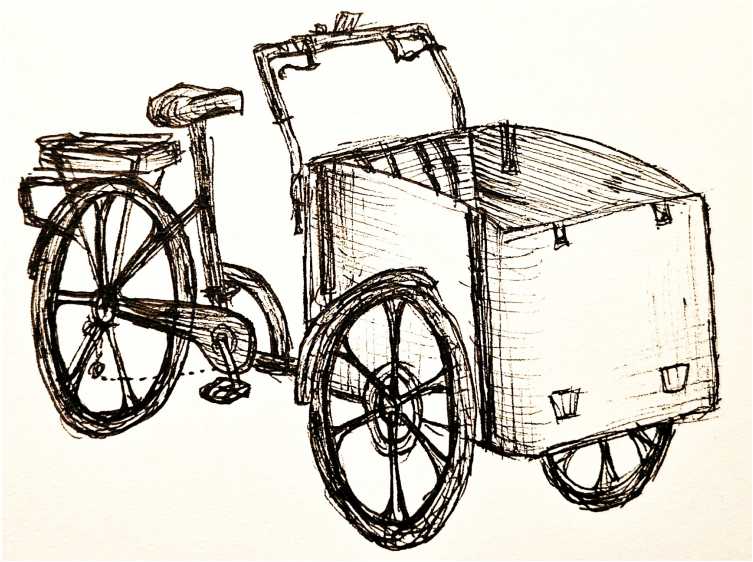

Exploring Barriers and Drivers of Shared Cargo Bike Systems

Using the Technological Innovation Systems framework to analyze cargo bike pools in Västra Götaland

Master's thesis SEEX30-VT26

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Abstract

Climate change, car congestion, air and noise pollution are all issues that can be mitigated through a change in mobility patterns. Significant socio-economical gains can be gained if active and shared mobility can replace personal car usage and ownership in urban areas. Shared cargo bike pools is one alternative with potential in a future sustainable transportation system.

This study examines shared electric cargo bike systems through the Technological Innovation Systems (TIS) framework, with a focus on three pilots in Västra Götaland, Sweden, conducted within the Car-goNE-City project. The aim is to evaluate the three locations, identify actors, networks and institutions as well as key barriers and drivers that influence the adoption of shared cargo bikes. A mixed-methods approach was applied, combining semi-structured interviews with 13 residents and 12 stakeholders, survey study with data from 29 residents, spatial analysis, field observations, and a literature review. The study maps the actors, networks, and institutions shaping the system, while also assessing the spatial suitability of the pilot locations.

The findings indicate that while all three locations are geographically suitable, barriers like street design, parking availability and cargo bike usability limits the usage. In addition, institutional frameworks such as mobility agreements play an important role in nurturing mobility service providers, but they lack incentives for increasing user engagement. Accessibility issues, such as complex renting procedures and low visibility of the bikes further hinder adoption. The study highlights the importance of improving user accessibility, adapting vehicle design to local conditions, and strengthening institutional incentives to promote higher usage rates.

Keywords: Shared cargo bikes, Cargo bike pools, TIS, Active mobility, Shared mobility, Sustainable transportation, Mölndal, Trollhättan

Contents

1
Introduction

More than 70 percent of EU citizens live in urban areas where mobility and transportation are crucial functions to ensure human well being and social inclusion. At the same time, transportation comes with challenges such as congestion, accidents, air and noise pollution and global warming (Europeran comission, 2021b). To tackle these problems, the EU has published strategies and road maps such as the European Green Deal, the Sustainable and Smart Mobility Strategy (SSMS), the Fit for 55 package, the Zero Pollution Action Plan, and Europe's Beating Cancer Plan (Europeran comission, 2021b).

According to these strategies the negative effects of car traffic in urban areas can be significantly reduced by shifting mobility modes from privately owned cars to public transport, walking, cycling and micro mobility (Europeran comission, 2021b). Some examples of measures used to foster this transition are improved infrastructure, awareness-raising and allocation of space. In urban planning, the EU has focused on developing proximity-based, sustainable urban models such as the 15-minute city concept (Driving Urban Transitions Partnership, 2024). A 15 minute city is a city where all basic amenities are reached within a 15 minute walk or bike ride from home (Moreno et al., 2021).

As an example, in 2017, around 40% of the car trips were shorter than 5 km (Göteborgs Stad, 2017), meaning that most of them could in theory be replaced with 15 minute bike rides. To ensure that the member states are working towards these visions, the EU supports cities in enrolling individual sustainable urban mobility plans (SUMP) (Europeran comission, 2021a).

One low emission alternative that is being investigated across cities in Europe a is electric cargo bikes (Philips et al., 2021; Tröger et al., 2025). Cargo bikes are bikes designed with a cargo space to enable transportation of people and larger goods. They come in numerous model designs, with a storage compartment either in front or behind the cyclist. Three designs that dominate the Swedish private consumer market are displayed in Figure 1.1 below.

There are many benefits to be gained from shifting to a more cycle-centered transport system. A report from Cykelfrämjandet, conducted by Sweco and Trivector, revealed that if cycling would double in Sweden it could save 1 100 lives and 30 billion SEK in health benefits yearly (Cykelfrämjandet, 2026). This is due to the increased safety on streets, and the active mobility that reduces the risk of a long

Figure 1.1: Three cargo bike designs that dominate the Swedish market. From the left to the right, the models are commonly called, three wheeled cargo bike, long-john, and long tail.

list of diseases. When active mobility is prioritized over car centered infrastructure, less parking per household will be built. This shift might reduce the cost of rents, since the cost of parking is often bundled into all rents in an apartment building (Litman, 2019, McAslan and Sprei, 2023). On a local business level, removing or reducing car parking in favor of active travel facilities generally has a positive or non-significant impact on retail and food service businesses (Volker and Handy, 2021). More efficient transport solutions can reduce traffic and spur economic growth and employment rate (Sweet, 2014). Although some of these findings are from studying cycling and active mobility in general, shared cargo bike trips are expected to have similar effects.

Cargo bikes have been recognized for their affordability, energy efficiency and for increasing utility and autonomy for citizens, especially for families with kids (Riggs, 2015 Azzouz et al., 2026 VGS, 2021). They are most often purchased by companies or private people with families who intend to use them frequently (Riggs, 2015). For people who will not use the cargo bike for everyday purposes, the cost can be a barrier, as it ranges from about 20 000 - 80 000+ SEK. Thus as an option for less frequent users, shared cargo bikes, or cargo bike pools can be used instead. Similarly to car pools, the vehicles are available for registered users who can access the vehicle through an app or other booking system. This way, one cargo bike can be placed in residential buildings or mobility hubs where more people can access them. That way it can become cheaper to use, accessibility for non car owners increases while car trips and ownership could go down. The potential appears to be large, but there are still logistical, behavioral and regulatory issues that need to be solved first (EU Urban Mobility Observatory, 2025).

To test and study these new transportation modes, projects are run by everything from the EU, NGOs, municipalities to small local communities. One of these projects, called the Car-goNE-City project, is co-funded by the EU and run in 6 European cities. The aim of the initiative is to investigate the potential use of shared electric cargo bikes as a way of reducing car dependency and increasing the availability in the 15 minute city (DUT, 2024). The way this is being studied varies

from city to city.

In Sweden, the project has implemented pilot projects in three residential complexes, two in Mölndal municipality and one in Trollhättan municipality. In each location, an electric cargo bike pool has been installed with 1-4 vehicles, exclusively available for the residents for a small rental fee. Other more locally driven shared cargo bike projects have been made in the city of Gothenburg through public housing companies and the public bike-share system "Styr & Ställ" operated by Nextbike. The cargo bike pools managed by the public housing companies work similarly to the ones within the Car-goNE-City project, but with a wider rage of bike models.

The trial period of the cargo bike pools in the three locations ran for approximately one and a half years, and the bikes were used a total of 16, 58, and 81 hours, respectively. With this result, the project managers wondered what could be done to increase the user rate of the service. Previous research has studied what factors that need to be in place in order for cargo bikes to be viable and well used. Some factors mentioned are adequate bicycle infrastructure, favorable local culture and norms and visibility of cargo bike pool (Otterloo Kuronen, 2025). However, the actors represented in previous research are predominantly experts, researchers and project managers. To really understand what is hindering the widespread adoption of shared cargo bikes, the perspectives of the local residents need to be explored more in depth. These perspectives then needs to be related to those of other key stakeholders to get a comprehensive view of the full system at large. Similar types of system analyses have been conducted for other innovative technologies using the Technological Innovation Systems (TIS) framework (Bergek, Jacobsson, Carlsson, et al., 2008), indicating its relevance for this context.

1.1 Aim of this study

The aim of this study is to identify the biggest barriers and drivers for shared cargo bike systems as well as potential measures for addressing the barriers. This is done by done deep diving into the three cargo bike pilots within Car-GOne-City initiative. Surrounding geography, user experiences and stakeholder's perspectives will be studied through field studies, interviews, survey analyses and literature reviews. Throughout this process, involved actors, networks and institutions will be identified. By putting these perspectives together, a full mapping and analysis of the socio-technical system will be made, and future recommendations will be proposed.

The findings in this report can guide decision-making regarding what issues to prioritize when planning and operating shared cargo bikes in the future. These are measures related to the rental system, mobile application, surrounding physical infrastructure, and relevant technologies.

1.1.1 Research questions

In order to reach the aim of this study, the following research questions will be answered:

- **Which actors, networks, and institutions can be identified within the technological innovation system of cargo bike pools?**
- **What barriers and drivers influence the use of shared cargo bikes in the Västra Götaland region, as perceived by different stakeholders?**
- **To what extent are the locations of the cargo bike pools spatially suitable for their intended use?**

2
Background and theory

This chapter will include a deeper background in how cargo bike pools have been organized and implemented in various contexts. It will also include thorough explanation of the TIS framework, that will be used to study shared cargo bikes and help answer the research questions.

2.1 Implementation of Cargo Bike Pools

As mentioned in the introduction, there are numerous reasons why municipalities work towards less car dependent societies (Europeran comission, 2021a). Shared cargo bikes services have the potential to play an important role in this new mobility system. Through simulations of a virtual European city, cargo bikes was shown to have the potential to replace up to 60% of private transport trips made for commuting, leisure, and shopping (Otterloo Kuronen, 2025). 46% of the shared cargo bike rides replaced car trips in a study made in Germany and Austria (Becker and Rudolf, 2018). Similarly 38-55% of the rides replaced car trips in a study done in Bremen (Pernot and Weir IV, 2025).

Various organizational models for shared cargo systems have been developed in different places. In Gothenburg for example, 6 cargo bikes have been distributed over 3 stations (2 in each) in central Gothenburg. Branch manager at Nextbike (22 January 2026, personal communication), said that the three cargo bikes are part of a test project that will go on for three years. They are integrated into the larger bike pool system that spans over Gothenburg and Mölndal and includes 1750 bikes, located in around 135 stations (Swanberg, Linda, 2021). The system is available for anyone above the age of 18 (Nextbike Sverige AB, 2024). Planning manager Emma Edvardsson at urban environment administration at Göteborgs stad (personal communication, 21 May, 2026), said that the bikes were financed by public procurement in the beginning, but now runs on the user revenues.

Another model that is being increasingly common in Västra Götaland are bike pools, exclusively used by residents living in specific housing complexes (Holm et al., 2025). Trollhättan stad and Mölndal stad are two municipalities that have worked with with this model to reduce car dependency and traffic. However, their approaches differ: Mölndal implements the strategy through its municipal housing company, Mölndalsbostäder, whereas Trollhättan manages it directly at the municipal level.

A future district is being constructed close to Mölndal center that is planned to be adapted for a future transport system where shared mobility plays a larger role (MölnDala Fastighets AB, 2026). When it is completed, it will have three mobility hubs, where shared cars, and cargo bikes will be available for the residents, and potentially also the public.

Similar to Mölndal, Trollhättan stad are developing a new urban district with a strong focus on enabling more sustainable transport solutions. This is done through low parking numbers and a variety of mobility options like shared cars and cargo bikes. It is located close to Trollhättan city center and will include 1500 homes when finished. They have collaborated with housing companies to develop agreements that will ensure that other housing companies will engage in implementing mobility measures.

Göteborgs stad is working to increase diffusion of shared cargo bikes in residential buildings through what is called mobility agreements. In short, this agreement allows a housing developer to implement a combination of mobility measures to reduce the amount of parking they need to build when constructing a new residential complex (Göteborgs Stad, 2021). Examples of potential measures can be a car pool, cargo bike pool or a month of free public transport.

The city of Gothenburg started working with mobility agreements in 2017, and by 2023 they had been signed for over 100 housing projects. On average, the number of parking spots being built has been reduced by 25 percent (Holm et al., 2025). By reducing the number of parking spots that the housing developer needs to build they can dedicate more area to apartments. This is often desirable because of the fact that car parking usually costs much more to build and maintain than what is being payed for by the users. Public housing companies in Sweden often pays 100 000 - 500 000 SEK for building a new parking spot (Ståhle, 2021), and above that, the maintenance cost is on average 1750 SEK/month. The rent for a parking spot rarely even covers the maintenance cost, meaning that the rest of the cost has to be transferred to the rents of the apartments instead.

The frameworks that ensures that the housing developers build enough parking are managed by each municipality. For each project, they calculate a minimum parking requirement (MPR) and sometimes also a maximum cap. There is no national standard for this, instead the Swedish law states that there should "to a reasonable extent, be an appropriate amount of parking" adjacent to the residential building (“Plan- och bygglag (2010:900)”, 2010). Therefore, each municipality have been adjusting their parking norms according to the local needs since the 1950s (Holm and Ivarsson, 2022). In the city of Gothenburg, the MPR gets decided through an evaluation process based on factors such as proximity to public transport and distance from the center. If the developer wants to reduce the parking number, then they sign a mobility agreement (Göteborgs Stad, 2021). Different combinations of measures will lead to different reductions of the parking number. Stockholm on the other hand, has recently decided to implement a *maximum* parking requirement for

newly built houses in the center of the city (Stockholms stad, 2025). According to the guiding document, this limit can also be reduced further by implementing similar mobility measures in different combinations.

The mobility agreements has become a way for shared cargo bikes to become part in society without the service needing to cover their own costs though only user payments. Instead it can finance its operations with the help of housing companies, that in turn also saves money by not needing to build as much parking.

2.2 The three study locations

The locations studied in this theses all contained a cargo bike pool, but they varied in how the projects were executed. Trollhättan had a cargo bike available for a residential complex with 120 apartments. The apartments are distributed in 5 houses, all three-story apartment buildings. The bike pool consisted of thee cargo bikes, all three wheeled, two with open boxes and rain covers to better transport children, and one bike with a closable lid on the cargo compartment. The bikes were located in a small storage shed inside the big courtyard in front of the apartment buildings (see Figure 2.1 bellow). The shed had a code lock that the registered users got access to through the app. The whole project was done in a collaboration between Trollhättan stad and the local housing company Lundqvist Byggförvaltning AB, where the municipality provided the bikes and the housing company arranged and maintained the storage room. The bike pool got 25 registered users, meaning 21% of the households (if there is not more than one user per household).

Figure 2.1: Storage shed in Trollhättan where the cargo bikes were located.

In Störtfjällsgatan, the 145 apartments have a living area that ranges from 47-130 sq.m in size. They are distributed in 5 buildings, each between three and seven stories high. The bike pool consists of two identical cargo bikes, both with a cargo compartment specially designed to fit two kids, or other cargo luggage (see Figure 2.2 bellow). The bikes were located in a small storage room inside one of the apartment buildings in the complex. To enter, one needed to extend their access tag (usually being used to enter the apartment entrance) to also work for that specific

apartment building and the storage room. In contrast to Trollhättan, the project is organized by the housing company Mölndalsbostäder who both manage the facilities and bought the bikes.

Figure 2.2: Cargo bike model used in Kålleredsgården and Störtfjällsgatan.

In Kållered there were 109 apartments spread out over 27 buildings either duplex- or terraced houses. The buildings are either one or two stories high with small private gardens, a shared playground and leisure areas between the houses. The bike pool in Kållered consisted of only one cargo bike, identical to the ones in Störtfjällsgatan except it did not have any rain cover. It was located in a storage shed similar to the one in Trollhättan, but rather than a code lock, it required a physical key to enter. This key was handed out to registered users at a certain occasion in the area, but if one missed that chance, a key could be collected in the housing company reception in Mölndal approximately 8 km away.

2.3 Technological Innovation System

In this thesis, the Technological Innovation Systems (TIS) framework was used to structure and analyze the system of shared cargo bikes. By mapping out all actors involved, their networks and underlying institutions, the framework helps to get a rich understanding of the dynamics and development of the system at focus (Bergek, Jacobsson, Carlsson, et al., 2008). The TIS framework was developed as a tool for researchers and policy makers. It assists in structuring the analysis of the dynamics of a system in order to better direct policy interventions to support and guide the development of technologies. The reasoning behind making these interventions is that a completely free market for technologies risks leading to major negative externalities that make the societal costs higher than the gains from that new technology. To structure the analysis, Bergek, Jacobsson, Carlsson, et al. (2008) provides 6 “steps”: defining the system, mapping structural components, analyzing system functions, assessing overall functionality, identifying inducement and blocking mechanisms, and deriving key policy issues.

2.3.1 Defining the TIS in focus

The first step is to clearly define the system in focus. This involves making several deliberate and conscious choices that will determine what TIS that will be covered in the study. Three main choices that need to be made are i) if the focus will be on a knowledge field or a product, ii) if the scope should be broad or narrow, and iii) what spatial boundaries to have.

2.3.2 Map out involved actors, networks and institutions

The second step involves doing a structural analysis that identifies the main building blocks of the system. That involves i) actors, such as municipalities, organizations, firms, and users, ii) networks that appears between different actors, and iii) institutions that affect the system in some way by existing or by not existing. Networks can be either formal or informal connections between actors, and institutions can be norms, laws, regulations, or simply habits.

2.3.3 Identify the current state of each function

To study the dynamics within the system, the framework presents a set of 'functions' to focus on. Each function effects how well the system develops or gets applied. The functions mentioned are listed bellow:

- **Knowledge development** - The evolution and diffusion of the knowledge base of the technology. It involves scientific knowledge as well as, market, logistics and design knowledge.
- **Resource mobilization** - The availability of financial resources, competence/human capital and complementary assets such as infrastructure and supporting services.
- **Market formation** - For a technology to reach a broad mass market, it usually needs to develop in a smaller market setting where it gets support. The formation of these markets will determine how well and fast the technology can mature.
- **Influence on the direction of search** - The combined effects of all involved actors on the system. Through visions, regulations, bottle necks and trends, the whole system is guided towards certain technical alternatives.
- **Legitimization** - Concerns the social and political acceptance of the technology. How it gets perceived by media and society will effect how easy it is to mobilize resources gain policy support and attract investors.
- **Entrepreneurial experimentation** - Activities where new technologies, business models, and applications are tested in practice. With brave investments, a lot of alternatives can be trialed and the dominant designs can be selected.
- **Development of positive externalities** - New entrants can take advantage of the knowledge and networks that previous actors have built up. More

actors involved will legitimize the technology, boost knowledge development, and increase the force guiding the technology.

2.3.4 Construct a desired functional pattern

A function being weak is not necessarily a problem for the specific system in focus, and a strong function might not contribute to how well the system functions. In order to really understand how well a technology is developing, the functions of the system need to be placed in relation to i) the phase of the development of the TIS, and ii) other comparable TIS's.

The current phase of development of the technology will impact what we determine as a well functioning system and not. For an emerging technology, certain functions might be more important than others, while for a technology in a scale up phase, other supporting functions are needed. If the phase is not considered, then the wrong expectations can lead the analyst to deem the technology as a failure because of its slow growth rate, even though that's what one should expect from a technology in that phase.

To compare the technology in focus with other similar ones can help in recognizing development patterns. If a technology has come a longer way in another country for example, the development steps can be studied to find what functions that are crucial for the previous development phases. It can also help with setting realistic expectations for the technology, so to not deem it failed too early. Not least, if the technology is succeeding better in other places, the methods being used there can be evaluated and possible reused.

When these factors have been thoroughly studied, a desired functional pattern for the focal TIS can be constructed. This map can give a clear picture of what is desirable for this specific technology, at this stage of development. It makes it possible to move on to the fifth step with a plan on what system structure that we want to achieve.

2.3.5 Identify drivers and barriers to this desired system

To understand how the functions relate to, and affect one another, this step involves mapping out causal effects between the different functions. It is not uncommon that they reinforce one another, rather than being independent from the other functions. By mapping them out, blockades in the TIS that hinder the technology from functioning better can be identified, or drivers that are favoring the technology can be recognized. When these functional relations have been understood, measures can be directed to the root causing some functions being weak.

Here the blocking mechanisms are especially important if the aim is to guide policy intervention. Then each barrier can be linked to the different functions, and links between functions can reveal where potential root causes exist.

2.3.6 Specify key policy issues to manage these barriers and drivers

With both a desired state of the TIS, and a map of the current state at hand, key functions that needs to be addressed can be identified. Each function might require a different set of policy interventions. Thus, a thorough analysis of the unique state of this TIS needs to be made.

The policy measures can be directed either towards weakening blocking mechanisms, or to empower driving mechanisms. If there is a lack of knowledge development and experimentation for example, then perhaps more funding R&D and pilot projects are needed. If there is a problem with market formation, then government procurement can help the technology to compete with the actors currently dominating the market.

2.4 Other versions of TIS

Other versions of the framework have been developed where additional functions are included. One example of a function is materialization, which captures how products, artifacts and physical infrastructure is being developed (Bergek, Jacobsson, and Sandén, 2008).

Weber and Rohracher (2012) uses concepts from the innovation systems failure literature and combines TIS with the multi-level perspective (MLP). In their resulting systems failure framework they propose 12 types of system failures that can be analyzed to find out potential weaknesses that needs to be addressed with policy interventions.

3
Methods and data

To capture the complexity and different dimensions of the topic, a mixed methods approach was used for this thesis. In Figure 3.1 below, the different methodological steps are displayed in blue boxes, connected with the research question they were intended to answer. The TIS analysis used the findings from the other methodological steps as input, which is why they are also linked in the figure.

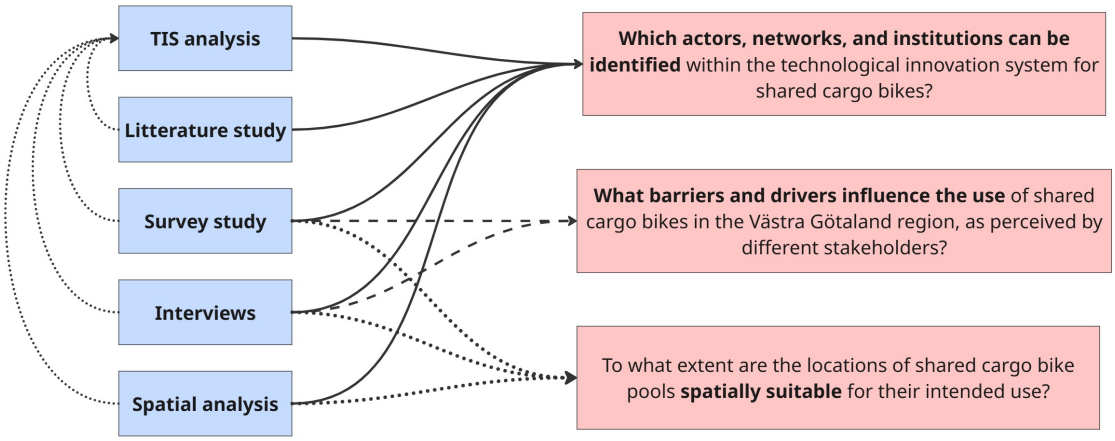

Figure 3.1: To the left in blue, the methodological steps are lined up. They are linked to the research questions in red to the right that they are intended to support answering.

3.1 Literature study

A literature study was done to understand the background of this topic, the frameworks mentioned in the thesis, and to fill out gaps in the results. Sources were found through systemic searches on the Scopus data base, the Chalmers media archive and articles in Journal of Cycling and Micromobility Research. To discover additional sources, exploratory searches was done using the AI tool Perplexity. Searches on the internet was done in order to find demographic statistics for the studied areas and to find images, maps and spatial data such as locations of markets, cycle roads, and schools. Internet searches were also used to learn more about certain stakeholders and find contact information.

3.2 Survey distribution and analysis

Before the start of the writing this thesis, a survey was planned as part of the Car-goNE-City project. It was planned to be handed out to everyone living in the three selected residential buildings in Sweden, Störtfjällsgatan, Kålleredsgården and Trollhättan (see Figure 3.2). For this, fliers were printed with information and a QR code, linking them directly to the online survey. Both the flier and the survey were available in both Swedish and English. The surveys in Trollhättan were handed over to the property manager that later distributed them to the households. In Störtfjällsgatan and Kålleredsgården, the housing complexes were visited and the fliers were placed in each households mailbox, (see Figure 3.3). They were also invited to the survey via e-mail. Reminders were sent out 3 weeks after the first hand out.

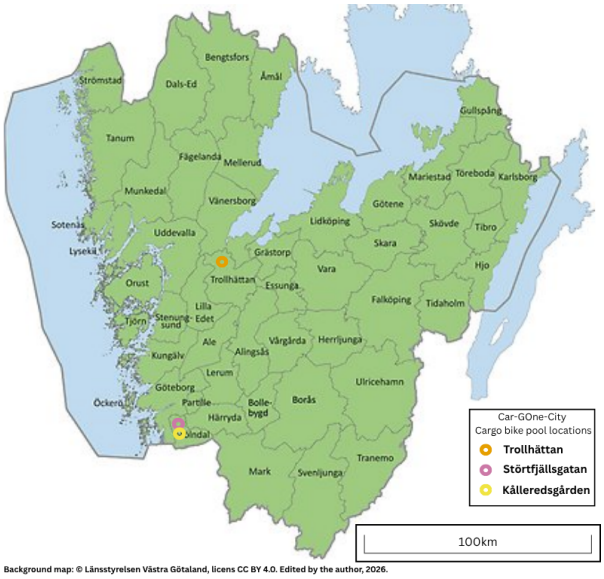

Figure 3.2: Map over Västra Götaland with pins on the three studied locations.

Figure 3.3: Survey flier being placed in a mailbox.

On the flier there was information that cinema tickets would be distributed to 5 random respondents in each area. At the end of each survey there was an invitation to participate in an interview as well, in exchange for another cinema ticket. Without having the a major part in constructing the questions, I was responsible for handing out the fliers and for analyzing the results.

Surveys were distributed to a total of 374 households (each of the three complexes contained 109 - 145 apartments each). Out of these, 29 people answered the survey, meaning that the total response rate was approximately 8%. There were between 9-10 answers from each complex, and out of the 29 total answers, 7 people had used the service at least once.

As the number of respondents were rather low, and the survey didn't contain so many questions, all data analysis was done qualitatively in Microsoft excel. Only

the results relevant to the scope of the thesis was extracted during the analysis. In the end of the survey, there was an opportunity to fill in additional comments. The comments that have been quoted in this thesis have are all translated by the author to English.

3.3 Interviews

Before preparing the interview questions, a discussion session was held with a senior researcher who had prior experience with the TIS framework. The aim of this session was to ensure that all the relevant topics in the framework were covered. During this meeting, the seven TIS functions were reviewed, and their potential meaning for the different actors were discussed. After this meeting questions were formulated in ways so that they would reveal the status of each function of the TIS framework as well as the networks and institutions behind the whole system. All questions asked to the residents and the stakeholders are displayed in the Appendix A.

Most interviews were transcribed into text, but other were remembered by taking notes. All the results from the interviews were analyzed qualitatively by reading notes and transcribed interviews and compiling them in google sheets. There they were organized into categories, quotes were collected and opinions on specific topics were counted.

Interviews were conducted with residents from areas where cargo bike projects had been implemented, as well as with representatives from the public and private sectors. One set of questions were formulated for the residents, while the other stakeholders got unique sets of questions based of their organization niche.

All interviews were conducted in Swedish, and the quotes have all been translated to English by the author for this thesis. The interviews with the residents usually lasted for around 20 minutes, while the interviews with the other stakeholders lasted for between 15-50 minutes.

3.3.1 Stakeholder interviews

Relevant stakeholders to interview were identified through previous research, brainstorming, discussions with experts, and through snowball sampling during interviews. Most of the stakeholders were contacted via e-mail, and then a phone call, online meeting or in-person meeting was scheduled. One actor was approached at a mobility event, and two actors answered questions through e-mail only.

Ideally everyone in the TIS that is affected, or is affecting the system should be interviewed. For this system, that would mean: experts, public and private housing companies, cargo bike pool service providers, mechanics, cargo bike sellers, manufacturers, municipal actors, representatives from research institutes etc. In the end, a total of 12 interviews were made with stakeholders, 5 with representatives from the public sector and 7 with private company representatives. The full list of the

interviewed stakeholder are presented in Table 3.1 below, with actors from the public sector first and the private sector below.

Actor	Description
Poseidon	Gothenburg based public housing company. Manages multiple residential complexes that have installed cargo bike pools.
Familjebostäder	Gothenburg based public housing company. Manages multiple residential complexes that has an installed cargo bike pool.
Mölndals - bostäder	Mölndal based public housing company that have tested cargo bike pools in 2 locations, both of which are being evaluated within this thesis.
Trollhättan Stad	Municipality in Västra Götaland that have collaborated with service provider and private housing company to test out a cargo bike pool in the city.
Sandviken kommun	Municipality $\tilde{5}$00 km north east of Gothenubrg. Have had a pilot project to let 5 families each borrow a cargo bike for that have collaborated with service provider and private housing company to test out a cargo bike pool in the city.
Nextbike	European public shared bike service provider. In Sweden only located in Mölndal and Gothenburg. In addition to regular bikes, they have 3 locations with shared cargo bikes in Gothenburg.
GoRide	Gothenubrg based company that provides app and rental system for different types of bikes, including cargo bikes.
OurGreenCar	Malmö based company that provides rental systems, mainly for cars, but also for cargo bikes
EC2B	Service provider that collect and mediate mobility options to users. They also supply their own bike rental service, with cargo bikes included.
Cargobike of Sweden	The largest cargo bike manufacturer in Scandinavia. Also sells and repairs cargo bikes in their a shop in Malmö.
Elcykelbutiken	Bike shop in Gothenburg specialized in cargo bikes.
Koucky & partners	Consultant company focused on sustainable mobility and traffic solutions.

Table 3.1: Table of actors interviewed, the first five from the public sector and the bottom seven from the private sector.

Due to the exploratory nature of the early phase of the study, some of the stakeholder interviews were done in a unstructured or semi-structured manner. This was done to complement the background study with stakeholder perspectives. To adapt the topics to the interests and knowledge of the interviewees, minimal influence on the direction of the interview was a priority. However, as many of the topics discussed during these interviews were relevant for the TIS framework, they have not been separated from the others.

3.4 Interviews with residents

After the interviews with different actors had been conducted, interviews with residents that had access to shared cargo bikes were done. As earlier mentioned, invitations to participate in the interviews were sent out with the surveys. At the end of the survey, there was an option to fill in contact information and approve to be part of an interview in exchange for a cinema ticket. These people were contacted via mail or phone to schedule meetings, either on Microsoft teams or phone. One interview was done on site after a conversation with a resident that was met while distributing surveys.

With the help of the project developers, contacts were retrieved to the people who had registered to the cargo bikes in the three residential complexes. These people were also invited through mail and text messages to participate in interviews in exchange for a cinema ticket.

The interviews were semi-structured, allowing respondents to elaborate on their answers and introduce additional perspectives they deemed relevant. Some questions were skipped if they got answered before they were asked. When consent was obtained, the interviews were transcribed to enable verification of the findings during the analysis.

They were first asked questions about their life situation and their knowledge and experience with the shared cargo bikes. Then they were asked to name things that made it difficult or hindered them from using the shared cargo bike service as well as things that worked fine. This was to give an open chance to mention barriers and enablers without being restricted by the boundaries of the TIS framework. The remaining questions were formulated in ways so that they would reflect the state of the TIS functions from the residents perspective, but also to reveal networks and institutions that could affect the system.

3.5 Spatial analysis

To understand the local context of the shared cargo bikes a detailed spatial analysis was made. By combining map analyzes with field visit to each location with electric cargo bikes, the projects could be understood from their individual contexts. This context understanding was also used to better relate to the responses from the residents to their local geography. When references were made about their destinations, that could be better understood since I had been to those places before.

3.5.1 Cycling experience

While surveys were being distributed to the three locations, test rides on the cargo bikes were made to potentially relevant destinations. The bikes were borrowed by the project managers from Trollhättan stad and Mölndalsfastigheter. This was done to get a first hand experience of what it is like to book, unlock, and ride the cargo

bikes in the areas. More specifically the goal of the riding was to see if the bike lane and parking infrastructure was suitable, if the terrain was challenging, if the battery capacity was sufficient, how it felt to move around obstacles that appeared on the way and how long it took to reach certain destinations.

Since all the experiences, opinions and thoughts expressed in the results are my own, it is important to elaborate on my personal relation to the topic. I am a 27 year old man that have been commuting by bike since the age of 11. Before writing this thesis, I have been a regular user of the shared city bicycles in Gothenburg for at least two years. I have tried cargo bikes less than 10 times before writing this thesis, one time being a two-wheeled public shared cargo bike. Overall I consider myself being in a good physical condition with experience in cycling, shared mobility apps.

3.5.2 Map and demographic analysis

As part of the spatial analysis, the maps of the surroundings of the three cargo bike pools were studied. Satellite images from Lantmäteriet's e-service *"Min karta"* (Lantmäteriet, 2026) were used as a base layer, upon which additional map-layers and pins were added. The bicycle network maps that were used were found on the respective municipality websites. After that, the potential points of interest were marked out, destinations that were located using observations from the field study, google maps, and the municipality websites.

The selected categories were based on previous research on how shared cargo bikes are being used (Becker and Rudolf, 2018,Otterloo Kuronen, 2025). The selected categories were the following:

- Leisure activities
- Schools and preschools
- Grocery stores
- Stores, shops and restaurants
- Public transport stations (buss, tram train)
- Bike pool (not cargo bike)

In addition to these categories, the locations of the studied residential complexes and their associated cargo bike pools were mapped. Their different potentials were compared qualitatively, first by assessing how well the bike path connected to the different locations, then by measuring the time distances to these locations. When measuring the time it would take to cycle to each destination, google maps travel planer was used. As there is no function for measuring the travel time for electric cargo bikes, the travel time for regular bikes was used. During the cycling excursion, the travel time between two points was measured at three separate occasions and compared with the travel time proposed by google maps. Since the deviation was below one minute for all three measures, it was deemed an acceptable approximation. The speed measured (~15 km/h) also corresponded well with speed estimates and measures made in previous research (Otterloo Kuronen, 2025; Lasovský, Jan,

2019).

Schools and kindergartens were pinned out if they were for middle school students or under. Some of them have were pinned out as leisure activity as well, since the play grounds, sport halls and football fields were expected to be available for the public after school hours. Other locations that were categorized as leisure activity could be a swimming area, library, museum, or cultural center.

A destination was categorized as a store or shop if it was a pharmacy, second hand shop, furniture store, eyewear store, clothing shop or something similar. The "restaurant" category includes everything from simple street food to dining restaurants. A "grocery store" can be anything from a large supermarket to a small convenience store. It also includes local shops specialized on fresh fruits and vegetables or food products from other parts of the world.

Public transport stops include bus, tram and train stations. The difference between the three have were distinguished in the maps. The bike paths were highlighted on the map it they were visible on the online municipal bicycle map.

To assess whether the studied sample reflects the average demographic situation in the residential, local statistics were analyzed. Data were collected from Statistics Sweden (SCB) and complemented with publicly available data from the residential areas. The data points studied were the following:

- Average age.
- Salary in comparison to the.
- Employment rate for residents aged 20–64.
- Percentage of of residents with at least 3 years of higher education completed.
- Percentage of residents with high school degree as highest education level.
- Percentage of residents that are under 19 years old.
- Percentage of families that have more than one child.

3.6 System mapping - TIS analysis

Doing the TIS-analysis involves all the steps mentioned in the Theory (Chapter 2) in this report, and starts with defining the scope. In this thesis the TIS is defined as shared cargo bikes as a mean of transport. While the spatial boundary is urban areas within the Västra Götaland region, Sweden, some perspectives from actors in other parts of Sweden have been included (for example Malmö and Sandviken).

The TIS framework has been developed to study products or knowledge fields, while this thesis focuses on shared cargo bikes as a service. This means that the framework might not be fully suitable for this type of analysis, and this thesis will therefore be exploratory rather than confirmatory. The focus could have been on solely cargo bikes as an innovative technology, but that would include for example privately, and company owned bikes as well, widening the scope much more. Therefore one could

argue that the scope shared cargo bikes is a subsystem of cargo bikes, that is a subsystem of bikes.

In the next step, actors networks and institutions were being studied. Actors were identified mainly through the interview process earlier mentioned and the literature study. Questions were asked about what other actors the stakeholders had connections with and how those connections affected the overall system. Finally, questions were asked to identify which types of institutions have the greatest influence on the actors and the overall system.

In the third step, the state of each TIS-function was supposed to be identified. Since the seven functions are general categories, work was needed to put them in the context of the TIS in focus. To address this, the previously mentioned discussion session with the senior researcher was organized. As already described, this resulted in formulations of questions for the interviews with the residents and the other stakeholders. The results from those interviews, the survey results, the spatial analysis and the literature study all served the purpose of identifying the state of each function.

The final three chapters were carried out in parallel in the discussion chapter. Desired functional patterns were analyzed together with the barriers, drivers, and potential measures for addressing them. All the analyzes and conclusions made in these steps were based on the findings from the other methodological steps.

3.7 Ethical standard

Great care was taken in order to conduct the interviews in an ethical manner. The questions were designed to be inclusive and non-discriminatory, based on ethnicity, gender, age, socioeconomic status, or other personal characteristics. Potential power imbalances were studied in order to be able to identify the effects they could have on the responses. For example, since many people are aware of the negative effects of car driving, it could lead to them feeling ashamed of their driving. Although this might not be to a significantly high degree, it could increase the risk of "impression management"; the process where interviewees adapt their answers to control how they are being perceived (M. R. Larry, 2001). When this was observed, I tried to gently highlight that I was only there to study their preferences, not to change them.

Furthermore, to ensure that the interviewee was aware were conducted ethically and with the interviewee's consent, the following interview principles were formulated as guidelines for myself:

- Each interviewee has the right to drop out of the interview at any time.
- Each interviewee has the right to pass questions without explaining why.
- Each interviewee will remain anonymous, and their responses should be presented in a way that no one will be able to identify them by their responses.

- The answers will be stored according to GDPR until they will be deleted in December 2026.
- Each interviewee should be informed about the background and scope of the study before any question is asked.

These principles were mentioned to all residents that got interviewed. However, the other stakeholder interviews were conducted in a more unstructured manner at the early exploration phase of this thesis. Therefore, the same standards were not applied for those interviews. If quotes and opinions from them are presented in this thesis, their permission to use those quotes has been confirmed at a later stage.

The visual material in this report consists of original photographs, custom-designed illustrations, and maps retrieved from municipal and authority websites with permission. To ensure high accessibility, colorblind-friendly palettes were specifically selected so that key information remains distinguishable for all readers. All images have been either partially or entirely edited by the author using software such as Canva, Photopea, Miro, and Windows Paint.

AI was used to find relevant litterateur, to correct grammar and suggest alternative formulations of already constructed sentences. Anything constructed by AI has been carefully controlled and edited by the author.

4

Results

4.1 Spatial analysis

The spatial analysis includes the creation of maps, analysis of the surrounding relevant destinations and a cycling excursion to each of the three studied locations. After a brief overview, Trollhättan, Störtfjällsgatan and Kålleredsgården will be analyzed by their proximity to good cycling paths and the following destinations: grocery stores, leisure activities, public transport stops, public shared bicycles stations, stores and restaurants and schools and preschools.

In table 4.1 below, a quick overview of the distance to certain locations is seen. The distance is categorized as for 5, 10 and 15 minutes and number of locations from each category is displayed for each of those distances. As can be seen in the table, all three locations has at least 2 of each destination type within 5 minutes cycling distance. Trollhättan has more than 10 schools/preschool and over 10 stores and restaurants within 5 minutes. Around Störtfjällsgatan, one could reach over 10 different destinations from each category within 10 minutes. Kålleredsgården has 4 grocery stores within 15 minutes cycling while Trollhättan has 9 and Störtfjällsgatan more than 10. Kålleredsgården also has less schools and preschools within 10 minutes distance than the other who locations.

		Trollhättan			Störtfjälssgatan			Kålleredsgården		
	Cycling duration from bike pool to destinations	5 min	10 min	15 min	5 min	10 min	15 min	5 min	10 min	15 min
Approximate number of destinations within the time boundary	Grodcery stores	4	8	9	6	10+	10+	2	4	4
	Schools and preschools	10+	10+	10+	3	10+	10+	4	7	9
	Shops or restaurants	10+	10+	10+	10+	10+	10+	6	10+	10+
	Leisure activities	5	10+	10+	3	10+	10+	6	10+	10+

Table 4.1: Approximation of the number of locations within 5, 10 and 15 minutes of cycling.

Due to numerous limitations and restrictions (mentioned in the limitations Chapter 5.6), all results related to geography, destinations and travel duration were approximations based on the available data. They should therefore only be used to get an overview of the area surrounding the cargo bike pool and should not be interpreted as completely realistic.

4.1.1 Cycling in Trollhättan

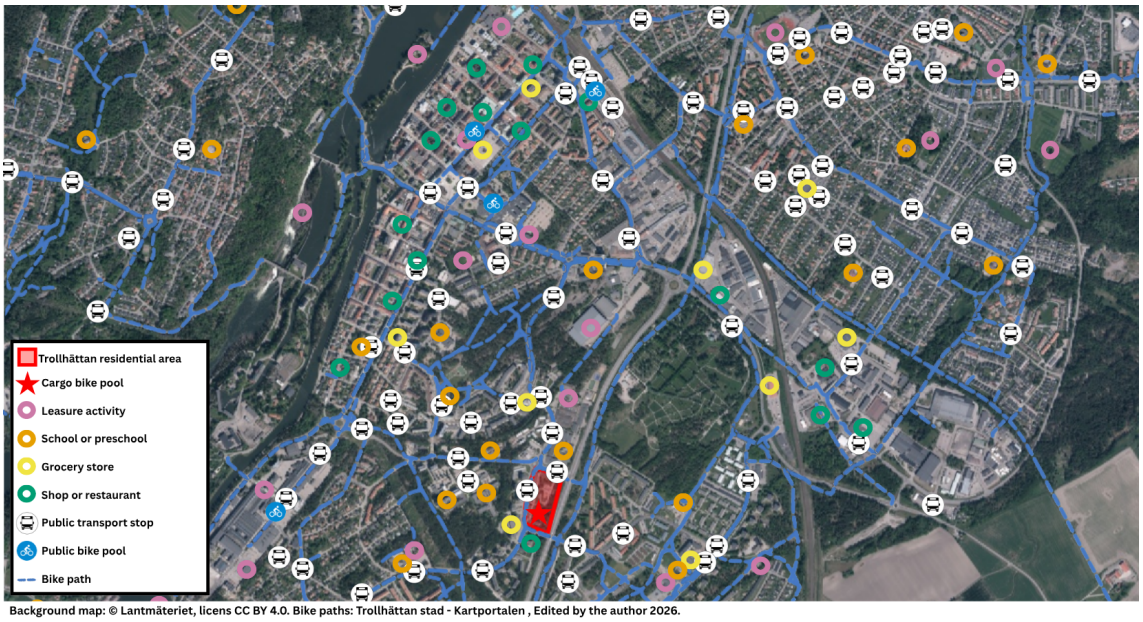

Figure 4.1: Map of the area around the cargo bike pool in Trollhättan. Colored circles pointing out basic amenities and blue lines marking bicycle paths.

In Trollhättan, the overall bicycle network was very well connected with protected lanes that often was disconnected from the car street network. The bike lanes were in good condition, mostly wide enough for a cargo bike to meet another cargo bike, at least at lower speeds. As I cycled there during winter in minus degrees and a few days after snowfall, I could confirm that the bike lanes plowed from snow and often even swept and salted. At some instances, the bike lane was discontinued, which left one to continue either on the sidewalk or on the street.

The nearest place to get groceries is a small-scale grocery retailer that lays within a minute walk (<100m) from the residential area. The nearest grocery chain was a smaller store, 4 minutes away by bike. By riding 10 minutes on separated and protected cycling lanes, three larger grocery chains could be reached. All of the grocery stores mentioned had plenty of space for parking a cargo bike right outside of the entrance, much closer than you would get by car. Within 1 km, at least 11 schools at different levels could be identified, most with sufficient cycle lanes to get there.

In 10 minutes, one could ride into the center of Trollhättan where a mall is located, a cinema, bowling hall and plenty of shops, restaurants and cafés. Just next to the city center flows the canal, along which there are several trails for cycling and trekking. Other leisure activities closer to the residential building are parks and playgrounds, a library, ice rink. Just next to the city center, there are several trails for cycling and walking in natural areas alongside a canal. Other leisure facilities near the residential building include parks and playgrounds, a library, and an ice rink.

4.1.2 Cycling in Kållered

Figure 4.2: Map of the area around the cargo bike pool in Kålleredsgården. Circles pointing out basic amenities and blue lines marks bicycle paths.

Kålleredsgården was located on a hill, next to a villa neighborhood, and a lot of nature around. Within 5 minutes cycling at least 4 schools and preschools could be reached and several local playgrounds. No potential destinations could be found west or south from the cargo bike pool.

Down the hill, approximately 5 minutes cycling east of the residential complex, there was a large shopping area. Although all these stores were very adapted to car driving costumers, the bike paths around the area were separated for cars, wide, in very good condition and well maintained after the snowfall. In the shopping area there were large stores for furniture, hardware, horse riding, hunting, fishing, home decor and more. In the shopping area there were also three large grocery stores.

There were several bike path options to choose between when cycling from Kålleredsgården down the hill to the shopping area. Each option allowed one to cycle either almost entirely on protected cycle lanes or partly on low speed neighborhood streets and gravel roads. The downhill was very steep at certain places and had some sharp turns that would be very dangerous without good breaks. However, the breaks on the bike felt reliable, making it easy to ride slow in the downhill if one wanted to. To cycle back up from the supermarket, using one of the numerous alternatives, took 7 minutes without rushing. Although some parts where very steep, they were possible to climb with the lowest gear and maximum electric support. However, if one would

stop in such a hill and try to start moving again, that would be challenging and would require some user habit.

If one continued further east from the shopping area, one would reach the train station, an industrial area and the small town center. In the town center there were some smaller stores, and more densely built residential buildings and some parks and playgrounds. From the train station, one could cycle north on a bicycle highway to Mölndal and Gothenburg.

4.1.3 Cycling around Störtfjällsgatan

Figure 4.3: Map of the area around the cargo bike pool at Störtfjällsgatan. Circles pointing out basic amenities.

The two cargo bikes in Störtfjällsgatan were locked into a small storage room, inside one of the apartment buildings. The spaces were narrow but manageable, and the door out from the building had no automatic door opener. This made it slightly troublesome to exit the house with the cargo bike.

Dedicated cycling paths were available from just outside the residential building, along each major road. Cycling west into Mölndal center was done in less than 5 minutes on a steady downhill, and the way back up hill took approximately the same time with electric assistance. To reach most of the stores, the cyclist has to cross around 4, quite busy streets. Each bike passage was well marked and most of them also had speed bumps for cars.

Well inside the city center, most of the area consists of walking streets. This means that as a cyclist you have to leave priority to pedestrians, and not ride faster than walking speed. It is also mandatory to park the bike only at dedicated spots within this area. For most stores, the cargo bike could be parked within 50 meters away from the entrance. Apart from shopping and restaurants, a hospital, fitness, sports and health centers, some parks and playgrounds could be found on the western side

of the highway.

Just before the city center on the western side, a large highway and train track passes under the bridge in a north south direction. In that cross is a major mobility hub were the trains go to Gothenburg, or all the way to Copenhagen. There are also busses and trams as transport alternatives and public bike pool that connect with the large network of stations inside Gothenburg. This area in only 500 meters walking from Störtfjällsgatan, meaning that there are already a lot of options available for long distance mobility.

Focusing on the eastern side of the Störtfjällsgatan, there are two kindergartens, playgrounds, a public swimming area by the lake, historical buildings and museums. To reach many of the locations on this side, one has to climb a steep uphill.

At the time that this thesis was written, the area near Störtfjällsgatan is under a major reconstruction. In addition to the new residential area being built opposite to Störtfjällsgatan, a completely new district is taking form a few hundred meters away. This affected the area in terms of making it feel temporary in it's layout.

Within 15 minutes of cycling, there is a wide range of other amenities available, such as several fitness-, health- and sports centers, a museum, swimming area, historical buildings, a hospital and numerous parks. Some locations are at higher altitudes, but the hills were manageable with the battery power available.

4.2 Overall riding experience

First of all, locking up the bike and heading out in the streets was a challenge. In total it took about 10 minutes to enter the facility, unlock the bike, open the battery box, insert it in the bike and exit the building. To access the room, one first had to download an app and register. A booking schedule, instructions and FAQs could be found on the app as well. Additional instructions were also available on the walls in the cargo bike storage room. Booking the bike and entering the room was easy. The things that took most time to figure out was were the bikes were located, how to manage the lock for the battery safe, and to find where to insert the battery.

The fact that the cargo bikes were challenging to unlock had been mentioned by all 4 project managers interviewed before the test ride. It was one of the arguments for why hosting events to introduce people to the cargo bikes was important. By providing direct support, the users were not left to figure out the complexities of cargo bikes on their own and risking giving up in the process.

When cycling above 20 km/h the bike started to wobble slightly which made it feel a bit unsteady. Although it was not close to wobble out of control, it was still an uncomfortable feeling. This was especially prominent when one used the pedals while riding fast. Changing to the highest gear when going downhill required quite a lot of force and was tiring for the wrist and the hand.

There were some very steep uphills that were necessary to climb in order to reach important destinations, especially in Störtfjällsgatan and Kålleredsgården. If I would have been on a regular bike the hill would have been intimidating. But with the lowest gear and electric assistance it was manageable without major efforts.

Along most cycling paths, the streets were well maintained from snow. However, some walking and cycling streets were uncomfortably narrow. In Figure 4.4a, one can see a cycling street that is probably big enough when there is no snow, but now it was necessary so slow down to walking speed when meeting a pedestrian to not risk causing an accident. The cycling and pedestrian path just outside of Störtfjällsgatan was not maintained at all, and cycling there was very uncomfortable (see Figure 4.4b).

(a) Narrow walking and cycling street in Mölndal

(b) Unplowed, bumpy street outside of Störtfjällsgatan residential area

(c) An example of a small bump with a large effect on the comfort of the ride.

(d) Tilting passage that increased the risk of tipping over the bike.

Figure 4.4: Examples of uncomfortable cycling conditions.

Small bumps and elevation differences had a big effect on how easy it was to balance the bike. Either they created a barrier that became surprisingly challenging to overcome (see Figure 4.4c), or they tilted the bike to a degree that it felt very easy to tip the bike over (see Figure 4.4d).

The reason I had to cycle on the tilted path in Figure 4.4d was because of the metal barrier, blocking the road. There are two common types found in Sweden. The one seen on Figure 4.5a is called "bilhinder" which can be directly translated to "car obstacle". The one seen in Figure 4.5b is called a "cykelfålla" and is intended to prevent cyclists from cycling straight out on another street (Cykelfrämjandet, 2025). During the field study, they were encountered several times, making it difficult if not impossible to pass.

(a) A fixed "car barrier" in Trollhättan that was impossible to pass.

(b) A "cykelfålla" in Trollhättan that made it difficult to pass.

Figure 4.5: Examples of barriers that were difficult to pass with cargo bike in Trollhättan.

When arriving at the different potential destinations, I tried to find good ways of parking the bike outside of the facilities. The experience was that it was almost always possible to park relatively close to the destination, if not just outside. However, it did not always feel intuitive where the bike should be placed. I did not want to block trash bins, benches or doorways or the regular bike stand (unless there was plenty of space over for other bikes). Apart from the parking in Mölndal center and Trollhättan library (see Figure 4.6d and 4.6b) it did not feel intuitive where the cargo bike was expected to be parked. Although I managed to park close to most destinations, there was not always a possibility to lock the bike to a stand. It was also hard to imagine that the parking spots would be able to handle bigger amount of cargo bikes in a good way. In the pictures bellow are some pictures from locations where i parked.

(a) Narrow parking in Mölndal without designated parking spot.

(b) Spacious parking in Mölndal center outside the mall, felt very intuitive and safe to lock the bike to the poles.

(c) Parking outside store in Trollhättan without designated parking spot.

(d) Spacious parking by the library in Trollhättan.

Figure 4.6: Examples of cycling infrastructure and surface conditions in Mölndal.

4.3 Interviews and survey answers

In this section, first some general information about the demographics, the interviewees and survey takers will be displayed. After that, the following subsections will present the TIS functions, under which the perspectives of the different stakeholders will be summarized.

4.3.1 Resident demographics

The socio-demographics in the three studied locations have some similarities as well as some notable differences. First of all, the average age of 54 years in Trollhättan is slightly higher than in the two other locations in Mölndal where it is 45. The salaries in Trollhättan is on average 25% lower than the Swedish average, which is significantly lower than the 5% below the Swedish average in Kållered. Störtfjällsgatan was just in between at 17% below the Swedish average. Furthermore, the employment rate is lowest in Trollhättan (46%), whereas in Kållered and Störtfjällsgatan it is 67% and 64%.

The percentage of people with at least 3 years completed higher education, was 42% on average in Mölndal municipality, and 28% in Trollhättan. A high school degree

was the highest education level for 24% of the people living in Trollhättan municipality, and 20% for the people in Mölndal municipality.

Kållered has the highest proportion of people under 19 years old (29%) and families with more than one child (24%). In comparison, for Störtfjällsgatan it is 15% and 12%, and in Trollhättan it is 16% and 11%.

In the table 4.2 below, the compiled demographics statistics can be seen for each residential area:

Variable	**Trollhättan**	**Kållered**	**Störtfjällsgatan**
Average age	54	45	45
Salary in comparison to the Swedish average	25% *lower* than Swedish average	5% *lower* than Swedish average	17% *lower* than Swedish average
Employment rate (ages 20–64)	46%	67%	64%
Percentage of people with at least 3 years of higher education completed	28%	42%	42%
Percentage of people with high school degree as highest education level	24%	20%	20%
Percentage of people under 19 years old	16%	29%	15%
Percentage of families with more than one child	11%	24%	12%

Table 4.2: Demographic statistics for the three selected areas. Education statistics are municipal data from SCB (2024), while the remaining data were collected and processed from Hitta.se (2026).

4.3.2 Interview and survey respondents

Interviews were conducted with both residents/users and other involved stakeholders. Out of the residents in the 374 apartments where the Car-GOne-City project had been conducted, 11 people took part in an interview. In addition to these, a couple more interviews were done with shared cargo bike users in other residential areas in Gothenburg.

Out of the total 13 interviewees, 8 people, at ages ranging from 27-60 years old have used the service at least once. The average age of the users was 38, and among the 4 non-users it was 48. 6 men and 7 women were interviewed, 5 men and 3 women were users. Out of the 8 interviewees that had a partner and kids, 5 of them were users and three were non-users. The last three expressed an interest in using the

bikes, but for various reasons had not done so yet.

All of the interviewees were aware that there had been, or still is a cargo bike pool installed in their building complex. 8 of them had some sort of higher education, and the same 8 people were the ones that had tried the cargo bike pool. This means that the highest completed education level of the 5 non-users was the Swedish equivalent to high school, "gymnasiet". 7 of the 8 users were working, at least part time, while one was a full time student. 2 of the 5 non-users reported to be working. 3 of the users mentioned that they use the cargo bikes on a regular, weekly basis.

When asking about what they had used the cargo bikes for them mentioned: dropping of kids at school or kindergarten, going on leisure activities with them, visiting stores like IKEA or Jula, go grocery shopping, moving larger items to or from a storage facility or simply just to try out the bike. Most users mentioned more than one type of activity that they have used the bike for. The non-users mentioned similar destinations as interesting for themselves or potential users in similar life situations as their.

The survey was completed by 29 residents in the 374 apartments. From the 9 survey answers from Störtfjällsgatan, only one was from a person that had used the cargo bike pool at least one time. From Kålleredsgården and Trollhättan they were 3 users from each. In total 4 of the users were male and 3 were female while 19 of the total survey answers were from women and 11 from men. The average age of the respondents were around 39 years old. The average age of people who answered from Trollhättan was 56, the highest of the three. In Störtfjällsgatan it was 53, and in Kålleredsgården it was the lowest, 46 years.

4.3.3 Knowledge development

The type of knowledge development mentioned for this system varied in several ways. Mainly, it was stated that knowledge had to be developed by users (or potential users) or by developers of the mobility service. For each actor, the knowledge development had to be developed across different areas. For this reason the categories have been separated into four subsections; Mobile app and rental system, Bike security, User experience of riding the cargo bike and Cargo bike development.

4.3.3.1 Mobile app and rental system

This topic regards the knowledge development of the app and rental system from two perspectives. First, from a user perspective of learning how to use the app to rent a bike, and second, from a developer perspective of knowing how to make the app and rental system user friendly.

When it came to how user friendly the app and the rental system was, the opinions varied widely between the residents. One user said:

"I had to learn how it works in the beginning, but I have no problem using the service anymore. Everything works fine now."

Another user said:

"There are apps and codes [...] There were way too many steps, the lock is complicated and heavy, the battery needs to be brought out from a box, then put in properly in the bike, you need a code combination to enter [...] It took half an hour before I could start cycling."

When asked about if the app and rental service had been fully developed, 9 out of 13 mentioned things that could be improved. Out of these, 8 said that their use rate would increase if these issues were addressed. The following suggested improvements were mentioned more than once:

- Take the bikes outside so they are easier to access.
- Make it easier to get the key to the room where the bike is.
- Easier registration.
- Fewer steps before the cycling starts.
- Different price options (monthly, daily and hourly rental options).

Regarding the key, it was mentioned several times by the people living in Kållereds-gården. There, one had to collect a physical key to access the cargo bike, either when there was a cargo bike event in the residential complex, or by going to an office 8 km away. The residents complained that it was a long way to drive to a place they rarely passed by, and that the opening hours clashed with their working schedule. The residents said that they were not home when the events were done, and suggested that there should be a way get the key from the janitor instead.

One person mentioned that the bike would be perfect to bringing to the lake when one has a lot of luggage to carry. But with the hourly payment method, but the experience would not be as relaxed if every hour added to the total cost that could be quite high. For such occasions, a low-cost daily rental alternative would be more appealing.

The following points were also mentioned:

- The app should be adapted for non-Swedish speakers and elderly people.
- Real time rental price update in the app
- Clearer information about what happens if the bike or the battery gets stolen.
- The app should end the bike ride automatically when locking the bike.
- A possibility to return the bike even if the phone runs out of battery during the rental period.

When GoRide and OurGreenCar were asked whether their services would be further developed to improve user-friendliness, both stated that their services were already

fully developed and did not require any major improvements.

GoRide mentioned that, in general, people manage to navigate and use the app. A large majority of the contact they have with users are through the costumer support service, and thus with people who need help with something that has gone wrong. Similarly, OurGreenCar mentioned that most of the costumer communication is with people who experience issues with the service. They estimated that 70 % of the costumer support issues were due to lack of experience or knowledge from the user side, and thus easy to help with. The remaining 30 % was technical issues with the app or broken components.

In the survey, one person commented:

"You forget that it exists when it stands inside the house. It would've been better if every house had one in each bike storage and that it could be booked [...] like one books a laundry time slot."

When mentioning that people might find the rental process complicated with many steps, and that the bikes and batteries might be hard to find and access behind closed doors and locks, both GoRide and OurGreenCar pointed to safety reasons as an explanation. The most critical barrier that prevents them from meeting the demand of more easily accessible bikes are the major risk of getting the expensive bikes and/or batteries stolen. This leads us to the second topic of knowledge development: *bike security*.

4.3.3.2 Bike security

Both Poseidon and Familjebostäder mentioned that they had issues with thieves breaking into the cargo bike room and stealing bikes. Apart from the cost of replacing them, one of them said that the time it takes is a major issue. The longer it takes to replace, the more difficult it will be for people to trust and rely on the system.

In Störtfjällsgatan someone tried to break in to steal their cargo bikes, according to Mölndalsbostäder. They broke the door, but did not manage to steal any bikes. To fix the damages costed approximately 10 000 SEK.

GoRide mentioned that stealing a bike is very light crime that one can easily get away with, especially if the thief is also being prosecuted for other crimes at the same time.

OurGreenCar mentioned that even if they try really hard, and store everything inside locked cases, thieves will still find a way. This prevents them from meeting the requests from the users to place the cargo bikes in more open areas where people can see them and access them easier.

Nextbike has challenged the regional norm of locking in the shared cargo bikes behind closed doors. For over one year, their publicly available shared cargo bikes have been standing outside at three locations in central Gothenburg. According to them, they have not had any cases where bikes have gotten stolen. However, different components of the bikes have been damaged, and one battery has been stolen. They think the reason for the bikes not being stolen is the GPS tracker and that one has to create an account to open them.

GoRide has adopted and adjusted safety measures over time until the bikes were safe enough. Measures like cameras, safer doors, GPS trackers on the bikes etc. has been implemented over time. Since they shifted to their more advances security system, the stolen bikes has always been returned to the cargo bike pool, either by the police, or by someone in the GoRide team.

OurGreenCar also mentioned several measures they have used to increase the safety of the bikes and the batteries. From caging in the bikes and locking them into separate rooms, to locking in batteries in safes. Most solutions are tailor made by themselves for specific issues that come up along the way. Despite these measures, they have had significant issues with bike thieves. GPS trackers in the bikes worked in certain cases, but it happens that the thieves find and remove the trackers. Even if the GPS stays on the bike, they cannot rely on the police to get it for them, so it happens that they have to go and retrieve the bikes themselves. This is not done at all times, because of the risk that comes with it.

They pointed out that it would help out a lot if there was a safety service that could ensure the protection of the bikes, and if something happened the costs would be covered and the issue could be fixed quickly.
Cargo bike of Sweden, who had experience with both shared and privately owned bikes, said that a GPS tracker is not a sufficient security measure. The reasons mentioned is that it rarely prevent the bikes from getting stolen, and if they get stolen, it does not help them to retrieve the cargo bike. Their experience is that the police will not prioritize the case since they have more urgent crimes to deal with, and collecting a stolen bike yourself can be dangerous as it requires confronting an unknown criminal in their home. Instead, they put their hope in a good insurance solution that hands over that responsibility to a third party.

4.3.3.3 User experience of riding the cargo bike

As mentioned in the background, there are several different models of cargo bikes on the market, each being very different to cycle. According to Elcykelbutiken, the three wheeled cargo bike often feels more steady at low speeds and when standing still, while the two wheeled is more natural to steer and are better at dealing with sharp curves. Their cargo bike costumers often come in pairs and have to negotiate with each other to decide what model to buy. In the three locations studied, the three wheeled model was the only model available. The alternative models were mentioned as interesting or desirable by 3 of the interviewees.

In the interviews, all residents had comments about issues with handling the cargo bike, but still, all users except one said that they generally feel safe when riding it. Some of the specific issues mentioned about handling the bike was:

- Hard to steer
- Unstable in curves
- Didn't feel safe on the bike
- Easy to tip over
- Takes up a lot of space
- Cycle so rarely that you don't get used to it
- Hard to insert battery
- Not adapted for very small children <1 year old

In "final comments" part of the survey, one person wrote:

" The cargo bike was incredibly (!) difficult to steer, It felt heavy and relatively hard to break and accelerate [...] So even if I am REALLY pro sustainable transportation [...] the cargo bike was scary to ride."

Another one wrote:

"I tried one time. Almost no speed and turned carefully. And still, it almost rolled over with our grandchild strapped in the seat in the box. NEVER AGAIN!!!"

In the survey, the 7 users were asked if they agree with the statement: "The bike feels very safe when riding.". The scores varied widely between the extremes, leading to an average score of 4.4 on a scale of 1-7.

When asked if they agree with the statement: "Bike lanes make me feel safe while riding the cargo bike." and "Bike lanes are wide enough for me to ride the cargo bike comfortably." both got an average score of 5.1 on a scale of 1-7.

Both users and service providers mentioned that it can be difficult to manage the bike in the beginning, as it is heavy, big, easy to roll over and sensitive to bumps and obstacles. GoRide and OurGreenCar mentioned that with time, the rider learns how to manage the bike, several interviewed users had similar comments.

When asking the users what they had been using the cargo bikes for, each of the following alternatives were mentioned more than once:

- Take kids to school or preschool.
- Move large items from or to a storage.
- Go on leisure activities.
- Go grocery shopping.
- Transport products from IKEA.

- Transport products other stores.

Both users and non-users were asked if they had thought of other ways that the cargo bike could be used. 7 people said that it could be used to bring groceries, 4 said it could be used for leisure activities. Going to the city center, transporting goods from a store or taking the kids to preschool was also mentioned more than once.

A study by Becker and Rudolf (2018) showed how the shared cargo bikes were used by communities across 29 cities in Germany and Austria. With 931 answers on their survey they discovered that the most common use for shared cargo bikes was to transport groceries and bottle crates. After that, materials from hardware stores, use for events and to transport kids were also common answers.

4.3.3.4 Cargo bike developemt

Both GoRide and OurGreenCar mentioned that one potential solution that could reduce the steps of renting would be to have the battery on the bike at all times, and charge it while it is there. The problem with this solution is that people often forget to unplug the charger, which can damage both the charger and the battery. In the worst case, both components may need to be replaced entirely, which can be very expensive. GoRide proposed that a charging solutions similar to Apples Magsafe technology could be something that would reduce the risk of this type of damage. Magsafe is a type of charger that attaches to the device through a magnet instead of a connector. This makes it possible to remove the device from the charger, even with force without causing any damage to the device or charger.

However, GoRide mentioned that although more high tech solutions might be available, peoples price sensitivity might hinder their costumers from purchasing a more advanced cargo bikes. This price sensitivity makes the cargo bikes stick to a design that has not changed drastically since the early 1900s (Wikipedia, 2024), apart from them becoming electrified.

Both GoRide and OurGreenCar mentioned the importance of having bike mechanics that offered bike maintenance at the location where the bike was. However, while GoRide mentioned that it is becoming more common and therefore less of a problem, OurGreenCar mentioned there was still a lack of this service, especially in smaller towns in Sweden.

4.3.4 Market formation

One thing mentioned by OurGreenCar, as crucial for the existence of cargo bike pools, is the possibility for housing developers to sign mobility agreements in order to reduce the MPR. That allowed them to get the funding they needed to develop and maintain their services. According to both GoRide and OurGreenCar, shared cargo bikes almost never manage to cover their own costs. Therefore it they say that it is important that, instead of relying on revenues from the *use* of cargo bike

pools, the services can have a secured source of income from the housing developers or housing companies.

EC2B mentioned that it can be a problem when the housing developer orders a cargo bike pool, but don't want to pay extra for the marketing of the bike pools. Their main concern might be fill the requirements needed, and there is no minimum use rate required for them to get a reduced MPR. This sometimes leads to them getting disappointed at the service when they can not reach the use rate target. EC2B said the following:

"It can be hard to manage that people find the cargo bike and try it out. Therefore a good collaboration is needed [with the housing developer]"

One of the service providers mentioned that it might not be desirable to apply the user rate as an indicator of how successful the system is. They argued that, by looking at this factor alone, the more complex shared mobility system is neglected. Shared cargo bikes should instead be seen in its entirety with all its components of shared cars, bikes and public transport. As an example they said that a person might only need to use it 2 times in a year to be able to live without a privately owned car. On the other hand, someone that uses the bike very often might just replace their walking commutes.

In one part of the survey, users of cargo bikes rated the rated different aspects of the cargo bike from 1-7 (7 being extremely good). Affordability had an average score of 6.1, which together with storage capacity was the highest average score among all the 16 topics.

In the interviews there was no question specifically on what they thought about the cost of riding, but whenever it was mentioned by someone they said that it was either cheap, or at least manageable. Several users also emphasized that if it would be more expensive, their interest in renting would decrease. As earlier mentioned, some said that the service could be improved with more options on price models (yearly, monthly, hourly or daily).

When asked if the service providers took inspirations from models in other countries, both GoRide and OurGreenCar said that they don't. They mentioned that they are more focused on providing services adapted to the needs of the client.

From the literature study, cases in Germany were found were shared cargo bike projects were run by local communities instead of housing developers. Under the name Commons cargo bikes, 1109 cargo bikes are used over 150 local communities (Becker et al., 2024). The idea is that the booking service if offered to the local communities by the central organization, and the community finances the bike. At its core they strive to be completely free for the users, and only financed by donations.

4.3.5 Entrepreneurial experimentation

EC2B mentioned that they have recently launched a feature in their app that they call a "mobility wallet". The aim with the function is to collect the many different mobility service options into one platform. As a housing company or employer, one can give out a certain mobility grant to the residents/workers to nudge them into adapting to a more space, energy and recourse efficient mobility system. The plan is to make this feature the core of the next growth phase of the company.

The both GoRide and OurGreenCar expressed that they feel that the app service and rental system is quite well developed and experimentation is not really needed. Although something they did experiment with and that Cargo bike of Sweden was also investigating was different types of security systems, as mentioned in the section 4.3.3.2. This was both to make it harder to steal bikes and components, and to increase the chance of getting them back, if they would get stolen.

When the problem of bike theft was further investigated, a report from 2026 was found, done by the Swedish road and transport research institute (VTI). The report title translates to "National bike register - A potential measure for reduced bike thefts - a pre study" (authors own translation). As the title reveals the report is a response to the estimated 500 000 bike thefts that prevents so many people from cycling in Sweden. A national bike register, that makes it clear who the owner to each bike is, could make it much harder to sell stolen bikes on the second hand market. The investigation was done by looking at examples in other countries like France and Belgium, but also through literature studies and interviews with central stakeholders, such as insurance companies, the bicycle industry, cyclists, and the police and transport authority.

The literature review showed that work is being made to increase bike safety on a national level in Sweden. The Swedish National Road and Transport Research Institute (VTI) recognize bike thefts as a societal issue rather than just a problem for the individuals that gets their bikes stolen (Egeskog, 2026). It is estimated that around 500 000 bikes gets stolen every year, and this leads to less people choosing cycling as their main mode of transportation (Egeskog and Karemyr, 2023). To tackle this, VTI are investigating the implementation of a national bike register. This means that each bike gets an official owner that can be traced through, for example a QR code. According to evaluations made in countries where similar registers already exist the system has proven to have effects both in terms of reducing the risk of theft, but also by increasing the possibility of the bike being returned to its owner if it gets stolen (Egeskog, 2026). According to the study by VTI, the Danish bike register "BikeKey" claims that by registering a bike, the risk of getting it bike stolen could be reduced by 57 %, with over 10 % chance of getting the bike returned if that would happen.

The framework to reduce the MPR in Gothenburg can also be seen as a type of experimentation. It was implemented in 2017, outcome has just recently been studied and analyzed by academia (Holm et al., 2025 Borgsten et al., 2024 Deurell et al.,

2025). As mentioned in the parking requirement 2.1 section, each municipality develops their own frameworks to monitor parking requirements when new buildings are constructed. In many Swedish cities these frameworks are being reconstructed to be adapted to a future transport system that is not as heavily reliant on privately owned vehicles.

4.3.6 Influence on the Direction of Search

OurGreenCar said that it is critical for them that both users, and potential users speak up about what they need from the service and from the app for it to be more user friendly. When they raise their voice, they can attract the interest of the housing developers. When they see that there is a big interest in the service, their willingness to pay for improved systems can increase. Through that, a business case is made for OurGreenCar that allows them to invest in improvements.

OurGreenCar are aware that many find it difficult to handle the phone applications to rent the bikes, but they can't adapt the service unless users express their dissatisfaction. They reasoned that users might not dare to express their dissatisfaction, as it is a service that no one takes for granted today. The service is so new, and is seen more as an *extra feature* of the residential building. This makes the residents less likely to complain about it, compared to other functions that people take for granted, like for example parking.

GoRide mentioned the housing developer or the municipality as the actors with the biggest effect on how a project is being executed. The job of GoRide is primarily to listen to their needs and try to meet the needs in the best possible way. Sometimes the person ordering the service is very interested and engaged to ensure that the solution gets well implemented. Other times they just do it because the developer has to, not because they want to.

When asking the residents about if they feel that they have an effect on how the system develops, the answers were mixed. Most of them seemed hesitant, and said things like "It doesn't feel like I have an effect.", "The landlord might listen, but won't do anything." or "I expect the service to develop on its own.". 3 out of the 12 residents had been in contact with costumer support for specific problems, but no one considered reaching out to propose ways to improve the service.

On the question on who they would contact if they had feedback on the rental system or the app, nearly everyone said they felt confident that they would find the right person if they tried.

4.3.7 Legitimization

The section on legitimization is separated into two categories: social image, and safety and reliability.

4.3.7.1 Social image

Three of the interviewed residents had plans to start using the service at a later stage, but at the time of the interview, the service had been removed. According to one of them, this lack of continuation made them feel unsure about changing travel habits, where as the car felt more reliable.

To understand if the shared cargo bikes are socially legitimized by the public, they were first asked how they perceive other people riding cargo bikes and then how their self-perception changes when they imagine themselves on a cargo bike.

100 % of the interviewed residents said that they had a positive view of people riding on cargo bikes. The most common trait they attributed to cargo bike cyclists was that they were 'conscious and sensible people'. Other attributes were environmentally aware, healthy, open minded and adaptable, and someone that chooses adventure over comfort. One person mentioned that the positive view applies as long as it is a grown up riding the bike. If the person is be a teenager they would instead be attributed as an unwary person that risk getting them selves or others hurt.

This prejudice was also highlighted in an interview done by Kuronen (2025). The cargo bike pool service provider Pedalink mentioned that riding a cargo bike have become a symbol of certain values in several communities. It is associated with being a more environmentally aware person that recycles and buys clothes on second hand. In order go get a greater diffusion of the cargo bikes, Pedalink argues that it is important to find how sustainable mobility alternatives can be be made more attractive to other groups in society.

When residents instead asked about how their view of themselves would be affected if they would be riding the bike, three people mentioned that they would feel a bit silly or odd. The positive attributes they assign to other people did not apply to themselves. For the others, the positive associations were also applicable to themselves, although they didn't use as many praising words as to other cargo bike cyclists.

4.3.7.2 Safety and reliability

To understand if shared cargo bikes are legitimized from a safety perspective, the residents were asked if they feel safe riding the bike. The answers from this question has been presented in subsection 4.3.3.2. They were also asked if they feel safe meeting other cargo bike cyclist on the street. On this, all said they felt safe meeting others, but two had small remarks from situations on narrow bike lanes where it could feel dangerous.

When asked about what the residents thought about the future of the cargo bikes, 90% responded that they hope for shared cargo bikes to become more common. Most of them highlighted the difficulty in predicting the future since it depends on so many uncertain factors. Two people said that there is no need for shared cargo

bikes in the future.

GoRide also mentioned that it was difficult to predict the future of shared cargo bikes, but it would at least not become *less* common. They believed that it will be a larger amount of cargo bike pools, with a few number of bikes in each pool. OurGreenCar agreed and said that with a younger generation growing up, that are more used to apps, it will get easier to transition to shared mobility. At the same time they believe in a societal shift where it is trending to be active, and environmentally and economically aware.

All residents that were interviewed said that the bikes were almost always in a good condition and that the service available was professional. They highlighted that it was good that the bikes got winter tires when the weather got colder, and that the bikes were almost always available when they needed one.

A frequent user reported that the door to the bike room had been damaged during an attempted break-in, but it was repaired quickly and access was restored shortly thereafter. Another person mentioned that they felt unsure about getting to reliant on the cargo bike, as it was presented as a very temporary project. They said:

"If it would be clear that the use rate would determine if the cargo bike stayed here or not, I would have used it more"

In the survey, there was an opportunity to add additional comments in the end. 6 out of the 17 comments included messages against, or in disbelief of a future where shared cargo bikes were more common. Two of them read:

"I think it is a waste of resources. I have never seen anyone use the cargo bike and the neighbors i have talked to think that it is a joke." and "Build more parking spots instead"

In the interview with the cargo bike designer, they said that cargo bikes will be more and more common in the future. They believe that there is still a wide range of applications where the potential of the cargo bike has not yet been discovered and met.

OurGreenCar mentioned that one thing that prevents them from being able to provide a seamless service for housing cooperatives is the long decision making processes they sometimes have for expenditures. As an example they said that if a cargo bike gets a puncture, they need to wait for the cooperative to have a meeting about their finances where they will evaluate the cost and make a decision on if they can spend money on it or not. This process can take several months and severely damage the reliability and reputation of the cargo bike pool. None of the studied residential complexes belonged to a cooperative however, therefore no further observations on this issue was found.

4.3.8 Resource mobilization

OurGreenCar mentioned that skilled and reliable bike mechanics are difficult to find, especially in smaller cities and towns. As they have cargo bike pools 100+ km from their head quarters in Malmö, it becomes very troublesome to fix the bikes themselves. But because of the lack of mechanics, this is sometimes necessary.

The Cargo bike developer also emphasized the importance of having reliable bike maintainers that do regular checkups and fast repair works when something fails. They said that this type of service is not easily available today, but needs to be developed if the reliability is to be improved. They added:

"Ideally the bike should be checked at least once per day."

GoRide mentioned that this was a problem for them before, but not anymore. In their experience mobile bike mechanics have developed into a reliable service that they commonly use.

4.3.9 Development of positive externalities

Although questions were asked in the interviews about positive externalities, most insights on this topic were generated thought the literature review. The positive externalities (or reduced negative externalities) of using the cargo bike pool is the reason why authorities on different levels are promoting it. The arguments for reducing car traffic and finding alternative mobility modes have been presented in the introduction and the theory chapters.

GoRide mentioned that one critical invention that opened up opportunities for shared mobility is the invention of Bluetooth Low Energy (BLE). This technology allowed for digital locks to be developed that could be unlocked with phones. Trollhättan stad also mentioned that more advanced GPS technology had been beneficial for the development of the services. These types of technologies has opened up for more effective rental share systems.

Michael Koucky, (personal communication, 5 May, 2026) from Koucky & Partners mentioned that the smart phone was a crucial invention that allowed the shared bikes to become less expensive. They mentioned a pilot project for shared bikes in Denmark that they helped to develop. The project was required each bike to be equipped with a SIM-card and mobile subscription so that it could connect to a server. The whole system was very expensive and therefore no major success. A few years later, however, similar shared bike systems became much more successful due to the widespread adoption of smart phones. Instead of each bicycle needing its own internet connection and GPS module, the bike's electronics could now communicate locally with the user's smart phone through low-cost Bluetooth technology. The smart phone would then handle the communication with the central server using the user's own mobile network connection and GPS data. This significantly reduced both hardware and operational costs, making large-scale implementation of shared

bike and scooter systems much more economically feasible.

4.4 Actors, Networks and institutions

Insights from the literature review and the interviews resulted in an understanding of what the actor network looked like. Based on this understanding, the network map illustrated in Figure 4.7 below was constructed.

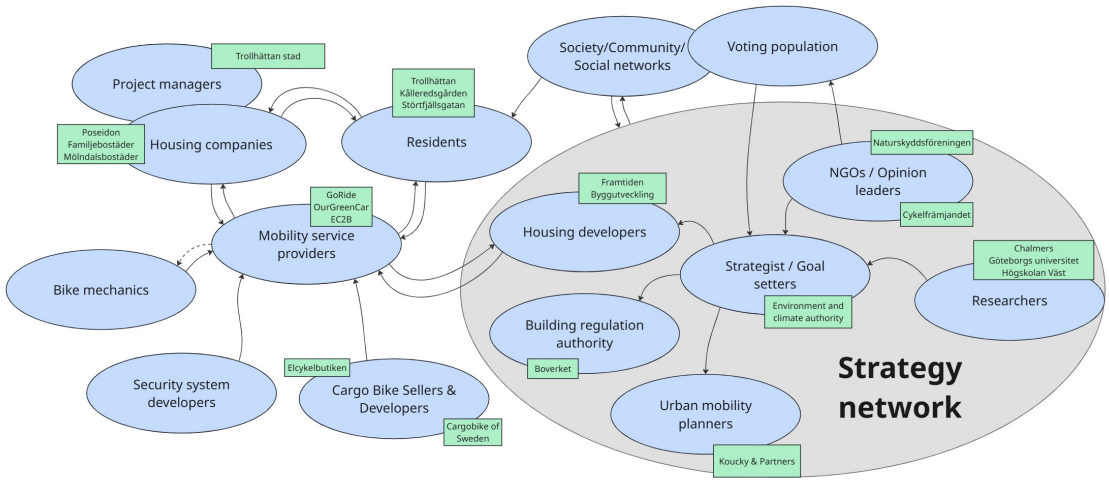

Figure 4.7: Map of the stakeholders involved, and the connections between them.

Three central actors that are well linked together are the residents, the mobility service providers and the housing companies/project managers. The last actor was merged since it is often the housing companies that acts as the project manager, but not always. Although they are the ones offering and marketing the service officially, it is often done together with the mobility service provider. Therefore, the residents often interact with both of them, both when they attend events and receive marketing, but also when reporting issues with the service.

Mölndalsbostäder mentioned that they did not have a lot of communication with the janitors or the residents about the cargo bikes. Their contact with the service provider was more established and they consulted them for example when deciding what type of bike to buy. GoRide mentioned that their job is to adapt solutions to what the client demands, and that their influence is minimized.

The mobility service providers mentioned that they buy services and products from bike mechanics, cargo bike sellers, and security system developers. They are connected with the housing developers as they are the ones that orders the service from them, often to reduce the parking number.

The rest of the actors inside the "Strategy network"-bubble can be understood as the actors planning the future mobility and transport system. The Strategists/goal setters in the middle are thought to be municipal or national actors that sets the

larger vision. They are influenced by voters, researchers and NGOs and opinion leaders. Subsequently, their visions are imposed by the housing developers, authorities and urban mobility planners. They together work with systems and strategies to steer the development in the desired direction.

Finally the "Society/Community/Social networks" actor can be understood as the people influencing the residents that might use the cargo bike pool. A few interviewees admitted that social constructions, trends, norms had an effect on how they perceived themselves on the cargo bike. Some also said that they got motivated to start cycling themselves when they saw others doing it. They are thought to both have influence on, and be influenced by the strategy network. That is partly done by voting and electing the politicians setting the goals, but it is also done by engaging in society as a whole in different ways.

While the people in the social networks are actors, the social constructions and norms should be seen as informal institutions. The voting system, the laws and the strategies should be seen as formal institutions where the strategists are the actors.

For several survey answers, a lack of cargo bike parking and infrastructure was a reason for them avoiding using the cargo bike pool. When users rated the different aspects of the cargo bike pool in the survey, bike parking at destinations got the lowest score, averaging at 3.4 on a 1-7 scale, 7 being extremely good. Therefore, the institutions regulating all types of bike infrastructure (parking, streets, etc.) are central. These institutions are designed and managed by many actors on different levels, from laws enacted by the Swedish government, to the national transport authority, local municipalities and housing developers (“Plan- och bygglag (2010:900)”, 2010, Trafikverket, 2024, Göteborgs Stad, 2021).

OurGreenCar and GoRide both mentioned how the development of mobility agreements had been an important framework for generating clients. This institution shapes the contracts and deals between the housing developers, project managers and the service providers. Although the framework allows many different constellations, they are formal institutions that largely affect the structure of the cargo bike pool.

Cargobike of Sweden were asked if there were any rules or regulations that made it difficult for them to design their bikes. Their response was that they did not feel restricted by such institutions, but that the surrounding physical infrastructure that was something they had to adapt to. For example it was important that the bikes would fit well through a normal door to the bicycle storage.

5

Discussion

5.1 User friendliness and bike security

One thing that was clear and mentioned by both users, non users and project developers was that the system can be difficult to use. Although several people said that they learned over time and that it was no longer a problem, there were people that stopped using it after several attempts.

Some of the problems should be easy to fix, like changing the lock of the bike storage so that one didn't have to travel 8 km to pick up a physical key. This was evidently a major barrier that hindered several people from at least trying the bike. The other two pools did not have this issue as they both had digital keys.

In the literature, visibility and easy accessibility was shown to be highly important factors to increase the use of shared cargo bikes. In the storage room, the cargo bikes are often left unseen by the majority of the residents and was then forgotten by people who were intentionally interested.

Using the app to register and book was difficult for a few people, but more often it was said to be working fine. People highlighted specific functions as being good and easy to manage, like extending the rental period during the ride. Rather, it seemed like it was the system complexity that hindered people using the service more often. People complained that there were too many steps to complete before one could start riding the bike. For one user, that process took 30 minutes. Even people who were very positive to bikes said that the extra time it takes to access and unlock the bike might be enough for them to chose another, less sustainable mode of transportation. Thus, the concept of locking in the bikes for security reasons is worth being challenged.

Observations from the field visit confirmed this. The many steps during the renting process made it feel cumbersome compared with for example shared e-scooters or the public shared bike system. Interviews with service providers revealed that this issue was largely rooted in a crucial trade-off between accessibility and security. The system complexity was said to be a by-product from trying to make the bikes and batteries hard to access for thieves. The bikes were locked into storages that were only available for the people who had registered for the bike pool. Despite this, they had problems with thieves breaking in and stealing the bikes and/or the batteries.

The service providers seemed to be working more towards increasing the safety in different ways, rather than to make it easier to access the bikes. To place them outside in a courtyard, with the battery already inserted seemed like completely unworkable.

The problem with bike thieves were mentioned by Poseidon, Familjebostäder, GoRide and OurGreenCar, but it was not a problem for Nextbike. That is especially interesting since, in contrast to the other actors, Nextbike's cargo bikes are publicly available in central areas in Gothenburg with the battery always inserted. According to Nextbike, the reason they do not get stolen was that people expect the bikes to be traceable through the GPS. However, according to OurGreenCar and GoRide, the GPS itself was not enough to keep the bikes from getting stolen. Instead they focused on combining many different safety measures. According to Cargobike of Sweden, the GPS did not even seem like enough motivation to get the police to prioritize the case. Another reason why Nexbike's cargo bikes are not getting stolen might lay in the *perceived*, rather than the *actual* supervision. When an internationally legitimized brand places bikes in public spaces, they might be perceived as being equipped with a more advanced tracking system or with higher surveillance than the more local ones in the residential buildings.

Relating this to the functions in the TIS framework, one can see that there is experimentation being done to increase safety of the bikes, but often at the expense of accessibility. Knowledge development is needed from the user side, as there are new mobility patterns and service systems to adapt to. This change in habits requires efforts, but these efforts can be reduced with a more user friendly rental system. To do this, there might be a need for more financial resources mobilized to experimentation of security measures that does not lead to longer unlocking processes. Stronger networks between service providers can increase knowledge sharing and the diffusion of best practices. And finally, measures organized by authorities, such as a nation wide bike register might increase security and allow the systems to be more accessible.

5.2 Market formation

A good business model is important for a technology to get market shares and to be able to afford experimenting and developing further. However, emerging technologies often face difficulties competing with dominant technologies. Therefore they might need to be protected and grown in an isolated market to be able to enter the dominant socio-technical regime.

In this case, privately owned cars could be understood as the dominant technology, while car based transport would be the dominant socio-technical regime. Since we have had such a car centered society for a long time, a major part of the transport and mobility infrastructure around us have been adapted to them. People have mobility patterns since before that can be difficult to change unless there are significant gains and low threshold.

One significant gain that many residents highlighted was the economic savings of choosing the shared cargo bike over a car. The price to rent was regulated to around 10 SEK per hour to ensure that the service was affordable to as many as possible. Since the price level was the aspect with the highest satisfaction score in the survey (together with the storage space), affordability could be considered to be achieved.

Although the hourly cost for renting was perceived as affordable by the residents, people mentioned that other price models should be available. Since this app feature seemed to already be available by the service providers, the lack of alternatives could be a communication issue or justified by being a way to reduce complexity.

It was found in the interview answers that the protected market seem to have emerged through the mobility agreements. This formal institution allows service providers to sell their services over long periods of time which has given their businesses stability and predictability. For some actors it even seemed like that was what made them start their businesses in the first place. Both OurGreenCar and GoRide said that their businesses could not finance themselves only with the revenues from the users, and it didn't seem to be a long term vision for them either. Thus, they are likely to continue to rely on funding from actors signing mobility agreements.

When cities like Göteborg implement policies that are favorable for mobility service companies, then that becomes a hub for knowledge development. This knowledge will make it possible for them to offer their service in other smaller cities, like Mölndal and Trollhättan, and grow even bigger.

One thing that the mobility agreements are not encouraging is a higher use rate. EC2B mentioned how some cargo bike pools does not reach their full potential because not enough money is invested in marketing of the pools. Rewards for higher user rates could lead to increased efforts for finding solutions that makes the service user friendly. It might incentivize the project manager to invest in a digital lock. It can even lead to them placing the cargo bikes outside, and urge the service providers to find security solutions that does not require all the bikes and components to be locked into rooms and boxes. This new demand might incentivize the cargo bike developers to find wireless charging solutions so that the battery can be permanently installed in the bike.

Without a strong incentive to increase the use rate, there is a risk that system development will stagnate earlier than necessary. Only a few service providers were identified in the regions, most without near-term plans for major development. The lack of competition, together with housing developers' limited incentive to increase user rates, can lead to the service not living up to its full potential.

Of course, there might be issues with incentivizing a higher use rate. As one actor mentioned, the shared cargo bikes are only one part of a more complex sustainable mobility system that should be studied in its entirety as well. Despite this comment, it is still a value that needs attention. Regardless if the cargo bikes rides are replacing

car trips or not, they can create visibility and credibility. A trip that increases the utility for one person can inspire other car drivers in the same building to replace their short distance trips. Therefore I would argue that the user rate it a factor that should be in focus when continuing to develop the service.

5.3 Riding experience

While listening to people's experiences with cargo bikes, I found many comments relatable to my experience, both the good and the bad. Some of the critique from the survey comments were very strong and it was easy to imagine that a less experienced cyclist or cargo bike rider would struggle to maneuver the vehicle safely. Both in Kålleredsgården and Störtfjällsgatan this was especially true, since the speed gained in the steep downhills caused the bike to wobble. In addition to this, there were often sharp turns in the steep slopes, which had been reported unsafe and scary by several interviewees and survey respondents.

It is worth noting that I and many of the survey and interview respondents were not regular cargo bike users. Several of them had just registered in the app and tried one or a few times. Some more frequent users stated that the bike was difficult to maneuver initially, but became easier to handle with practice. This could either indicate that the learning phase is a barrier that prevents people from becoming more frequent users, or/and that the safety level of the cargo bike design is a barrier that prevents risk averse people from feeling comfortable riding it. The first issue could be addressed through additional events or workshops where people receive coaching and practice cycling in safe but challenging environments. The latter could partly be solved by investing in a safer cargo bike, alternative models or by developers designing models that are safer to ride in downhills and curves. As already mentioned, other models are available, like for example, the two wheeled long tail cargo bike. It is more narrow, and will thus fit better narrow spaces, on regular bike streets and parking spots. Since the bike only has two wheels, it should also handle sharp curves and tilted streets better than three wheeled cargo bikes.

Various infrastructure issues were also mentioned in the interviews. Since cargo bikes are still in an early phase of development, it is understandable that the infrastructure is not completely adapted for them. For example bumps, sharp turns, and tilting streets, might all be easy to manage with a two wheeler but was much harder with a three wheeler. However, by working with the institutions that set the standards for the infrastructure used by cargo bikes, these issues can be addressed. This is of course considering there is a sufficient monetary resources dedicated to (cargo) bike infrastructure.

Regarding bike parking at the destinations, this aspect received the lowest rating by the users in in the survey. In my experience, I always managed to find a spot. If not outside the destination, then within a reasonable walking distance. However, the parking spots were rarely dedicated to cargo bikes specifically. This might have prevented people from feeling invited to park at their destinations even though there

were space. It could also be that I visited the destinations at a time when it was not so crowded, making it less troublesome to find a spot. With a wider selections of cargo bikes, or with thinner cargo bike alternatives, like the long tail design, destination parking would perhaps be perceived as less of an issue. These models would also make it easier to get through the narrow barriers seen in Figure 4.5a and 4.5b.

When studying users and non-users perspective on potential destinations for the shared cargo bike, the answers were very similar. Both mentioned grocery shopping, leisure activities taking kids to preschool, and moving goods from stores. All these destinations were available within 5 minutes cycling, with several alternatives within each category. Within 10 minutes cycling, over 10 alternatives of leisure activities and shops and restaurants could be reached in Kålleredsgården, Trollhättan and Störtfjällsgatan. This could all be considered to be more than enough to qualify for a suitable location for the cargo bike.

Despite a few obstacles and gaps, the cycle path to most of the destinations were sufficient, with wide, separated and well connected streets. Judging by my own experience, cycling in Trollhättan was the most pleasant, as it was less hilly, close to a wide selection of destinations, and the bike paths were often completely separated from the car streets. Though the other two locations in Mölndal both had a good variety of destinations within a reasonable cycling distance, they were located in hilly areas with several sharp curves that together with the traffic made the experience less relaxed.

5.4 Networks actors and institutions

When looking at the networks seen in Figure 4.7 there is an and important network between the three actors: residents, project managers and service providers. Project managers can also be seen as housing company as they are often the ones taking the decisions about the cargo bikes. Although these connections are essential, the voices of the residents are rarely heard, showing a potential weak link. This could partly be because many residents feel that they are not able to influence the development of the service, or that they are not responsible for it. Co-creation requires engagement from all the actors involved, which could possibly be induced through workshops.

Another interesting network that appeared to be missing was the one between some service providers and the bike mechanics. One actor said that there is a lack of mobile bike mechanics that fixes bikes on site, but another said that this already existed. This indicates that there is a gap in communication between mobility service providers and bike mechanics. It could also imply that one service provider hosts more bike pools in areas where mobile bike mechanic services have not yet been developed. That could indicate that there is a potential market for bike mechanics that could be utilized if there was better knowledge or better demand articulation from the service providers. Smaller towns in Sweden might not have a large enough demand for this type of service to be profitable, but it could also be a lack of

entrepreneurial experimentation from the bike mechanics side.

5.5 TIS evaluation

As already mentioned, the TIS framework is designed to be functional on products and knowledge fields, while shared cargo bike pools would be better categorized as services. Thus, the study aim was not expected to be fully compliant with the framework, and its use was intentionally exploratory. Having applied the framework, several advantages became apparent, as well as some weaknesses.

Primarily, the framework served as a guide to organize the studied system and to structure questions for oneself and interviews. It was very valuable to reflect over how each function in the framework would present itself and how each aspect could be studied. Without the framework, it would probably be harder come up with interview questions that covered the whole system. Similarly, it was favorable to reflect on what networks, actors and institutions that were most critical for the development of the system. To think about and to discuss formal and informal institutions would probably not have been done to the same extent if the framework would not have been used.

On the other hand, the framework has boundaries, beyond which there might be other critical aspects influencing the system. As an example, the infrastructure used by the shared cargo bikes were found to have a large influence on peoples experience of the service. However, there was no fitting category where this aspect was covered, and instead experiences of the infrastructure were placed in the subsection "User experience of riding the cargo bike" under knowledge development. Similar subsection modifications were used to fit in relevant topics into the framework.

The framework can thus be used for services, even though it might not be the ideal way to study a system like this. There might be more fitting methods already developed. If a future study on services would be considered, my recommendation would thus be to explore other methods before continuing with this framework. If other frameworks are not found, then this framework works fine with some small modification and an abductive approach.

5.6 Limitations

When identifying all the relevant destinations for the maps in the spatial analysis, several assumptions and estimations were made. Some locations existed on the online maps but were closed in real life, if these locations were identified, they were not included in the map. Other shops that seemed to be opening soon but were under renovation at the time of the field visit were not included in the map due to the uncertainty of the location.

In order to not cover a too large area of the map, several stores and restaurants

were left out intentionally. Another reason for leaving out certain locations was due to the time constraints, as identifying every store and location for leisure activity simply was too time consuming.

To get a fitting satellite map as a background to the cycling path network map some manual editing was needed. Ideally these edits would be done using GIS software, but as this was not a skill I had since before, a more manual process was used. This might risk that the cycling paths are not perfectly located at all spots. Similarly the locations of all the pins were places manually, meaning that slight errors might have occurred. A few of them were intentionally placed slightly off to not completely overlap other pins

The frames for the maps are not in the same scale nor size. The selection of where to draw the boundaries was arbitrary and based on discussions with municipal stakeholders, interviews with residents and users, and by analyzing the maps surrounding the locations. Boundaries were drawn to include the areas were cargo bikes were most likely to be used, approximately where a 15 minute could take a cyclist. In Störtfjällsgatan however, the distance one could reach on a 15 minute bike ride ended far outside of the edge of the map in some directions. The reason these places were not included was because those map would risk losing the details of the many relevant location closer to the cargo bike pool, or to take up much more space than the other maps, making it appear more prioritized than the other locations.

If i would have had more time, I could have looked deeper into the different versions of the TIS framework and see if there were potential versions that could have been more fitting for my scope.

I don't look at resource extraction as an issue of the system since cargo bikes don't contain nearly as much raw materials as the cars that they are intended to replace. Similarly, the infrastructure dedicated for them is small in comparison to what is needed for cars today.

The interviews were mainly made with people who had used the shared cargo bikes and had a positive view of them. Although the invitations for the interviews were made towards all the residents, not only the users, they did not seem to be interested. The survey revealed that there were a few people who were very skeptical to the investments in shared mobility, but they were not as well represented in the interviews.

Before starting to write this report, my personal view cargo bikes were very positive. The aim of reducing car traffic within cities is a vision that I have resonated with for several years. I cycle daily and have never owned a car privately. With this in mind, I have actively worked with setting these values aside to not let any biases affect the execution or results of this thesis.

The fliers and the questions in the survey were written in Swedish and in English only. That meant that every resident not speaking one of these languages was

automatically excluded. The questions in the survey were carefully formulated to be understandable, however, misinterpretations did still occur. When analyzing the survey answers, situations were identified where respondents were contradicting themselves. For example, a person that said they did not own a cargo bike later marked "I have my own cargo bike." as a reason for not having used the shared one.

Similarly, in the interviews, some respondents misinterpreted questions. Unlike the survey questions, however, the questions could be reformulated in different ways be more clear. This was not always effective, as the time constraints didn't allow the interview to get stuck on certain parts for too long.

One question that was often misunderstood was "Have you thought about what errands you could use the cargo bike for?". This question was meant to reveal if the respondent had dedicated time to think about the potential value of the cargo bike. Instead the question was interpreted as an invitation to start reflecting during the interview. In hindsight, the question could have been formulated more clearly. As a result, the responses to this question were interpreted in relation to how respondents understood it, rather than its original intent.

6
Conclusion

This study set out to explore shared cargo bikes as a technological innovation system. The contexts of three cargo bike pools were investigated and through a mixed methods approach where the involved actors, networks and institutions were identified together with barriers and drivers of the system. 13 residents and 12 stakeholders were interviewed, and survey answers from 29 residents were analyzed. In addition to this, a spatial analysis and a field study was carried out.

Overall, the three locations studied have a large variety of basic amenities within reach, and are all deemed suitable for a cargo bike pool. The infrastructure in the studied locations is to a large extent sufficient for cargo bikes, but several issues still remain. Sharp curves, tilting streets, obstacles and lack of dedicated parking at destinations are all barriers likely to prevent people from using the service more often. To address this, project managers and service providers should explore safer cargo bike models and/or work with better safety information to users. The long tail bikes model is suggested as it takes less space on streets and parking, and it handles obstacles, curves and tilting streets better than three wheeled cargo bikes. If three wheeled cargo bikes will remain as the standard, faulting infrastructure should be addressed through the institutions that set standards for bike infrastructure.

Mobility agreements have been a crucial formal institution that created a nurturing market for cargo bike service providers. In this agreement however, there is nothing that incentivizes or rewards a high user rate. Thus, there might be a lack of efforts to advertise the pool or to maintain the bikes efficiently. For future studies, it would therefore be valuable to explore how higher user rates could be rewarded, either within or independently of the mobility agreement. If such a system was to be developed, it could engage project managers and experimentation could drive the development while academic research can support. Effective measures to change peoples travel patterns could then be shared among other housing companies to help others reach a higher user rate.

Another thing that project managers and service providers can experiment with is ways to make the cargo bikes more accessible to the residents. It was evident that users find it complicated and time consuming to start the cargo bike ride due to the many steps involved. Since the cargo bikes were locked inside storage rooms and remained out of sight, they were also forgotten by interested residents. Thus, there is a high chance that the user rate can go up if the bikes are made more visible and easy accessible to the users. These measures are mainly hindered by security

problems, but are deemed critical for making the system reaching its full potential. By learning from successful examples, like Nextbike, there might be a chance that the bikes can become more easily available, and thereby more frequently used.

Using the TIS framework was very constructive for formulating interview questions and when structuring the analysis of the system. Above all the framework helped with stimulating reflections on the different aspects of the cargo bike pool. However, it lacked a function that captured the development of the infrastructure used by the cargo bikes, and contained some functions that were less relevant for the studied system, such as physical resources.

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A

Appendix - Interview questions

As all interviewees were fluent in Swedish, there were no interviews conducted in English although the questions had been prepared in English as well. Below are the English versions of each question.

A.1 Interview questions for residents

The following questions were asked to each resident interviewed in this study. Depending on the participants' answers to specific questions, subsequent questions were modified or adapted. However, all questions regarding the functions were asked to each person.

A.1.1 General questions

- How old are you?
- Do you live alone or with others?
- What is your main occupation?
- What is your highest completed education?
- What are the most common destinations for you in your daily life?
- Have you used the cargo bike pool in your residential building?

If the person <u>had not used</u> the cargo bike pool:

- Did you know that you had a cargo bike pool available?

If the person <u>had used</u> the cargo bike pool:

- Please name three things that made it difficult for you to use the cargo bike pool. (If they find it difficult to answer, name examples like high price, bad infrastructure, long distance to destinations, etc.)
- If these obstacles were not there, do you think you would have used the cargo bike more?
- Name one thing was has NOT been an obstacle for you using the cargo bike pool. Something that has just work well.

If the person <u>did not know</u> that they had a cargo bike pool available (never asked since all interviewees knew about the pool since before):

- Would you have been interested in using the cargo bike pool if you knew about it?
- If yes, for that purposes?

- What is the highest amount that you would be willing to pay for that service?
- In what way would you want to be informed about this service‘?

A.1.2 Questions related to the TIS-functions:

Resource mobilization

- Do the bikes seem to be in good shape and well maintained?
- Does the service feel professional?

Knowledge development

- Does it feel scary to ride the cargo bike?
- Does the rental system feel user friendly?
- Does the app feel user friendly?
- Have you thought of what errands you could use the cargo bike for?
- Are you aware of the economical and health benefits that can be gained by using the cargo bike?

Market formation

- Do you think that people in a similar life situation to yours could benefit from using cargo bikes? Why or why not?

Entrepreneurial experimentation

- Do you think that the system could be developed to be more useful or user friendly?
- If yes, how?

Influence on the direction of search

- Do you feel like you have any effect on how the rental system develops?
- Do you know who to turn to if you want to give feedback?
- Would it feel easy to give feedback?
- What type of actor do you think have the most power to affect the cargo bike system?

Legitimization

- Municipalities all over Sweden are transitioning from a car centered mobility system to a system based on more sustainable modes such as public transit and micro mobility. Do you think the vision of less car use in urban environments is a good goal?
- Do you think shared cargo bikes are a good initiative?
- What do you think is the future for shared cargo bikes? Will it be more common, less common or like today?
- Can you trust that the cargo bike will be available and in good shape when you need to use it?
- Do you feel safe when you meet cargo bike cyclists on the street?
- How do you perceive other cargo bike cyclists when you meet them on the street?

- How does riding the cargo bike affect your self image?

A.2 Interview questions for the service providers (GoRide & OurGreenCar)

Market formation/resource mobilization

- What made this company start? Was there a particular opportunity in the market that opened up?
- Are there actors or services that you are missing on the market or in society?

Development of positive externalities

- What other companies or actors do you think have benefited from the presence of your company?
- Are there actors in the system that have been necessary for the existence or growth of your company?

Entrepreneurial experimentation

- Are there technologies that needs to be developed for your service to function better?
- Have your found an optimal service system or are you still experimenting to find the best working system?
- Have you taken inspiration from other bike pools?
- Are there potential rental models/systems that have not been used in Sweden yet but that could be useful?

Influence on the direction of search

- Who has the most influence on how a project turns out?
- What actor is most dominant in shaping the final result of a project, you or the project managers?

Legitimization

- How do you see the future of shared cargo bike system? Will it become more popular or less used than today?

Networks and institutions

- Do you have good contact with the users of the cargo bike pools regarding their user experience?
- Are there certain rules or regulations for the cargo bike pools that you need to adapt to? If yes, are they a big obstacle/challenge for you?

A.3 Questions for unstructured/semi-structured interviews with other stakeholders

Sandviken municipality

- Please tell me a bit about your project and some general results of it.
- What were your main learning and findings?
- What were the complaints/tributes from the families that took part in the project?
- Please explain the process of deciding where to distribute the bikes.
- Do you know if any of the participants bought a cargo bike after the project?
- Have you observed any notable increase in the use of cargo bikes in the municipality?
- What actors did you collaborate with to realize the project?
- Where there certain rules of regulations that made the project more difficult to pull through?
- Was it an expensive project?
- How large do you think the societal gains are from a project like this compared to shared cargo bike pools?
- How did you continue the work with sustainable mobility after this project?

Trollhättan stad

- Please tell me a bit about the cargo bike pool project that has been running in Trollhättan.
- What different models did you chose? Why them?
- Could you find out to what destinations the cargo bikes were used for?
- Did you host events to introduce the cargo bikes to the residents and teach them how to use them?
- Have you had a lot of contact with the residents/users?
- Was it an expensive project?

Mölndalsbostäder

- Please tell me a bit about your role in Mölndalsbostäder and how you have worked with the cargo bike pools.
- What are your thoughts on this project? How was your experience of implementing this measure?
- Has it been expensive for you?
- Have you had problems with theft of the cargo bikes or their components?
- Are there other people that have worked more closely with the project than you? Do you have any information of what their experience has been like?
- Have you had any contact with the residents about the project? What have they said about it?
- Did you consider any other bike models than the three wheeled cargo bike?

Familjebostäder

- What are the main challenges with the cargo bike pools that you have installed in your facilities?

- How are the bikes normally used? For what errands?
- What type of user is the most common?
- Have the user rated been as high as you hoped for?

Cargobike of Sweden

- What actors in the shared cargo bike system do you have closest connection with?
- Who has the most influence on the designs that you manufacture?
- What are the dominant design(s) today?
- Do you think they will stay like they are or will there be a lost of changes in the future?
- Have you sold cargo bikes to shared pools? How has that worked? What types of users are the most common?
- Do you see a potential type of user that is currently not so common, but could become more common in the future?
- Are there certain regulations for how a cargo bike must be designed for it to be able to be sold on the market? Is this something that effects your business?

Elcykelbutiken

- What type of costumers are your most common ones?
- Have you had any experience of shared cargo bikes? What is your thoughts on that system?
- What is the dominant design(s) for cargo bikes today? Do you think they will remain or will there be significant changes in the future?
- Which is most suitable for cargo bike pools, and why?

EC2B

- Please tell me a bit about your role in your company?
- Which of your mobility services seems to be the most popular?
- Based on your contact with the users, what have you learned about the normal user experience?
- What are the main challenges for developing a better cargo bike pool service?
- What is it that you work on today to make this experience better?