainstream. The KAIA Mobility Hotel is a singular case that has been studied for the first few months of operation; we cannot be assumed that it is representative of other mobility hotels and expect more longer-term evaluations and analyses in the future.

Scaling new concepts like mobility hotels requires more than overcoming technical uncertainties. Successful adoption depends not only on proving the viability of cargo bikes but also on aligning stakeholder interests, managing expectations, and establishing clear roles and responsibilities. Without coordination between public and private actors, even well-functioning innovations may struggle to gain traction. Using a transitions theory perspective, this study examines the key drivers and barriers to adoption and explores how system actors, particularly the public sector, can play a role in shielding and nurturing the niche to support long-term integration into urban logistics

The case study of KAIA is roughly divided into three phases. An insight phase, an analysis phase, and a governance phase. The purpose of the insight phase was to determine the goals of the various actors, what they envisioned for the mobility hotel, and the types of problems they hoped to address. Five “insight meetings” were held in September and early October 2024 with users (Wolt, Posten, Trippel), the property developer (Moment Eiendom), and the operator of KAIA (Mobility Solutions).

Data collection involved conducting interviews, workshops, direct observations, attending meetings, registering interactions at the hub and data collected from the cargo bikes used by KAIA (km driven, position data, maintenance logs etc.). All of this was supported by close cooperation with the project partners.

Available literature (both scholarly and grey) was reviewed. Literature on the use of cargo bikes and mobility hubs was collected in parallel with the case study, with a focus on the drivers and barriers behind the use of cargo bikes as well as the type of services that could be beneficial to them. Seven semi-structured interviews were then conducted in November 2024 with users of KAIA. Interviews were held with interviewees at both strategic and operational level and included 2 interviews with cargo bike riders. The interviews were recorded and transcribed.

The interviewed riders where from Posten and Wolt, and they were subsequently observed for part of their shift to better understand the contexts in which they operated, gain more insight into their interview responses, and identify what infrastructure was relevant and preferred for them and how it was used. Observations were conducted by following behind the cyclists using an electric bicycle.

Data from 5 cargo bikes used during the analysis period was also collected, including km driven, average speed, and time in use. The data provided was aggregated by month. The bikes record other metrics, such as power use, but these had yet to be incorporated into Mobility Solutions reporting system during the analysis period.

Throughout the analysis period, close contact was held with the KAIA partners to remain updated on progress, activities, and plans for new services. Researchers from the TØI attended events at the hub such as the initial kick-off and Better Cities Fund event from Wolt (described in greater detail in chapter 4).

2 Urban logistics as a socio-technical system

2.1 Theory: What are socio-technical systems?

Urban logistics is a complex system with equally complex challenges. There are no simple fixes or technical solutions to these problems because "established technologies are highly intertwined with user practices and lifestyles, complementary technologies, business models, value chains, organizational structures, regulations, institutional structures, and even political structures" (Rip & Kemp, 1998 as cited by Markard 2012). The field of sustainability transitions focuses on studying these kinds of hard-to-decarbonize 'backbone systems' of society (e.g. energy, mobility, food, water, healthcare) and the dynamics involved in transforming them (Schot & Steinmueller, 2018).

The **Multi-Level Perspective (MLP)** is a prominent framework within the field of sustainability transition for understanding systemic change in socio-technical systems, particularly within the context of sustainability. Developed by Rip and Kemp (1998) and refined by scholars like Geels (2002, 2005, 2011), the MLP conceptualizes transitions as an interplay between three hierarchical levels: the **landscape**, the **regime**, and **niches**. These levels interact dynamically, shaping both the stability of existing systems and opportunities for change. By understanding the distinct characteristics of each level, we can better grasp the processes driving sustainability transitions.

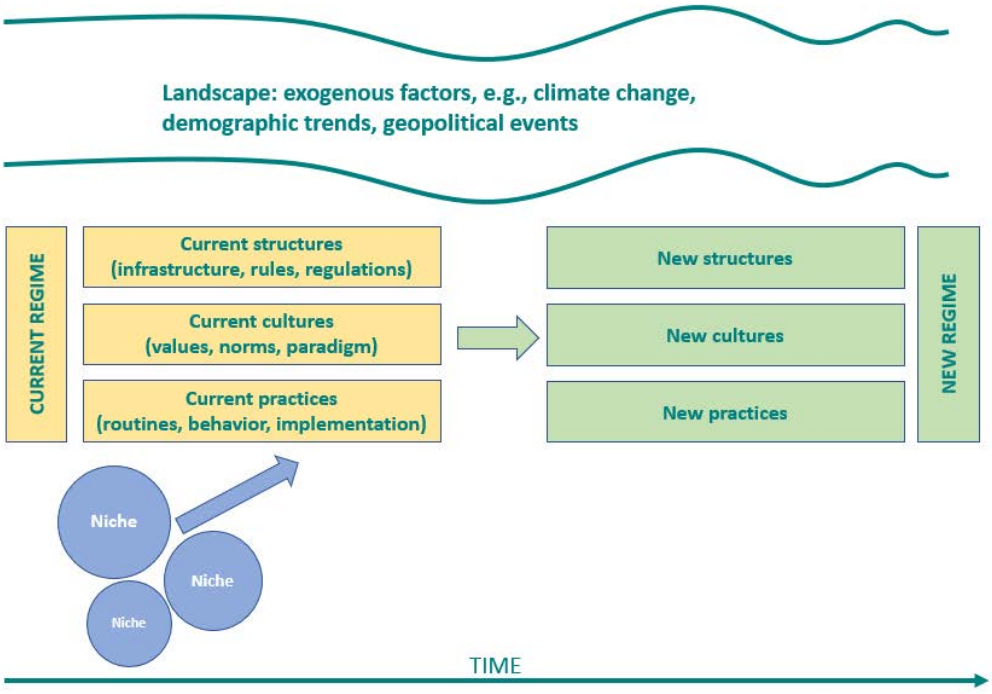

Figure 2.1: Simplified multi-level perspective for socio-technical transition (adapted from(Haan, 2010; Loorbach & Rotmans, 2010; van Raak, 2016)

At the broadest level, the **landscape** represents the exogenous forces that provide the overarching context for systems. These forces, such as climate change, economic crises, demographic shifts, or global political developments, are external to the system and largely beyond the influence of individ-

ual actors. The landscape evolves over long time horizons and exerts pressure on regimes by challenging their stability and exposing their vulnerabilities. For instance, climate change has become a dominant landscape force in recent decades, prompting systemic responses in energy, mobility, and other socio-technical systems. While regime actors cannot directly control landscape trends, they are often compelled to adapt their internal dynamics to respond to these pressures, thereby opening pathways for transformation (Geels, 2002, s. 1260).

The socio-technical **regime** forms the core of the system and can be understood as the structures, cultures and practices that guide actors (Loorbach & Rotmans, 2010) in their pursuit of carrying out a societal function (e.g. urban logistics). The regime is characterized by its stability and resistance to change, but in terms of transition, is the actual thing that changes. Structures refer to the material and institutional foundations of the regime, such as physical infrastructure, markets, regulations, and governance arrangements. These structures guide and constrain the actions of actors within the system, reinforcing the status quo. Culture represents the shared norms, values, and paradigms that shape how actors perceive problems and solutions. This cultural coherence underpins the regime's stability but can also inhibit radical shifts by favouring incremental change. Practices, meanwhile, are the everyday routines and behaviours that enact the regime's structures and cultures. These practices provide a dynamic connection between stability and adaptability, as they allow for small adjustments while maintaining the regime's overall trajectory. Together, the structures, cultures, and practices of the regime work to maintain system stability, making it resistant to disruption and favour incremental over radical change.

Despite this inherent stability, regimes are not impervious to change, particularly when subjected to pressures from both the landscape and emerging **niches**. Niches are protected spaces where novel technologies, practices, and ideas can develop without being immediately subjected to the selection pressures of the mainstream regime. These spaces are crucial for fostering innovation and experimentation, as they allow for the refinement of ideas that may initially appear inefficient or underdeveloped. Successful niche actors are able to articulate their expectations/visions, build social networks and align their innovations with regime configurations (Geels, 2011, s. 28).

The relationship between niches and regimes is dynamic, as niche innovations strive to "scale up" and become part of the mainstream. This process is often triggered by landscape pressures that expose vulnerabilities within the regime. For example, as climate change pressures intensify, niche innovations like electric cargo bikes and mobility hotels may gain traction, finding windows of opportunity to compete with or complement existing regime practices. If successful, these innovations can alter the structures, cultures, and practices of the regime, leading to a systemic transition.

2.2 The urban logistics system

2.2.1 Landscape

At the landscape level, several global trends and external pressures are reshaping urban logistics, creating both challenges and opportunities for sustainability transitions. These trends include **climate change**, **urbanization**, **digitalization**, and **e-commerce**. Each of these dynamics exerts unique pressures on the transport system while interacting to influence its evolution and enabling transformative change. In the following section, we will describe each of the landscape trends/forces with respect to transport and mobility and then provide a brief contextualization of how it relates to urban logistics in Norway.

2.2.1.1 Climate Change

Climate change remains a central challenge for transport systems worldwide, given the sector's significant contribution to global emissions. Transport accounts for about a quarter of all energy-related

CO2 direct emissions (Calvin et al., 2023, s. 1052) and 65% of global petroleum product consumption (Solaymani, 2019), highlighting the urgent need for decarbonization. Furthermore, the transport sector has experienced the fastest emissions growth among end-use sectors since 2010, with an average annual increase of 1.8% (Calvin et al., 2023, s. 1056). This rise is driven primarily by the rapid expansion of passenger and freight transport activity, which has outpaced the gains made through energy efficiency and cleaner technologies.

Norway, though a leader in renewable energy, green policies and the green vehicle adoption, faces its own transport challenges. The sector remains a significant contributor to the country's greenhouse gas emissions, accounting for about a third of all climate emissions (SSB, 2024b). The overall increase in transport emissions in Norway of 8% from 1990 to 2023 can be mostly attributed to the increase in freight transport (Miljødirektoratet, 2024).

2.2.1.2 Urbanization

More than half of the global population today resides in urban areas; this is up from about one-third in 1950 and is expected to increase to about two-thirds by 2050 (UN Population Division, 2018). As the urbanization trend intensifies, not only does the pressure on urban transportations systems increase there is increasing attention towards the non-climate related externalities of motor vehicle use in urban areas, including congestion, local air pollution (especially particulate matter), noise pollution, the health and economic costs of collisions, and the opportunity cost of urban space that is otherwise dedicated to transport infrastructure and storage. Urban logistics actors must contend not only with the added pressure of more people and activity in cities, but also greater efforts to curb the negative effects of motor vehicle use in them.

Although the demographic balance between urban and non-urban areas in Norway is relatively stable as compared with the rest of the world, more than 80% of the population already lives in cities and urban settlements (SSB, 2024a). Furthermore, there is national recognition of the aforementioned externalities and efforts to combat them, as evident in the long-term mobility planning in the major Norwegian urban areas (Samferdselsdepartementet, 2024) that seeks to think beyond tailpipe emissions, albeit with a focus on passenger transport, not logistics and freight.

2.2.1.3 Digitalization

Everything is increasingly digital, not just transport. As with the industrial revolution and the age of steel and electricity, the age of information and telecommunication in which we currently find ourselves has unleashed a series of new transport and mobility options and challenges (Aarhaug, 2023). Sometimes this manifests as entirely new segments like car sharing, ride-sourcing, and dockless e-scooter platforms, which could not be possible without digital infrastructures and interfaces. In other instances, digitalization helps us optimize existing modes of mobility, such as public transit systems using real-time passenger information to improve service reliability or dynamic traffic signal control systems that reduce congestion by adapting to live traffic flows. Moreover, digital tools have enabled the integration of multimodal transport options, making it easier to combine different transport types. For example, apps that combine ridesharing, bike-sharing, and public transit options enable users to seamlessly combine modes in one platform.

In the logistics sector, digitalization has introduced transformative tools that enhance operational efficiency and sustainability. Advanced routing algorithms enable delivery vehicles to optimize their routes dynamically, minimizing unnecessary mileage and reducing fuel consumption; UPS famously saved on fuel and reduced emissions by nearly eliminating left-hand turns in their truck delivery fleet (Holland et al., 2017). Real-time tracking technologies provide precise delivery updates, improving customer communication and reducing the need for repeated delivery attempts (Descartes, 2024). Predictive analytics allow for demand forecasting, ensuring that resources like vehicles and personnel are deployed efficiently (Striim, 2024). Digital Twins enable urban logistics stakeholder to optimize

operations by creating virtual replicas of logistics systems, allowing for real-time performance monitoring, dynamic decision-making, and continuous system improvements (Abouelrous et al., 2023).

2.2.1.4 E-Commerce

E-commerce is closely tied to the broader trend of digitalization, fundamentally transforming how goods are bought and delivered. With more people ordering products online, the volume of deliveries has surged dramatically. This shift has been accompanied by changing consumer expectations: faster delivery times have become the norm, adding new layers of complexity to logistics operations. The demand for speed means that logistics providers must handle not only larger quantities of goods but also tighter schedules, increasing the pressure on urban transport systems.

In Oslo, these challenges are further amplified by the rise of entirely new delivery segments that barely existed a decade ago. App-based food delivery platforms like Foodora and Wolt have introduced high-frequency, small-scale deliveries into the urban fabric. Often, this contributes to congestion and intensifies competition for road and curb space.

These businesses have also contributed to the rise of dark stores and kitchens- places that occupy retail space in city centres or portray themselves as a restaurant or store online but are only accessible to the public through app-based delivery. The common criticism is that these dark stores can create dead spots in otherwise attractive retail areas, which works against creating thriving urban centres. As e-commerce continues to grow, the need for innovative, sustainable, and efficient logistics solutions will only become more pressing.

2.2.2 Regime

The central functions of the urban logistics system are goods delivery, and mobile services. Waste management and transport is another important aspect of the system but was beyond the scope of this study. For goods delivery, operators rely mostly on large heavy-duty trucks and smaller vans that collect goods from warehouses and terminals – often located in non-central areas – and deliver them to customers throughout urban areas. For mobile services like facility maintenance and electrical work, it is more common to use vans, disproportionally by smaller operators as compared with goods delivery. The landscape pressures described above place pressure on both segments of the logistics system.

The increased volume and pace of deliveries intensifies the functional challenges of getting goods to their destinations while also exacerbating negative externalities such as congestion, air and noise pollution, accidents, and inefficient use of urban space. Simultaneously, urbanization trends toward restricting motor vehicle use in central areas pose new challenges for mobile service actors to access these areas. Although the challenge of emissions reduction is a pressing topic in all transport segments, in logistics, the central problems are more related to space, specifically the lack of it in urban areas. Given the finite nature of urban space, and its diminishing accessibility and manoeuvrability for larger logistics vehicles, we must identify new ways of delivering packages and providing mobile services.

Although spatial concerns are of central importance, emissions still matter, and existing logistics fleets are more difficult to electrify. While other areas of the transport system, particularly passenger transport, are making strides in addressing climate emissions through the adoption of electric vehicles, doing so in logistics remains a challenge. As with other transport segments that rely on larger vehicles, electrification in logistics is progressing slowly due to the high weight of batteries and extended charging times required for larger vehicles. As a result, logistics operators continue to lag behind broader transport electrification efforts, maintaining its reliance on diesel-power, especially in heavy-duty truck segments and contributing disproportionately to urban emissions and other

transport externalities. This lack of progress highlights the urgent need to align logistics practices with broader sustainability goals.

2.2.2.1 Structures

Urban logistics infrastructure is under significant strain, with road networks and loading zones struggling to accommodate the increasing volume of delivery vehicles and packages. The limited availability and poor distribution of loading zones, often occupied by personal cars in Oslo create inefficiencies. Drivers of delivery vehicles and mobile service providers choose to park in bike lanes, sidewalks or double park and can have a stressful working environment (Caspersen & Ørving, 2020; Enehaug & Gamperiene, 2010; Prosjekt STOR, 2023; Sweco, 2019). Cities, recognizing the negative impacts of motor vehicles, have begun implementing policies that restrict vehicle access in certain areas, expand pedestrian zones, add bike paths, and remove parking spaces. While these measures are critical for promoting sustainable urban mobility, they pose challenges for logistics operators. Delivery trucks and mobile service vans, which require space, are increasingly incompatible with the evolving urban landscape.

Simultaneously, the institutional logic of the regime reflects broader efforts to advance electrification as a central strategy for emissions reduction. This involves a set of incentives and government support for new vehicle purchases to accelerate the adoption of zero-emission vehicles (ZEVs). However, this fails to address the spatial problems at the core of urban logistics challenges and marks a fundamentally incremental rather than radical approach to transition. It involves replacing diesel-powered trucks and vans with battery-electric equivalents, maintaining the same basic system logic.

2.2.2.2 Cultures

Cultural expectations for fast and convenient delivery and service provision have risen dramatically in recent years, reflecting broader societal trends toward instant gratification. Same-day and next-day deliveries, once considered premium services, are in some urban logistics segments, such as food deliveries, becoming more common. This trend is more pronounced and visible in other European countries but can to some extent also be seen in Oslo. At the same time, the growing reliance on independent contractors for delivery and mobile services, rather than employees of traditional logistics companies, is reshaping the sector. This shift aligns with broader gig economy trends but raises concerns about labour exploitation and the effectiveness and consistency of the delivery process.

2.2.2.3 Practices

Despite advancements in digitalization, urban logistics remains fundamentally a material practice – the physical movement of goods and service providers to their destinations within constrained urban spaces. This is a deeply entrenched system that relies on established methods and material artefacts, namely trucks, vans, and centralized warehouses, terminals and distribution centres. These practices reflect significant path dependency, where logistics operators continue to use outdated approaches because they are familiar. This makes it challenging to integrate innovative solutions, as they often require significant changes to established routines, behaviours, and supply chain structures. The tension between the need for innovation and the inertia of existing practices underscores the difficulty of transitioning urban logistics toward more sustainable pathways.

2.2.3 Niches

There are a variety of urban logistics niches, reflecting diverse approaches to addressing the challenges of transporting goods in cities. Some niches are high-tech and futuristic, such as delivery robots and drones, which promise to automate last-mile deliveries in highly congested or hard-to-reach areas. These innovations are still in the experimental phase and face significant regulatory and

technological barriers but offer exciting potential for reducing reliance on traditional delivery vehicles. Other niches build on more established concepts but integrate modern technologies to improve functionality. For example, parcel lockers, a long-standing solution for secure deliveries, have been integrated with digital technology, allowing users to access them via mobile apps.

The most straightforward way to decarbonize transport is of course electrification; in many cases electric vehicles are no longer niche technologies, but a full-fledged part of the regime. Electrical vehicle adoption is accelerating globally, but the pace varies significantly across regions and vehicle types. While lighter passenger vehicles are leading this transition, heavier vehicles associated with freight and goods delivery have been slower to electrify. In 2023, they accounted for 18% of the global motor vehicle market, up from 14% the previous year; over the past decade, the global fleet of electrical vehicles (including all road vehicle types) has increased from well under 1 million to over 40 million (IEA, 2024). Norway is at the forefront of this shift with electrical vehicles accounting for close to 90% of the market for new passenger cars (OFV, 2024). Despite this, electrical vehicle adoption in the heavier segments have been slower due to expense and excessive weight and charging times associated with the larger batteries that such vehicles require. For example, the market share for electric vans in 2023 was about 30%, while the share for electric trucks was 12% (OFV, 2024).

2.3 Transition Pathways for Urban Logistics

There are four key pathways for socio-technical transitions, as articulated by Geels and Schot (2007): transformation, reconfiguration, technological substitution, and de-alignment and re-alignment. These pathways describe how change unfolds based on the timing, intensity, and interaction of pressures from the landscape, regime, and niches. The **transformation** pathway involves gradual adjustments within the regime in response to moderate landscape pressures, with incremental changes made by regime actors in the absence of fully developed niche innovations. In the **reconfiguration** pathway, niche innovations are adopted to address specific problems within the regime but eventually trigger broader systemic changes, altering its trajectory. In contrast, the technological **substitution** pathway arises when a mature niche innovation directly replaces the destabilized regime under intense landscape pressure. The **de-alignment and re-alignment** pathway occur when a regime collapses due to severe pressures, creating a period of experimentation where multiple niches compete until a new regime emerges. These pathways often overlap or follow sequentially, reflecting the dynamic and evolving nature of transitions.

3 Commercial use of cargo bikes

Understanding how cargo bikes are currently used, the contexts in which they operate, and the barriers they face, is important both to understand their role as a niche innovation and to determine the most relevant transition pathways to become a part of the regime. In this chapter we look at how cargo bikes are used commercially, based on what has been documented in the literature as well as data from KAIA Mobility Hotel and its users. We then look at barriers and drivers of commercial cargo bike adoption and consider how the services available at KAIA support such an adoption – either by removing or reducing barriers or strengthening drivers. Results from interviews and observations of KAIA's users and operator is also presented here.

3.1 Cargo bikes and transshipment hubs

Cargo bikes are often considered a viable option in urban areas where challenges related to parking, access and traffic reduce the effectiveness of larger vehicles. In such contexts, smaller vehicles are able to navigate dense urban areas more quickly and reliably than their larger counterparts, but have a comparatively more limited loading capacity, driving range, and speed (Malik et al., 2023; Narayanan & Antoniou, 2022). An additional benefit is that cargo bikes do not require a driver's license, which opens for a potentially larger pool of employees. Mitigating the downsides of cargo bikes while enabling their potential is key to making them competitive against more traditional vehicles such as vans. While studies have attempted to determine the potential of cargo bikes to replace other types of vehicles (especially vans), findings vary widely depending on factors such as the type of task being performed and the specific contexts of the cities. As a result, estimates for replacement potential varies from a relatively conservative 10% (Melo & Baptista, 2017) to as much as 67% of operations- assuming the support of transshipment hubs (Robichet et al., 2022). Indeed, transshipment hubs, often called micro terminals or city hubs, are critical for expanding the possibilities of cargo bikes as they can start closer to their operational area and can take multiple trips back and forth to the hub to refill goods (Arvidsson et al., 2024).

From a societal perspective, increasing the use of smaller commercial vehicles is desirable as a way of reducing the negative impacts associated with larger vehicles: traffic, pollution, accidents, use of space (Robichet et al., 2023). However, growing the share of cargo bikes commercially requires an understanding of both the drivers and barriers to their use and then implementing concrete measures that support them.

For individual businesses it may be impractical to rely on such a specialized means of transport as cargo bikes. Tasks that could be handled by one vehicle must be divided and reorganized in new ways, often involving some form of transshipment. This requires a location near the city for handling goods and overnight parking of the bikes, including charging and potentially battery swapping. The use of cargo bikes must be considered in the context of a suitable logistics strategy for the various tasks to be carried out, and this will vary depending on the type of goods or services involved.

In Oslo, the major logistics and transport players (Posten, PostNord, DB Schenker[1] , DHL, among others) handle most of the small and medium sized packages that originate from or are destined for locations outside the city. They also manage the bulk of e-commerce deliveries to consumers, and some offer fulfilment centres that handle storage, picking, and shipping for online retailers.

[1] *The Danish logistics company DSV bought DB Schenker in September 2024, and they are planning to integrate DB Schenker into DSV.*

In downtown Oslo, Posten, DHL, and DB Schenker have established transshipment hubs for centralized delivery of mail and packages. From 2019 Posten also operated a terminal (Elskedeby) for a few years in collaboration with the recycling and waste management company RagnSells and the real estate management company KLP Eiendom. The main idea behind these hubs is to save time by using large vehicles for the transportation stage between the main terminal and the hub while conducting city distribution efficiently with primarily electric vans, cargo bikes and mopeds such as Paxster. The significant distance from the terminal to the city centre and high congestion in the centre enhance the benefits of this solution. For the Elskedeby hub, Posten reported saving two full-time positions through transshipment and collaboration with RagnSells compared to their previous logistics arrangement (Jensen et al., 2022).

3.2 Vehicle choice

Cargo bikes offer quick, reliable transport in dense urban areas, and are hardly limited by traffic, urban access regulations, or availability of parking, which makes them conceptually attractive for urban logistics (Dalla Chiara et al., 2023; Narayanan & Antoniou, 2022). However, in practice, the choice of which specific type of cargo bike is used can have significant implications for pilot projects, where the success or failure of a pilot can be determined by a small number of vehicles. The breadth and variety of cargo bikes has increased dramatically in recent years, with new actors launching products aimed at different market segments. While this expands the arena in which cargo bikes can operate, it comes with its own pitfalls as the choice of vehicle may be made by those with limited experience of cargo bike operations and thus not aware of the specific features or services that should be prioritized in selecting a new vehicle type (Ørving & Weir IV, 2022). Depending on the model of cargo bike selected, different barriers or drivers can be wholly or partially addressed. For example, a 4-wheel cargo bike offering a windscreen and roof might alleviate barriers related to weather protection and employee acceptance but be less able to navigate traffic when compared with a two-wheel model due to its larger size. There are also trade-offs between ease of maintenance, cost, complexity and size of the cargo bike that may need to be considered.

Photo 3.1 CityQ cargo bike used by Posten. Photo: Howard Weir

In the case of KAIA, the vehicle in use during the analysis period was the CityQ cargo bike, a four-wheel, weather protected model with a payload of up to 175kg and volume of 1-2m^3 (depending on the box installed). The roof and wind screen can make the bike more attractive for some users, especially for those who have previously used a van or moped for their work and value a more car like experience.

CityQ uses a pedal series hybrid system for its drivetrain, sometimes called a digital or electric drive. Instead of a direct physical connection between the pedals and the motor using a chain or belt, the pedals are connected to a generator which sends electricity to the batteries. The motor then draws electricity from the batteries for propulsion. The use of the pedals determines when the motor activates. This allows it to fulfil legal requirements such as an e-bike that stipulates the pedals must be in motion for the motor to be active at speeds greater than 6km/h. The motor provides support up to a maximum of 25km/h (+-10%). Series hybrid systems were accepted by the EU in 2022 and given the same status as other e-bikes.

The removal of the chain can reduce maintenance needs for the vehicle's drivetrain, allows for more control over pedal cadence and gear ranges, and can allow for more novel vehicle configurations as the chain's pathway need not be considered (D'hondt et al., 2022). The potential downsides are a loss of efficiency over a chain system, that the bike may not "feel" right to experienced riders due a disconnect between pedal cadence and motor output, inability of the rider to contribute more torque to the system on steep uphill's (though additional motors can counteract this), and that the bike cannot be used if there is no power (either due to low battery or the motor being turned off) (D'hondt et al., 2022). Other models were considered for use at KAIA at the time of this writing, but interviews and data collection were related specifically to the CityQ bike.

3.3 Barriers and drivers to the commercial use of cargo bikes

The barriers and drivers of cargo bike adoption in a commercial context have been well documented in literature (Gruber, 2024; Gruber et al., 2024; Heinrich et al., 2016; Narayanan & Antoniou, 2022; Sherriff et al., 2023) and can be grouped into categories such as vehicular, operational or infrastructural. Gruber (2024) suggests 12 barriers and 11 drivers to cargo bike adoption by businesses and found that commercial users tend to underestimate the barriers related to adopting cargo bikes whereas they generally have a more accurate understanding of the drivers and benefits. Gruber looked at participants from a cargo bike testing program that involved 755 companies and public institutions in Germany. Participants received a cargo bike to use for 3 months. However, the testing program provided maintenance, insurance and repairs for the bikes which could have led to users underestimating its importance as a potential barrier. We have used the barriers and drivers identified by Gruber (2024) as a starting point and added additional barriers and drivers reported in the literature and by users of KAIA in Table 3.1.

Some barriers and drivers identified by Gruber (2024) have also been adapted, based on findings in literature and/or input from users of KAIA. Interviews conducted with users involved with KAIA generally confirmed barriers identified in the literature.

While Table 3.1 provides an overview, it can be difficult to isolate a single barrier or driver as they often work synergistically. For example, a more robust bike may engender greater employee acceptance and as a result ease the organizational effort needed. Though we discuss the different drivers and barriers in greater detail below, we do not exhaustively discuss the different connections between each driver and barrier and how they may strengthen or hinder each other.

However, as this study did not encompass winter months, the interviewees did not have experience with conditions such as extreme cold, snow or ice. Previous research suggests that proper clothing and equipment (such as spiked tires) can mitigate the main challenges related to cold weather use

(Arvidsson et al., 2024; Dybdalen & Ryeng, 2022). But poor weather can influence both the willingness to use cargo bikes and the length of the trips that are taken (Malik et al., 2023).

Adoption and diffusion of innovative technologies, such as cargo bikes, can be slowed or stymied if initial perceptions and interactions with a technology are tainted by poor experiences on the part of users (Heinrich et al., 2016). Some models of heavy cargo bikes can have significant maintenance requirements that lead to significant periods of downtime (Ørving & Weir IV, 2022). Maintenance, service and implementation costs combined with the robustness of the vehicle are frequently cited by users of cargo bikes as one of the major issues that must be accounted for to achieve efficient operations (Weir IV, 2024). This resulted in the inclusion of Robustness / Reliability as a barrier, and Technological maturity as a driver (Table 3.1). Both are mentioned by KAIA users as an important barrier and/or driver for cargo bike adoption and were also identified by Ørving and Weir IV (2022) as important factors in the adoption of cargo bikes. Gruber also mentions market maturity as a key factor in his conclusions. The driver Maintenance Cost (Gruber, 2024) was changed to Maintenance/ Operating Cost. As mentioned above, maintenance costs, insurance and repairs were covered during the German trial studied by Gruber, so businesses were more likely responding to costs associated with operation, such as lower tolls or fuel costs when compared with vans. Finally, we added No licensing requirement as a driver, as all KAIA users expressed access to a wider employee pool as beneficial since the riders did not need to have a driver's license to operate cargo bikes and could thus perform tasks that would normally be reserved for employees that had a driver's license.

Challenges associated with maintenance can help explain the initial excitement around cargo bikes and their potential on the part of policy makers and researchers without a corresponding widespread adoption among those who use or could use the technology. Essentially, the cargo bikes are often seen as working well when they are in use, but users have experienced prolonged periods of downtime due to maintenance problems, lack of service partners or limited availability of spare parts (Arvidsson et al., 2024).

Cargo bikes need more frequent maintenance than alternatives such as vans, though the overall cost is generally lower (Narayanan & Antoniou, 2022). The main challenge related to frequent maintenance of bikes is normally not the cost of the repair itself, but cost related to the down time of the bike. Each time a bike must be delivered in for service means that it cannot be used to earn money through commercial activities. Users must either find an alternative or, in the worst case, be unable to carry out planned activities. Service partners may not have experience with the specific model of cargo bike used or specific parts for specific models may not be commonly stocked or be unavailable due to small production numbers, which means the bike's downtime can potentially extend over days or even weeks (Ørving & Weir IV, 2022). A lack of reliability can make it challenging for businesses to fully integrate cargo bikes into their businesses. Developing new routines and routes around a vehicle that they cannot rely on is seen as too risky.

Implementation cost is another potential barrier, while at the same time purchase cost is a potential driver. Whether these two factors function as barriers or drivers depends on the type of bike being used and the circumstances of the user. There is a wide range in in the purchase cost of cargo bikes, with some models costing upwards of NOK 200 000. This begins to approach the price point of small electric vans, which can range from NOK 250 – 500 000. The perceived usefulness of a cargo bike must be similar to that of a van and be seen as a legitimate alternative. KAIA users also expressed difficulty in acquiring insurance for the bikes, as the types of policies they were interested in did not currently exist, though companies like Threspoint (discussed in 3.5.4) are attempting to fill this market. Difficulties in acquiring insurance leads to both increased implementation costs as well as organisational costs, as the time and effort needed to work around such problems is an additional burden for businesses.

Implementation cost also encompasses the cost of acquiring space for facilities and functions necessary for cargo bike operations. For example, space for transhipment of goods from van/truck to

bike, storage of equipment, the need for parking bikes overnight and potentially workshop facilities for maintenance. In central urban areas the cost of space is high, and can be a considerable barrier, though some actors may already have space available, especially if they are replacing vans and already have indoor parking available.

Table 3.1: Barriers and drivers to using cargo bikes commercially, adapted from Gruber (2024). Items marked with an asterisk have been added to, or adapted from, Gruber's list.

Barriers to using a cargo bike	Description
Weather	Exposure to bad weather (rain, cold, snow)
Spatial coverage	The geographic area that can be covered is limited compared to alternatives (e.g. vans), limited by range, speed and vehicle capacity
Handling	Poor experience of using the bike by cyclists
Robustness / Reliability*	Low resistance to mechanical failure
Cycling infrastructure	Low quality and/or limited extent of cycling infrastructure
Theft	High likelihood of theft
Safety	Perceived and/or actual safety is poor
Service Network	Low density and/or quality of service points (e.g. workshops)
Loading Capacity	Limited amount per working shift that can be carried
Organizational effort	Internal effort needed to adopt new vehicles, such as planning new routes
Payload damage	Concern that goods/equipment are more likely to be damaged during transport
Employee acceptance	Low willingness for employees to use
Implementation cost	Costs related to purchase and storage of cargo bikes, including procurement of other facilities needed for their operation (e.g. Microhubs)

Drivers to using a cargo bike	Description
Flexible parking	Ease of parking at destination
Image	Positive perception of using sustainable transport
Health	Improves employee health
Electric range	Distance that can be covered, without battery swapping or charging, is sufficient for expected use
Purchase cost	Lower price compared to alternatives (e.g. vans)
Maintenance/ Operating cost*	Costs associated with charging, tolls, parking and standard maintenance can be lower compared to alternatives (e.g. vans)
Environmental goals	Supports an organization's sustainability goals
Fun	Enjoyment of users
Accessibility	Provides access to areas that are difficult to reach with a car
Travel time reliability	Takes same amount of time to reach a given destination regardless of traffic conditions
Travel time	Reduced time taken to reach a destination in urban areas, compared to alternatives (e.g. vans)
Technological maturity*	Ability of cargo bike to take on commercial tasks in real world environments
No Operating License Required*	Allows a wider pool of potential employees to recruit

Some of the barriers are related to challenges in organization and perceived risk when adopting a new solution. Adoption of cargo bikes would, for many companies, mean start using a new type of vehicle in addition to the vans (and possibly trucks) they already use. The reason being that cargo bikes, due to limited range, relatively slow speed and limited capacity, cannot replace cars for all types of operations. Many tradespeople and service companies are medium-sized or small businesses and transitioning to a system with multiple types of vehicles can be demanding and risky. They must consider location and transport volume, including potential transshipment and fixed costs for premises. There are significant barriers to adopting a solution that is not a part of the regime and thus not supported by the current system.

However, there are few studies on mobile service providers. In 2016, TØI conducted a study on tradespeople and the mobile service industry regarding the transition to electric vans (Julsrud et al., 2016). At that time, the range was shorter, and the cargo capacity of electric vans was smaller than it is today, making the transition more challenging. The study included several interviews and GPS tracking of 115 vans operating in the Oslo area, as shown in Figure 3.1. The plot illustrates a high density of these vehicles in central Oslo, but it also shows that many vans were used in significantly larger areas, beyond the range of electric vans at the time and far beyond the reach of bicycles.

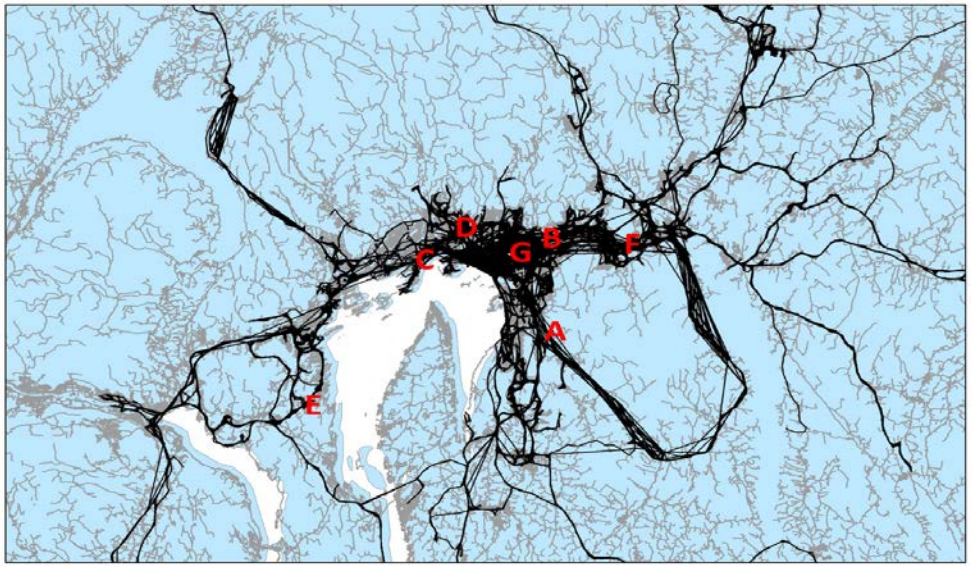

Figure 3.1: Driving patterns based on 115 vehicles for trade and service workers from 7 companies. Company locations are denoted by red letters, with vehicle movements as black lines (Julsrud et al., 2016)

There were examples of companies with multiple vehicles that, during electrification, reorganized the distribution of tasks among their vehicles, giving diesel vehicles a larger share of longer trips. It was also noted that this led to changes in the form of improved planning, which appeared to result in cost savings and fewer ad hoc trips (Julsrud et al., 2016). The project also noted that service companies had more predefined movement patterns than tradespeople, making it easier to plan in terms of range. Bravida is an example of a company that has established a presence in city centres with its GreenHubs, which have allowed them to use smaller vehicles for tasks in the city centre, saving time on transport and parking (Ørving & Weir IV, 2022).

Addressing the various barriers and/or supporting drivers of cargo bike use can occur at multiple levels. Some barriers, such as handling or weather, are mostly addressed at the vehicle level whereas building out a network of bike lanes or addressing theft, may be better addressed at the municipal level (see chapter 5). Still other barriers are related to challenges in organization and perceived risk when adopting a new solution, and these will primarily need to be addressed within the company using, or considering using, cargo bikes.

3.4 Barriers and drivers in transition context

The structure-culture-practice framework helps us understand how the existing urban logistics regime functions and where the barriers and drivers of mobility hotels reveal challenges and opportunities for transition. While all three dimensions play a role, a greater number of structural barriers are identified. Whether these collectively represent the most significant obstacle is difficult to determine, as weighing the relative importance of structural, cultural, and practice-related factors is

inherently complex. However, recognizing the prevalence of structural barriers provides a useful point of departure for systematically addressing the challenges and opportunities facing mobility hotels.

Structural barriers largely reflect the ways in which urban logistics infrastructure is optimized for traditional motorized freight rather than a model that integrates cargo bikes through mobility hotels. One of the most pressing issues is implementation cost, which includes securing physical space for storage, transshipment, and maintenance. In dense urban areas, where real estate is expensive and logistics hubs are already under pressure, this poses a significant constraint. The service network barrier further reinforces this structural challenge, as the existing maintenance and repair ecosystem is built around vans and trucks, making it difficult for businesses to ensure reliable cargo bike operations. Similarly, robustness and reliability remain a key structural concern, as cargo bikes are still perceived to require more frequent maintenance and face longer downtimes due to limited availability of spare parts and specialized workshops. The structural loading capacity barrier also plays a role, as businesses must determine whether cargo bikes operating from mobility hotels can handle the necessary freight volumes efficiently.

While cultural factors are not the primary constraint, they still influence adoption. Employee acceptance is a notable cultural barrier, as workers accustomed to traditional logistics practices may be hesitant to switch to cargo bike-based deliveries, particularly if they perceive challenges related to handling, safety, or exposure to weather conditions. However, there are also important cultural drivers that could support the transition. The image of sustainability aligns with broader corporate and municipal environmental goals, making mobility hotels an attractive option for businesses looking to enhance their green credentials. The health benefits associated with cycling-based transport could also contribute to a cultural shift, particularly among businesses that see employee well-being as a strategic priority.

Finally, the practices that define urban logistics, such as route planning, vehicle operation, and fleet maintenance, must be adapted for mobility hotels to succeed. The organizational effort barrier highlights the internal challenges businesses face when restructuring operations to integrate cargo bikes into their existing workflows. In a regime designed around motorized freight, the shift to mobility hotels requires businesses to develop new spatial practices, such as transshipment logistics, route optimization for bike-based deliveries, and coordination between different transport modes. However, mobility hotels offer practical advantages that could help reshape these practices. The driver “flexible parking”, for instance, enables easier access to dense urban areas where van-based deliveries face congestion and parking restrictions. Similarly, travel time reliability could be an incentive for businesses operating in heavily congested areas, where cargo bikes moving through dedicated cycling infrastructure may experience fewer delays than vans stuck in traffic.

Overall, mobility hotels face a large number of structural barriers, but cultural and practice-based shifts can reinforce their adoption if the right conditions are created. Addressing infrastructure and service network constraints will be critical, as overcoming these structural barriers could accelerate cultural acceptance and practice adaptation, enabling mobility hotels to become an integrated part of the urban logistics regime.

3.5 Organization and activity at KAIA

3.5.1 Mobility Solutions

> *"...the most important aspect of the collaboration around KAIA is not a commercial venture at this moment but the ability to test 'new types' of vehicles, technical and operational solutions, and collaborations, to see what is needed for these vehicles, collaborations, and solutions to work well for the involved parties and other similar actors. Measuring commercial gain will be difficult ... until such solutions have been tested in practice and the project is potentially scaled up and further developed at a later stage." (Citation from meeting with Mobility Solutions, September 19th, 2024)*

3.5.1.1 Interview results

While the primary service provided by Mobility Solutions at KAIA Mobility Hotel at this stage is cargo bike leasing with included service, they have a broader goal of contributing to the entire value chain for companies and their customers related to small electric vehicles. They are interested in supporting what they refer to as an ecosystem for the commercial use of cargo bikes and micromobility. KAIA is important for Mobility Solution's market position, both as a physical place to present its services, but also due to the media attention generated by the introduction of a "Mobility Hotel" as a new concept through news outlets such as Zag Daily.

At the startup phase, KAIA is an important customer channel for Mobility Solutions, allowing them to demonstrate their ambition to develop services and collaborations with others and build a wider ecosystem of mobility services. Furthermore, there are companies that complement Mobility Solutions' operations and wish to physically link their activities to KAIA. In this way KAIA is becoming a hub for the technological development of small electric vehicles for use in urban logistics. Several actors contribute to both technical development and covering rental and operating costs.

To become a more holistic operator that supports multiple aspects of cargo bikes value chain, Mobility Solutions is working with its existing partners and looking for new partners who can benefit from the services enabled by KAIA or support the establishment of new services. At this stage, Wolt is their primary partner. Wolt contributes half of the rent for KAIA, an arrangement which is expected to extend beyond the MOVE21 project. As discussed below in 3.5.4, Wolt is looking at several different ways in which KAIA can support more sustainable operations for them or open new possibilities by enabling new types of activities.

For the first months of the pilot period, the MOVE21 project has financed a share of the rental costs for KAIA Mobility Hotel, as part of a joint venture. This is a concrete example of the shielding necessary for niche innovations to move to the regime level (as discussed in section 2.2). However, Mobility Solutions also see a disparity in how cargo bikes are treated versus other electric vehicles by public support mechanisms, with the latter receiving a much larger share through lower taxes and advantages in public procurement. At the same time, they also recognize that changes to traffic patterns at the city level make their services more attractive as they provide options that are more successful in areas that are difficult to drive and park in. These themes are discussed more in depth in chapter 5.

3.5.2 Data from use of cargo bikes

The CityQ bikes collect data across several categories, such as kilometres travelled, speed, and time in use. Posten and Wolt have been using the bikes for several months, with data collected from the start of July until November 11th, 2024. Meanwhile, Trippel had just begun using the bike when the

data was gathered, so their figures are based on only a few days of usage. Not all bikes from Posten and Wolt were in use during the data collection period.

Even though the dataset is not extensive, it is still interesting to observe the different usage patterns. Clear characteristics emerge for the various operators based on their respective tasks. Despite the limited scope of data, the gathered data in Table 3.2 align with expectations derived from observations and interviews with the different actors.

Table 3.2: Data collected from KAIA's CityQ bikes November 18th, 2024.

Company	Number of bikes	Average distance per day (km)	Average speed (km/h)	Total distance (km)
Posten	2	14.8	14.5	3199.2
Wolt	2	42.0	17.7	6629.6
Trippel	1	6.5	14.5	30.2

Posten riders have many stops with short distances between them, resulting in fewer kilometres travelled and lower speeds. Conversely, Wolt riders experience relatively long stretches between stops, leading to higher speeds and greater distances covered. Trippel has the lowest number of kilometres travelled per day since the bike is used in the city centre to transport staff and cleaning equipment short distances between assignments, which can take 15–30 minutes to complete.

However, there is limited data on how cargo bikes behave in traffic and which types of infrastructure they use. (Dalla Chiara et al., 2023) used video cameras to study a cargo bike used for package delivery over a 2-month period in Seattle, Washington, USA, and found a strong preference for parking and riding on the sidewalk (80% and 37% respectively). Interviews with DB Schenker's cyclists in Oslo reported a preference for using the road or bike infrastructure for travel when possible, but often used the sidewalk for parking (Dybdalen & Ryeng, 2022; Ørving et al., 2018).

In the following sections, we look more specifically at how cargo bikes are used by the different users of KAIA. Information here was collected through interviews, meetings, and observations.

3.5.3 Posten - Last mile deliveries

3.5.3.1 Data from Posten

Within Oslo, most of Posten's daily transport of letters and small packages is carried out by electric vans and 4-wheel mopeds from Paxster (Table 3.3). Posten has several depots and hubs at different points in the city from which they manage their last-mile routes. Goods come by truck to these depots and are transferred to smaller vehicles for last-mile distribution (Photo 3.2). In addition to vans and Paxsters, walking trolleys are currently being used for a small number of routes close to the depot.

Table 3.3: Overview of Posten's fleet in Oslo (number of vehicles and average km/day driven). Data provided by Posten are averages from the month of October 2024.

Posten vehicles	Number	Average km/day
Large electric vans	36	45
Small electric vans	6	41
Paxster (L6/7e quadricycle)	70	35
City Q bikes	2	15
Walking trolleys	15	8

3.5.3.2 Interview results

It is through replacing walking trolleys that Posten sees cargo bikes supported by KAIA as most attractive in the initial phases of the pilot. Employees do not need a driver's license, and the bikes can carry a goods volume similar to that of the largest Paxster vehicles, greatly expanding their range and the types of goods they can carry when compared with a walking trolley. The additional capacity is also needed to address larger trends related to e-commerce and digitalization, where the number of letters is decreasing, and the number of packages is increasing.

The greater range is especially important as some of the depots nearest the city are being pushed further out as the most central locations are re-developed for other purposes by commercial actors. Posten reports that they will need to start operations further away from the delivery area and will no longer be able to use the walking trolleys for many of their routes. Cargo bikes allow a much greater travel range than walking and can reach a delivery area from further away, expanding the operational footprint of their depots while maintaining the same levels of access that the walking trolleys provided.

Photo 3.2: Inside one of Posten's urban depots. That the vehicles are electric and small allows them to be loaded indoors. Photo: Howard Weir

Posten prefers to use cargo bikes over Paxster in the inner city because cargo bikes are allowed to park on sidewalks and to access short cuts for walking and cycling. While Paxster vehicles are similar in size to the CityQ cargo bikes, they cannot legally park on the sidewalk or bike lane. However, this can also lead to conflicts as the cyclist reported that it was occasionally difficult and uncomfortable to navigate areas with many pedestrians on the sidewalks. The cyclist would prefer that the CityQ was more clearly marked as an e-bike so that people understood it was legally allowed in bike lanes and on the sidewalk.

For Posten, operational stability is crucial. Their leasing agreement includes a provision allowing them to terminate the contract if the bicycles experience more than 25% downtime. Additionally, they have an agreement that the repair technician will come to them, pick up the bike, and return it once it has been serviced. According to Posten, the breakdown of an electric cargo bike is problematic if it cannot be back on the road quickly, ideally within an hour. It is essential that the workshop is reasonably close to ensure a quick response. Thus, for Posten, the most important services provided by KAIA are related to maintenance. They have tested out other cargo bike models but found the bikes unreliable and previous service partners and manufacturers to be either unresponsive or

unable to fix the bikes quickly enough. Such maintenance issues led to an unacceptable level of downtime for the vehicle, and it eventually fell into disuse. As they increase the number of cargo bikes, they see the need to have a loaner/reserve bike available so that they can deliver a bike in for service without it negatively affecting their workday.

While the leasing agreement allows the costs to be spread over a longer period, this is not a significant factor for a large company like Posten, it is the service agreement and quick repair times that are crucial, as personnel costs are the main expense. For Posten, it is important that the couriers are satisfied with the vehicle and that the workday functions well from a health, safety, and environment (HSE) perspective. The cost per delivery matters more than the price of the bike itself. The courier we interviewed was positive about using the bike, except for the perception that the bike is somewhat less robust and that its ride comfort is sensitive to uneven surfaces. They also mentioned specifically cobblestones as a barrier to using the street in some instances.

By December 2024, Posten had approximately 8 CityQ cycles in Oslo and another 8 in Trondheim, primarily being used to replace walking routes. Posten appreciates the expansion of their courier's operational area, which they say provides greater productivity and flexibility when compared with a walking route.

3.5.3.3 Observation results

The cyclist from Posten was interviewed for an hour and then observed for the first portion of their shift directly after the interview on October 22nd, 2024.

The cyclist from Posten has a workday that goes from 8am-4pm where the first 30-45 minutes of a shift were spent sorting, getting vehicles ready and generally preparing for the day. The cyclists route began at the depot in Helsfyr, with the first stop occurring 2.3 km away. Once in the delivery area, the route was characterized by frequent stops, sometimes within 15 meters of each other, with small packages or letters. While the road and/or bike lane was used to travel between clusters of stops, the sidewalk was also frequently used, especially for parking to make deliveries. Often, once on the sidewalk, there was no possibility of returning to the road until the end of the block due to parked cars acting as a barrier. Most observed stops were less than 1 minute and there were few pedestrians around.

The bike was loaded near capacity and the cyclist slowed speed significantly over bumps. They expressed concern that the bike did not feel robust enough and were worried about its ability to tolerate the strain that comes from daily use. The bike could not navigate up and down curbs which limited its ability to manoeuvre from the road to the sidewalk in certain instances or meant that it would need to continue traveling either in the road or on the sidewalk until it reached an area with a ramp to reach its destination.

Aside from concerns about reliability, the cyclist was extremely favourable to the CityQ bike, preferring it to using the walking trolley. They experienced it as less physically demanding and appreciated the weather protection offered by the wind screen and roof. They were unsure as to how the winter would be, not because of the cold, but because they were uncertain as to how challenging it would be to bike through snow that had accumulated on the road/sidewalk. They had experienced days where it was difficult with the walking trolley because of heavy snowfall. While the interviewed cyclist had not used a bike through the winter, Posten had two bikes in use the previous winter.

Photo 3.3: Posten cyclist on the sidewalk, with parked cars limiting opportunities to move back to the road. Photo: Howard Weir

3.5.4 Wolt - On-demand deliveries

3.5.4.1 Interview results

The transport for Wolt is carried out by its courier partners. These are independent contractors that are responsible for providing their own means of transport. Couriers use an app to receive orders from customers which they can choose whether to accept. Orders can broadly be divided into two categories: 1) Orders from restaurants and stores, and 2) Orders from Wolt Market. Wolt Market provides a limited selection of groceries that can be chosen and delivered on-demand from one of their dark stores (stores only accessible online). From the courier's perspective, the main difference between the two order types is the size of the orders and the resulting route structure. Wolt Market orders always originate at the same location, as they must pick up goods from the dark store and deliver it to the customer. Additionally, orders from Wolt Market often comprise multiple customers, which can make these orders more attractive for couriers as they are paid per customer. In contrast, orders from stores and restaurants are generally smaller and the origin point of the next order depends on where the courier is within the city as Wolt's app will attempt to assign them an order that is close to them.

While couriers use a mixture of vehicles that includes cars, bikes, mopeds, and e-scooters, it is often cars that are used to fulfil orders from Wolt Market. The cargo bikes provided by Mobility Solutions can allow larger orders to be taken by more sustainable vehicles and are also available to couriers without a driver's license. In Wolt's app, couriers can either register as a car or a bicycle. Drivers on CityQ bikes, therefore, have greater access to tasks than those using cars or regular bikes as they can switch between the two modes. However, if registered as a car they must refuse orders that go over a longer distance. Wolt does not penalize couriers for declining an order nor do they provide preferential treatment. Wolt states that it is important to treat couriers equally and that the couriers experience the system as fair.

The use of cargo bikes begins to blur the line between the categories car and bicycle, as both Wolt and the couriers see that the cargo bike can manage a wider number of tasks, though its range and lower speed can be a limiting factor outside of dense urban areas. Wolt is in the process of adapting their app to better support multiple vehicle categories. Wolt wants to incentivize its couriers to use more sustainable vehicles as a way of reaching their sustainability goals. For Wolt, their largest

source of emissions (80%) is related to transport, and they have a goal to shift more of their vehicle kilometres to zero emission vehicles. However, from 2023 to 2024, Wolt has seen a downward trend in the proportion of couriers registered as using a bike in the app and an upward trend for couriers registered as using a car (Uhlving et al., u.å.). At the same time, recent years have seen a dramatic increase in cars registered from Romania operating in Oslo, the majority of which are able to avoid paying tolls. Norway does not have access to vehicle registry data in Romania and therefore no address to which they can send an invoice. The few that pay have registered for Autopass through a service called Epass 24, but this accounts for just 1-2% of the 12,4 million NOK in toll fees owed from 2024 (Sveen, 2025; Uleberg et al., 2025). It is unclear to what degree these cars are engaged in delivery activities for companies like Foodora and Wolt, though Wolt has said they are considering different options to improve the situation, such as requiring Autopass (Uleberg et al., 2025). Being able to avoid toll payments would be attractive for couriers making multiple trips through the toll cordon, and closing such loopholes would reduce the attractiveness to use vehicles and maintain the competitive advantage bicycle deliveries have when it comes to costs related to tolls. The introduction of cargo bikes that can perform a greater share of the orders currently relegated to cars could potentially make bike-based deliveries more attractive and reduce the number of kms driven by cars. It is the orders from Wolt Market that are the most relevant for finding sustainable alternatives that can contribute to a reduction km driven.

However, the couriers are very sensitive to cost and risk, so financing options are crucial for whether the bikes are used. Wolt (internationally) has established a fund (Better Cities Grant) to assist couriers in obtaining more environmentally friendly vehicles. The fund collaborates with a company (Treshpoint) that offers leasing GPS-tracked cargo bikes to Wolt cyclists on favourable terms (90 NOK per day). This includes leasing the bike, wrapped with advertising for Wolt, monthly maintenance, and insurance against theft and damage. These bikes are 4-wheeled cargo bikes from Vok and are slightly less feature rich (and therefore less expensive) and have a smaller cargo box than the CityQ bike.

Part of Treshpoint' s business concept is to sell data automatically generated from the bikes to provide insights on use which could be used to improve operations or for targeted advertising depending on where the bikes are in the city and presence of relevant customer groups. Advertising would be a way for courier partners to add an additional revenue stream, reducing the monthly cost of the vehicle.

Wolt has 5 Vok bikes and 5 CityQ bikes available in Oslo at the time of this writing. Mobility Solutions has entered into an agreement to provide maintenance for these Vok bikes. However, not all these vehicles were in operation at the time of this writing as Wolt experienced delays in finding insurance for the cargo bikes as they do not fit traditional insurance products. Though two CityQ bikes were in use, the final price and terms for courier partners using the bikes had not yet been decided when we conducted the interviews.

Photo 4 From Wolt's better cities event, a Vok 4-wheeled cargo bike in the background with a CityQ bike visible in the foreground. Photo: Howard Weir

It is also important to consider how the cargo bike might be used outside of work hours, and which couriers it would be attractive for. In a survey of 20,000 couriers carried out by Copenhagen Economics, Wolt reports that 83% of its couriers work less than 20 hours a week, and the average courier in Norway works just 7 hours (Wolt, 2024). The average Wolt user is not likely interested in a relatively expensive leasing agreement for a vehicle that is geared towards a very specific purpose and would instead use their existing vehicle (whether that be a car or bike). In the initial phases, it is likely that the leasing service would only be attractive for courier partners that are working closer to full-time. Both Wolt and Mobility Solutions have spoken about the potential to develop new business models that facilitate the sharing of a cargo bike, which could make their use more attractive for a wider number of courier partners. While the leasing and workshop services provided by KAIA are the most important services for Wolt, other services are planned that could influence how Wolt's courier partners interact with KAIA and carry out their workday, such as battery swapping, a self-service maintenance station, overnight parking and a break room.

3.5.4.2 Observation results

The cyclist from Wolt was interviewed for an hour and then observed for the first portion of their shift (about 3 hours) directly after the interview on October 25th, 2024.

The cyclist had a flexible work schedule, but usually worked from Wednesday to Sunday, starting the shift around 2-3pm and working until 10-11pm. Their delivery pattern was characterized by relatively long travel distances between stops (up to 3.9km during the observation round). As the deliveries were less predictable and dependent on the algorithm in the application, the cyclist attempted to navigate to areas that were perceived as order rich to increase the chances of an order. The rider changed between fulfilling deliveries for restaurants and orders from Wolt Market. Wolt Market was considered preferable as the bike's capacity allowed the rider to take multiple orders. However, this could change over the course of a shift as restaurant orders became more frequent as the evening

progressed. The cyclist experienced a switch in the types of orders that he received based on the time of day. They also mentioned that the cargo bike was a bit over dimensioned for the size of the orders they had, even when considering Wolt Market, and that a smaller box could be desirable to reduce the overall size of the vehicle and improve visibility.

After an order was fulfilled, the rider would again try to strategically travel to an area that they expected would be rich in orders. Time of day was important in this judgement, as they observed a change in frequency for Wolt Market orders and restaurant orders depending on the hour, with a perceived increase in restaurant orders around dinner time. They also felt they had an advantage for some orders from Wolt Market because many courier partners that used cars would be unwilling to take orders in the centre of the city, which, from the perspective of a cargo bike rider, are the easiest and fastest to fulfil.

The rider used mainly the road and bike lanes to operate, very seldomly parking on the sidewalk. Occasionally they parked in the bike lane to make deliveries. Similar to the employee from Posten, the cyclist would prefer clearer marking on the CityQ bike that it was in fact a bicycle. They mentioned that people often stopped to question them as to whether they could legally be in a certain area.

The Wolt cyclist was noticeably faster than the Posten cyclist and slowed down less to go over bumps, though still slower than was necessary for a two-wheeled bike to navigate the same obstacle. This could potentially be attributed to the much lower weight that was being carried, as the bike never had more than 15-20 kilograms loaded during the observation period so there was less concern on the part of a rider than a bump would be harmful for the bike.

Photo 3.5: Wolt CityQ cargo bike next to publicus type bike racks (left) and U-shaped racks (right). Photo: Howard Weir (left) Andreas Hætta (right)

3.5.5 Trippel / NFMG - Mobile services

3.5.5.1 Interview results

Mobile services make up a broad category within urban logistics but mainly involve tasks that must be done physically on-site. Tradespeople, plumbers, cleaners, and janitors are examples of professions where employees must travel to a location to perform a specific job. Trippel is part of NFMG (Norwegian Facilities Management Group) and provides cleaning services. They use 3 electric vans, but the rest of their employees use public transportation to commute to work and carry out tasks for various clients around the city.

Most of Trippel's tasks are planned, and they have access to equipment at their clients' locations. Additionally, they have some temporary tasks where they need to bring their own equipment. In these cases, they may need to use a van to transport a vacuum cleaner, ladder, carpet cleaner, or window cleaning equipment to the job site. They find it extremely costly (both financially and time-wise) to carry out these tasks, as the driver must travel into the city centre, find a parking space, pay for parking, walk to the job, and deliver the equipment.

In collaboration with one of their clients, Trippel has started using a CityQ cargo bike to explore the potential of making these city centre tasks more efficient. They are still in the process of understanding how to optimize its use but have found that for specific tasks they save significant amounts of time by using the cargo bike instead of a van. As an example, they point to the transport of towels between the districts of Frogner and Vika twice a day as a specific use that was difficult to efficiently manage with a van. While these two neighbourhoods are adjacent to each other, access regulation restricts car traffic on the most direct route, creating a time-consuming detour. The CityQ bike is too expensive for Trippel, but they have received support from a large customer to lease the cargo bike, provided they use the bike to perform tasks for the customer.

As mentioned by the other users, Trippel also consider it a major advantage that no license is required to operate a cargo bike. Very few of their employees have a driver's license, so a cargo bike unlocks the potential for a larger share of their employee pool to carry out tasks that would have either required a van or be considered infeasible. They would also need to pay employees with a driver's license a higher hourly wage.

Similar to Wolt, Trippel also consider the attention the cargo bike brings as an opportunity and are considering ways to market their services through ads on the side of the bike. They discuss with employees using the bike how it can be placed to be visible for potential customers. The bike will often be parked while they carry out tasks that last 15-30 minutes, so the strategic location of the parking spot could allow them to advertise their services to new potential customers.

Trippel considers KAIA well positioned for their use, as they use the bike to for customers in the city centre and can park the bike at KAIA overnight to charge. They have access to KAIA outside normal working hours. Trippel believes they could benefit from having a local storage facility at KAIA for some commonly used equipment that they occasionally need for temporary jobs.

3.6 Mobility Hotel services

3.6.1 What types of services are relevant?

A mobility hotel can support cargo bike adoption and use through the services it offers. Understanding the relationship between specific services and the factors they influence allows the development of a mobility hotel that considers external contexts and the specific needs of users so that it can effectively accomplish its goals.

In mapping the services desired by KAIA users and those offered by other initiatives (called variously mobility points, hubs and hotels), we have identified a list of services (Table 3.4) that can potentially be provided by a mobility hotel to support increased use of cargo bikes. These are services either directly named by KAIA's users, identified through literature (Gruber et al., 2024; Narayanan & Antoniou, 2022; Sherriff et al., 2023; Weir IV, 2024), other project such as Interreg's MoLo hubs, and through input from meetings with representatives from Nordstan Mobility Hotel in Gothenburg (a similar initiative in MOVE21). Interviews with users included questions on which services would be most useful for their operations and why. Using these sources, we were also able to identify alternatives to the named services which were usually the current activities cargo bike users (and potential users) were engaged in either currently or prior to one of the named services becoming available.

The services provided by a mobility hotel can influence barriers or drivers identified in section 3.3. Using information collected from KAIA users and supplemented with literature, each identified service was matched with the barriers and/or drivers it has the potential to influence.

We have divided the services into two main categories; services focused on 1) the needs of riders and practicalities for their workday and 2) improving operations.

Generally, we see in Table 3.4 that services focused on operations and efficiency are more likely to remove multiple barriers, whereas their ability to support drivers of cargo bike adoption is more limited. The drivers of cargo bike adoption are often intrinsic to the use of a bike itself or the urban context, and therefore not something a specific service can influence directly. Rather, it is easier to think of them as the collection of advantages that users receive when adopting cargo bikes. The services provided by a mobility hotel will not influence drivers such as flexible parking, travel time, or travel time reliability. However, drivers such as technological maturity or lower operating costs may receive an additional boost from a mobility hotel's services by generating institutional knowledge about cargo bike use that can be transferred back to manufacturers and mechanics or by stream-lining routines that further reduce operational costs.

The barriers faced by organizations will be highly variable and dependent upon the type of transport needs a company has as well as the facilities they already have available. For example, a break room was considered potentially interesting for all users of KAIA, but not something that was highly prioritized as users such as Posten and Trippel felt they had good alternatives already in place.

We have not assigned a degree of importance to the different barriers and drivers, though it was clear from interviews and literature that maintenance and reliability were among the biggest concerns and challenges when incorporating cargo bikes into business operations. While barriers such as implementation cost and organizational effort can be significant, the primary concern is to have a functioning vehicle that can provide advantages related to the 13 drivers listed in Table 3.1.

Table 3.4 Services potentially relevant for a mobility hotel

Service	Value of service	Alternative	Barrier influenced	Driver influenced
Rider's workday/practicalities				
Break room	Rest, protection from elements (warm, dry), social meeting point	Coffee shop (or similar) on route, designated or informal meeting points, online chat groups	Weather Protection; Employee acceptance	Fun
Weather protected facilities	Protects goods/people/vehicles	Garage, weatherproof goods containers, no protection	Weather protection; Theft; Payload Damage; Employee Acceptance	
Toilet facilities	Can be difficult to find facilities on route	Identify available facilities on route	Employee Acceptance	
Shower facilities	Can leave work and go directly to other activities	Shower at home, gym	Employee Acceptance	
Gear/tool storage	Ease commute, flexibility on each end of commute and what can be taken	Storage in private vehicle, take gear to and from home, bike hotel; carry less equipment	Spatial coverage; Theft; Organizational Effort;	
Maintenance-(self service)	Increase up time, less equipment carried	Carry limited equipment, deliver to workshop in opening hours	Robustness; Service Network;	Maintenance/ Operating Costs
Parking	Ease commute, allows more flexibility	Paid parking, bike racks, garage spots, bike hotel	Employee acceptance	Accessibility
Coffee/food	Makes job more enjoyable, improves morale	Coffee shop on route	Employee acceptance	
Kitchen	Increase comfort, potential for warm food	Lunch box, purchased food	Employee acceptance	

Service	Value of service	Alternative	Barrier influenced	Driver influenced
Changing Room	Get ready for work, can go to other activities, storage of clothing	Find other facilities, change at home	Employee acceptance	
Operations				
Charging	Extend range, vehicle ready for next shift	Carry extra battery	Spatial coverage, organizational effort, employee acceptance	Electric range
Battery swap, charging and storage	Extended range, greater earning potential	Carry extra battery	Spatial coverage, organizational effort, employee acceptance	Electric range
Maintenance - Workshop	Increase up time, less equipment carried, feedback on new cargo bike models	Carry limited equipment, deliver to workshop in opening hours	Robustness and Reliability; Service Network; Organizational Effort	Maintenance/ Operating costs; Technological Maturity
Mini warehouse	Storage of tools or other frequently used parts/equipment that are not needed for all work tasks	Use larger vehicle, storage in private vehicle, pick up from warehouse, delivery to work site	Spatial range, implementation cost, Loading capacity, Organizational cost, Employee acceptance	
Loaner vehicle	Maintains uptime	Access to own reserve vehicle, use of shared mobility services	Robustness, Service network, organizational effort	Maintenance/ Operating costs
Shared vehicles/ short term rental (scooters, bikes)	Alternative transport, easier to test other vehicles	Private transport	Implementation costs, Theft, Organizational effort, employee acceptance	Maintenance/ Operating costs
Leasing	Reduce initial vehicle costs	Vehicle purchase	Implementation cost, organizational effort	Purchase cost

3.6.2 KAIA's services

KAIA includes a showroom and parking area for vehicles, a workshop, and a small office/meeting room. There are also areas outside the main entrance for displaying and testing bikes, as well as space for people and activities during events. When looking more specifically at the services available at KAIA compared with those listed above in Table 3.4, we can see that some of these services are already in place, while others are planned or being evaluated for potential implementation.

As of December 2024, KAIA provides **five** primary services:

1) **Leasing** – Mobility Solutions offers a leasing agreement for CityQ cargo bikes and are considering other the inclusion other models of bikes and vehicle types. Leasing reduces barriers related to:
    a. Implementation cost- Partially addresses implementation costs by reducing the initial financial investment needed for a cargo bike and avoiding depreciation costs
    b. Organizational costs- Access to newest cargo bikes (and associated advances in technology), easier to expand fleet, inclusion of insurance and maintenance services (see #2 below) reduces time and decision making that otherwise would be needed to set up agreements with service partners or make choices on type of cargo bike.

   And drivers related to:
    c. Purchase costs- Leasing provides an alternative to purchase, strengthening this driver

2) **Workshop** – Service is included as part of their leasing agreement, but they also have maintenance agreements for other cargo bikes. Included workshop services with leasing reduces barriers related to:
    a. organizational effort – an external party manages maintenance schedules and repairs

   b. employee acceptance – a functioning vehicle is more attractive for both riders and fleet managers
   c. robustness/ reliability – A workshop experienced with large cargo bikes can reduce time needed for repairs
   d. available service network – Provides a workshop focused on commercial use of cargo bikes

   And drivers related to:

   e. Technological maturity – improving knowledge and routines for maintenance of heavy cargo bikes
   f. Operating costs – by streamlining routine maintenance, reducing time and cost

3) **Parking indoors** – They provide overnight parking for Trippel, which allows employees to take public transport into the city and use the cargo bike. Parking reduces barriers related to:
   a. Theft – secure parking reduces likelihood of theft
   b. Robustness/Reliability – Bikes are not exposed to the elements overnight
   c. Spatial coverage – The vehicle can be stored near the operational area
   d. And drivers related to: Accessibility – overnight parking closer to the operational area allows the cargo bike to make the most of its superior access in dense areas by reducing travel time to the operational area
4) **Charging** – Leasing customers that store bikes over-night can charge and be ready with a full battery the next day which reduces barriers related to:
   a. Spatial coverage – Can start the shift with maximum range
   b. Organisational effort – Businesses do not need to have their own facilities to charge vehicles
   c. Employee acceptance- Vehicle is ready at the start of the shift, reduces range anxiety
   d. And drivers related to: Electric range – Vehicle starts day charged, be charged between shifts and/or be charged during a lunch break as needed.
5) **Loaner vehicle**- If a bike needs maintenance or repairs over a longer period, users have an extra vehicle they can use which reduces barriers related to:
   a. Robustness/Reliability – If a mechanical issue occurs, a loaner vehicle can mitigate the negative impacts for businesses' planned activities
   b. Service network – Reduces time pressure associated with acute maintenance needs, allowing existing service network to carry out service on a more relaxed time frame
   c. Organizational effort- Reduces effort and stress for drivers and managers needed to manage acute maintenance problems

In addition to the existing services, KAIA has prioritized **two** other services that they intend to establish in the near term:

1) **Battery Swapping, charging and storage-** KAIA has a battery swapping station installed on the outside wall of the building from the company E-Mobility Rentals. As of December 2024, it was not yet integrated into their overall service offering. KAIA is also plans to provide space within KAIA to micro mobility operators so they can store and charge batteries for their e-scooters. The batteries would then be collected and distributed. This reduces barriers related to:
   a. Spatial Coverage – If coverage is limited by range and not speed it can increase the operational area
   b. Organisational effort – Facilities and time spent charging are outsourced to the battery swapping station

c. Employee acceptance – Makes cargo bikes more attractive for use cases such as Wolt couriers that want to increase time on shift

And drivers related to:

d. Electric range – Can quickly replace empty batteries and further expand the amount of time the vehicle is in operation.

2) **Mini-warehouse** – Frequently used supplies by tradespeople (e.g. electricians) could be stored here instead of larger warehouses outside the city. Materials could be ordered through Wolt's app or picked up by a tradesperson using a cargo bike. This reduces barriers related to:
   a. Spatial coverage – supplies can be picked up closer to where they are needed, avoiding lengthy, time-consuming trips that would usually only be practical by car/van.
   b. Implementation cost – Costs involved in establishing a mini-warehouse can be distributed among multiple users
   c. Loading capacity – Access to a mini-warehouse nearby means that not all equipment needs to be carried at all times, reducing the need for a large vehicle.
   d. Organisational effort – Users do not need to find, secure and manage a mini-warehouse, reducing the organisational burden
   e. Employee acceptance – Cargo bikes would not need to be used for long journeys and/or tradespeople would have readier access to the tools/parts they need

Taken together, these services directly address **8 of the 13** identified barriers and strengthen **5 of the 13 drivers** behind cargo bike use (

Table 3.1). The importance of a specific barrier or driver can vary significantly depending on the user and the context in which the bike operates. Some companies already have their own facilities that provide services related to parking and charging, while others have relatively small operational areas so barriers such as spatial coverage become less relevant. The choice of type of cargo bike itself can further influence barriers and drivers related to weather protection, handling, loading capacity, employee acceptance, accessibility, range and cost. See also section 3.2.

Though a break room was mentioned frequently by Wolt, Posten and Mobility Solutions as a potential service that could be of interest, it has not yet been prioritized. Wolt would likely need to be the driving force behind the establishment of a break room, as improvements to the building would be needed to make enough space. The bulk of the area is occupied by the different vehicles and the workshop which more directly support the primary interests of Mobility Solutions and the needs of the users. The other users of KAIA have agreements with restaurants, customers or their own facilities that mitigate the need for a break room.

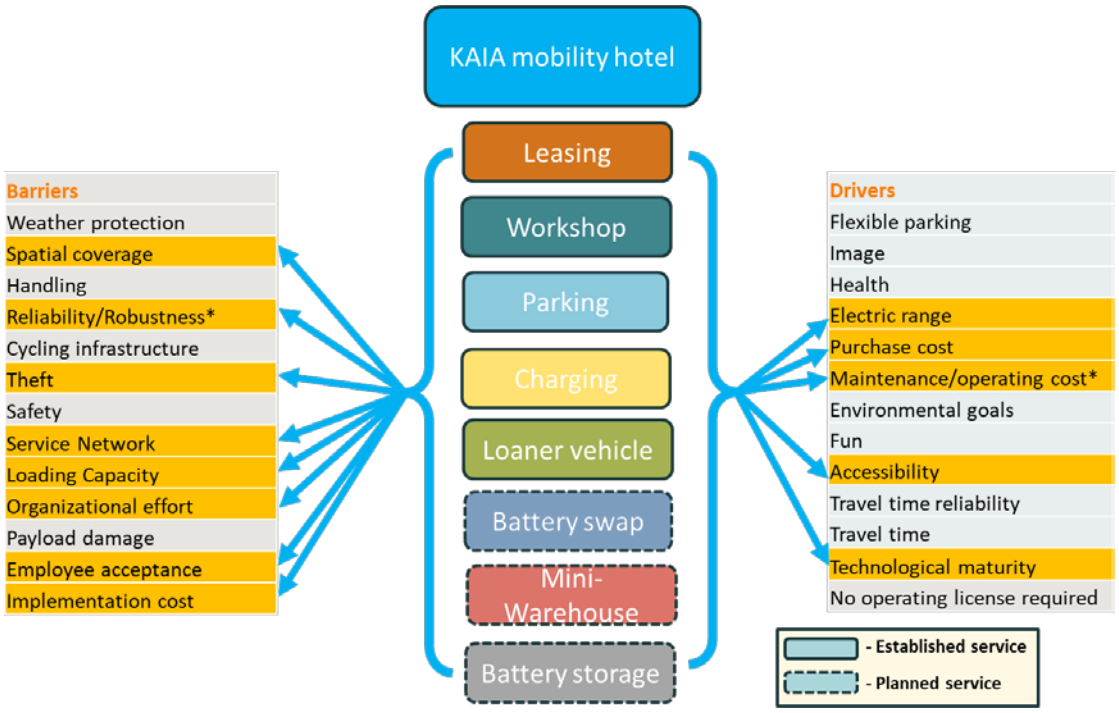

Figure 3.2: Services available at KAIA (centre) with the relevant barriers and drivers of cargo bike use they influence (left and right)

There are several interdependencies between the services a mobility hotel can provide as well as prerequisites for providing them. Access to electricity or water are obviously necessary to have services such as restroom facilities or vehicle charging. Access to the hub is another clear example. While the workshop hours at KAIA run from 9am-5pm and can be accessed by users during that time, many of the existing and planned services are needed by users outside standard opening hours. Trippel collects their bike to start working at 6am, whereas Wolt couriers may end their shifts at 10 or 11pm. Parking and charging are not useful services if they are limited to opening hours. In the early stages this can perhaps be managed on an ad-hoc basis, but scaling up (chapter 4) requires that a door system be installed that allows verified users to gain access during off-hours.

All the various services a mobility hotel can provide are premised on the fact that space is made available, though this can be a significant challenge, as discussed in 3.1. In this sense, KAIA was fortunate to gain access to a recently vacated property by Ruter that was suited to its purposes. However, Oslo Port Authority, the landowner, aims to minimize car-based activities (particularly trucks) at the location. This requirement is a potential obstacle for some services, especially those that require transshipment of goods. Moving transport from larger vehicles to cargo bikes often requires transshipment to address the lower capacity, speed and range of cargo bikes.

Considering the service offering, we see that the services available and planned at KAIA are potentially able to address barriers that are critical to making cargo bikes more operationally viable for businesses. KAIA's services increase the uptime and reliability of cargo bikes, ease of implementation and reduce the organisational effort needed for users. The close connection between the cargo bike manufacturer, the workshop, and users, can also serve as a driver of technological maturity.

4 Upscaling and replication potential

4.1 KAIA's role in transition of urban logistics

Though KAIA is still early in its startup phase, we can begin to set it within the context of transitions theory to understand different ways in which it supports a transition pathway for a niche product like cargo bikes to begin moving into a regime position.

The period supported by the joint venture initiative in the EU-project MOVE21 is short considering the task is to start a new business concept. New technology and concepts, like those introduced by Mobility Solutions, provide alternatives that do not fit into traditional workflows. These concepts require customers to adjust their operations, often taking significant time to establish. Additionally, while heavy cargo bikes have seen significant development over the last decade, the technology is not yet fully mature, and the bikes are still evolving based on user experiences and feedback. There are also changes in the development and organization of services that take time to establish.

4.1.1 Transition dynamics

4.1.1.1 Shielding and Nurturing

The KAIA Mobility Hotel is not financially self-sustaining, but this is to be expected at this early stage of niche development. Within transitions theory, shielding and nurturing are critical processes that protect emerging innovations from market pressures, allowing them the time and space needed to grow into viable mainstream solutions. In the case of KAIA, a range of actors across the system actively support these processes, creating the conditions necessary for experimentation and gradual scaling.

A key example of shielding is the financial support provided by stakeholders like Posten, Wolt, and Trippel, who help offset the additional costs associated with leasing and operating cargo bikes. These stakeholders employ diverse strategies: Wolt pays half the rent for KAIA and subsidizes cargo bikes for its courier partners using internal funds for CityQ bikes and the Better Cities Grant for Vok bikes. A large company who is a customer of Trippel pays for their use of the CityQ bike. In Posten's contract they have a clause that the bikes cannot experience more than 25% downtime. While this is an indication of the importance of maintenance for them, it also shows flexibility when piloting a new vehicle type as such a high proportion of downtime would not likely be acceptable for other vehicle types. Posten needs functional heavy cargo bikes in their strategy of downscaling the number of centrally located hubs and replacing the walking trolleys. They cover the leasing costs for the cargo bikes directly.

The physical site of the KAIA mobility hotel further illustrates the importance of nurturing. Access to the site was facilitated by the municipality and half the rental costs for the first nine months are covered through the MOVE21 project. In dense urban areas, where land is both scarce and expensive, this kind of resource allocation is essential for enabling such pilot projects. As covered in 3.4, the building facility was initially developed by Ruter, the Oslo region's public transport authority, for use in an earlier pilot project, with external funding covering site development costs. Without such institutional and financial support, it is unlikely that a mobility hotel for cargo bikes could operate in Oslo's current logistics landscape.

Photo: 4.1 Battery swapping station from E-Mobility-Rentals.

How shielding activities are carried out also matters. If arrangements are too short-term, there is little incentive for long-term thinking on the part of the stakeholders involved. For example, the KAIA site faces significant land-use challenges. Located in a port area designated for urban development, the agreement includes a six-month termination clause. This short-term arrangement discourages investments in infrastructure, such as utilizing container areas above the ground floor. Despite the uncertainty, it is likely that the area will remain unchanged for several years, raising questions about how best to use such transitional spaces for innovative logistics solutions or more permanently embed them in the city's fabric in longer term development plans. The port also restricts the use of lorries in the area, which limits the number of services that can be provided, especially those requiring transshipment from large to small vehicles.

4.1.1.2 Design and standardization

Problems related to the design and standardization of cargo bikes and mobility hotels remain a significant barrier to the broader adoption of these innovations in urban logistics. Issues with durability and design continue to surface; as discussed in chapter 3, feedback from users highlights concerns about robustness and functionality, while broader questions about materials, battery placement, motor configuration, and container design remain unresolved. As cargo bikes are an emerging vehicle segment, we have yet to see agreed-upon standards for these vehicle attributes among manufacturers, users and regulators. At the European level however, there are emerging standards specifically related to e-cargo bikes up to 650 kg (EN 17860).

The lack of standards is even more pronounced for the mobility hotel, the location of which was determined by availability more than functional appropriateness. This is unsurprising though considering the novelty of the solution. KAIA represents an important testing ground, where temporary solutions are tailored to the specific needs of the pilot. Through experiments and iterative learning, KAIA aims to contribute to the development of a coherent and replicable model for mobility hotels that are designed and positioned as per their functional requirements.

Drawing parallels from the passenger car segment underscores the importance of standardization. Today's cars, characterized by features like four vertically hinged doors, three-point seatbelts, and uniform placements for steering wheels and pedals, are the result of a century of iterative design and trial and error. These features, now taken for granted, emerged only after widespread agreement on design principles. Similarly, cargo bikes and mobility hotels will need agreed-upon design principles (e.g., materials used, the size and placement of batteries, and the configuration of containers, motors, and wheels) to achieve alignment with the structures, cultures, and practices of the urban logistics regime. Until these standards emerge, the niche will struggle to scale and contribute to the broader system.

4.1.1.3 Roles and Responsibilities

The slow pace of cargo bike deployment by actors like Wolt reflects broader uncertainties surrounding roles and responsibilities in urban logistics. Delays in finalizing insurance agreements, for example, are indicative of the absence of institutional norms for cargo bikes. Similarly, issues such as the pace of maintenance work and a lack of clarity around warranty claims, maintenance responsibilities, and product improvement requests further highlight gaps in the current system, whereby system actors are not on the same page. Established logistics methods, such as those involving trucks and vans, benefit from clear rules and norms governing insurance, liability, maintenance, ownership, and operation – rules and norms that cargo bikes currently lack.

The KAIA Mobility Hotel has begun to address these gaps by offering a centrally located hub supporting cargo bike operations, maintenance and storage, introducing a novel approach to urban logistics. Key challenges related to roles and responsibilities, including issues with insurance and maintenance, have highlighted barriers to cargo bike adoption. Addressing these challenges could inform the development of clearer industry standards and improve coordination among operators, insurers, suppliers, and regulators to support the integration of cargo bikes into the urban logistics system.

4.1.1.4 Contextual considerations

Norway is a unique context that presents both challenges and opportunities for the adoption of cargo bikes in urban logistics. The country's cold climate poses significant hurdles for electric mobility, as freezing temperatures reduce battery efficiency, extend charging times, and diminish power output. Additionally, the cold can affect the performance of mechanical parts, leading to issues such as stiffness or failure in critical components. Corrosion caused by salt and other de-icing materials used in winter further exacerbates maintenance challenges. These conditions not only affect the operation of cargo bikes but also complicate associated practices such as maintenance, storage, and battery swapping. Adapting technologies and processes to perform reliably in winter conditions remain a critical task for ensuring year-round functionality.

At the same time, Norway's traffic regulations offer distinct advantages for certain types of vehicles such as bikes. The ability to cycle and park on sidewalks provides a level of flexibility that is very useful in urban logistics. However, this practice requires careful management to avoid conflicts with pedestrians and other users of urban space. At KAIA, the three primary user groups (Posten, Wolt, and Trippel) demonstrate different approaches to using sidewalks. Posten makes frequent, short stops, often relying heavily on sidewalk access; Wolt primarily uses bike lanes and roads, parking briefly on sidewalks; and Trippel may park for extended periods while completing tasks. This is an instance of structural (i.e., institutional and regulatory) compatibility between heavy cargo bikes and the current urban logistics regime in Oslo, but to scale up, it must also align with current and future cultures and practices. This consideration is particularly important as cargo bikes are larger than traditional bicycles and could lead to public backlash when operated or parked on sidewalks.

4.1.1.5 New Markets

The KAIA Mobility Hotel is experimenting with expanding the functional domain of urban logistics. An example is the potential integration of a local storage facility for electrical material suppliers, which represents a departure from traditional urban logistics functions. This need not be limited to electrical materials; it could encompass any items that fit within the available space and align with the operations of the mobility hotel. The mobility hotel serves as a flexible space designed to accommodate vehicles, services, and potentially of a range of goods. By enabling mobile service providers such as electricians to quickly access frequently needed materials, KAIA can create new opportunities that are not traditionally associated with logistics operators.

This shift illustrates how innovations at the niche level can extend beyond established boundaries, introducing functions that address broader urban needs. If successful, this type of innovation has the

potential to trigger cascading changes within the logistics system, paving the way for larger systemic shifts. Such reconfigurations, rather than outright transformations, could play a critical role in shaping the future of urban logistics (see section 4.3 on transition pathways).

4.1.1.6 Public instruments and measures

Public support and intervention often play a crucial role in shielding and nurturing emerging mobility solutions like cargo bikes and mobility hotels. As these innovations are not yet fully market-ready, they require protection from competitive pressures and support to develop into viable alternatives within the transport system. This type of strategic shielding is essential for fostering experimentation, refinement, and gradual integration into the broader urban mobility landscape. Ways in which the City of Oslo can provide such support through targeted policy instruments and initiatives are discussed in chapter 5.

4.2 Analysis of upscaling potential

The intention is that KAIA will be able to operate independently after the funding from MOVE21 ends. To do so it must either generate revenue or secure partnerships and funding to cover its costs. There are currently three primary routes towards upscaling for KAIA: 1) Increasing usage of the existing services, especially leasing of vehicles; 2) Greater density and diversity of services at KAIA; 3) Establishing additional mobility hotels with complementary services. KAIA is primarily focused on 1) and 2) at this stage.

A fundamental condition for scaling up activities at KAIA is customer satisfaction with the bikes and workshop services, ensuring that the bikes deliver the performance customers expect. For cargo bikes to expand their use, they need to work within the larger business models related to urban logistics, whether that be last-mile, on-demand, or service. The concept of “carrying out operations by cargo bike” needs to function in practice under the demands of hard daily use. The services available and planned at KAIA support this concept, primarily through maintenance activities and services that facilitate expanded range and usability. Importantly, KAIA also supports the development of institutional knowledge on how cargo bikes function, lowering barriers related to organizational costs and uncertainty in implementation.

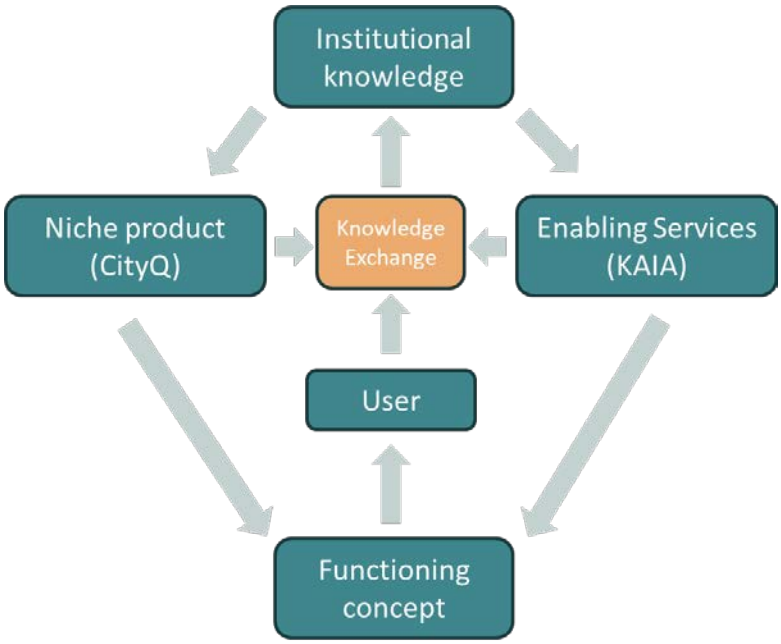

Figure 4.1: KAIA's role in supporting a niche concept such as cargo bikes to create a functioning concept that can be used by businesses.

There is a close connection between the bikes and the services provided by Mobility Solutions and CityQ, the bike manufacturer. Mobility Solutions is dependent on providing a functioning product to its customers. Through interactions with customers and maintaining the bikes in use, Mobility Solutions generates knowledge and experience on heavy cargo bike operations and maintenance as well as points of improvement for CityQ that they can give feedback on. CityQ is currently expanding its production which will more easily allow Mobility Solutions to meet customer demand. The key is providing a functioning concept to the user, learning from the experience and knowledge generated, and using that knowledge to improve the concept. (Geels, 2011), identifies this as a learning and articulation process, involving multiple dimensions ranging from technical design and user preferences to policy instruments, infrastructure requirements and symbolic meanings.

By providing a functioning concept that is reliable and easy to use, KAIA can more easily attract new customers. This is especially true for smaller users that might be more reticent to take on the organizational burden and financial risk of implementing a new vehicle concept in their existing services. Tradespeople or smaller transport companies could be especially relevant here.

4.2.1 Mobility Solutions, indications of growth at KAIA

KAIA's high level of activity after a very short time, suggests it could become an arena for increased use of cargo bikes. However, further development is still needed to before KAIA can be considered self-sustaining. Typically, such efforts require capital for development over time and achieving profitability within nine months of operation is challenging. Mobility Solutions is dependent on others to move forward (learning processes, Wolt app development, insurance products, delivery of vehicles, etc.) which limits progress and upscaling.

As of December 2024, we recorded the following developments at KAIA since its startup in September 2024.

Mobility Solutions has delivered or is in the process of delivering several CityQ bikes, has received new orders, and established contact with interested parties:

- **Posten** had received all 8 bikes from their original order, albeit slightly delayed, by the end of November 2024. Posten has also ordered 2 additional bikes for use in Oslo.

- A window cleaning company has ordered 1 bike after their previous 4-wheel model experienced maintenance problems.
- In October 2024, in collaboration with **Wolt** and the **Better Cities Fund**, KAIA hosted an event for Wolt's courier partners to present Vok and CityQ bikes. Following this, 35 couriers expressed interest in leasing a bike. However, insurance and monthly rental prices for couriers are yet to be finalized for CityQ.
- A car rental company has visited KAIA and sees potential relevance for the CityQ bike to be included in their offering as part of their B2B segment.
- A major parcel transport company has expressed some interest but wants to give their current bike supplier a chance with an improved model of their existing bikes. Their existing bikes will be serviced by Mobility Solutions.

Mobility Solutions also aims to contribute to the value chain for small electric vehicles, seeking collaborative partners who can co-locate at KAIA. Their initial focus has been on battery swapping. KAIA is evolving into a hub for technological development of small electric vehicles for urban logistics, with several contributors supporting professional development, rent, and operational costs.

- **E-Mobility Rentals** established a battery swap cabinet outside of KAIA. Additional vehicles compatible with the battery swapping station have been delivered, such as a two-wheel e-scooter and a microcar. E-Mobility Rentals is testing battery charging performance in cold climates and looking to adapt the CityQ batteries to work with their battery swap station.
- **E-scooter operator** is a potential tenant for a smaller part of KAIA's space. They need a site to charge e-scooter batteries and a central location for staff who swap the batteries in the scooters.
- Are in contact with a supplier for tradespeople to explore the possibility of having a mini warehouse at KAIA where frequently used goods can be more centrally available, avoiding trips outside the city and saving time for electricians.
- A parking company has shown interest in building a hub on the outdoor parking areas to offer parking for cargo bikes.
- Mobility Solutions is also evaluating the possibility of sourcing a "long tail" two-wheeled cargo bike and a scooter to offer at KAIA.
- Mobility Solutions plans to develop **a short-term rental** concept for CityQ bikes. They see tradespeople parking their vans outside KAIA facing challenges transporting equipment to Tjuvholmen. Short-term rental to trade people is a potential new product which was not initially part of their planning.

Taken together, these activities show a wide range of interest among diverse actors that see potential in the concept of a mobility hotel. Providing a capable vehicle where pain points related to maintenance and organization are supported by a 3rd party is filling a clear need for users. If KAIA successfully scales up it will likely contribute to the increased use of cargo bikes commercially by removing critical barriers that can make them challenging for businesses to integrate into their daily operations.

4.2.2 Risk factors for upscaling

While we have evaluated KAIA positively for its potential to remove barriers to the use of cargo bikes in chapter 3.6, and see a trajectory that supports continued upscaling due to widespread interest among current and potential customers, there are several risk factors that could negatively impact its future prospects in both the near and long term. Adding additional services to KAIA provides other revenue streams - such as subleasing space within the hub for battery charging and swapping or a mini-warehouse concept.

4.2.3 Risk factors short-medium term

4.2.3.1 Immature technology

An important source of operating revenue for Mobility Solutions comes from leasing, including maintenance, of heavy cargo bikes. This requires that the vehicles provided meet high standards to ensure a manageable workload for the workshop. We have seen signs that the cargo bikes used have required more maintenance than hoped, ranging from minor issues such as routing of the brake cables to more serious issues with the stiffness of suspension or strength of wheel connections. While most of the documented problems have been relatively minor, they still require time in the workshop that reduces uptime and the perception of cargo bikes as a functioning concept for users. If the overall uptime of the cargo bikes is not significantly impacted then this can be manageable, but if the number of issues begins to outpace the workshop's ability and resources to enact repairs, then the business model for KAIA is in jeopardy.

As heavy cargo bikes are still a niche technology, production runs are small and costs are high, often nearing or exceeding the prices of a small van or four-wheel moped. This can make users hesitant or unwilling to invest and make attracting new customers challenging for KAIA.

Other services, such as the battery swapping being piloted, have not yet been thoroughly tested at cold temperatures, which may lead to further delays in implementing the service.

4.2.3.2 Financial runway

Another important risk is whether KAIA can achieve critical mass before support from MOVE21 runs out. The short fall must be covered by an upscaling of existing services, attracting new customers and/or increased support from existing customers. Registered activity at KAIA so far indicates interest across most areas of proposed and established services, though the establishment of some services has taken longer than expected in some instances. The bikes for Posten were delivered slightly late, Wolt has taken longer than expected to make vehicles available to couriers, and Trippel is working on figuring out how to integrate cargo bikes into its operations before adding more.

4.2.3.3 Underdeveloped organization

Some of the planned services will require more advanced organizational systems than were present in January 2025. Services requiring storage of goods and equipment, or a mini warehouse will need a system for managing storage, ideally unmanned.

- Who will pick up items from storage? Access control, routines, restocking, etc.
- Is there a need for app development?
- Could Wolt delivery partners be utilized?

Service for Wolt delivery partners without CityQ bikes: This has been delayed due to access control and system setup. While it does not generate revenue for Mobility Solutions, it strengthens the partnership with Wolt but also occupies space.

4.2.3.4 Diversity of vehicle selection

Mobility Solutions has realized the need for a broader range of vehicle types in its portfolio than originally anticipated but there are challenges in determining the idea fleet offering. They want to keep the number of vehicles they manage low to keep maintenance costs low, but different customers are interested in different types of cargo bikes.

4.2.4 Risk factors long-term

4.2.4.1 Public acceptance

Given the novelty of both Mobility Hotels and the commercial use of heavy cargo bikes, the discussion of longer-term risk factors begins to be more speculative. One concrete risk that we see is the acceptance (and potential backlash) that the widespread introduction of a new vehicle type could generate. The users we spoke with were both positive to the flexibility of the bikes and the fact that they could be parked on sidewalks, while also aware that they must parked responsibly so as not to hinder pedestrians. With the small number of bikes currently deployed this is not an issue. However, if KAIA succeeds at upscaling, supporting a much larger fleet of heavy cargo bikes, regulatory changes could be implemented that restrict their use.

4.2.4.2 Viable locations

Land use concerns are another risk factor in the longer term. The area where KAIA is situated is planned for redevelopment within the next 5-10 years. Development of additional mobility hotels in other locations around Oslo will also require acquisition of suitable space. See also chapter 5, where municipal measures that can mitigate this risk are described.

4.2.4.3 Changing needs

Looking forward, KAIA could potentially be a victim of its own success if it contributes to a shift where heavy cargo bikes become more widely adopted by the regime. The services currently offered by KAIA would likely be more widely available and provided by a larger number of actors. Businesses that fully integrate cargo bikes may no longer need the same profile of services that they did when cargo bikes were more of a niche. Mobility hotels such as KAIA will need to adapt the type of services they provide to reflect changing needs of users.

4.3 Transition Pathways

If we again consider KAIA and cargo bikes in the context of transitions theory, we can look at different pathways these niche innovations might take to become a part of the regime. In terms of transition pathways (outlined in 2.3), it is easier to begin with which pathway(s) the KAIA hub is not a part of. First and foremost, there is little indication that KAIA will contribute towards a **de-alignment and re-alignment pathway** as the regime is nowhere near collapse. While landscape pressure, combined with path dependencies of the regime do create systemic tension and bottlenecks with respect to carrying out the societal function at hand, they are still moderate in extent.

In some ways, the adoption of cargo bikes does represent a **substitution pathway** for logistics, whereby new cargo bikes have replaced larger vans and trucks for urban goods deliveries and mobile services. Substitutions occur when sudden and strong landscape forces create a window of opportunity, a sort of mini-breakdown in the system, for which there is a fully developed niche waiting to be used. Given that there are few agreed upon, rules, standards, expectations and practices concerning the use of cargo bikes for parcel delivery and mobile services, it is safe to say that the niches are not fully developed and ready to be plugged in to the regime.

Furthermore, the vehicle is just part of a larger picture. The central innovation in this study is not the cargo bike but KAIA Mobility Hotel, the primary novelty of which is not the physical space itself, but the collection of services that are offered. Cargo bike leasing, workshops, parking facilities, battery swapping, vehicle charging, and loaner vehicles are all concepts that have existed before but bundling them in one package for logistics operators is new. As such the mobility hotel reorganizes existing technologies and solutions to create a new offering that has the potential to change how operators own, maintain, use, and store vehicles. Put simply, at the right scale, such hubs can change

the logic of the regime and enable a range of new vehicles, delivery methods and mobile services. If the mobility hotel proves to be successful and is replicated in ways that bring about radical change to the regime logic, we can describe it as being part of a **reconfiguration pathway**.

If, however, the mobility hotel proves to be a more modest addition to the system, it can be part of a **transformation pathway**. Here, moderate landscape pressure (e.g., increased traffic resulting from larger trends such as urbanization and more fragmented transport from rising e-commerce and digitalization) presents an opportunity for a new solution that is compatible and symbiotic with the existing regime. Regime actors can incorporate the new solution while maintaining the overall logic of the system. A transformation pathway with cargo bikes and mobility hotels would likely find them placed in central urban areas that are difficult to manoeuvre with trucks and vans, while maintaining the truck and van logic in less dense and peripheral areas.

Transition pathways are useful because they help us make sense of large-scale long-term sectoral change that involve many variables and factors. They provide the framework for identifying sequences of events that point toward differing future transition outcomes; in the case of urban logistics, the complementary innovations of mobility hotels and cargo bikes are likely to be either a targeted solution for a specific localized problem that maintains the overall stability of the existing system (transformation) or a set of local innovations that are adapted and applied to a wider array of challenges, eventually augmenting the structures, cultures and practices of the system (reconfiguration).

It is, however, worth keeping in mind other alternatives. Our analysis presupposes that there is no unforeseen **landscape shock**, which is, of course, impossible to know with certainty. Whether such shocks lead to system collapse, as with de-alignment/re-alignment pathways, or system instability as with substitution pathways, the role of cargo bikes and mobility hotels would surely be affected. Put simply, such pathways are possible, but given the difficulty of foreseeing landscape level shocks, our analysis focuses on those pathways that involve moderate landscape forces. Furthermore, we must also consider the possibility that cargo bikes and mobility hotels will not succeed in becoming integrated parts of the logistics regime. If they remain niches, or are dropped entirely as an alternative, the system could be characterized as following either a business-as-usual pathway or another transition pathway using other niche innovations.

4.4 The impact of KAIA on vehicle choice and use

KAIA offers services that directly address many of the barriers associated with cargo bike use, of which maintenance and reliability are the most critical. For businesses, this transforms cargo bikes from an interesting idea, with potential niche applications, to something more operationally viable across a wider array of tasks. The combination of quick, reliable travel times and ease of parking can create significant advantages for businesses able to integrate them effectively.

However, we also see that the cargo bikes used by KAIA are not always direct replacements to cars, vans or trucks. The different use cases for KAIA show differing potential to replace larger vehicles based on the goals of the businesses. In the case of Posten, cargo bikes directly replace walking routes, or occasionally Paxster routes. The use of cargo bikes in the city centre expands the abilities of couriers who had previously used walking trolleys while providing more parking flexibility than Paxsters. This will allow them to more easily adapt to potential closures of their inner-city depots as cargo bikes have a larger operating area than walking trolleys and can have a starting point further away from the delivery area.

An expansion of cargo bike use by Posten, would have limited impact on vehicle kms for large vehicles in in the city centre. While it would free up some of the Paxster vehicles to be deployed in other areas, Paxsters have a similar footprint to the cargo bikes so the benefit related to space use would be reduced. The use of cargo bikes would make it easier for users to operate legally, as

Paxsters and other electric mopeds are not allowed to park on the sidewalk or use bike lanes. Similarly, the impact on small and large van movements would also be limited. Vans are primarily used outside of the city centre or for tasks requiring goods with greater volumes. Even with the help of a transshipment hub allowing multiple trips, capacity is still a limiting factor for large volumes. In such cases larger vans and trucks will remain preferable. However, if cargo bikes can shift Paxster routes to the periphery of the city then some van kms in those areas may be replaced.

While cargo bikes can replace some of the vehicle kilometres for last mile parcel services, their true value is more likely to be seen in service and on-demand transport sectors, as indicated in Gruber's (2024) study of a large-scale pilot project in Germany where 58% of participants used their cargo bikes to provide mobile services. A much larger proportion of commercial vehicles are involved in mobile services than package delivery (Kummer et al., 2021), which can be seen as an opportunity to shift a large number of trips related to service over to smaller vehicles. In Oslo, rough estimates show a similar disparity, with goods distribution making up 18% of van kilometres within Oslo (inside ring 2) whereas service and tradespeople made up 58%. Within the centre of Oslo (inside ring 1) the disparity is even more extreme, with 68% of van kms being driven by trade and service people and just 6% by goods transport (Pinchasik et al., 2023).

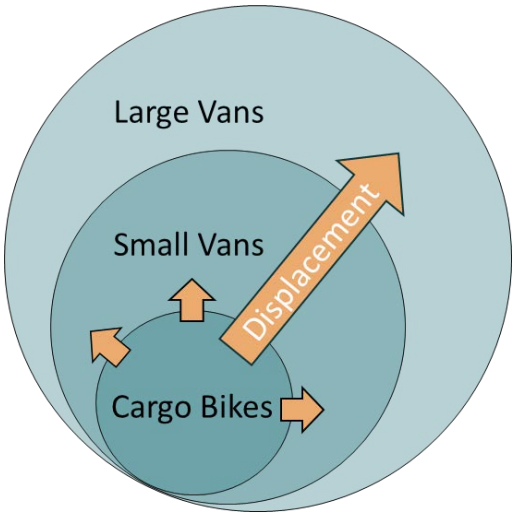

Figure 4.2: Representation of how KAIA can support displacement of van usage with cargo bike activities.

When considering the use of cargo bikes, a study focused on commercial transport in the Oslo/Akershus region estimated that on average vans used by service and tradespeople carried 51kg of material (excluding tools) per day, while vans for parcel delivery carry 268kg (Caspersen & Ørving, 2018). This is well within the abilities of cargo bikes, though may require support of a transshipment facility. (Arvidsson et al., 2024) report that the cargo bikes used by a freight company in Oslo carried 321 kg as a daily average while the Sprinter vans carried 492kg, though this was with support of a city hub that allowed them to refill goods. The bikes took 3 rounds on average per day whereas the vans took 1.5.

Looking at the characteristics of freight vehicles in Table 4.1, it is likely that many commercial trips are made with vehicles that are over dimensioned for the task. The maximum capacity of two commonly listed vans (520kg and 1305kg respectively) can be more than double the weights needed to be carried by users. Smaller vehicles, especially when a transhipment point is available, can likely take a larger share of commercial transport. It is especially the reported weights carried by service and tradespeople (51kg + tools) that are well within the capacity of smaller vehicles such as electric mopeds or cargo bikes (240kg and 150kg respectively).

Thus, we would expect that the type of transport carried out by Wolt and Trippel has greater potential to replace van and car kms with cargo bikes than for package delivery. For Wolt, the cargo bike allows a greater share of orders to be taken that may otherwise be carried out by car, especially those that are larger in size from Wolt Market. As the pickup point for Wolt Market is in the centre of Oslo, shifting these orders over to cargo bikes or other small vehicles could significantly reduce the number of kms driven by car. Additionally, a reduction in the size of the vehicles carrying out Wolt Market orders would be beneficial for the neighbourhood in which the dark store is situated. Couriers frequently return to the area where they wait for orders, but the lack of parking in the area can lead to either illegal parking or unwanted circulation as courier partners maintain a presence in the area in the hope of receiving an order.

Trippel can also potentially reduce the use of vehicles in the city centre, avoiding trips that would have been made by car and expanding the range of activities for its employees. This would lead to a higher overall degree of transport from cargo bikes as new types of tasks to be performed that may have been dismissed as too expensive or time consuming previously.

Table 4.1: Characteristics of different vehicle types. Capacity and battery size can vary depending on model and cargo box selected.

Vehicle type	Dimensions (LxWxH)mm	Footprint m^2	Capacity m^3	Capacity kg	Battery kWh
Mercedes e-Citan (small van)	4498x1859x1819	8.4	2.9	520	45
Mercedes e-Sprinter (large van)	5932x2020x2350	12.0	9.5	1305	81
Paxster Cargo	2365x1180x1880	2.8	1.25	240	8.1
CityQ cargo bike	2260x870x1550	2.0	1.5	150	2.8

Parking and Space use

An important benefit of replacing cars and vans with smaller vehicles is the reduced burden on space in cities, both occupied road space in traffic and space needed for parking. If we consider the footprint of different vehicle types (Table 4.1) it is no surprise that cargo bikes and Paxsters occupy significantly less space than vans.

There have been some counts and registrations using different methods in Oslo and other Norwegian cities regarding loading and unloading times. Some of these likely include several vans on service assignments. The average parking time for loading and unloading from trucks and vans is between 15 and 20 minutes. However, there is a significant skew in the distribution, so the median shown in some projects is considerably shorter, around 8 minutes or less, while some vehicles may remain for more than an hour, raising the average. A registration from downtown Oslo shows that 70 percent of vehicles in loading zones stay for less than 15 minutes. Deliveries to shopping centers and grocery stores take the longest, while deliveries on streets are somewhat quicker. Deliveries from vans are shorter than those from trucks (Grønland & Berg, 2008; Jensen et al., 2022; Sweco, 2019).

However, we should also consider where these vehicles occupy space. That cargo bikes can use other types of infrastructure (bike lanes, sidewalks) means that they are relieving pressure on traffic by reducing the number of vans needed. (In Norway you are allowed to ride bikes, including cargo bikes, on sidewalks.) This comes with its own consequences however, as a significant increase in the number of heavy cargo bikes could negatively impact the experience of those using bike lanes and sidewalks that must contend with the presence of these new vehicle types.

Choosing the right vehicle for the right job can be facilitated by providing access to a wider range of options. Currently, the system logic supports choosing vehicles that are over-dimensioned for many of their tasks to ensure flexibility in case they may need to transport a larger amount of goods/equipment than normal. This system logic can be changed by facilitating access to purpose-built vehicles and services but may take significant pressure to overcome the organizational hurdles. There is unlikely to be a 1:1 swap of vans for cargo bikes in most instances. Instead, a reduction in the number and size of vehicles used will need to come through reorganizing routes, making use of services such as those provided by KAIA that support the use of smaller vehicles. The resulting fleet would be more diverse, and the total number of vans or cars used lower overall and occupy less space in traffic or while parking.

5 Roles, instruments and measures for the City of Oslo

This chapter addresses questions related to the City of Oslo's possible roles, instruments and measures. Oslo wants to explore how they can support a mobility hotel that contributes to the replacement of cars with cargo bikes for commercial uses. The previous chapters illustrate the cargo bike niche for commercial use has a way to go to be an integrated part of the urban logistic regime, and that further nurturing and shielding is required.

It is obvious that most of the goods that are used and recycled in the center of Oslo and the inner city cannot be transported by cycling. Nevertheless, a considerable proportion of the vans in central Oslo transport small volumes of goods and equipment, see further elaboration in chapter 4.4. There are barriers to the use of cargo bikes within the current «regime» consisting of existing «structures, culture and practices» as discussed in chapter 2. The transition to increase the use of cargo bikes depends on changes in the regime that allow the cargo bike niche to better establish itself and become part of a new regime. Examples of this could be that the cargo bikes must be technically robust enough to work in practice, and that the location of physical nodes (hubs) in the logistics chain must be adapted to the range of a bike. Cargo bikes must be accepted by drivers, businesses, financial institutions, the public and the authorities. There is also a need for rules, regulations, and public policy to safeguard and contribute to the development of the cargo bike niche. The roles, instruments and measures discussed in this chapter are aimed at removing or reducing barriers, strengthening drivers, exploiting opportunities, and avoiding the risks discussed in the preceding chapters. The measures are aimed at shielding and nurturing both the services at KAIA and the commercial use of cargo bikes in general. The latter will indirectly support KAIA as well as other potential players.

The context and overview of measures in this chapter are based on scientific literature, Norwegian reports, and research, and on interviews with the actors at KAIA Mobility Hotel. There is little or almost no literature on mobility hotels such as KAIA. We therefore build on a mixture of literature on policy instruments in public administration, the need for public involvement and experiences with measures for cargo bikes, Light Electric Freight Vehicles, and urban logistics in general. From the scientific literature, it is partly based on measures that have been evaluated, but also on how new policy instruments and measures are, or are planned, being used in other countries, without a comprehensive evaluation of the consequences. We have also looked at advice and guidelines for public administration that have been prepared by researchers under the auspices of the OECD and the EU. Much of the scientific literature has been developed with empirical data from megacities with several million inhabitants. The selection and structure of what we have included in the following is adapted to how Norwegian public administration is structured and to the size and geography of the Oslo area.

5.1 Types of municipal instruments and measures

We begin by looking more generally at municipalities' opportunities to influence society, using the four categories suggested by (Hood & Margetts, 2007). Table 5.1 presents an overview that categorizes public tools into legal, economic, and organizational instruments, as well as the position the municipality holds in society. The framework for municipal use of legal and economic tools is limited by existing legislation, with the state as an issuer of laws and regulations as well as national policy. The laws are based on joint international coordination from the EU and other international institutions that issue regulations or standards to which Norway has subscribed. Nevertheless, there are

measures municipalities can take, especially using organizational tools and their position. The key lies in enacting a coordinated strategy of initiatives across municipal departments and agencies, as well as collaboration with the business community and civil society. The urban logistics regime includes a wide range of interests and actors such as National and city governments, communities and residents, shippers and receivers, carriers, owners of distribution and warehouse facilities, property owners and managers, real estate developers, vehicle manufacturers, technology solutions providers, and drivers and labor representatives (Browne & Goodchild, 2023; Presttun & Jensen, 2024).

Table 5.1: Different types of municipal instruments and measures for exerting power, adapted from Hood and Margetts' (2007) classification.

Instruments[2]	Theoretical Explanation	Example
Legal	Is the basis for the use of coercive power. Refers to the exercise of legal and official authority. Involves demanding, prohibiting, guaranteeing, and judging.	Laws, regulations, circulars, guidelines, goal formulations and result requirements, mandatory reporting, symbols, norms, and hidden threats.
Economic	Related to money and anything that can be exchanged. As an instrument, finances are expressed either in the form of economic reward or economic punishment.	Grants, co-financing, incentives, provision of other material goods (e.g., premises, office spaces, etc.), subsidies, taxes, or fines.
Organizational	Involves knowledge, property, equipment, and other material resources that authorities may employ. Refers to the authority's ability to organize. The choice lies between using their own organization or involving a third party.	The activity is incorporated as part of the public sector, or representatives from the public sector participate.
Position	The strategic resource inherent in the public sector as a hub for both receiving and sending messages or information. As a large organization, public actors possess more information than the actors they collaborate with.	Exchange of information and knowledge and persuasion through dialogue (communication, recommendations, political signals, communication, and informing about concrete proposals).

5.2 The need for public engagement and opportunities from the landscape

Mobility Solutions' goal is to operate KAIA economically sustainable on a fully commercial basis when the initial pilot period of 9 months is over in May 2025. For KAIA to survive in the long term, it must create value that customers are willing to pay for. Put simply, KAIA's revenue streams must exceed its costs over time.

Transitioning to the use of cargo bikes in city centers requires greater adjustments for businesses than the shift from fossil-fueled vehicles to electric ones. The shift from fossil to electric vehicles is also supported by government initiatives, but the transition from fossil vehicles to cargo bikes or small electric vehicles for commercial transport is mainly relevant in larger cities, and there are no state-level financial or legal incentives to facilitate this change.

Cargo bikes represent a very small and underdeveloped niche that can offer economic and environmental benefits to many stakeholders. However, the existing system assumes vans and lorries as the standard, influenced by structural, cultural, and practical factors. These factors are closely tied to material dependencies and established habits.

What constitutes appropriate concepts and logistics solutions also evolves with societal developments, as discussed in Chapter 2.2 on sustainable transformation in urban logistics and the concept of "landscape". Digitalization is a key factor, as the ability to manage large amounts of data enables

[2] These categories are named Authority, Treasure, Organization and Nodality respectively in Hood and Margetts' work (2007).

more complex (segmented, specialized, and integrated) management of logistics and transport. Digitalization also facilitates communication with others, leading to the development of new services and concepts. The growth of "on-demand deliveries," exemplified by Wolt in this study, is an example of such new concepts. Another example is the change in the sorting of deliveries made by DHL when they, as the first large company, started with cargo bikes in Oslo city center. They had to separate small deliveries for the cargo bike from larger deliveries for vans. At the same time, they did not want receivers to have DHL coming to their doorstep twice with one small and one larger package. So, their sorting and route planning systems also had to manage to give these small packages to the van. Introducing cargo bikes requires changes in their digital and physical routines (Gruber et al., 2024; Narayanan & Antoniou, 2022; Ørving et al., 2018).

Another landscape change is the nature crises together with climate change requires more green spaces and fewer grey spaces in Oslo. This will likely lead to increased competition for street space and increased congestion. EU-mandated sustainability reporting requirements (EU-Taxonomy) for larger companies, implemented nationally in Norway, may contribute to innovation, including adapting cargo bikes in some larger companies' practices.

However, achieving this transition remains challenging for both businesses and municipalities, even in contexts where it is appropriate. Planning a transition from one type of transport to another involves changes to established ways of solving tasks beyond merely replacing the vehicle itself.

The services available at KAIA have the potential to contribute to a transition from vans to cargo bikes. However, it is not enough for this to be beneficial for the city; it must also be commercially viable. The risk factors identified in Chapter 4.2.2 — immature technology, financial runway, underdeveloped organization, diversity of vehicle selection, public acceptance, and viable location — emphasize this point. Finding an appropriate business model, can be challenging, as some of the value of using small vehicles, such as those related to emissions, livability, and space use, are not necessarily captured by businesses, whereas they often bear the lion's share of costs related to implementation. At the same time, negative externalities of commercial traffic are not fully priced into the cost of transport, allowing larger vehicles to ignore some of the costs they impose (Robichet et al., 2023; Rødseth & Thune-Larsen, 2021).

(Björklund & Gammelgaard, 2023) illustrate a business model (Figure 5.1) that originally was used for analyzing urban consolidation centers. The model incorporates components commonly found in business models and is based on the Business Model Canvas (Osterwalder & Pigneur, 2010). In addition, it includes value proposition for society as a distinct component, which is relevant in the context of mobility hotels. For City of Oslo, achieving value proposition for society and learning how the mobility hotel and its services can contribute to ease the adaption of fit for purpose vehicles is the main purpose for joining the venture under MOVE21.

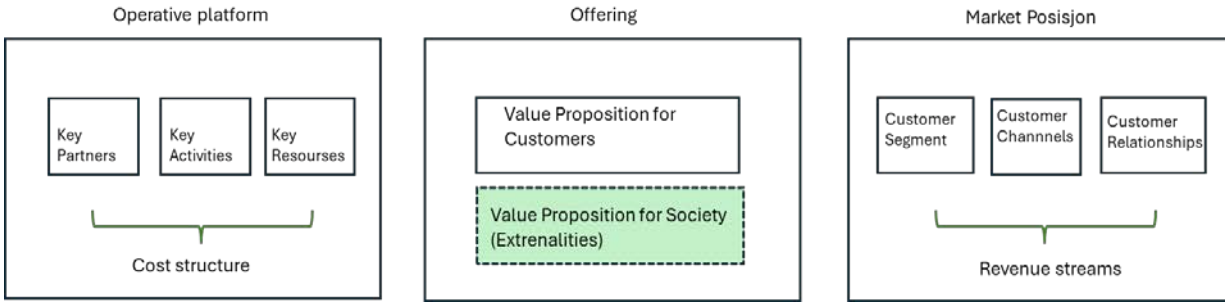

Figure 5.1: Business model (Bjørklund & Gammelgaard 2023).

The business model comprises three dimensions:

1. **Operative platform:** The first dimension focuses on achieving efficient operations with an appropriate cost structure. It assumes that certain partners and activities carried out by the company are fundamental to its operations. Additionally, other resources may also be critical to the business.
2. **Offering**: At the center is the added value the company creates, which is of interest to customers—what the company offers that customers are willing to pay for. In this dimension, Björklund & Gammelgaard (2023) also incorporates value proposition for society that goes beyond what the customer receives. Normally in this context value creation for the society refers to reduced negative externalities from traffic and thus relates to the goals of City of Oslo.
3. **Marked position:** The right box addresses market position, focusing on customers and the company's revenue streams. Key considerations include identifying the most important customer groups, where or how customer contact occurs, and the nature of the relationship—whether it involves close collaboration with customers, partnerships, the pursuit of loyal repeat customers, or more casual "drop-in" clients. Customer channel is the place where Mobility Solutions meet their customers. The channel may be physical, like the KAIA site, and / or digital.

The municipality can direct its supportive activities to both the left and the right box in the model. For the operational platform to reduce costs, they can support KAIA with, for example, grants for rent or other forms of subsidies, but also by continuing research and development as a living lab. For the market position, the municipality can provide support by, for example, being a customer themselves or offering incentives for the use of cargo bikes in the procurement of goods and services for the municipality. The municipality can also utilize the Planning and Building Act, the Road Traffic Act, and investments in bike-friendly street design and traffic patterns, thereby indirectly reducing the market value of car use and increasing the market value of cycling solutions. Measures are further elaborated in chapter 5.3.

5.3 Municipal measures and strategies for implementation

We have compiled a list of measures, see Table 5.2. We do not distinguish between measures and more general policy instruments listed in table 5.1, but we have categorized the types of instruments the measures belong to. This list is based on input from KAIA and its users, scientific literature and reports made by consultants for the City of Oslo and other relevant Norwegian authorities.

The direct measures related to cargo bikes in general and KAIA specifically are divided into four groups based on the model in figure 5.1: 1) Support to the operative platform; 2) Direct support to cargo bike's market position; 3) Indirect support to market position through changes to the street network; 4) Support through measures related to urban development.

In Table 5.2 the measures are briefly described with content, purpose, type of instrument (legal, economic, organizational, position), and whether they are relevant in the short, medium, or long term. Strategy and implementation are key aspects of this, so we have chosen to organize the more comprehensive description of measures by timeframe: short, medium, and long term for the implementation. We begin with less comprehensive, individual measures that can be implemented quickly and potentially have a rapid impact, followed by medium- and long-term measures. What is meant by short-term measures versus long-term measures is basically how rapid the measure can be implemented, considering the time needed to prepare (political) decisions and the time to materialized reality.

Table 5.2: Overview of different measures with a short description of purpose, type (Leg=Legal, Econ=Economic, Org=Organizational, Pos=Position), and timeframe.

ID	Measure	Purpose	Type	Timeframe	Comments
Support to the operative platform					
1	Continue financing part of the rental costs at KAIA for some months	Support during vulnerable startup phase for niche innovation	Econ	Short	This could possibly be done by redirecting existing grants and funds
2	Remove the 6-month notice period for KAIA at Filipstad	Facilitate wider array of users and services at KAIA	Org	Short	Requires an agreement with Oslo Port Authority
3	Establish new joint venture R&D agreements with KAIA and other actors	Utilize KAIA as a living lab for cycle logistics in Oslo	Org/Pos	Medium	ViV's living lab, and Bærum Municipality's model at Fornebu Hub, could provide lessons learned (TØI report 2056/2024)
Direct support to market position					
4	Lease and use cargo bikes in municipal activities	Contribute to revenue. Stimulate private market	Org/ Pos	Short-Medium	Home health care services, gardening or other activities that use vans or cars for transport
5	Provide cargo bikes with preferential treatment in municipal tenders	Similar to what has been done with electric cars.	Org	Short	
6	Provide subsidies for the monthly leasing cost of bikes for a set number of months	Reduce the financial burden for potential small and start up users	Econ	Short	This means including leasing in Oslo's program to directly support the purchase of cargo bikes
7	Collaborate with and encourage large companies to use cargo bikes for initiatives that can be reported under mandatory sustainability reporting	Increase awareness of opportunities for more city-friendly and environmentally friendly logistics.	Pos	Medium-Long	Not necessarily limited to cargo bikes or logistics
8	Provide space for overnight bike parking with charging facilities near or in the city center	Especially needed for smaller companies' transition to cargo bikes	Pos, Econ	Medium-Long	
Prioritizing cargo bikes in the street network					
9	Facilitating cargo bike parking through street design	Relative advantage for cargo bike over van	Org/ Econ	Medium-Long	
10	Driving patterns that favor cargo bikes	Relative advantage for cargo bike over van	Leg/ Econ	Medium-Long	Allowing narrow vehicles to access streets as a mitigation tool to allow some deliveries on streets closed for other reasons
11	Inform users of cargo bikes on how to 'behave' in the urban environment in terms of speed and parking to avoid conflicts	Public acceptance for cargo bikes, building a culture of use	Pos	Short	Public communication and awareness raising campaign, potentially in coordination with businesses
12	Enforce illegal parking of cars and vans	Relative advantage of cargo bike over van/car	Org		
13	Introduce a fee for loading and unloading in congested loading bays	Relative advantage for cargo bike over van	Econ	Medium-Long	Road pricing and parking fees when insufficient space. Will also improve availability for trucks
Urban development and planning					
14	Set requirements for logistics space in the municipal master plan, land use and zoning plans. Rezone parking garages to logistics areas and night parking for small vehicles	Secure sufficient and adequate space in streets and in buildings. Integrate logistics space into the urban fabric in a way that allows for high utilization.	Leg	Long	Paris has implemented this type of measure to ensure private facilitation of logistics space beyond the goods reception in individual buildings
15	Develop and own a public urban logistics terminal integrated into the urban fabric for transshipment to smaller vehicles.	Secure infrastructure for area- and cost-effective urban logistics.	Org (Leg)	Long	The premises will be put out to tender to private transport and logistics companies that can deliver space-efficient and environmentally friendly logistics solutions.

5.3.1 Municipal actions for the short term

The joint venture period within the MOVE21 project was 9 months, which is relatively short considering how underdeveloped the cargo bike niche is. Shielding and nurturing of niche innovations take years, so if KAIA is to have a realistic chance of continued development and surviving, long term municipal engagement might be necessary. At the same time, KAIA' survival will also benefit from shielding and nuturing in the short term. The City of Oslo can extend the joint venture with KAIA, using existing grants (1).

One issue is obstacles to private investments in smaller modifications of KAIA so that a larger portion of the existing space can be utilized. One such important obstacle is Oslo Port Authority's requirement of a 6-month notice period, which makes it uncertain for businesses to invest in something that needs 2-3 years of depreciation (2). More tenants would make the mobility hub more complete and help cover rent costs. More relevant tenants could also provide wider benefits in the transition to include bikes. Mobility Solutions refer to this as an important hinder for the planned expansion of activities at KAIA.

The City of Oslo can also choose to use KAIA as a site for R&D project relevant for the transition of cargo bikes from an immature niche to an adaptive regime (3). This builds on the living lab concept (Quak et al., 2023), and lessons learned can be extracted from the ViV project, as well as Fornebu Hub as an arena for innovation for Bærum Municipality (Jensen et al., 2024). R&D funding could be provided to Mobility Solutions for developing KAIA further. From the interviews in this project, we have registered several challenges related to barriers to the commercial use of cargo bikes that can be solved with further R&D. This may be related to the bicycles – for example, where the interviews show that the CityQ bicycle is not very robust against uneven road surfaces. R&D can be improvements in design and maintenance – from innovative technical solutions to IT systems. It can be the development of the leasing model and how to handle the relationship with user errors, insurance, financial details, system development, infrastructure or vehicle technical issues. New KAIA partners may be relevant, such as a system for the delivery of parts and equipment to tradespeople. The City of Oslo does not need to be the main applicant for funding but can participate in applications for innovation and research programs, including the public interests and state the societal benefits of developing cargo bikes in industry. See a more detailed discussion of barriers, drivers and scale-up potential in chapter 3 and 4.

Another key point stated by the partners at KAIA is the municipality's procurement of services. Providers using electric cars are given an advantage over providers with fossil-fueled cars, while providers with cargo bikes do not receive this advantage (5). The public sector in Norway places significant emphasis on electrification as a central strategy for sustainable transport. This focus is reflected in a wide array of incentives and programs designed to promote the adoption and use of electrical vehicles. Public procurement criteria are no exception, often prioritizing or giving advantages to conventional electric vehicles in public tenders and contracts. However, these benefits do not extend to cargo bikes. This disparity underscores a broader tendency to focus narrowly on electrification without considering the spatial and functional needs of urban logistics. Cargo bikes, which are well-suited to dense urban environments, receive little to no support through existing public procurement policies.

In addition to broadening procurement criteria to include cargo bikes, the concept of the mobility hotel itself warrants consideration. A shift in procurement policies to incorporate these broader considerations could play a critical role in accelerating the adoption of cargo bikes and mobility hotels. By tailoring procurement policies to support both cargo bikes and innovative concepts like the mobility hotel, the public sector could provide a vital form of niche shielding, enabling these solutions to gain traction.

The municipality could also support KAIA by leasing some cargo bikes to be used in various parts of its operations and services, to test possible applications and benefits. This could be part of R&D initiatives (3) or put out to tender. If KAIA fails, it would also be a learning experience.

The municipality should also think about the desired behavior related to the use of cargo bikes in the city and communicate this on websites, etc. Especially relevant here is ensuring that parking on sidewalks does not block pedestrians, wheelchair users, or strollers, and providing advice on how much space should be kept clear for free movement. The same applies to rules for cycling on sidewalks and pedestrian and bike paths. This information can also be communicated through KAIA. It might seem less relevant given the small number of vehicles currently involved, but if cargo bike use accelerates quickly it is better to be proactive with this information than reactive.

The short-term measures involve several municipal departments and agencies. When the municipality signals that the goal is to replace vans with cargo bikes, it gives more credibility to the relevant actors if this is integrated into the municipality's own practices as a business. Using concepts from transition pathways theory, this is about opening the regime for cargo bikes as a new niche and using available instruments through the organization of the municipality's own operations and its position as an important actor. This will also give the municipality experience and knowledge about moving from van to cargo bike and will likely make communication with actors in the private sector easier. In interviews with KAIA partners the lack of comprehensive engagement from the municipality is pointed out. KAIA itself serves as a base for increasing interest in cargo bikes through the combination of leasing and maintenance.

Mobility Solutions has stated in the conversations and interviews that they prefer measures to strengthen market position as opposed direct subsidies. This includes integrating cargo bikes into the municipality's own operations, as well as general measures in the street network for cargo bikes.

5.3.2 Municipal actions for the medium term

Previous research has made clear that collaboration between the public and private sectors is necessary to achieve sustainable urban logistics (Browne & Goodchild, 2023; ITF, 2024; Presttun & Jensen, 2024). KAIA and potentially other mobility hubs represent a form of facilitation that the municipality can point to. Collaboration with transporters and mobile service providers may identify and disseminate actions that the municipality and private sector can take to improve the market for cargo bikes. Industry associations, tradespeople associations, real estate owners, downtown associations, and other organized interests are relevant groups. The new requirements for larger companies to report how they become more sustainable (EU-Taxonomy) may represent a change in "landscape" with potential for higher priority for sustainable solutions. They buy services and could priority cargo bikes in their tenders or even support their contractors to lease cargo bikes. Large companies can also contribute to the "shielding and nurturing" of the cargo bike niche. The City of Oslo can use existing networks such as Næring for Klima (Business for Climate) to promote the use of cargo bikes (7).

Driving patterns and street design that favor cargo bikes access and cargo bike parking could potentially support the change from van to cargo bikes (9, 10). This assumption is related to the barrier "low quality in cycling infrastructure" and driver "accessibility" as elaborated in chapter 3 and Table 3.1.

One possible measure is physical or regulatory width restrictions of approximately 1.10 meters. This could be combined with time-based restrictions on the streets or access to properties physically enforced with rising and lowering bollards or barriers. There will always be challenges with measures that conflict with the need for street space and accessibility for other groups, and the municipality must, of course, make holistic assessments. Through-traffic opening for narrow vehicles can also be used as a mitigating measure when the municipality will carry out through traffic or access ban for larger vehicles for other reasons than logistics. Cargo bikes for small deliveries or tools can benefit

from a more fine-meshed road network and utilize parking space for unloading where vans have no access.

Cargo bikes may also reduce the disadvantages for local businesses from regulations that restrict larger vehicles (10), or fossil fueled vehicles. A mobility hotel can be a mitigating measure for small volumes of goods and equipment in the event of the introduction of zero-emission zones. It is important to focus on the goods and services that need to be delivered so that businesses and residents within the zone receive the services and goods they require. One or two mobility hotels near a zero-emission zone may be relevant but not sufficient as mitigating measures. The composition of services and the space requirements will likely be different than at KAIA Mobility Hotel. For example, the showroom for different bikes and the workshop will not be needed in every hotel and more space for handling packages and incoming larger vehicles may be needed. Service of renting out bicycles for craftsmen and service personnel, which has been launched at KAIA for the car-restricted area, could be a relevant service.

An important advantage for cargo bikes is the ability to legally drive and park in pedestrian streets and to drive in ordinary travel lanes, bus lanes and bicycle lanes. There should generally not be a need for street space especially dedicated to cargo bikes. However, we can see some need for dedicated parking spaces, especially for service and tradespeople who need longer parking times than quick stops for loading and unloading. These spaces can be by the curb, for example in streets where there is no space beside the roadway. The current sign regulations in Norway do not support such solutions, so physical measures are more relevant, as has been done with passenger bicycle parking at the curb. The design must be different, and reservation for commercial cargo bikes is unlikely to be enforceable. Design and function can be tested with temporary measures. In New York a test of designated cargo bike loading areas (Cargo Bike Corrals) marked by bike sleds, flexible bollards, and markings in the curbside lane was conducted as part of a broader study (NYC DOT, 2021).

Reducing incentives for delivery vans performing small tasks may reduce the number of vans occupying street space and may thus also benefit large trucks in finding unloading spaces (12, 13). See also chapter 4.4. The measures we have proposed here are based on the need to adapt the existing regime to a new niche by changing structures, practices, and culture in both the public and the private sector.

5.3.3 Municipal measures for the long term

In the long term, it will probably become more important to streamline urban logistics and establish accessible, suitable premises that are integrated into the urban fabric and utilized in a way that it minimizes need for valuable surface areas. New central city developments should include logistics areas that can also serve the existing buildings (ITF 2024) (14). The use of cargo bikes or other small electric vehicles is included in this. As mentioned in Chapter 4, mobility hotels such as KAIA may eventually become redundant. There would still be a need for space related to logistics itself—such as transshipment, storage, and parking for small electric freight vehicles. Regulation of space in or close to the city center for logistics purposes will require provisions aligned with specific land-use objectives under the Planning and Building Act (Plan og bygningsloven, PBL).

Logistics premises in the inner city have quite similar basic requirements for building design, of which the most important and difficult to achieve is appropriate access and unloading space for trucks or semi-trailers. Paris has set requirements for developers in some areas to establish logistics areas in connection with urban development, with clear requirements for the size of the area. Evaluations showed it was especially important to set appropriate requirements for access and unloading areas for trucks (Zachert, 2020). The amount and type of activity will have an impact on the size of the logistics area needed. For example, warehouses will require more space than cross docking, cold chain goods (due to the need for refrigerators and freezers) will require more space than packages,

bicycle workshops will require some space, etc. The distribution of activities, the number of tenants in the same area and the interior design of the premises may vary over time.

Initially, the demand for logistic space has been highlighted for the largest parcel distributors through the temporary hubs at Filipstad (Ørving & Eidhammer, 2019) and in Postterminalen (Jensen et al., 2022). Experience from other countries also shows demand in the parcel segment. Other segments where we have seen documented interest, both domestically and abroad, are food deliveries for restaurants and canteens. Another rising market in large densely populated regions is providing premises for "dark stores" – local warehouses for instant home deliveries that are only accessible through online platforms (Dablanc, 2023).

In the long term, it is relevant for the City of Oslo to consider what constitutes appropriate ownership and organizational structure for logistics areas (15). There are examples from Paris of public ownership through a mainly publicly owned company (SOGARIS) with high expertise in logistics, urban development, and city-adapted architecture. The public ownership gives SOGARIS low profit requirements and long start-up times for new premises. SOGARIS develops and owns the premises, and private companies rent space for their environmentally friendly logistics. Paris also has examples of fully private logistics areas where part of the land must, during development and urban renewal, only be used for this purpose (Dablanc, 2023; ITF, 2024). There are also other European examples with varying municipal involvement, including cases where the municipality owns land that is leased long-term for urban logistics purposes, while the traditional logistic buildings are constructed privately with private risk.

6 Conclusions

6.1 Cargo bikes in urban logistics

Though cities will always need vans and trucks for supplies, **cargo bikes have the potential to replace a share of the vans** for commercial use in urban areas. This is also the case for Oslo. While bikes can replace some car trips for last mile delivery services, such as Posten's mail and parcel delivery, the true value of bikes is more likely to be seen in on-site mobile service and on-demand transport. Such as Trippel's cleaning services and Wolt's food deliveries. In cities, a much larger share of commercial vehicles are used for mobile services than parcel delivery, and overall, mobile services often carry equipment and materials that are well within the capacity of cargo bikes. Work carried out by trades-people often has different parking requirements compared to that of package delivery, and it can be difficult to find parking for longer periods of time in urban centers. Cargo bikes can alleviate this problem by allowing them to easily find parking close to where they are needed without risking a fine. On-demand transport such as Wolt is often carried out in city centers and the deliveries are generally small in size, though may be too large for a standard bicycle. Using cargo bikes for these deliveries not only avoids the use of conventional motor vehicles in the inner city, but also saves space needed for parking during delivery and while couriers are waiting to receive new orders.

Using the **right vehicle for the right task** is essential for efficiency and better use of urban space. Despite diverse logistics needs, ranging from large to small package deliveries and various mobile services, most operators still rely on the same vehicle types, primarily vans and trucks. As a result, we have a fleet of vehicles that are larger than necessary to ensure the flexibility that can accommodate occasional surges in cargo or equipment needs as well as adequate driving range for longer journeys. In addition to underutilized capacity, over-dimensioned vehicles take up more road and parking space than necessary, contributing to congestion and inefficient use of limited urban space. Choosing the right vehicle for the right job can be helped by providing access to a wider range of vehicle options and supporting the use of smaller vehicles. A more diverse fleet would reduce the overall number of vans and cars, decreasing both traffic congestion and parking demands. Shortly after the KAIA pilot started, it was already evident that customers required a wider range of cargo bikes. While the bikes currently available for leasing seem to be a suitable size for Posten and Trippel, there are indications that the box installed on the CityQ may be too large for Wolt, with some users expressing preference for the smaller box installed on the Vok bikes. While changing the box size is quite easy, other users may prioritize characteristics such as agility or price and could be interested in nimbler 2-wheel cargo bikes at the cost of weather protection. Addressing range limitations may be more complex, as it requires not just choosing vehicles that accommodate different load sizes but also adjusting routing strategies, redefining delivery zones, and reconsidering coverage areas to match vehicle capabilities. This exemplifies the importance of not lumping all commercial bike users together but adhering to the principle of different vehicles for different uses.

Technological maturity has been identified as a key driver for cargo bike adoption. Users need to believe both that cargo bikes can perform specific tasks and do so reliably. Cargo bikes, especially larger ones used for transporting heavy goods, have not yet reached a high level of technological maturity. They are often developed with very specific use cases in mind, employing new designs, incorporating new technologies, and often lacking standardization, factors that together drive up costs for production, maintenance and repair. However, there are developments indicating that this could improve in the years to come as production scales up to meet the needs of customers and large logistic actors such as La Poste in France or Bpost in Belgium in scaling up their use of cargo bikes.

Many drivers or contributing factors to cargo bike adoption are intrinsic to the use of cargo bikes themselves and will come into play as soon as the bikes are being used in commercial operations. Such factors include flexible parking, improvement of employee health, no licensing requirements, accessibility, and quick and reliable travel times in urban areas. Despite these benefits, the use of commercial cargo bikes in Norway is still limited and can be considered a niche activity, with a regime that is dominated by the use of trucks and vans.

Three **critical barriers for adoption of cargo bikes** for commercial use have been identified: **bikes not being robust and reliable** enough, **organizational burden** when introducing cargo bikes into existing operations, and **implementation costs**. While we have looked at other potential barriers, these three taken together constitute the greatest barriers for considering cargo bikes as an attractive and functioning concept for commercial use. Simply put, cargo bikes need to work and be seen as worth the cost and effort to implement.

Cargo bikes today are often seen as not durable or reliable enough for demanding daily use. This leads to costly downtime and hesitancy among operators to organize routes around vehicles that are not seen as reliable. This is the case with cargo bikes in general and is not specific to the ones currently being leased by the KAIA Mobility Hotel. When introducing cargo bikes into existing operations tailored for cars/ vans, the organizational efforts can be substantial. Specific examples, all of which serve as barriers, include organizing new routines for sorting and driving routes, time spent researching different types of cargo bikes, aligning the expectations, competencies and routines of leadership and employees, and securing insurance and maintenance agreements. The costs of implementing cargo bikes include those for acquiring bikes, equipment, insurance, and space for transshipment from van to bike, storage of equipment, overnight bike parking, and potentially, workshop facilities. These spaces typically need to be in dense urban areas, where there are many customers and parcel recipients, and the distances remain within a suitable range for bikes. Since space in dense urban areas is significantly more expensive than in suburban or outlying areas, high implementation costs can be a major barrier to cargo bike adoption.

6.2 KAIA Mobility Hotel potential

The collection of services available at KAIA Mobility Hotel can play a role in making cargo bikes more attractive for commercial use. The services provided by KAIA can remove or reduce critical operational barriers for cargo bikes which makes them more competitive with larger commercial vehicles such as cars and vans.

Of the available services, the combination of leasing and maintenance is especially important as this facilitates access to vehicles that may have been too expensive to purchase while also ensuring that they are in working order for daily operations. Other services offered at KAIA, such as charging, parking, and battery swapping, can further support the commercial use of cargo bikes, but the relevance of these services depends more on the specific use case and needs of the user. Smaller actors will likely have a greater need for the services offered by mobility hotels, as they are less likely to have the financial or organizational capacity to secure facilities for parking and charging. Large cargo bikes also represent a new vehicle type, and KAIA users reported that finding insurance products that matched their needs was an unforeseen challenge. Managing these types of issues for cargo bike users is something that KAIA is well positioned to accomplish.

However, it is important to remember that it is not the mobility hotel itself that is the primary innovation, but rather the collection of services that facilitates the expanded commercial use of cargo bikes. In other words, KAIA is fundamentally a service innovation, not a product innovation. If cargo bikes begin to successfully transition into the regime, then some services will almost certainly become more widely distributed and available. Mobility hotels will have to adapt to the changing

needs of users, and their role may expand or diminish depending on which support services become more essential for cargo bike use in future urban logistics systems.

6.3 Holistic and broad use of municipal measures

The City of Oslo has a critical role in shielding and nurturing the cargo bike niche so it can become a mainstream part of regime. Supportive policies are needed to ease market pressures, and backing initiatives like the KAIA Mobility Hotel can help strengthen the cargo bike niche.

In this report, we have considered cargo bikes and mobility hotels mostly from the perspective of operator firms. In this respect, it may be useful to think of Oslo Municipality as a business, and importantly, one that can play a key role in advancing cargo bike adoption by integrating them into its own operations. The municipality can support cargo bike adoption by integrating them into tenders, using them in its own operations, and signaling their importance through small but visible measures in the street network and media. The municipal government's goal of replacing vans with cargo bikes gains credibility when it both adopts cargo bikes in its own operations and visibly signals this commitment to logistics actors. This is about expanding windows of opportunity within the regime for cargo bikes by leveraging the municipality's influence and the policy tools at its disposal.

The availability of well-located space is critical for cargo bikes, KAIA, and urban logistics activities in general. The physical site of the KAIA mobility hotel illustrates this need, as its location was made available through municipal support. For KAIA to grow and accommodate new activities, Mobility Solutions needs better operating conditions for utilizing the first floor. However, the Oslo Port Authority's six-month notice requirement creates uncertainty, making it difficult for businesses like craftsmen services to make longer-term investments in the space. Public sector support in removing these small but significant barriers, such as lease uncertainties, is crucial for enabling new niche businesses to develop at the site.

A public procurement strategy that prioritizes or gives advantages to cargo bikes over conventional electric vehicles in public tenders and contracts could be a powerful tool for promoting their adoption. Procurement policies have significant influence and can drive market demand for sustainable transport solutions. However, public procurement in Norway has yet to be leveraged to support cargo bike adoption in the same way it has been used for other green mobility initiatives. At the same time, while the government offers various incentives to encourage the use of electric vehicles, similar support, whether through procurement or other measures, is largely absent for cargo bikes and other light electric freight vehicles suited to dense urban environments. This reflects a broader tendency to focus on electrification without fully considering the spatial and functional needs of urban logistics and urban environments.

For cargo bikes to scale beyond niche applications, municipal action is essential in shaping the conditions for adoption. Businesses may be hesitant to invest in new logistics models until the right support structures are in place. By strategically using procurement policies, securing well-located urban space, and addressing regulatory barriers, the municipality can help open windows of opportunity for cargo bikes to gain a stronger foothold. These efforts not only support current pilot initiatives like KAIA Mobility Hotel, which facilitate cargo bike use for inner-city deliveries and mobile services, but also help free up space in dense urban areas, potentially improving conditions for larger freight operations.

6.4 A way forward

Integrating cargo bikes into urban logistics at scale requires time, targeted policies, and sustained support. Rather than just a shift in vehicle choice, this is part of a broader transformation in how goods and services move through the city. Based on the findings of this report, a strategic approach

to supporting cargo bike adoption should be embedded within Oslo's wider efforts to develop sustainable urban logistics and mobility.

A key step in scaling up cargo bike use is to actively **shield and nurture the niche** through a holistic set of municipal measures. This includes procurement policies, zoning regulations under the Planning and Building Act, financial incentives tailored to commercial bike use, improvements to urban infrastructure, and the integration of cargo bikes into municipal operations. The City of Oslo has already taken some steps in this direction, such as providing grants for cargo bike purchases and supporting KAIA Mobility Hotel through partnerships like MOVE21. However, additional efforts are needed, particularly in addressing the needs of mobile service providers that could integrate cargo bikes into their operations.

KAIA Mobility Hotel provides a **valuable source of knowledge** regarding the innovative role of cargo bikes in urban logistics and the challenges involved in scaling them up. This report represents a first look at KAIA, based on its initial months of operation. As a new and experimental initiative, its long-term impact remains uncertain, and there is still much to learn. If cargo bikes are to play a greater role in urban logistics, a long-term perspective is needed that recognizes transitions take time and that early-stage concepts often require adjustment and iteration. Through the MOVE21 project, the City of Oslo has been a partner in the KAIA pilot for approximately nine months, until the end of April 2025. During this period, it has supported KAIA by facilitating access to its site at Filipstad and covering part of the rental costs in the initial phase. How KAIA develops in the coming years will depend on various factors, including its ability to address market needs and secure long-term viability. In the future, initiatives like KAIA could contribute to broader urban logistics experimentation, potentially serving as a test arena or living lab to explore different models of cargo bike integration.

Given that transitions take time, we must recognize along the way that urban logistics is fundamentally about negotiating space. Ensuring **sufficient and well-positioned space** for urban logistics is a crucial factor in supporting more sustainable freight solutions and mobile services. This can be addressed through the municipal master plan, land use and zoning regulations under the Planning and Building Act, as well as street design and regulation. Special consideration should be given to dense urban areas where last-mile deliveries, on-site mobile services, and on-demand transport require efficient logistics solutions. These areas often have a high concentration of logistics activity, creating demand for transshipment hubs, storage facilities, parking, workshops, and related services. At the same time, the high cost of real estate in city centers makes securing space for these functions a challenge, requiring careful planning and prioritization.

Finally, **data on urban logistics** and commercial vehicle movements remains limited, making it difficult for policymakers to make informed decisions. Collecting such data is particularly challenging and has often been deprioritized in favor of passenger mobility data. As suggested by the Expert Group on Urban Mobility (EGUM, 2024), A more systematic approach is needed, including clearer definetions of relevant data, stronger collaboration between public and private actors for data collection and sharing, and better use of existing data sources, such as toll register data from ANPR cameras. Improved data availability would provide a stronger foundation for policymaking and a clearer understanding of the potential impacts of initiatives like KAIA Mobility Hotel.

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