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Evaluating Mobility Agreements

A Case Study of Kallebäcks Terrasser and Fixfabriken in Gothenburg

Bachelor's thesis in SEEX16-VT25-06

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CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2025
www.chalmers.se

BACHELOR'S THESIS REPORT 2025

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CHALMERS
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DEPARTMENT OF SPACE, EARTH AND ENVIRONMENT
Physical Resource Theory
CHALMERS UNIVERSITY OF TECHNOLOGY
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Bachelor's degree project report 2025
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Typeset in L^AT_EX
Gothenburg, Sweden 2025

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Abstract

To sustainably develop cities and achieve climate goals, urban transport systems must shift away from private car usage. In Gothenburg, mobility agreements are allowing property developers to reduce required parking spaces by instead implementing sustainable mobility solutions such as bike- and carpool services and public transport passes. This thesis evaluates how these agreements are implemented and experienced in two residential areas, Kallebäckcs Terrasser and Fixfabriken. Using a mixed method approach combining survey data, stakeholder interviews, site visits and area mapping, the study identifies differences in communication, resident awareness and practical application of mobility measures. Results indicate that while agreements can reduce car ownership and increase satisfaction among non-car users, poor communication and lack of ongoing evaluation limit their full potential. Recommendations are made for improving implementation and follow-up processes to enhance the long-term impact of mobility agreements, thereby supporting Gothenburg's goal of becoming climate neutral by 2030.

Keywords: Mobility agreements, Mobility measures, MPR, Survey, Sustainable development, Kallebäckcs Terrasser, Fixfabriken

Acknowledgements

First and foremost, we would like to give a special thanks to our supervisor, Devon McAslan, for his support and guidance throughout the thesis. He has been easy to communicate with, always responsive, and has dedicated plenty of time to our work. Your expertise and feedback have been more than helpful to us.

We would also like to thank our examiner, Frances Sprei, for her insightful comments and for helping us improve our work.

Thank you to those responsible for the mobility agreements at the municipality, for participating in an interview and for always providing us with valuable responses when reaching out.

Finally, we would like to thank everyone who participated in our interviews. A special thanks to the representatives from Wallenstam and HSB, for giving us your meaningful insights and valuable tours of the two areas.

Isa Deurell, Rebecca Lindh, Julia Tiderman, Melker Tillenius, Oskar Westerdahl, Wilma Widén

Gothenburg, May 2025



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1

Introduction

Road transport leads to impermeable surfaces, road noise, harmful tire particles, resource consumption, habitat barriers and hazardous emissions, impacting both climate and health [1]. Emissions from the transport sector are one of the largest contributors to climate change globally and one fifth of Europe's total emissions. Of these road transport emissions, 61% come from passenger cars [2]. Domestic transport accounts for one third of Sweden's total emissions of greenhouse gases [3]. The goal is to have net zero emissions by 2045 in Sweden, thereafter have negative emissions to compensate [4]. The city of Gothenburg is striving to become climate neutral even earlier, already by 2030 [5]. To achieve this, one big problem to combat is excessive car usage.

Despite this problem, the need for parking space continues to increase and minimum parking requirements, MPRs, are used to ensure that new developments can accommodate the presumed need for parking [6]. The requirements were originally intended to avoid too much stress on existing public facilities, including on-street parking. Parking creates a lack of proximity and accessibility for non-car users, and MPRs are now being reduced or even removed to create more walkable cities [7]. The construction of parking facilities is also costly and poses environmental challenges, such as increased water run-off.

In Gothenburg, the municipality is using flexible arrangements to control car use. One type of arrangement is mobility agreements, which serve as an alternative to constructing conventional parking spaces restricted by the MPRs. This is done by the property developer agreeing to provide other mobility services and getting a lower MPR in exchange. These agreements are made between the municipality and the property owner through the traffic committee before the detailed plan is completed [8]. The city is divided into five zones and the reduction depends on what zone the development is part of. The zones are labelled A, B, C, D and E, where A is the city centre and its closest surroundings, and has the lowest MPR in the mainland and D the highest. Zone E is the archipelago where there is no physical connection to the mainland, therefore no cars can be on the islands and the MPR is zero.

A survey, conducted in spring 2024 through a collaboration between the City of Gothenburg and Chalmers University of Technology, compared properties with and without mobility agreements [9]. Property developers adopt these mobility measures primarily for economic reasons, but also because of internal guidelines, environmen-

tal reasons, and the motivation to be a part of developing the city [10].

Not only does a lower MPR result in lower costs for developers, it also shows a positive correlation with people owning fewer cars [7]. From the survey, it is noticeable that mobility agreements have not been successful everywhere. The lack of information about the provided mobility services has shown that a large proportion of residents do not know about the solutions and even fewer actually use them [10]. There has been insufficient follow-up on mobility solutions, resulting in some developments that received parking reductions might not meet the criteria that initially justified those reductions. This inconsistency highlights the need for a deeper understanding of how mobility agreements are applied, perceived, and maintained in different contexts.

This thesis project will study two existing areas, Kallebäcks Terrasser and Fixfabriken, both of which have implemented mobility measures to lower their MPR.

1.1 Purpose

This bachelor thesis investigates how mobility agreements have been implemented in the city of Gothenburg. The results are used to provide recommendations to improve the implementation of mobility agreements. By comparing two large residential areas where these agreements have been implemented, communicated, and evaluated in different ways, the aim is to present recommendations for both developers and the municipality to optimize the effects that mobility agreements have on the reduction of car ownership.

1.2 Problem and Task

Achieving Gothenburg's goal of becoming climate neutral by 2030 requires a significant reduction in the number of privately owned cars within the city. One promising solution to address this change is the increased use of mobility services, such as bike pool, carpool, and public transportation. Mobility agreements support this shift by offering incentives for sustainable modes while discouraging private car use.

1.2.1 Identified Problems

Based on the survey conducted by the city of Gothenburg and Chalmers [10], along with literature reviews, two central issues have been identified that affect the experiences and outcome of current mobility measures: differences in implementation between properties and lack of communication between residents and property owners.

The first problem is that the implementation of mobility agreements varies between properties, affecting their overall outcomes. Effective implementation is important

because it influences how residents choose to travel, particularly with respect to car use and car ownership, which is the intended outcome of the mobility measures. For example, Kallebäck's Terrasser and Fixfabriken have adopted some differences in their approaches in terms of mobility measures and communication strategies.

The second problem is the lack of communication between residents and property owners, resulting in residents not being aware of the available benefits. For instance, newly relocated residents often do not receive the municipality's 30-day public transport pass, despite policies intended to provide this access. This gap in policy implementation undermines efforts to encourage the use of public transport. Another example is that several residents in properties with mobility agreements are unaware of car and bike pool offers.

In addition to these challenges, there is limited insight into how mobility agreements are followed up or evaluated over time. Without structured evaluation frameworks, it becomes difficult to understand long-term effects, track progress, or identify properties that need improvement.

1.2.2 Research Questions

To answer the challenges outlined in Section 1.2.1, the following research questions have been framed to investigate how mobility agreements are implemented, communicated, and evaluated.

1. What factors contribute to differences in implementation and outcomes in properties with mobility agreements?
 - (a) How are the mobility agreements implemented differently in Kallebäck's Terrasser and Fixfabriken?
 - (b) How does level of familiarity and communication about mobility measures influence how much they are used?
 - (c) How are the implementations of the mobility agreements evaluated over time?

1.2.3 Task Description

Building on the research questions (1.2.2) derived from the issues highlighted in Section 1.2.1, the project will focus on a comparative analysis of the two properties, Kallebäck's Terrasser and Fixfabriken, which have implemented mobility service agreements. The goal is to evaluate the differences between them and identify factors that contribute to successful future mobility service agreements that benefit developers, residents, and the outcomes of mobility agreements.

In order to evaluate the differences, the project undertakes the following subtasks:

- **Survey and Data Analysis:** Using `Python` to identify key subjects from the survey in order to provide statistical analysis to better understand residents needs and improve mobility options.
- **Neighbourhood Mapping:** Showing the topography and facilities in the area to understand how the elevation and proximity to different services may affect the extent to which people choose to walk.
- **Literature and Policy Review:** Reviewing relevant literature and policy documents from the city of Gothenburg and stakeholders to perceive a broader understanding about mobility in general.
- **Stakeholder Interviews:** Conducting interviews with key stakeholders involved in mobility options, including representatives from the municipality, property owners and mobility service companies. These interviews helps identify operational, administrative, and communicative differences between neighbourhoods.
- **Site Visit:** Conducting to gain a deeper and more nuanced understanding of the areas that can not be provided by the neighbourhood mapping. The site visits are guided by representatives from Wallenstam and HSB, giving insights into how the mobility agreements have been implemented.

By combining insights from literature and policy reviews, stakeholder interviews, survey analysis, neighbourhood mapping, and site visits, the project aims to pinpoint the factors influencing the effectiveness of mobility agreements. Ultimately, these findings will guide property developers and the municipality in adopting successful practices, supporting Gothenburg's goal of reducing car dependency and progress toward climate neutrality by 2030.

1.3 Limitations / Demarcations

To narrow down the scope of the project and reach a conclusion within the given time frame, certain parts are excluded. The case study is limited to the areas of Fixfabriken and Kallebäcks Terrasser, thereby excluding a significant portion of the dataset originating from other parts of the city. Parking zones B and D are not included in the analysis, as Fixfabriken is located in zone A and Kallebäcks Terrasser in zone C. This decision is partly based on the limited availability of data from zone D, which would not provide reliable results. It is also based on the aim to enable a meaningful comparison between areas with similar characteristics and proximity to the city centre, despite being in separate parking zones.

No additional surveys are conducted, as the provided dataset is extensive and contains sufficient information, allowing for time- and resource efficient use of existing

data. However, a limited number of qualitative interviews are conducted in order to obtain insights not captured in the survey.

From a time perspective, the analysis is limited to developments from 2018 onwards, as this marks the introduction of the mobility agreement. Developments completed before 2018, as well as those planned for the future, are excluded, as neither provides access to the full scope of relevant data.

The operations of external entities such as Västtrafik are not included in the scope of this analysis. Although aspects such as the distribution of free public transport cards are examined, matters related to pricing strategies are excluded. Similarly, political processes and the internal governance of the municipality are not subject to analysis.

2

Background

This chapter introduces information on the need for a sustainable transportation system and the background knowledge needed to understand the reason for the implementation of mobility measures. Details about the agreement and a survey used for the evaluation of the agreement will also be provided.

2.1 Sustainable Mobility

People in the modern society of today depend on individual car use and being a car owner increases the freedom of a person to travel independently. Car transportation is used to fulfil important needs, such as travel to work, school, and health care. Today, the transportation sector emits multiple greenhouse gases, creates harmful noises, as well as segregated areas and is therefore not a sustainable system [11]. According to the European Environment Agency, the transportation sector alone stood for 29% of the total greenhouse gas emissions for the economic sectors in the European Union in 2022 and had increased 26% since 1990 [12]. The EU has a goal of becoming climate neutral by 2050 and has therefore created multiple approaches to reduce their emissions. One policy for the transportation sector is to reconstruct the mobility options and peoples choice of transportation [13].

From 2010 to 2022, total emissions from road traffic decreased by 3% in Sweden [3]. This is mainly due to more fuel efficient engines and the increase in electric cars. Although this is a step in the right direction, cars still take up as much space no matter if they are electric or fossil-fuelled. Gothenburg has the goal of becoming climate neutral by 2030, and one of their actions to achieve this goal is to develop the transportation sector and make it more sustainable [14].

The accessibility of parking spaces is an important aspect for car users, both for parking at home and when travelling. The availability of parking spaces is considered a necessity for car users, and the lack of parking spaces decreases the probability of choosing a car for transportation. [15]. To make driving less attractive and to reduce the number of cars in urban areas, multiple cities, including Gothenburg, have decided to reduce the number of parking spaces linked to private housing. The Park4SUMP project, made to develop Sustainable Urban Mobility Plans and funded by the European Union, explains that parking spaces require a lot of space designated for stationary traffic. Instead, this space could be used for pedestrian spaces, such as benches and cafés. To make cities walkable and attractive for its citizens,

it is important to minimize overall car usage [15]. This will allow for a reduction in parking lots and for the space to be able to convert into public parks or new housing developments.

Developers need to provide a certain amount of parking spaces per housing, called Minimum Parking Requirements, MPRs. Donald Shoup, economist and expert in urban planning, explains that removing MPRs will decrease the parking spaces in urban areas. Multiple cities in America have removed their MPRs which has shown a decrease in parking spaces [6]. As part of creating a more sustainable transportation system, the city of Gothenburg has introduced a mobility agreement that allows developers to lower their MPR by offering transportation alternatives such as bike pools and good access to public transportation [8]. More details about MPR and the mobility agreement of Gothenburg will be introduced later in the chapter.

High accessibility to destinations and walkable streets will address the challenges of private car use. The 15-minute city, a concept introduced by Carlos Moreno, is an effective approach to this [16]. In this model, all amenities and services are within a 15-minute walk or bike ride. This promotes the use of alternative modes of transportation, as walkable cities often feature fewer roads and parking for larger vehicles, naturally reducing the reliance on cars [17]. This concept is included in some mobility agreements and is referred to as proximity and accessibility in the plan.

However, when planning a 15-minute city, it is important to take into account that people of various ages and economic statuses have unique walking behaviours. They also need somewhat different amenities [16]. In cities where this is taken into consideration, choosing to walk, bike, or taking public transport might become the fastest and most convenient choice.

2.2 Minimum Parking Requirements

Minimum parking requirement is a commonly used strategy in both Sweden and Europe. It allows cities to regulate the number of parking spaces in newly developed areas [7]. The MPR is a number that represents the least amount of parking spaces per apartment that developers need to provide to receive a building permit. In Gothenburg, this number generally ranges between 0 and 1 [8].

2.2.1 Minimum Parking Requirements in Gothenburg

MPR requirement in Gothenburg depends on factors such as accessibility to daily needs, travel time to the city centre, and population density. In general terms, the MPR is lower in the city centre and higher in the outskirts, see Figure 2.1. The city of Gothenburg has decided on the creation of five zones, A to E, where the different zones correspond to different MPR numbers [8]. Figure 2.1 visualises the different zones and how they span the city.

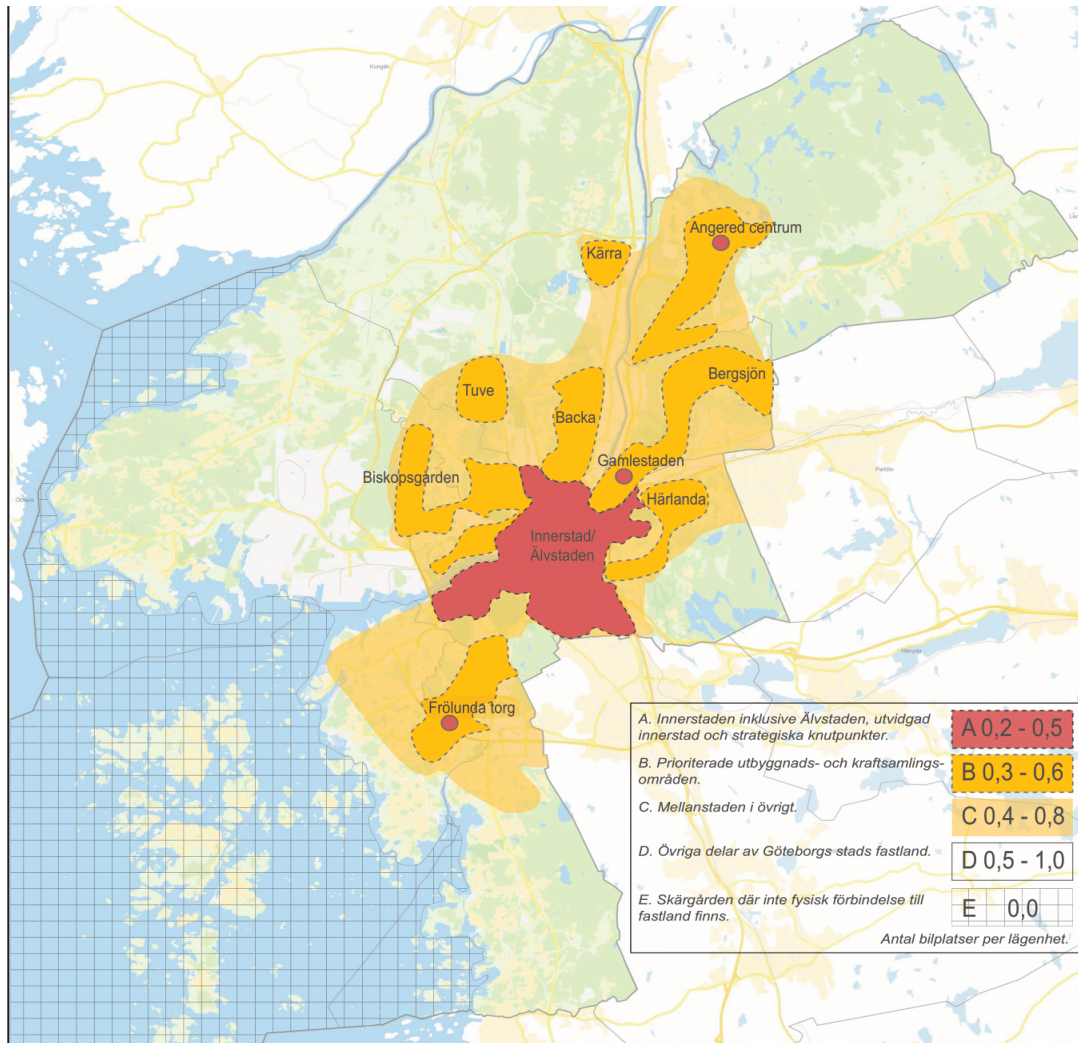


Figure 2.1: Gothenburg minimum parking requirement zones. [8]. Reprinted with permission.

In Figure 2.1 the red area corresponds to zone A, which covers the central city as well as Frölunda torg, Gamlestaden, and Angered centrum. These three detached areas are considered dense enough to be in zone A although their geographical location is quite far from the city centre [8]. Zone A consists primarily of apartments [8]. Zones B and C mainly represent less densely built apartment buildings as well as single family housing that still have great communication to the city centre. Zone D mainly corresponds to detached single family housing, while zone E represents the archipelago only accessible by boat, making car usage irrelevant.

The MPR zones fall within a range, meaning that it can be reduced or increased in specific instances, based on the starting value. This range is presented in Table 2.1. The reduction is made in several steps, whereas the first one considers the geographical location of the properties. By building near existing cycling infrastructure, attractive public transport, or near daily services, the parking number is reduced [8]. This reduction can be made in all four main zones, but can allow for bigger reductions in zone C and D than in A and B. In the second step, an adjustment is

2. Background

made based on the sizes of the apartments. If there are more than 75% small apartments (1-2 rooms), a reduction of 0.05 is made, while if 25% or more apartments are big (4 or more rooms), an increase of 0.05 is made [8]. A third way of lowering the parking number is by implementing mobility measures. This can allow for a maximum reduction of 0.2 [8]. The mobility measures are explained more in detail in Section 2.3 below.

Table 2.1: The starting value for parking spaces.

Zone	Starting value	Minimum outcome	Maximum outcome
A	0.5	0.2	0.55
B	0.6	0.3	0.65
C	0.8	0.4	0.85
D	1.0	0.5	1.1
E	0.0	0.0	0.0

The difference in minimum parking numbers also depends on the type of service the building offers. Student accommodations allow for a lower MPR, while nursing homes or schools have specific requirements [8]. Further on, this project will exclusively focus on parking numbers linked to apartment buildings.

Below, in Figure 2.2 the reduction process is visualised. It shows that all zones can get both a reduction and increase in MPR, as well as properties within zones with higher starting values are able to get bigger deductions.

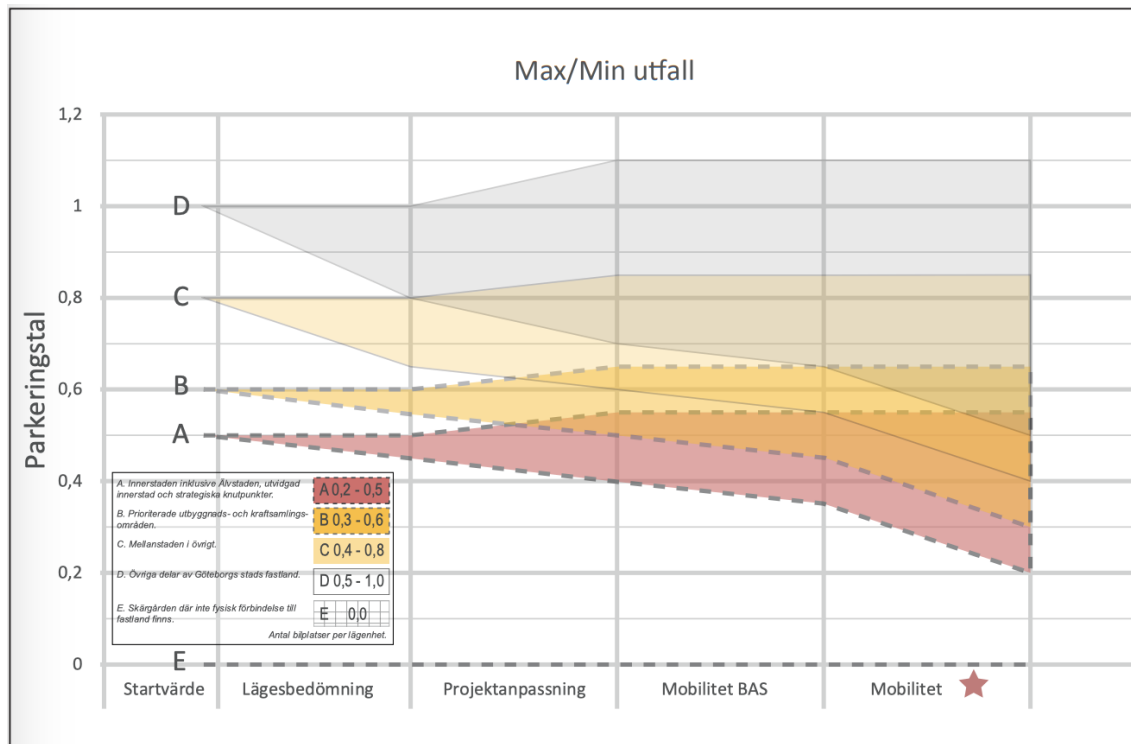


Figure 2.2: The diagram shows possible outcomes for a mobility and parking study at each stage of analysis. [18]. Reprinted with permission.

2.3 The Mobility Agreements in Gothenburg

As previously stated, the city of Gothenburg has the goal of achieving net zero emissions by 2030. A subpart of this goal is to reduce the usage of private cars by lowering the MPR at residences and instead offering mobility options to residents. This is called a mobility agreement. The mobility agreement includes different mobility options that property owners can include in their residential areas to reduce the amount of parking spaces. The more mobility options the property owners include in their area, the fewer parking spaces are needed [8].

2.3.1 Mobility Solutions

The property owners that sign the mobility agreement determine how many mobility solutions will be implemented in their projects. The purpose of the mobility agreement is to make it easier for residents to live without a car by offering mobility options. A larger selection of mobility options means a lower MPR, which can be used as an indication of how easy it is to live in a certain area without a car. This section will go into greater detail about the different mobility solutions.

Table 2.2: Base package, apartment building.

Category	Measure
Information	Starter package for new movers
	Current information about mobility
Public transport	Free public transport ticket 30 days for new residents
Bike	Extra good bicycle parking
Car	Limitation of fixed car parking spaces
	The car parking rental is reported separately
	Carpool spaces
Other	Mobility manager

Table 2.3: Star package, apartment building.

Category	Measure	Stars
Information	Annual mobility activity	
Public transport	Real-time board for public transport	
	Free public transport ticket 90 days for new residents	★
Bike	Area for bicycle service	
	Cargo bike pool	★
Car	Limitation of fixed car parking spaces, extended level	
	Discount on carpool	
	Carpool	★
	Collective car parking facilities	★
Other	Delivery services	
	Shared office spaces	
	Digital service for mobility	★
	Open mobility solutions	★
	The property owner's own proposal (can be a star measure at the city's discretion)	(★)

In Kallebäck's Terrasser and Fixfabriken a mobility agreement used prior to 2018 was used. The mobility solutions provided by the municipality are divided into two packages: the basic package presented in Table 2.2 and the star package presented in Table 2.3. All measures in the base package need to be fulfilled, then the parking number is decreased by 10% per apartment. The property owner can then implement more measures using the star package in their project to reduce the parking number even more. The more stars, the lower the parking number, seen in Figure 2.3 [8].

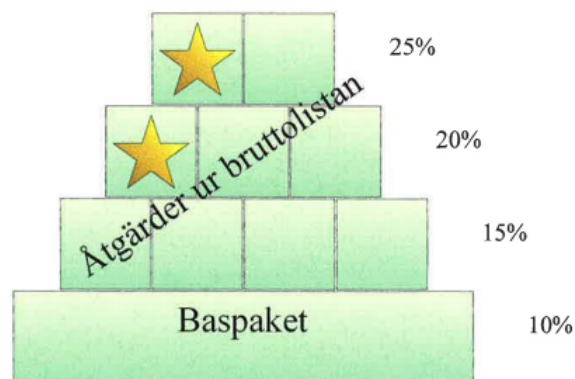


Figure 2.3: Parking number reduction, mobility agreement, older version. [19]. Reprinted with permission.

However, in 2018, new policies and regulations were introduced and a change in agreements was made [20]. Instead of having a percentage reduction, the new agreements have a fixed reduction in the number of parking spaces. To receive the maximum reduction of the parking number, only two star measures are needed. However, three measures, in addition to the ones already needed in the newer version, are also required, as seen in Figure 2.4.

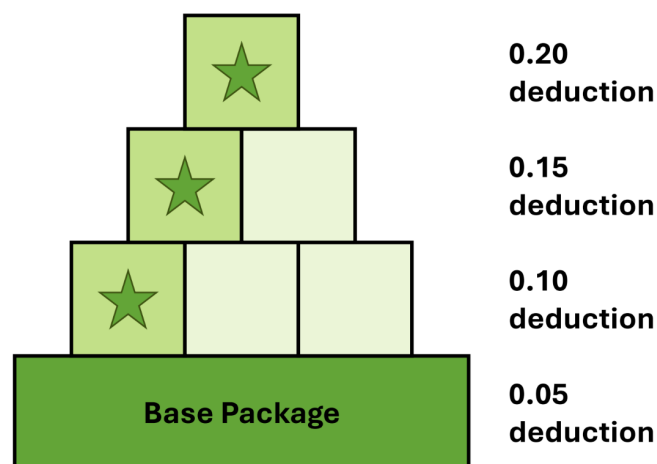


Figure 2.4: Parking number reduction, mobility agreement. [21]. Reprinted with permission.

2.4 Survey

In 2024, Chalmers University of Technology in collaboration with the city of Gothenburg, sent out a survey to residents in areas with mobility agreements, called the GotPark survey. The survey examined the residents travel behaviour and their experiences and thoughts about living with mobility measures. The results will be

used to evaluate and analyse the mobility agreement. The areas in which the survey was sent are presented in Figure 2.5.

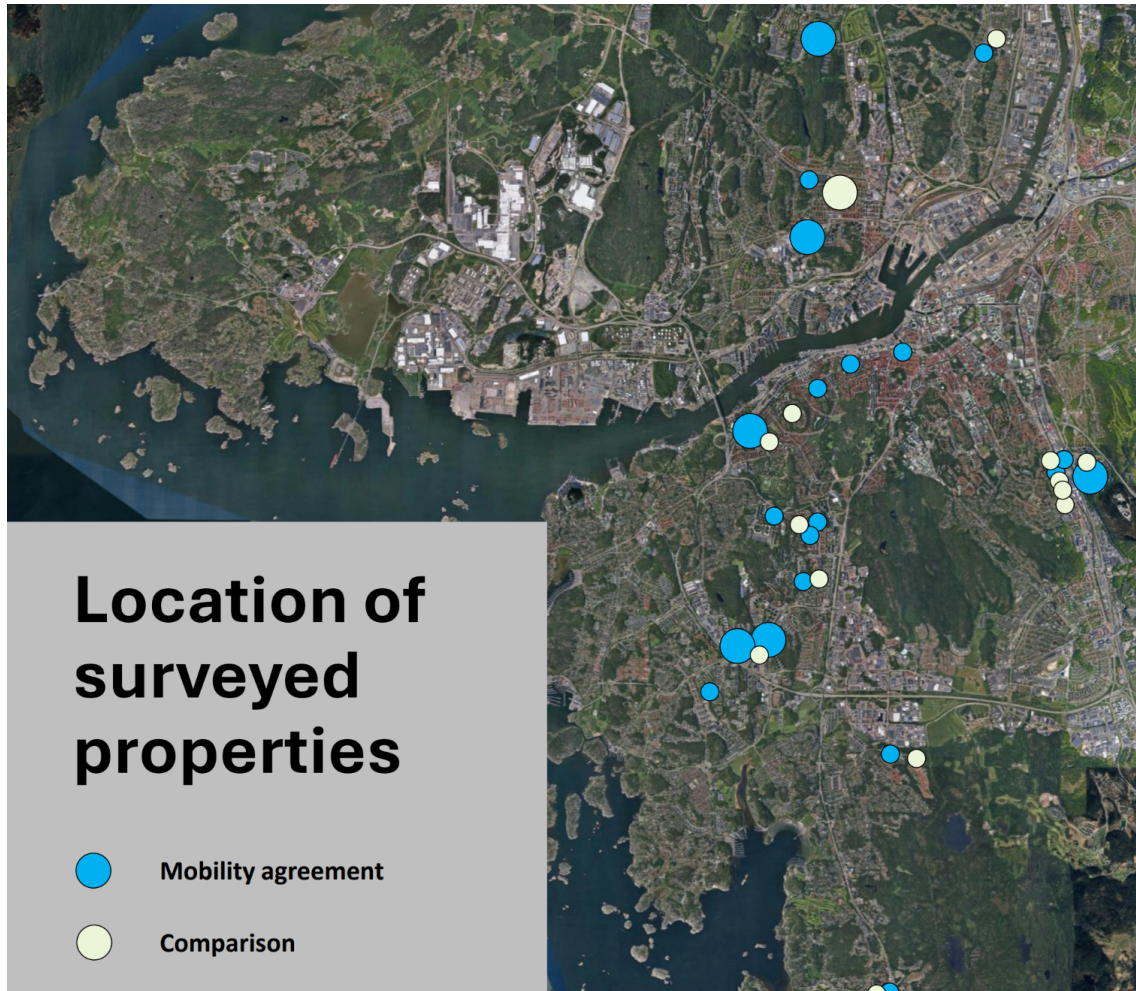


Figure 2.5: Location of studied properties. Larger dots mean larger housing areas. [21]. Reprinted with permission.

Many of the surveyed properties are large developments that span multiple blocks. This means that the status of the construction of the buildings may vary in the same area. The survey has only been sent out to apartments where residents have moved in as of 2024. It is therefore important to note that not all parts of the areas are included in the survey, as some buildings have recently been occupied and others are still under construction.

3

Methods

The following chapter describes the methods used to carry out this thesis. It contains both quantitative and qualitative analysis and describes how literature, map analysis, interviews, site visits, and the GotPark survey were used during the project.

The reason for this study was to work with the mobility agreement and parking policy made by the city of Gothenburg as a part of their sustainability goals for 2030. As a foundation, the results of the GotPark survey were used to study the opinions and experiences from the residents living in areas with a mobility agreement. The results provided perspective on the different areas and residents opinions.

In this project, Kallebäcks Terrasser and Fixfabriken have been selected as case study areas. These residential areas were chosen due to their high response rate in the survey. Both are large residential developments located at a similar distance from central Gothenburg, with construction that started at the same time. By choosing two areas with similar characteristics, but with different results, this project examined the reasons for these differences and studied how the agreements could be optimised.

3.1 Mixed Methods

In this project, both quantitative and qualitative analyses have been performed. The report was partially based on a previously conducted survey and a map analysis. These two methods are quantitative, as a large amount of data has been collected and analysed. In addition, the report was also based on qualitative analyses, including literature and policy review, interviews, and site visits to the two studied areas. The results from the quantitative and qualitative analyses were treated separately and then compiled to complement each other, providing a clearer and reinforced basis for how the mobility agreements have been implemented, communicated, and followed up. The integration of quantitative and qualitative data in this report was based on the mixed method design, described by John W. Creswell and Vicki L. Plano Clark [22]. The use of mixed methods was motivated by the fact that the combination of quantitative and qualitative methods allows the strengths of each method to compensate for the different limitations of the two methods.

3.2 Quantitative Analysis

A quantitative analysis provided a systematic approach to understanding data through numerical measurement and statistical techniques. This chapter explores how patterns, relationships, and trends can be identified to support the results.

3.2.1 Survey Analysis

The results from the GotPark survey were presented in an Excel file and the analysis was made using `Python`. The analysis started by sorting the data into two subgroups, one containing the results from Fixfabriken and one from Kallebäcks Terrasser. The whole dataset of the survey was referred to Gothenburg, and included all residential areas with mobility agreements. The survey questions chosen for the analysis were answered on a scale from 1 to 7, where 1 meant that they did not agree and 7 meant total agreement with the statement.

3.2.1.1 Data management

The survey analysis was conducted in two ways. The first analysis was made to study how frequently residents use different mobility options across Kallebäcks Terrasser, Fixfabriken and Gothenburg. The second part included separate evaluations based on household composition and car ownership. The household deviation was made to investigate how the residents travelled in their respective neighbourhoods. The result was then compared to the site visit to analyse if the different needs of the households were met. The goal of the mobility agreement was to minimise the car ownership in Gothenburg and therefore the data was also split depending on whether the respondents owned a car or not.

The chosen cohabitation statuses were family, couple, and single person households. For this project, a household was considered a family as long as there was a child (someone under the age of 18) in the home. The split was done depending on the answer to the question *Do you live with a partner or spouse?* and the number of children in the household. The summary of this is presented in Table 3.1.

Table 3.1: Deviation of cohabitation status.

Household	Do you live with a partner or spouse	Total amount of kids
Family	Yes/No	>0
Couple	Yes	0
Single	No	0

The sizes of each subgroup might differ and therefore the result for each area and group was normalised and then presented in either an ordinary or horizontal bar chart. The mean values were also calculated in `Python` and were presented in a

table.

3.2.1.2 Chosen survey questions

To study the research questions 1a and 1b, the survey questions *I am satisfied with the mobility measures in my building* and *I am familiar with the mobility measures available in my apartment building* were studied respectively. This was done to gain perspective and understanding of the implementation and level of familiarity of the mobility agreement. Then the survey question *Mobility measures are convenient and easy to use* were studied to increase the understanding of the mobility measures from the residents point of view and helped answer both research questions 1a and 1b.

To gain a perspective about the responders current travel behaviour, in each respective area, the questions *Considering how I travel today, it is easy to do my daily activities* and *Walking is an efficient way to travel to shops and activities in my neighbourhood* were studied. This helped answer research question 1b.

The last survey questions studied helped answer both research questions 1a and 1b. The questions studied were: *Did the transit pass influence how frequently you use public transport*, *Bike sharing bikes are located in a convenient location in or near my apartment*, *Bike sharing bikes are easy to book when I want them*, *Car sharing vehicles are located in a convenient location in or near my apartment* and *Car sharing vehicles are easy to book when I want them*. The answers from these questions provided information about mobility implementation and the responders thoughts about them.

3.2.2 Neighborhood Mapping

Mapping tools were used to visualise the two areas. The topography was portrayed by the height model in the open data from the city of Gothenburg. This was done to gain a greater understanding of what mobility solutions work in the area and helped answer research question 1a. Public transportation stops, grocery stores, schools, health care, and other amenities were pinpointed in OpenStreetMap to show the walkability of the area.

In addition to this, demographic analyses were conducted. All results from each area were compared to see if there were any interesting and relevant differences between the areas that can underlie the different outcomes of the mobility agreements.

3.3 Qualitative Analyses

Qualitative analysis focuses on interpreting non-numerical data to gain deeper insights into behaviours, experiences, and perspectives. This chapter examines how

methods such as literature and policy reviews, interviews, and site analysis can be used to better understand how mobility measures are used and why.

3.3.1 Literature and Policy Review

To develop basic knowledge of the studied subject, a literature review was made. This contributed to a deeper understanding of the topic and served as a basis for identifying the purpose and problem formulation of the report. To gain a better insight of the municipality's principles regarding MPR and mobility agreements, the publication *Anvisningar till Riktlinjer för mobilitet och parkering i Göteborgs Stad* was reviewed. The literature study has been helpful in identifying key concepts and guidelines within the subject area and has provided the foundation for the introduction and background.

The project included a review of policy documents from the City of Gothenburg. The documents contained mobility agreements established for the two areas in question, including any revisions. Other documents relevant to the built environment were also considered. The material was used primarily for the project's background and area analysis.

3.3.2 Interviews

To gain more insight and information about the chosen areas, multiple actors within the system were contacted and interviewed. Those who were interviewed were representatives from the municipality, property developers, and mobility service companies. The reason of the interviews with the property owners was to gain complementary information on how the mobility agreements were implemented differently in the two areas, as well as how they are communicated. This helped answer the research questions 1a and 1b.

To obtain more information on how mobility requirements were communicated and evaluated, an interview with the municipality was conducted, answering research questions 1b and 1c.

The purpose of the interview with the mobility service company was to gain another view of the system that complemented the project. The information gained from the interview added perspective about their services provided to a property with mobility agreement and how they worked together. The interview helped answer both research questions 1a and 1b.

All interviews were held in Swedish, and all citations were translated into English as close to the original as possible.

3.3.3 Site Visit

To obtain a clear understanding of the areas, a total of four site visits were conducted, two in each location. The first two visits were made independently by the project group. The purpose was to examine the areas topography, proximity to gyms and grocery stores, as well as the accessibility and distance to different types of transportation, such as public transport, pedestrian and bicycle paths.

The remaining two visits were conducted together with a representative from each property developer (HSB in Fixfabriken and Wallenstam in Kallebäcks Terrasser). The purpose of these visits was to obtain a deeper understanding of the mobility solutions available in the areas, where they are located and how access to these solutions was communicated to residents. This contributed to answering the research questions 1a and 1b. The observations made have allowed connections to be drawn to the results of both the survey and the interviews.

4

Results - Area Analysis and Mapping

The two areas studied in this project are Kallebäck's Terrasser, located in Zone C, and Fixfabriken, located in Zone A. The geographical locations of these areas are illustrated in Figure 4.1. The main developer of Kallebäck's Terrasser is Wallenstam, which is responsible for both management and development of the area [23]. Fixfabriken is developed by HSB Göteborg and Fastighet AB Balder, where each company developed two blocks separately [24].

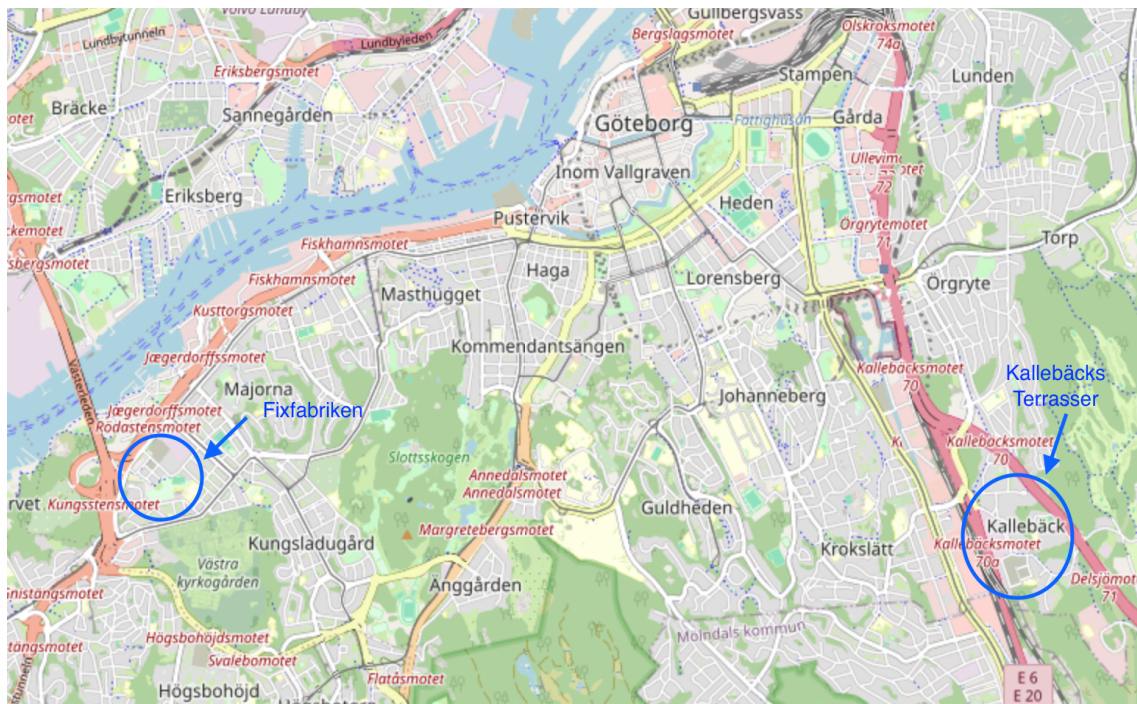


Figure 4.1: Map over Gothenburg. The blue circles show the locations of Fixfabriken and Kallebäck's Terrasser. [25], CC-BY-SA

Below, the two areas are described in more detail, focusing on demography, topography and the location of public and commercial services. Finally, the different types of mobility measures implemented in each area are presented.

4.1 Demographic Description of the Two Areas

Table 4.1 presents a description of the demographics in Kallebäcks Terrasser, Fixfabriken and Gothenburg. The data is sourced from the GotPark survey and has been used in this report as a representation of the entire area. A total of 159 respondents from Kallebäcks Terrasser participated in the survey, which is 11.3% of the total residents. There were 63 respondents from Fixfabriken, which represents 16.1% of the total residents. In total, 1171 people responded to the survey in Gothenburg.

Table 4.1: Demographic description of survey respondents in Kallebäcks Terrasser, Fixfabriken, and Gothenburg.

Category	Kallebäck		Fixfabriken		Gothenburg	
	n	%	n	%	n	%
Gender						
Male	78	49	32	51	589	50
Female	78	49	31	49	574	49
Non-binary	3	2	0	0	8	1
Age group (years)						
18–24	17	11	3	5	115	10
25–34	94	59	12	19	475	40
35–44	35	22	10	16	234	20
45–54	3	2	12	19	102	9
55–64	6	4	12	19	83	7
65+	4	2	14	22	162	14
Cohabitation Status						
Living alone	58	36	28	45	403	35
Only with partner/spouse	71	45	21	33	440	39
Family (with kids)	30	19	14	22	291	26
Highest level of education						
Primary school	3	2	0	0	32	3
Gymnasium/High school	33	21	14	22	293	25
Bachelor's degree	66	41	27	43	446	38
Postgraduate degree	57	36	22	35	396	34
Employment status						
Employed	134	84	46	73	844	72
Unemployed	7	5	2	3	50	4
Student	10	6	2	3	92	8
Retired	5	3	13	21	149	13
Other	3	2	0	0	34	3
Household income (SEK)						
0–10 000	3	2	0	0	31	3
10 000–20 000	5	3	4	6	71	6
20 000–30 000	11	7	6	10	129	11
30 000–50 000	75	47	16	25	431	37
50 000–70 000	31	20	12	19	221	19
70 000–90 000	24	15	15	24	166	14
90 000+	10	6	10	16	117	10

4.2 Kallebäcks Terrasser

In the district of Kallebäck, located in the southeastern part of Gothenburg's city centre, the residential area Kallebäcks Terrasser is being built. Once completed, it will consist of nearly 2000 apartments ranging from 1 to 6 rooms and a kitchen. Construction started in 2019, and as of now, tenants have moved into seven blocks. To improve the air and noise conditions in the area, the office building Ormen has been placed closest to the adjacent highway [26]. The area features a restaurant, gym, health care centre, and school, with plans for a central main street with more shops [23].

4.2.1 Site Description

The area is strategically located in proximity to both green spaces and a wide range of services and community functions. As illustrated in Figure 4.2, where Kallebäcks Terrasser is highlighted in orange, grocery stores, schools, and other essential services are within walking distance. A gym and a healthcare centre are located in the Ormen office building. A preschool and an elementary school are centrally located within the residential area, directly adjacent to the surrounding natural environment. The nearest supermarket is 500-950 metres from the area, while a larger supermarket is approximately 1.6 kilometres from the residential area.

The area has good bus connections, while access to tram services are more limited. Along Separatorsgatan, which runs alongside the residential area, there are two bus stops: Smörgatan and Smörkärnegatan. This means that bus services are located close to many residents. Bus lines 18 and 86 serve this route. The nearest tram stop, Elisedal, is located along Mölndalsvägen, approximately 900–1400 metres from the Kallebäcks Terrasser. Reaching tram lines 2 and 4 therefore requires either a longer walk or a connecting bus journey.

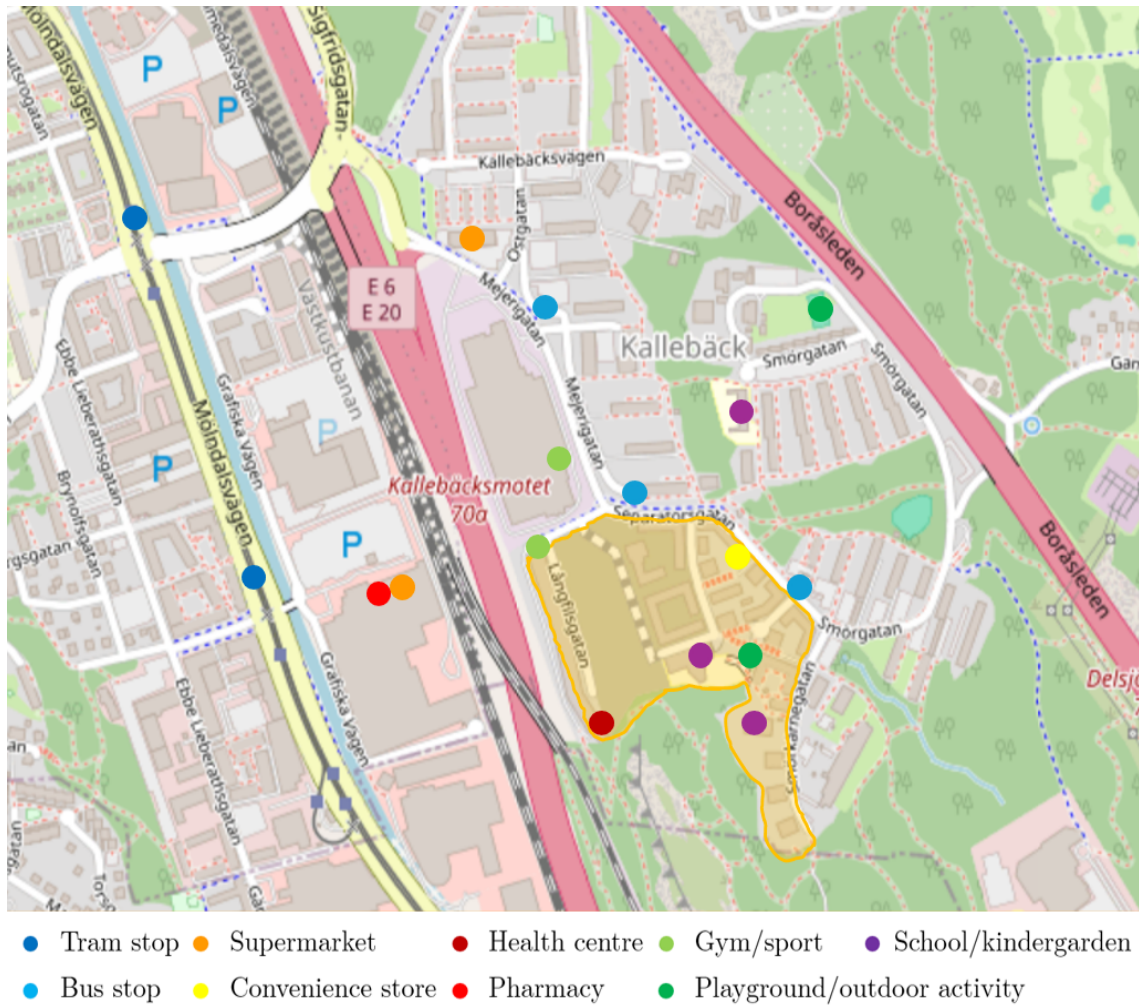


Figure 4.2: Overview of the Kallebäck's Terrasser area (outlined in orange) and its surrounding amenities. [25], CC-BY-SA

The area within and around Kallebäck's Terrasser is characterised by elevated terrain, as clearly illustrated in Figure 4.3. Access to Mölndalsvägen requires crossing the highway using a bridge at a higher elevation. The road that runs along the perimeter of the residential area has a significant incline for the most part. Most of the blocks in the area are built at varying elevations, as the development has been adapted to the natural slopes. This results in substantial differences in elevation between residential buildings, with steep stairs connecting them. An exception can be found in the lowest part of the area, where Torget and Torggatan are located. Here, the incline is considerably gentler, though the terrain is not entirely flat.



Figure 4.3: Topographic map of Kallebäcks Terrasser and the surrounding area. [27], CC0

An elevated terrain, such as this one in Kallebäck, could make it difficult to follow the 15-minute city model, as the area's topography influences the conditions for pedestrian and bicycle traffic. Although some sections have a steep gradient, others are more accessible. At the same time, elevation differences create scenic viewpoints and contribute to a varied urban environment.

4.2.2 Mobility Measures

Two levels of agreements are implemented in Kallebäcks Terrasser, a basic and an additional. The basic level satisfies the base package to give a reduction in MPR of 10%. The additional level provides a reduction in MPR of 25% when implemented with at least two star (★) mobility measures [19]. The additional measures are chosen from a gross list provided by the municipality. The agreement was signed in 2017 and the gross list has since changed slightly as seen in Table 4.2.

Table 4.2: All mobility measures implemented in Kallebäcks Terrasser, between Wallenstam and the Municipality [19]. The star (★) indicates the star measures.

Mobility Measures	Type of Package	Explanation
Restriction of fixed parking spaces	Base	Maximum 75% of parking spaces in the plan are fixed.
Attractive parking for bicycles	Base	Accessible, safe, and theft-proof parking. Half of them are weather-protected and cleared yearly.
Cargo bike parking	Base	Parking for at least 4 cargo bikes per 100 apartments.
Attractive and accessible planning area	Base	Bike and pedestrian paths.
Car-sharing parking	Base	Minimum 2 fixed parking spaces for the first 200 apartments. Then 1 parking space per 100 apartments.
Starter package for new residents	Base	Encourages traveling by foot, bicycle, public transport, or shared car. Contains a physical gift such as an umbrella, reflector, bag, or similar.
Ongoing information about mobility	Base	Updates on public transport timetables, new shared cars or bicycles, reminders, and similar.
Free 30-day public transport card for new residents	Base	1 card for a 1-room apartment and 2 cards for apartments with more than 1 room.
Parking fee is itemized separately	Base	Parking is not included in the apartment contract.
Real-time departure boards for public transport	Additional	Departure boards in stairwells and entrances.
Bicycle service room	Additional	Automatic doors and suitable equipment to maintain private owned bicycles. 1 room per 100 apartments.
Bicycle-sharing with special bicycles	Additional★	Access to electric, cargo and collapsible bicycles, bicycle trailers etc. Minimum 3 vehicles per 100 apartments.
Car-sharing vehicles	Additional	Minimum 2 cars for the first 200 apartments, then 1 car per added 200 apartments.
Attractive car-sharing membership	Additional★	Membership is included in the rent.
Restriction of fixed parking spaces, extended level	Additional	Maximum 25% of parking is fixed. Replaces the measures for fixed parking spaces in the basic package.

4. Results - Area Analysis and Mapping

Proximity and accessibility in the plan	Additional	Densely populated plan area and proximity and accessibility to service, schools, leisure activities etc.
Annual mobility activity	Additional	Property owners should arrange annual mobility activities with the aim of encouraging mobility solutions.
Measures to reduce the need for travel	Additional	Property owners implement measures that facilitates home driving services, offices and parcel lockers in the building.
Attractive conditions for pedestrians	Additional	Property owner can report measures that increases
Property owners own idea	Additional	Public available bike pumps and public available bicycle information points

4.3 Fixfabriken

In Majorna, south-west of Gothenburg's city centre, the residential area Fixfabriken is taking shape. When finished, it will consist of 1300 housing units, 550 of which are already built [28]. The apartments are between 1-5 rooms and a kitchen. Construction started in 2019 and the first residents moved in during 2021 in the housing association Bränneriet, where Balder is the property developer. The three other housing associations are called Spanjoletten, with Balder as property developer, as well as Sannaparken and Glasbruket, which HSB has developed [24].

4.3.1 Site Description

In close proximity to the four buildings, there are several essential facilities for the daily life of residents. As illustrated in Figure 4.4, the buildings, outlined in orange, are surrounded by a school, a preschool, a gym, and a green area. The green area serves multiple purposes, offering space for recreation, a playground for children, and a football field for sports activities. There are also two convenience stores within walking distance of approximately 450 metres and 750 metres, while the nearest large supermarket is about 1300 metres away. A health care centre and pharmacy are within walking distance. All of this makes Fixfabriken contribute to Gothenburg becoming a 15-minute city.

4. Results - Area Analysis and Mapping

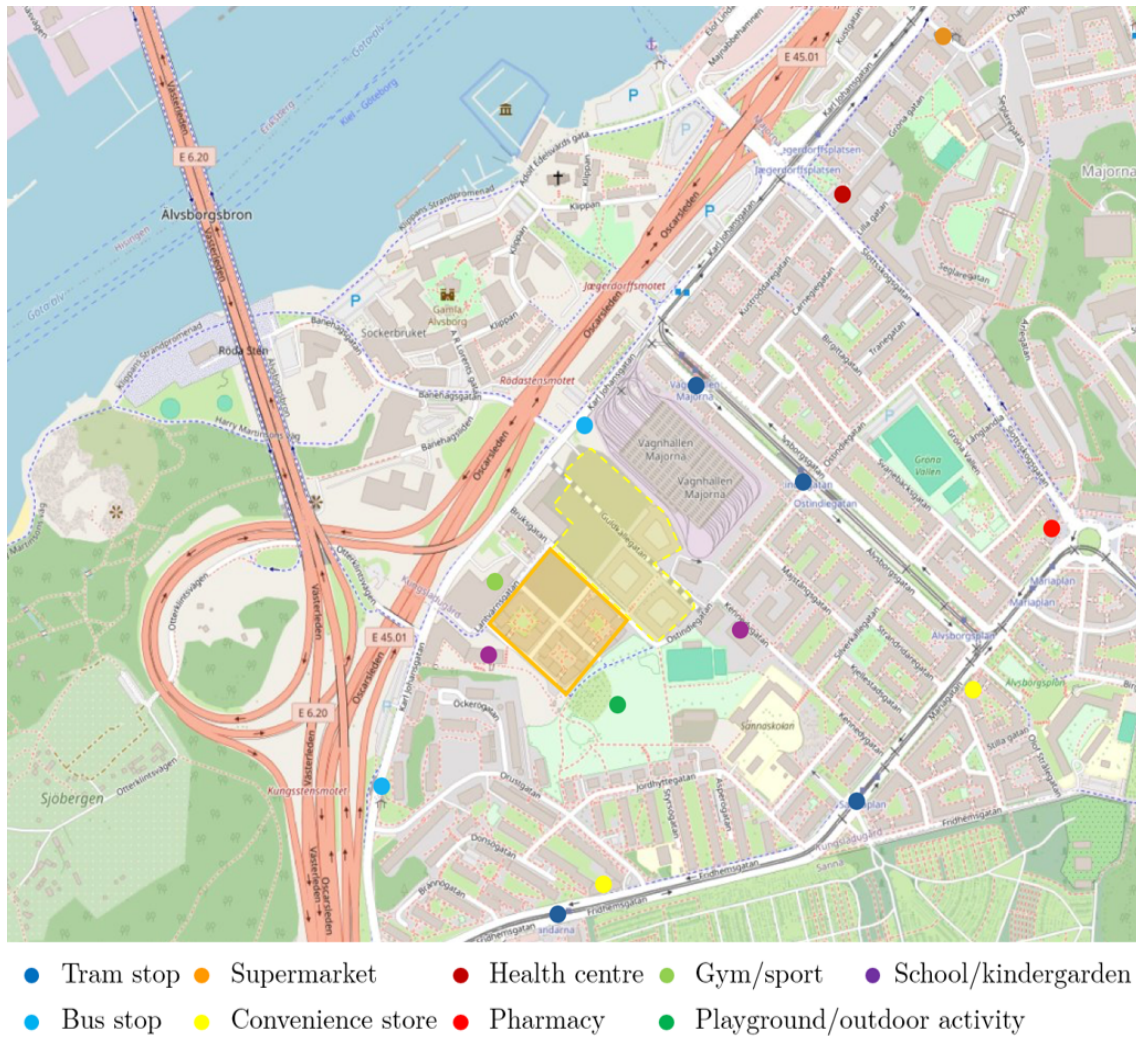


Figure 4.4: Overview of the Fixfabriken area (outlined in orange) and the nearby amenities. The yellow area will be included once completed. [25], CC-BY-SA

In the surrounding areas of Fixfabriken, there are several modes of public transport. The buildings are surrounded by five stops, served by bus 90 along Karl Johansgatan as well as tram lines 9 and 11, with stops south of Fixfabriken, along Fridhemsgatan. The distance to the nearest stops is approximately 400 to 500 metres. To reach the nearest stops and the grocery store, there are pavements and bike lanes available. These pathways are illuminated to create a sense of security for residents at night [29].

The area surrounding Fixfabriken is relatively flat, as illustrated in Figure 4.5. This topography makes it easy to reach the nearest stops on foot or by bike, and then travel around Gothenburg using public transportation. However, the walking and cycling path to Orustgatan, the bus stop located west of Fixfabriken, is partially steep, which can be seen in Figure 4.5.

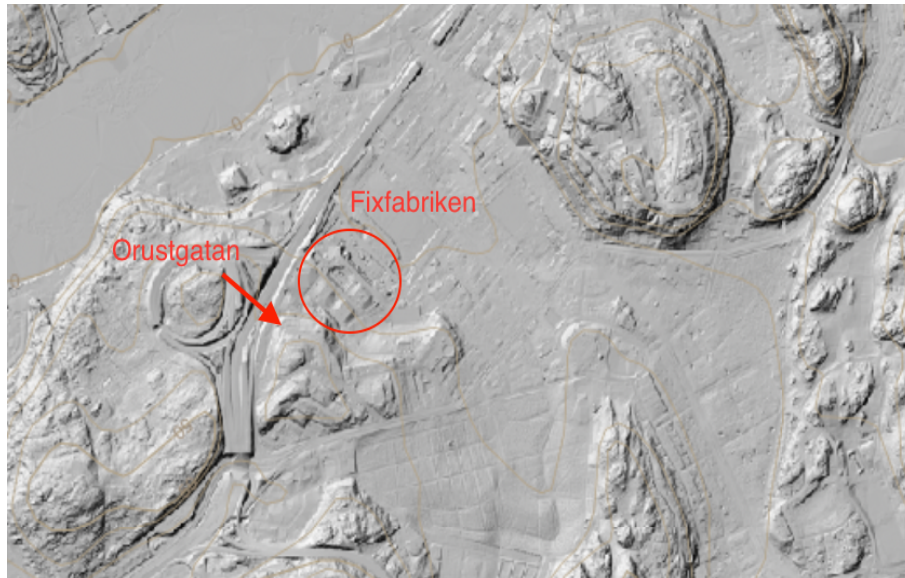


Figure 4.5: Topographic map of the area surrounding Fixfabriken. [27], CC0

4.3.2 Mobility Measures

The mobility measures implemented in Fixfabriken have been revised three times, each time adding additional measures that in combination with previous agreements, have reduced the MPR [19]. The base package gives a reduction of MPR with 10% and the final additional package gives a reduction of MPR with 20%. This can be seen in Table 4.3.

Table 4.3: All mobility measures implemented at Fixfabriken, between HSB, Balder and the Municipality [19]. The asterisk (*) indicates what measures have been updated after the first agreement and the star (★) indicates the star measures.

Mobility Measures	Type of Package	Explanation
Restriction of fixed parking spaces	Base *	Maximum 50% of parking spaces in the plan are fixed. Was changed from 75% in the agreement.
Attractive parking for bicycles	Base	Accessible, safe, and theft-proof parking. Half of them are weather-protected and cleared yearly. Bicycle pumps available.
Cargo bike parking	Base	Parking for at least 4 cargo bikes per 100 apartments.
Attractive and accessible planning area	Base	Attractive pedestrian paths and bicycle lanes. Should be safe, easy and secure to move in the are.
Car-sharing parking	Base	Minimum 1 parking space per 100 apartments.
Starter package for new residents	Base	Encourages travelling by foot, bicycle, public transport, or shared car. Contains a physical gift such as an umbrella, reflector, bag, or similar.
Ongoing information about mobility	Base	Updates on public transport timetables, new shared cars or bicycles, reminders, and similar.
Free 30-day public transport card for new residents	Base	1 card for a 1-room apartment and 2 cards for apartments with more than 1 room.
Parking fee is itemized separately	Base	Parking is not included in the apartment contract.
Bicycle service room	Additional	Automatic doors and suitable equipment to maintain private owned bicycles. 1 room per 100 apartments.
Restriction of fixed parking spaces, extended level	Additional	Maximum 25% of parking is fixed. Replaces the measures for fixed parking spaces in the basic package.
Proximity and accessibility in the plan	Additional	Densely built area or connected to a densely built area with all amenities.

Attractive conditions for pedestrians	Additional	The property developer can report an amount of measures that increase attractiveness for pedestrians with e.g. closeness to amenities.
Real-time departure boards for public transport	Additional *	Departure boards in stairwells and entrances.
Measure to reduce the need for travel	Additional *	Ergonomic workplace for residents that work from home.
Free 90-day public transport card for new residents	Additional **	The purpose is to instil a habit among residents to travel with public transport. Replaces the measure for free public transport in the base package. This measure have been removed from the agreement.
Bicycle-sharing with special bicycles	Additional **	Access to electric, cargo and collapsible bicycles, bicycle trailers etc. Minimum 3 vehicles per 100 apartments.
Car-sharing vehicles	Additional *	Minimum 1 car per 200 apartments. This replaced bike sharing in the contract.
Attractive car-sharing membership	Additional **	Membership is included in the rent.
Annual mobility activity	Additional *	Property owners should arrange annual mobility activities with the aim of encouraging mobility solutions.
Property owners own idea	Additional *	Electric scooter

5

Results - Survey Analysis

This chapter presents the results of the quantitative analysis conducted on the survey data. It begins with a description of the respondent subgroups, followed by a general overview of the usage of different mobility options, and then an overview of the responses to relevant survey questions that help answer the research questions in Section 1.2.2. The analysis aims to highlight outcomes and differences based on subgroup characteristics. The results are structured as quantitative findings and are illustrated using graphs generated with the programming tool `Python`. Not all subgroups are included in every part of the analysis, and different subgroups are used for different questions. Additional graphs can be found in Appendix B.

5.1 Subgroup Sizes

This section presents the number of responders in each subgroup, used to evaluate the survey. The number of responders in each subgroup is presented for both of the chosen areas, Kallebäcks Terrasser and Fixfabriken, and for the entire survey. The amount of responders will here on be referred to as the *size* of the subgroups, and the entire survey will be called *Gothenburg*. In the tables presented in the following sections, Kallebäcks Terrasser will only be referred to as Kallebäck.

Table 5.1 presents the amount of responders in the entire survey and the amount of responders in Kallebäcks Terrasser and Fixfabriken.

Table 5.1: Sizes of the area subgroups.

Area	Size (n)
Kallebäck	159
Fixfabriken	63
Gothenburg	1171

The subgroup sizes depending on cohabitation status in each area are presented in Table 5.2.

Table 5.2: Subgroup sizes based on the household arrangement in each area.

Area	Cohabitation status	Size (n)	Percentage (%)
Kallebäck	Family	30	19
	Couple	71	45
	Single	58	36
Fixfabriken	Family	14	22
	Couple	21	33
	Single	28	45
Gothenburg	Family	291	25
	Couple	440	38
	Single	403	34

Table 5.3 presents the group sizes for each area depending on whether the responders own a car or not.

Table 5.3: Subgroup sizes based on the car ownership in each area.

Area	Car owner?	Size (n)	Percentage (%)
Kallebäck	Yes	63	39
	No	96	60
Fixfabriken	Yes	39	62
	No	24	38
Gothenburg	Yes	602	51
	No	569	49

In the final table, the subgroups are based on both car ownership and cohabitation status. The result is presented in Table 5.4.

Table 5.4: Subgroup sizes based on car ownership and household arrangement in each area.

Area	Car owner?	Cohabitation status	Size (n)	Percentage (%)
Kallebäck	Yes	Family	9	6
		Couple	36	23
		Single	18	11
	No	Family	21	13
		Couple	35	22
		Single	40	25
Fixfabriken	Yes	Family	10	16
		Couple	15	24
		Single	14	22
	No	Family	4	6
		Couple	6	10
		Single	14	22
Gothenburg	Yes	Family	167	15
		Couple	256	23
		Single	158	14
	No	Family	124	11
		Couple	184	16
		Single	245	21

5.2 Usage of Different Mobility Options

To understand the general usage of different mobility options in Kallebäck's Terrasser, Fixfabriken, and the broader Gothenburg area, this section presents an overview of how different modes of transportation such as walking, biking, public transport, and private car use, are used by residents. These graphs provide insight into how mobility behaviour varies between neighbourhoods and how residents allocate their time across different travel options.

The aim is to gain a general understanding of the usage of different mobility options among residents.

As shown in Figure 5.1, residents in Kallebäck's Terrasser spend more time using public transport on a weekly basis compared to other modes. In contrast, walking is more common in Fixfabriken, while the broader Gothenburg average shows a more balanced distribution between walking and public transport.

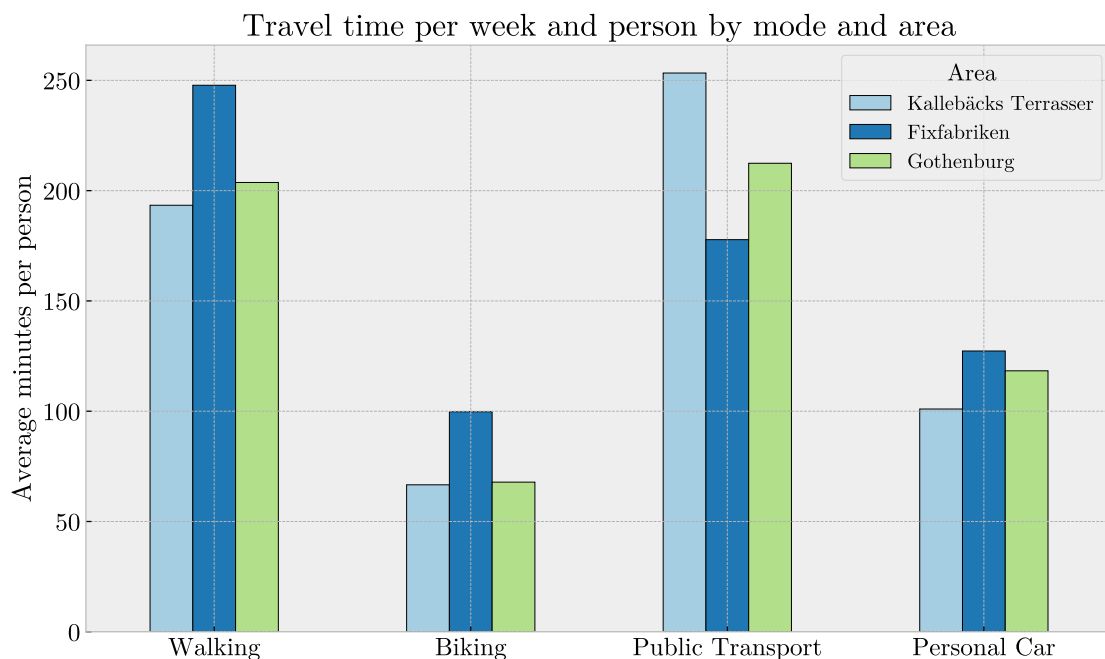


Figure 5.1: Average weekly usage (in minutes) of different modes of transportation in Kallebäck's Terrasser, Fixfabriken, and Gothenburg.

The relatively lower scores for biking in Kallebäck's Terrasser may reflect the area's topography, as several residents highlight the hilly landscape as a challenge. One respondent explains, *“Kallebäck is on a hill. I'd bike more often if it were flat. Walking is better.”* Another states, *“The main reason I don't bike more is that I prefer walking in the local area. If I'm going into the city, I find it too far to bike. I also live high up, so I'm not too excited about the uphill ride home.”* A third adds, *“But the steep hills make it hard for my legs to handle biking up and down all the time.”* (All quotes translated from Swedish.)

5.2.1 Travel Frequency by Mode of Transportation

This section explores how often residents travel to and from activities using various modes of transportation. The results are presented across different frequency categories and compared between the two neighbourhoods, Kallebäcks Terrasser and Fixfabriken, as well as the broader Gothenburg area.

As shown in Figure 5.2, walking is the most frequently used mode in all three areas. Residents in Fixfabriken report the highest rate of daily walking, with very few stating that they rarely or never walk. In Kallebäcks Terrasser, walking is also common, but the responses are more evenly distributed across the different frequency categories.

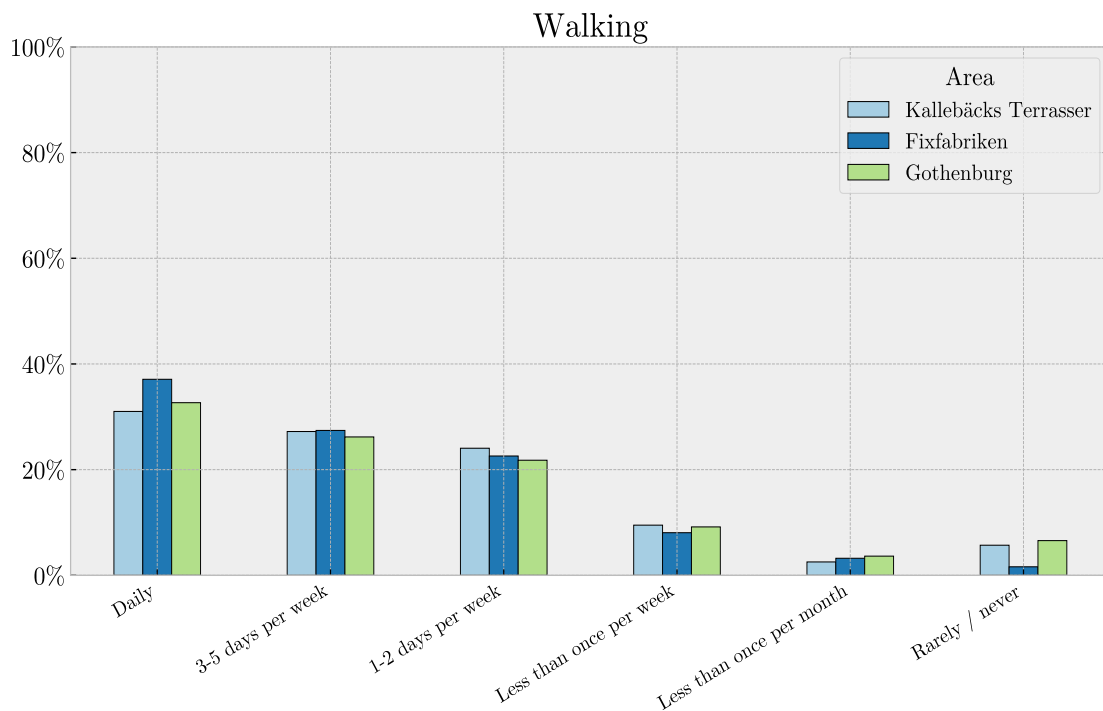


Figure 5.2: Walking frequency for travel to and from activities, presented by area and categorized by travel frequency.

Use of shared mobility services such as bikes or e-scooters is generally low across all areas. As shown in Figure 5.3, the vast majority of responders report that they rarely or never use shared bikes or e-scooters, with over 80% in Fixfabriken and around 75% in Kallebäck's Terrasser and Gothenburg selecting this category. Regular use (daily or several times per week) is minimal in both Fixfabriken and Kallebäck's Terrasser.

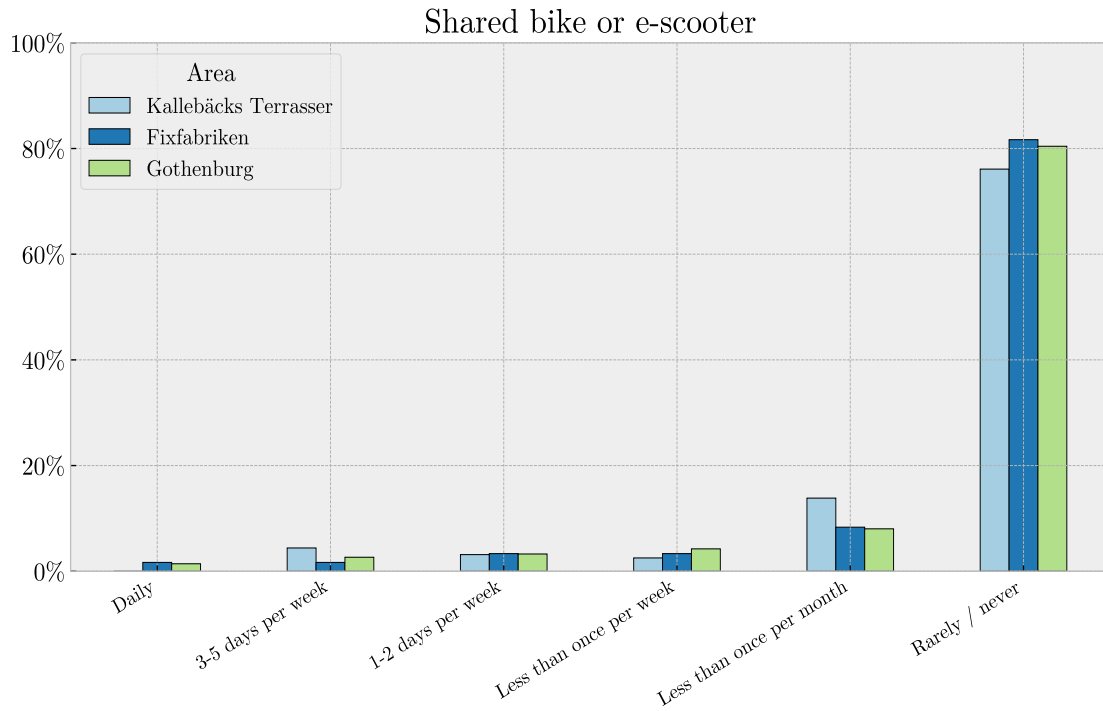


Figure 5.3: Frequency of shared bike or e-scooter use for travel to and from activities, by area and usage category.

As seen in Figure 5.4, both neighbourhoods use public transport to varying degrees, with no single area dominating across all frequency categories. Daily use is most common in Kallebäck's Terrasser, while residents in Fixfabriken report using public transport 3–5 days per week more often. In general, the results indicate that public transport plays a significant role in everyday mobility.

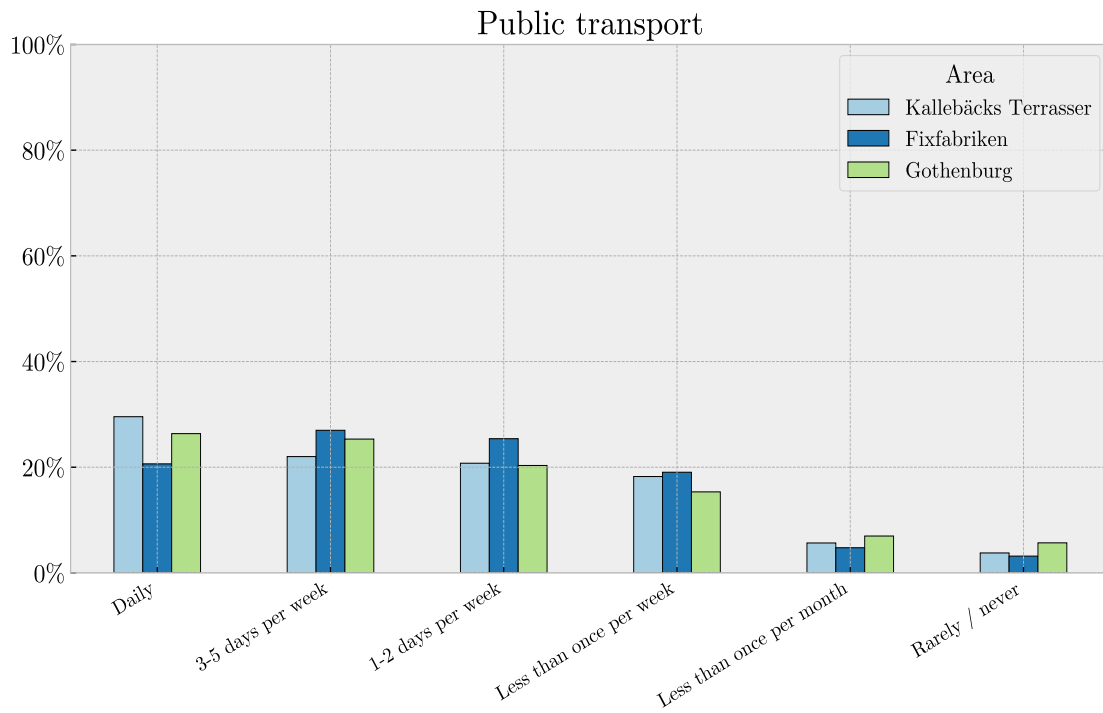


Figure 5.4: Distribution of public transport usage frequency for travel to and from activities across Kallebäck's Terrasser, Fixfabriken, and Gothenburg.

Despite being available, shared car options such as car sharing or taxis are not commonly used as part of residents regular travel routines. As seen in Figure 5.5, the vast majority across all areas report that they rarely or never use this mode. A small share of respondents in Fixfabriken report using it less than once a month, slightly more than in Kallebäck's Terrasser. Daily or frequent use is virtually non-existent.

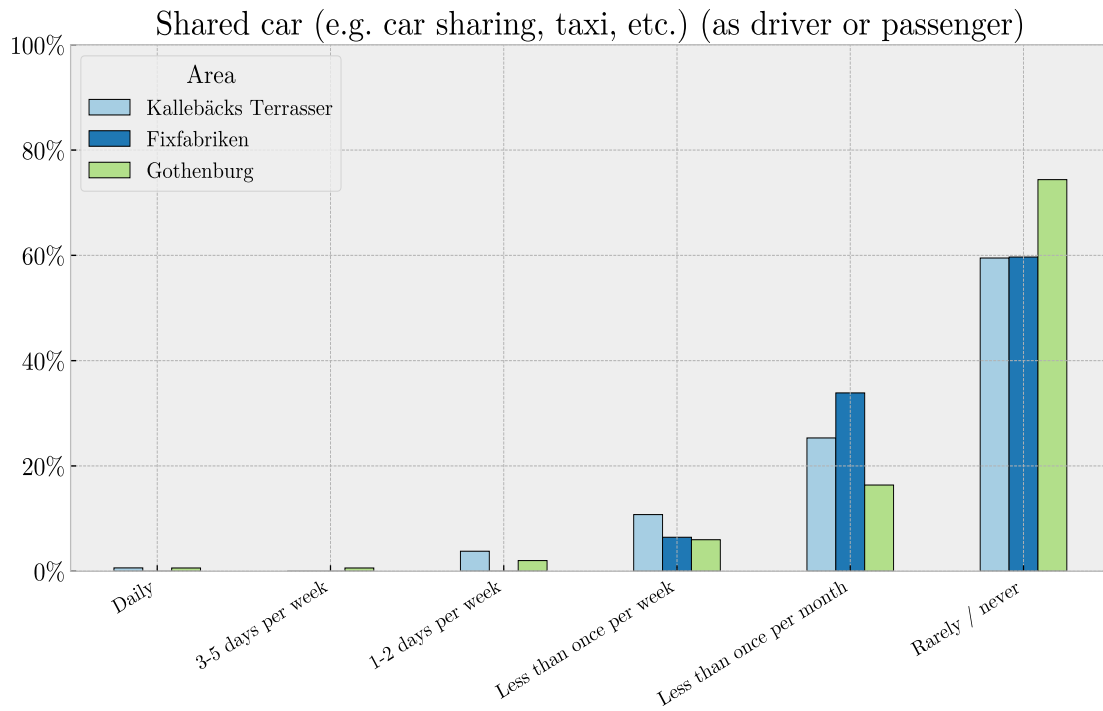


Figure 5.5: Frequency of shared car use for travel to and from activities in Kallebäck's Terrasser, Fixfabriken and Gothenburg.

Use of personal cars shows a more varied pattern compared to shared mobility options. In Figure 5.6, Fixfabriken stands out with a relatively even distribution across all frequency categories. In contrast, Kallebäck's Terrasser has the highest share of respondents who report rarely or never using a personal car.

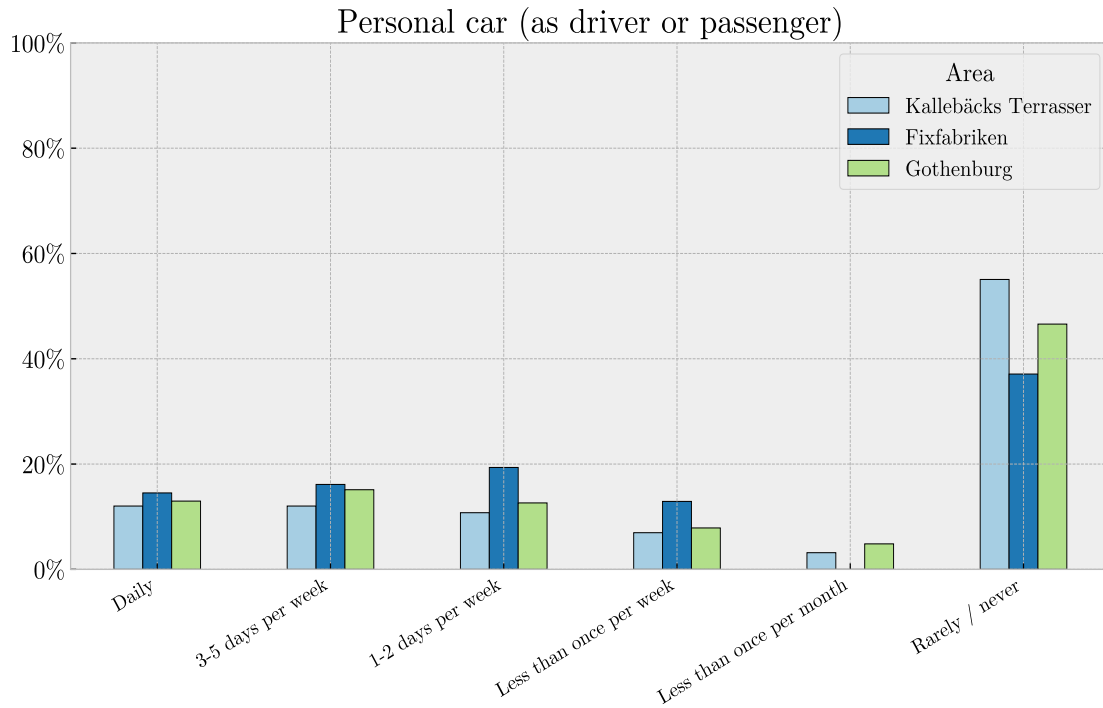


Figure 5.6: Frequency of personal car use for travel to and from activities in Kallebäck's Terrasser, Fixfabriken and Gothenburg.

5.3 Residents Experiences with Mobility Agreements

The following section will continue to present the results from the quantitative analysis. Here, the graphs constructed from the questions stated in the method section 3.2.1.2 will be presented. The responders were asked to answer the statements in the survey on a scale of 1 to 7. The results are either provided in a horizontal or regular bar chart with one bar for each subgroup.

For some bars on the horizontal bar graph, there is a grey part labelled "rest", representing the responders who did not answer the question. Next to each chart, there will be a table stating the mean value for each subgroup. The presentation of the mean values in the regular bar charts is presented in a table within the plot.

5.3.1 Satisfaction of the Mobility Agreement

To gain an understanding of the respondents general opinion about the implementation of the mobility agreement, the survey question "I am satisfied with the mobility measures in my building" was analysed. The results are presented in this section and help answer the research question 1a.

Figure 5.7 shows how satisfied the residents are in each property that the survey was sent out to. The black horizontal line represents the mean value for the residential areas.

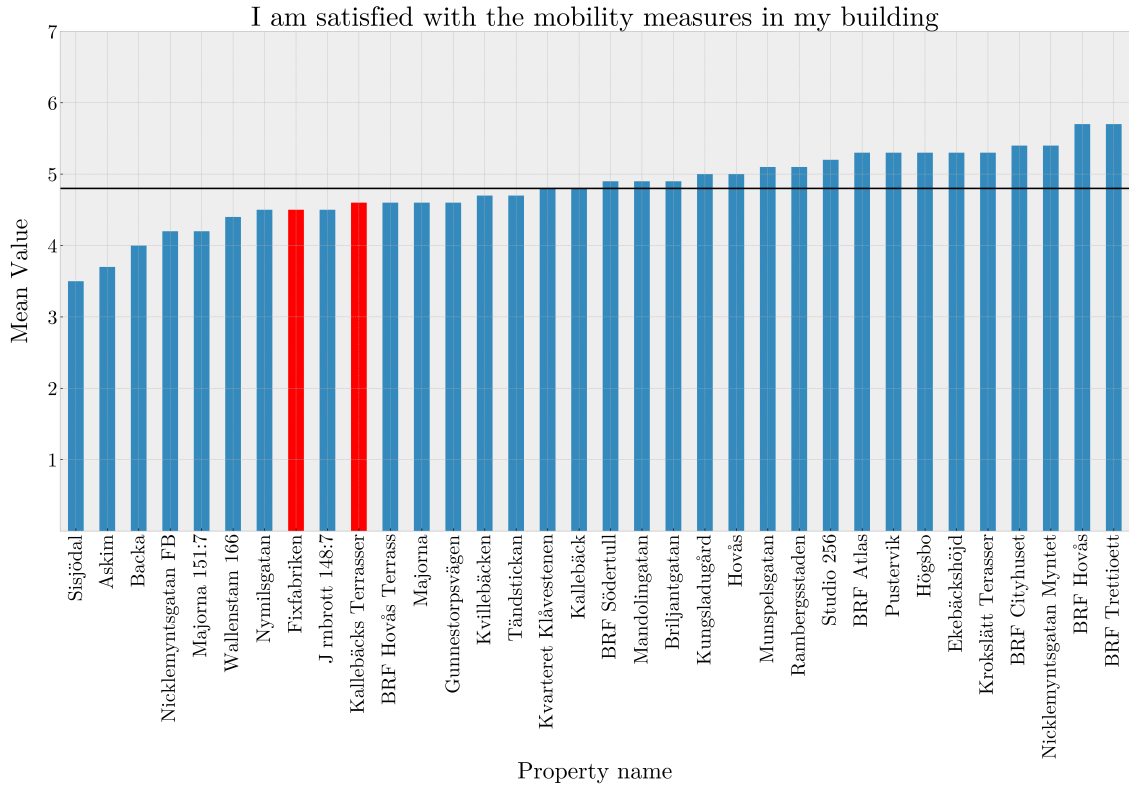


Figure 5.7: Mean values of the areas the survey was distributed to.

The mean values for Kallebäcks Terrasser and Fixfabriken are 4.6 and 4.5 respectively. For Gothenburg in total, the mean value is 4.8.

5. Results - Survey Analysis

Figure 5.8 shows how the satisfaction of the mobility agreement varies depending on the household. The mean value for each subgroup is presented in the grey table next to the graph. The figure also shows that families in Kallebäck's Terrasser report the highest satisfaction with their mobility measures, while couples in Kallebäck's Terrasser and families in Fixfabriken report the lowest. The remaining households show moderate satisfaction levels.

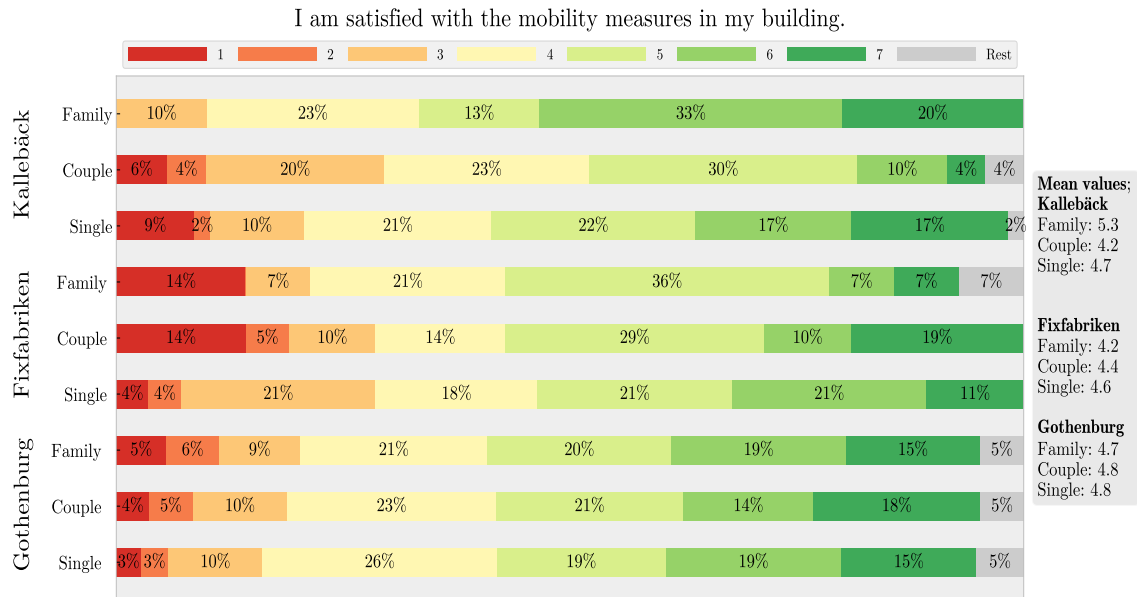


Figure 5.8: The residents satisfaction of the mobility measures in their respective area, depending on their cohabitation status.

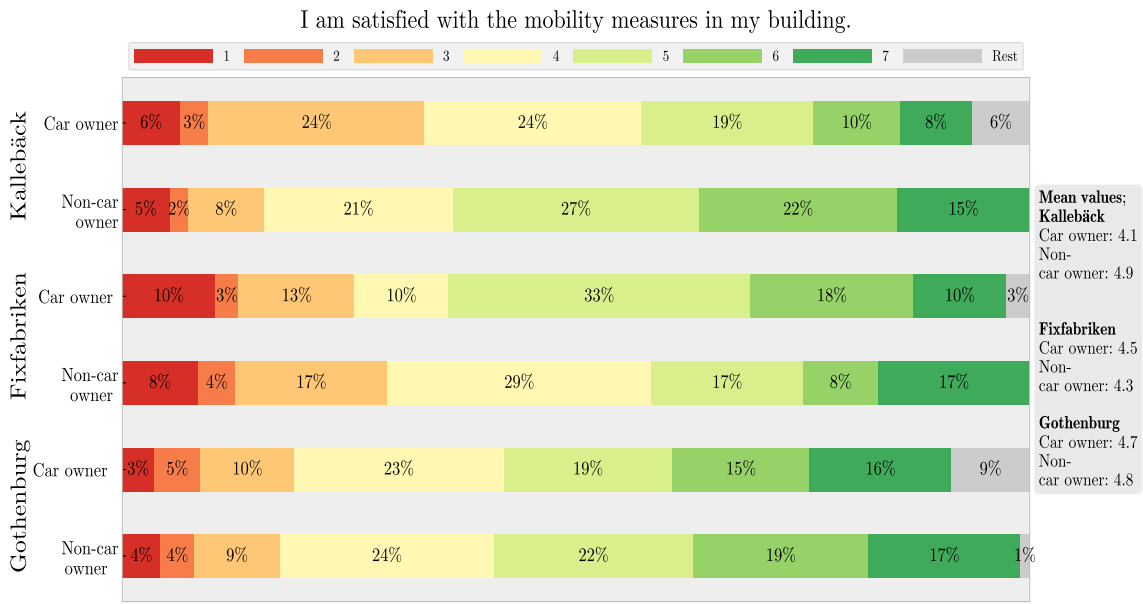


Figure 5.9: Residents satisfaction with building mobility measures by car ownership status in Kallebäck's Terrasser, Fixfabriken and Gothenburg.

Figure 5.9 compares satisfaction by car ownership status. In all areas, the distribution of agreement scores (1-7) differs between car owners and non-car owners. In Kallebäck's Terrasser, 37% of non-car owners select 6–7 compared with 18% of car owners, resulting in a higher mean value of 4.9 for non-car owners versus 4.1. Gothenburg shows a smaller gap (4.8 vs 4.7), while Fixfabriken presents nearly identical mean values (4.5 vs 4.3) they also have the highest proportion of low scores (1-2) at 13%.

Figure 5.10 shows how the satisfaction of the mobility agreement varies depending on car ownership and their cohabitation status.



Figure 5.10: The residents satisfaction of the mobility agreement in their respective area, depending on car ownership and cohabitation status.

In the upper row (non-car owners), families in Kallebäck report the highest overall satisfaction, followed closely by families in Fixfabriken, both exceed the mean score for Gothenburg. Comparing non-car owners and car owners across both neighbourhoods, Kallebäck achieves the highest mean values for every household type. In Fixfabriken, families with cars register the lowest satisfaction, while couples and singles show similar moderate scores.

5.3.2 Residents Awareness of Available Mobility Measures

To better understand residents awareness of the mobility measures and to address research question 1b, the following question "I am familiar with the mobility measures available in my apartment building" was examined. The overall mean value was 5.3 in Kallebäck's Terrasser and 5.7 in Fixfabriken.

Seen in Figure 5.11, families in Kallebäck report the greatest familiarity, with 55% selecting 6–7 and no responses below 2. Couples in Fixfabriken have the highest overall mean score (6.3), with a large majority selecting 6–7 and no responses below 4. Compared to Gothenburg, both Kallebäck and Fixfabriken show similar results, with only marginal differences between household types.

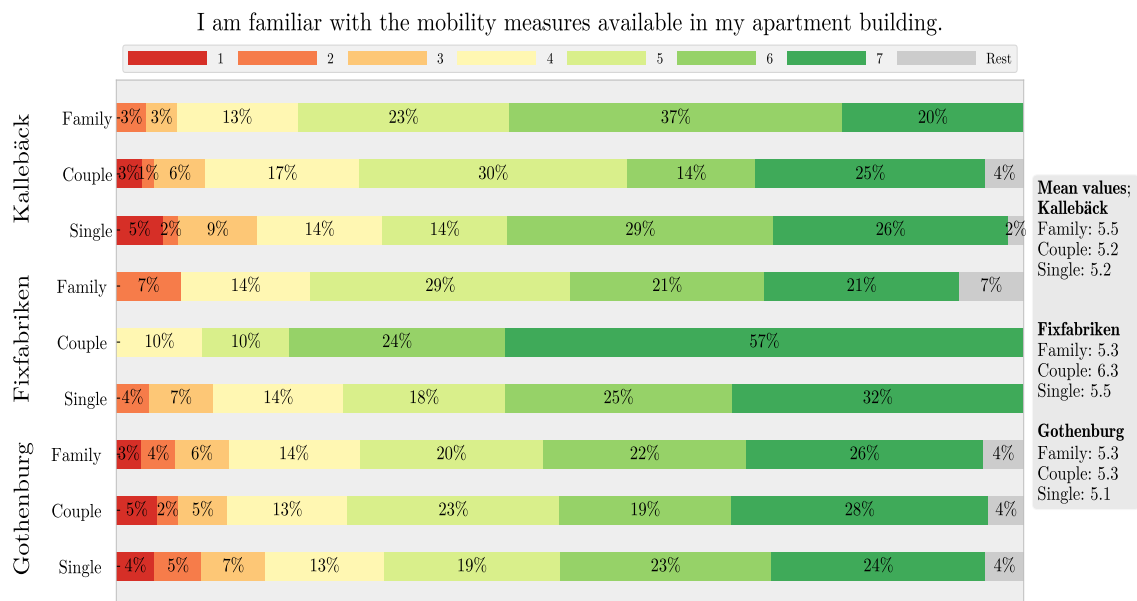


Figure 5.11: Familiarity with the mobility measures available in the apartment building, categorized by household type and residential area.

5. Results - Survey Analysis

Comparing car owners and non-car owners in Figure 5.12, the mean values for non-car owners in both Kallebäck and Fixfabriken are higher than the average for Gothenburg. In Kallebäck, 57% of non-car owners scored 6-7, compared to 35% of car owners. In Fixfabriken, car owners and non-car owners scored almost the same.

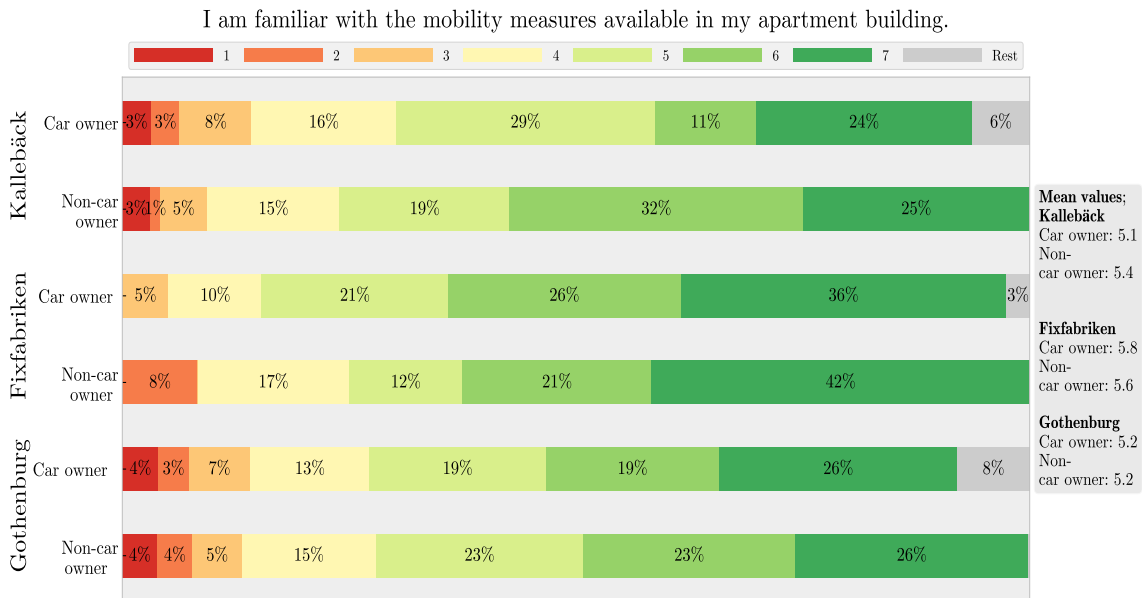


Figure 5.12: Familiarity with the mobility measures available in the apartment building, divided by car ownership and residential area.

5.3.3 Convenience of Mobility Solutions

To better understand the respondents on the convenience and usability of mobility measures, the question "Mobility measures are convenient and easy to use" was analysed. This question also contributes to answering research questions 1a and 1b. The overall mean values for the two neighbourhoods, Kallebäck and Fixfabriken, are 4.5 and 4.3 respectively.

Figure 5.13 shows that for mobility measures perceived as convenient and easy to use, families in Kallebäck score the highest with a mean value of 5.0. In Fixfabriken, single households achieve the highest score among the local groups. Compared to Gothenburg, only families in Kallebäck score above the city-wide averages, while all other groups fall below.

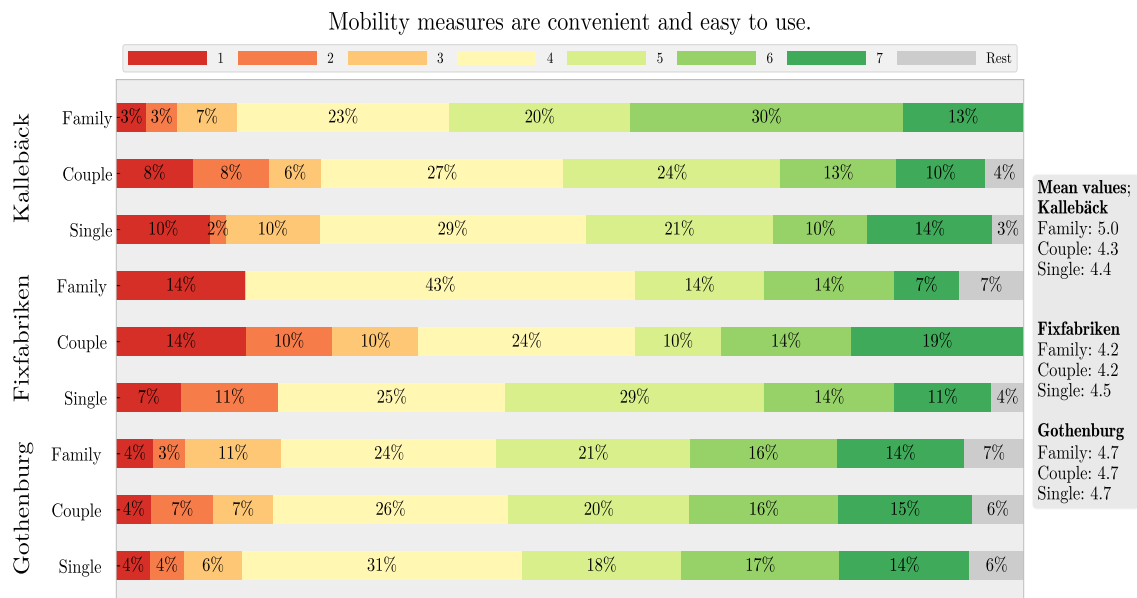


Figure 5.13: Residents experience of mobility measures in terms of convenience and ease of use, presented by household type and residential area.

Figure 5.14 presents the distribution of responses regarding the convenience and usability of mobility measures, categorised by household composition, car ownership, and residential area. Among non-car owners, families report the highest scores across Kallebäck and Fixfabriken, with mean values between 5.1 and 5.2. In contrast, among car owners, families in Kallebäck score highest (mean 4.6), while couples and singles generally score lower across both neighbourhoods. In particular, car owners in Kallebäck show a clearer difference between household types, with couples and singles scoring well below families. Overall, non-car owners tend to score higher than car owners in perceived convenience and ease of use.

Mobility measures are convenient and easy to use.

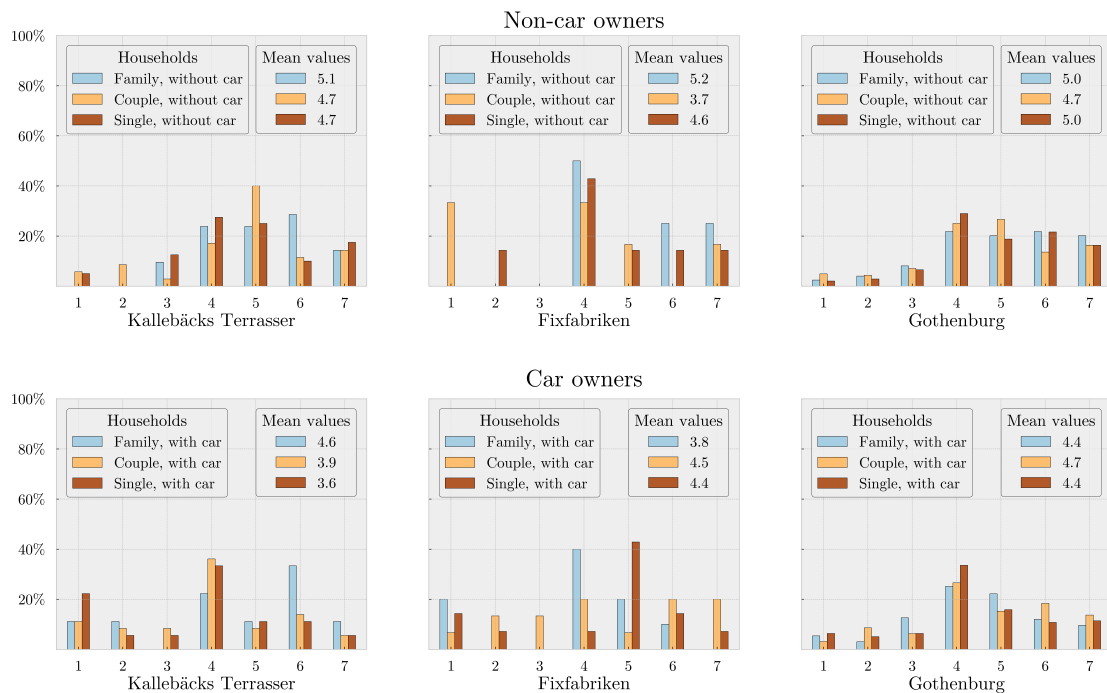


Figure 5.14: Residents views on the convenience and usability of mobility measures, presented by household composition, car ownership, and residential area.

5.3.4 Travel Convenience for Everyday Needs

To help answer research question 1b, this section explores how residents experience the convenience of their current travel habits in relation to completing everyday activities. The focus is on how this experience differs between car owners and non-car owners. The overall mean values show that the residents in Fixfabriken rate their travel convenience slightly higher, with a mean of 5.4, compared to 5.2 in Kallebäck. These results provide insight into how well current mobility measures support residents daily needs across the two neighbourhood as well as in Gothenburg.

Figure 5.15 presents how residents rate their ability to carry out daily activities based on current travel habits, divided by car ownership and residential area. In Kallebäck, car owners and non-car owners report the same mean value of 5.2, indicating no difference in perceived convenience between the two groups. In Fixfabriken, car owners score notably higher than non-car owners, with mean values of 5.6 and 5.0, respectively. A similar pattern is seen in Gothenburg, where car owners reach the highest overall score of 5.7, compared to 5.3 among non-car owners. These results suggest that car ownership is associated with higher ratings for travel convenience in Fixfabriken and Gothenburg, but not in Kallebäck.

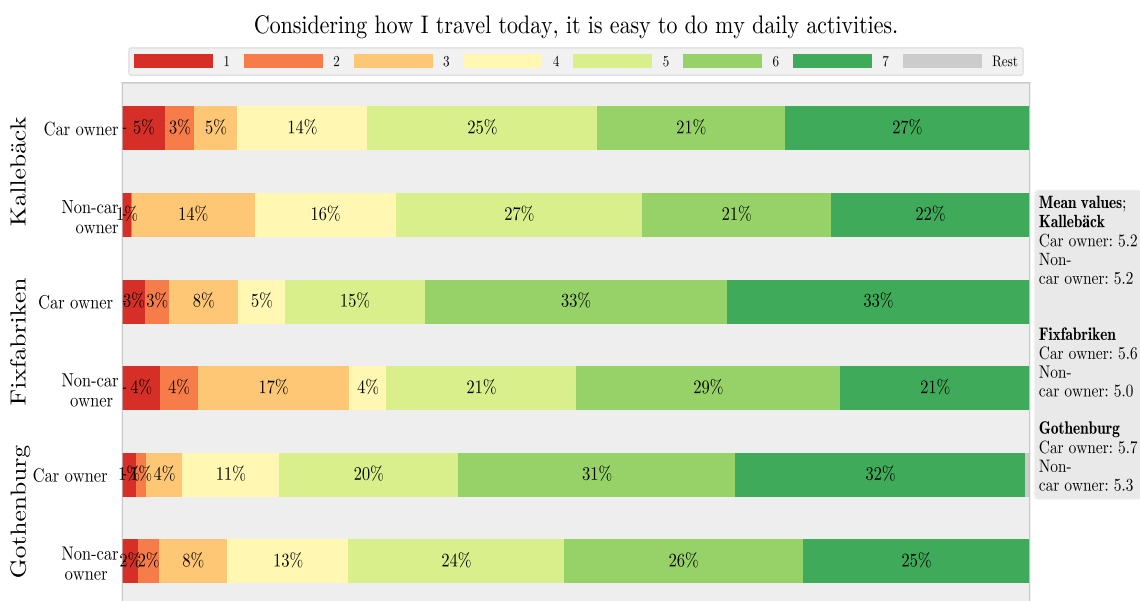


Figure 5.15: Ability to carry out daily activities based on current travel habits, presented by car ownership and residential area.

Figure 5.16 shows how the ability to carry out daily activities based on current travel habits varies depending on both household composition and car ownership. Among non-car owners, families in Fixfabriken report the highest mean score (5.8), with no responses below 5, followed by families in Kallebäck (5.1). In particular, both groups score higher than families with cars in the same areas, who report mean values of 5.0 in Fixfabriken and 4.2 in Kallebäck. This indicates that in these two neighbourhoods, non-car-owning families report greater travel convenience than car-owning families, a pattern not observed in Gothenburg.

Considering how I travel today, it is easy to do my daily activities.

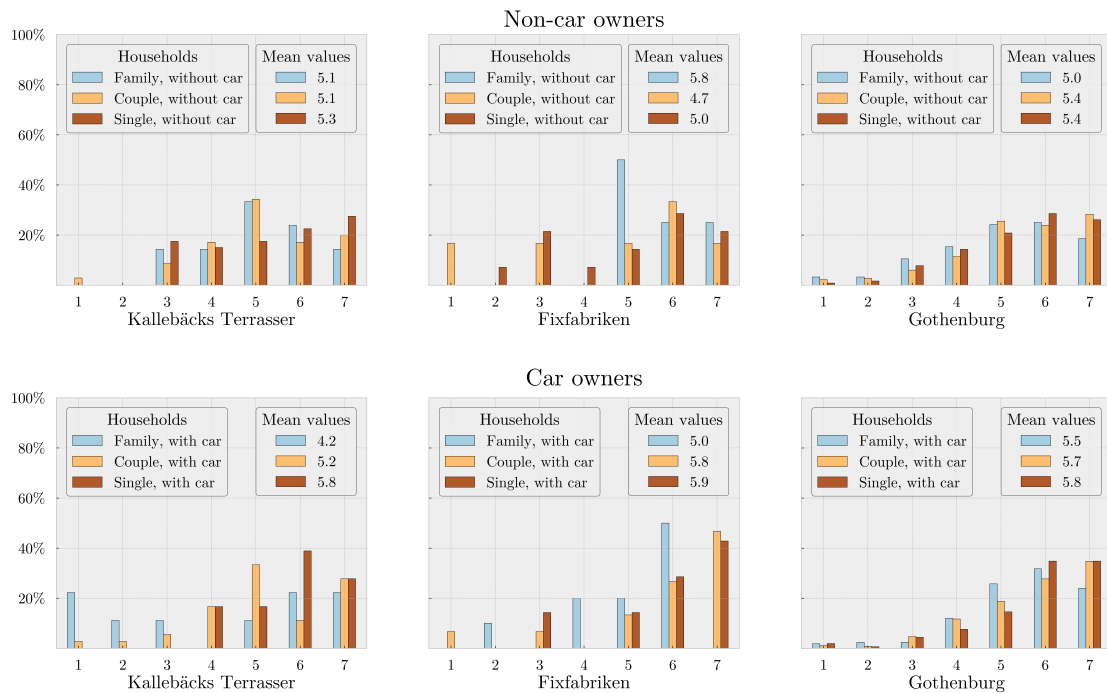


Figure 5.16: Ability to carry out daily activities based on current travel habits, shown by household composition, car ownership, and residential area.

5.3.5 Walking as a Means to Reach Shops and Activities in the Neighbourhood

To contribute to answering research question 1b, this section examines how residents experience walking as a means to reach shops and activities within their neighbourhood. The responses reflect the perceived accessibility of nearby destinations on foot. The overall mean value for this question is 4.5 in Kallebäck and 4.9 in Fixfabriken.

Figure 5.17 presents how residents assess walking as an efficient mode of transport to reach stores and activities according to household type, car ownership, and residential area. In Kallebäck's Terrasser, car-owning families report the highest number of the lowest possible scores (1), while non-car-owning families do not report any. Families, couples, and single households without cars in Kallebäck generally find walking to shops and activities more efficient than households with a car. A similar pattern is observed in Fixfabriken, where non-car-owning families report no scores below 4, resulting in a mean value one point higher than that of car-owning families.

Walking is an efficient way to travel to shops and activities in my neighborhood.

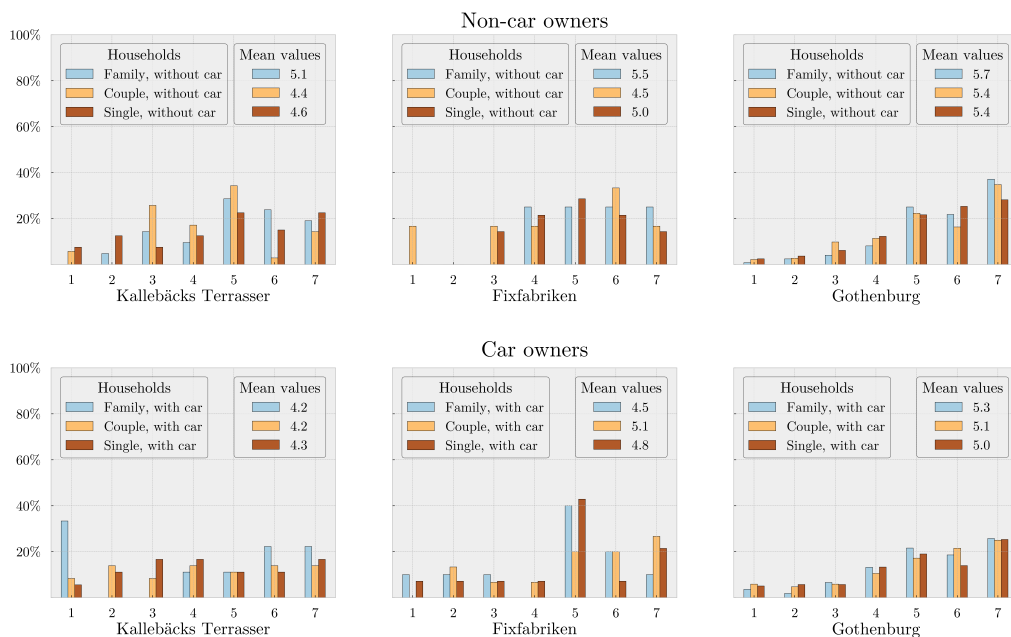


Figure 5.17: Responses to whether walking is considered an efficient mode of transport for accessing local shops and activities, presented by household composition, car ownership, and residential area.

5.3.6 Impact of Transit Pass on Public Transport Usage

This section examines how offering 30- or 90-day transit passes to new residents at move-in influences their public transport usage. The analysis contributes to answering both research question 1a and 1b. Only those who received a transit pass were asked to rate its influence on their public transport use. The results do not distinguish between 30-day and 90-day passes in relation to perceived impact. As shown in Table 5.5, a majority of respondents in both Kallebäck and Fixfabriken received a 30-day pass, and the overall mean values reported were 4.6 in Kallebäck and 4.2 in Fixfabriken.

Table 5.5: The amount of responders that where offered a transit pass when moving in.

Option	Kallebäck (n)	Fixfabriken (n)
Yes, a 90 days pass	0	1
Yes, a 30 days pass	111	41
No	35	17
Total responders	146	59

Figure 5.18 shows how the transit pass was perceived to influence the frequency of public transport use, based on household composition and car ownership. In Kallebäck, non-car-owning families report the strongest impact, with a mean value of 5.1, while couples in Fixfabriken report the lowest (3.0). Overall, non-car-owning households tend to rate the effect of the transit pass higher than those who own a car. This pattern is also observed in Gothenburg. These results indicate that the transit pass appears to have had a greater influence on travel behaviour for residents without access to a car.

Did the transit pass influence how frequently you use public transport?

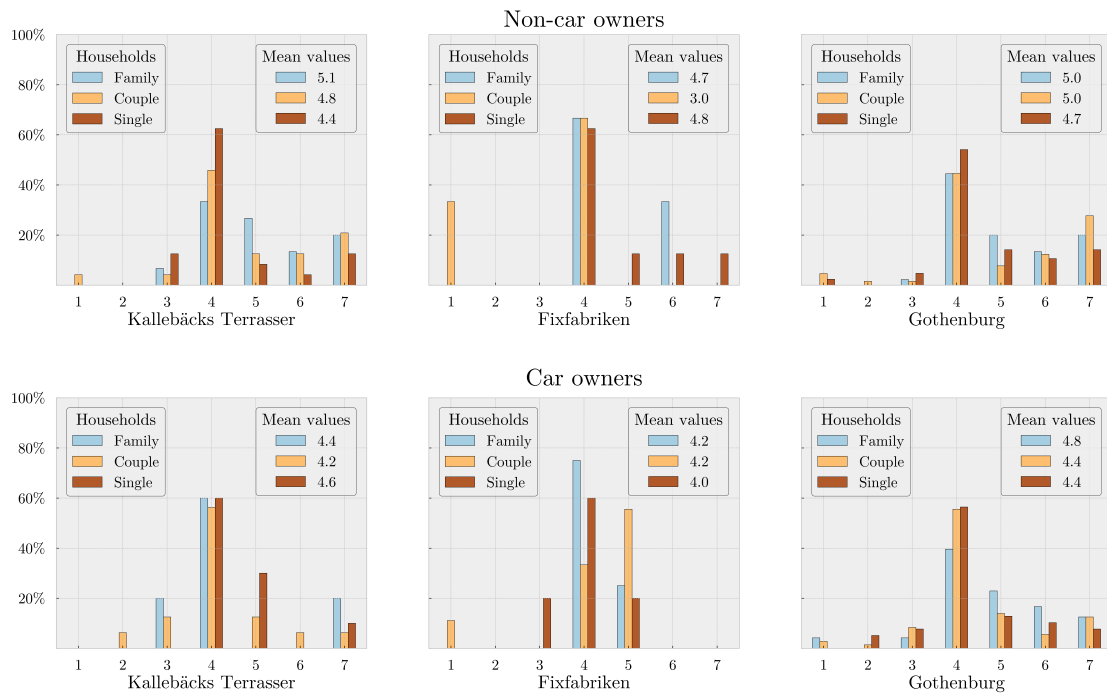


Figure 5.18: Influence of the transit pass on public transport usage, grouped by household composition and car ownership across Kallebäck, Fixfabriken, and Gothenburg.

5.3.7 Convenience of Bike-pool Locations

To help answer research questions 1a and 1b, this section examines how residents experienced the convenience of bike-pool locations. The question was only relevant in areas where a bike pool service was implemented, which explains why responses were only collected in Kallebäck. The reported mean value for Kallebäck is 5.7.

Figure 5.19 shows how residents rated the convenience of bike pool stations located in or near their apartment, divided by household type and residential area. In Kallebäck, all groups report high scores, with families averaging 5.8 and couples and singles averaging 5.6. The majority of respondents in Kallebäck selected values of 6 or 7.

Bike sharing bikes are located in a convenient location in or near my apartment.

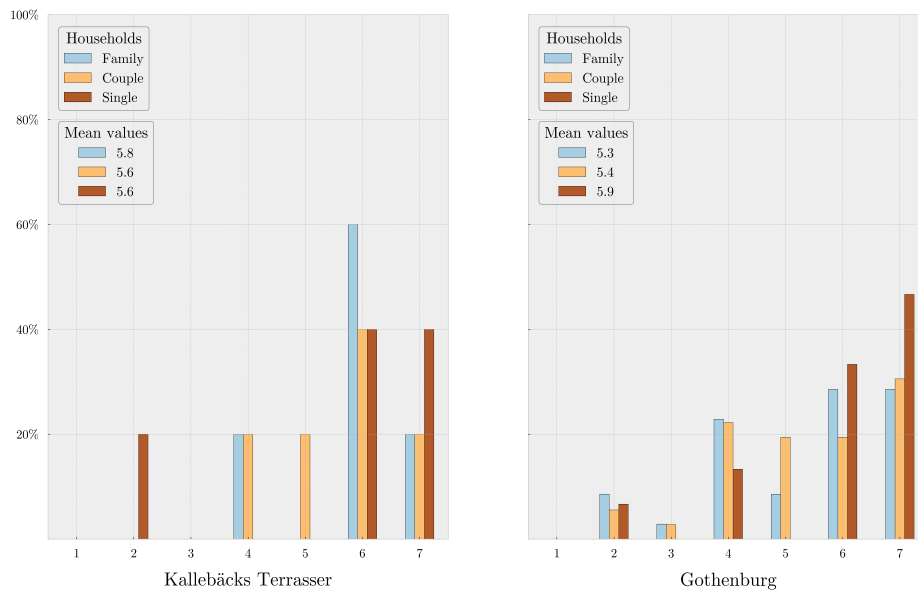


Figure 5.19: Availability of bike sharing stations in or near the apartment, as reported by different household types and residential areas.

5.3.8 Availability and Booking Ease of Bike pool Bikes

In addition to the location of bike pools (see question 5.3.7), it is also important to consider the availability of the bikes and how easy they are to book. This aspect contributes to answering research questions 1a and 1b. As the bike pool system was only available in Kallebäck, no responses were recorded from Fixfabriken. The overall mean value in Kallebäck is 5.8.

The results seen in Figure 5.20 show consistently high mean values across all household types. Only single households report scores as low as 2, while families do not report any values below 5. Despite some variation, all household categories in Kallebäck report higher average scores compared to those in Gothenburg.

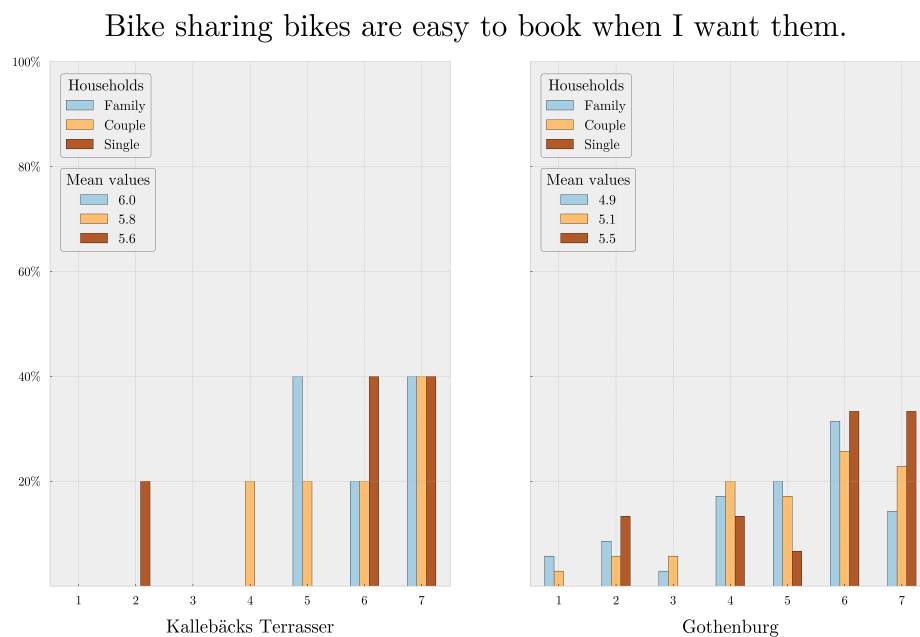


Figure 5.20: Experiences of booking bike sharing bikes when needed, presented by household composition and residential area.

5.3.9 Convenience of Carpool Vehicle Locations

This section presents the results on how conveniently located residents perceive carpool vehicles to be in or near their apartment. The overall mean value is 6.3 for Kallebäck and 6.4 for Fixfabriken, indicating a very high level of agreement in both areas.

As shown in Figure 5.21, families in Fixfabriken score the highest, with a mean value of 6.8. The majority of residents strongly agree with the statement, with no responses below 4. In Kallebäck, single households find the carpool vehicles the most conveniently located, with a mean value of 6.5. Overall, both neighbourhoods score high compared to Gothenburg.

Car sharing vehicles are located in a convenient location in or near my apartment.

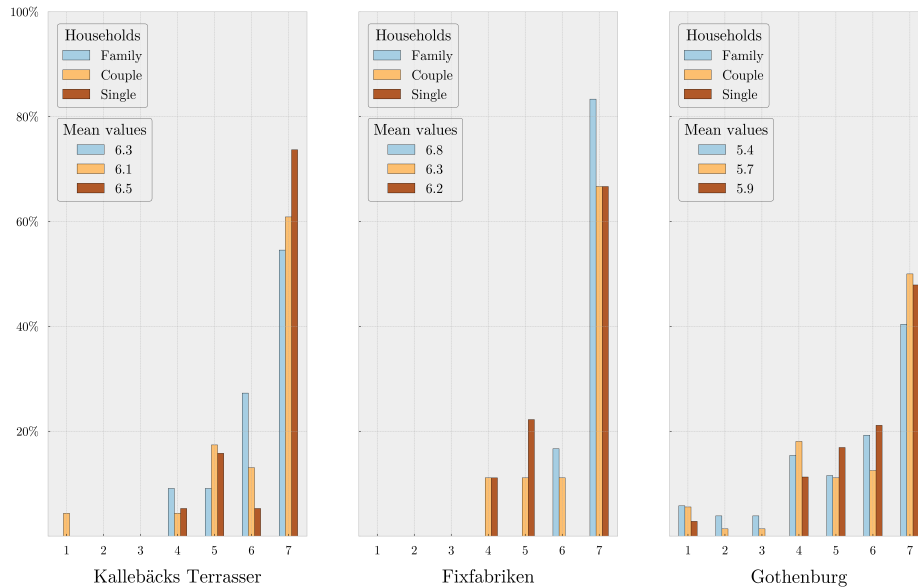


Figure 5.21: Survey responses regarding how conveniently located carpool vehicles are in relation to the apartment, presented by household type and residential area.

5.3.10 Availability and Booking Ease of Carpool Vehicles

Besides the location of carpools (see question 5.3.9), it is important to consider the ease of booking carpool vehicles. This helps address research questions 1a and 1b. The overall mean values for both neighbourhoods are 5.2 in Kallebäck and 5.0 in Fixfabriken.

In Figure 5.22, single households in both Kallebäck and Fixfabriken score the highest, which is also the case in Gothenburg. A noticeable difference is that families in Kallebäck score higher than families in Fixfabriken.

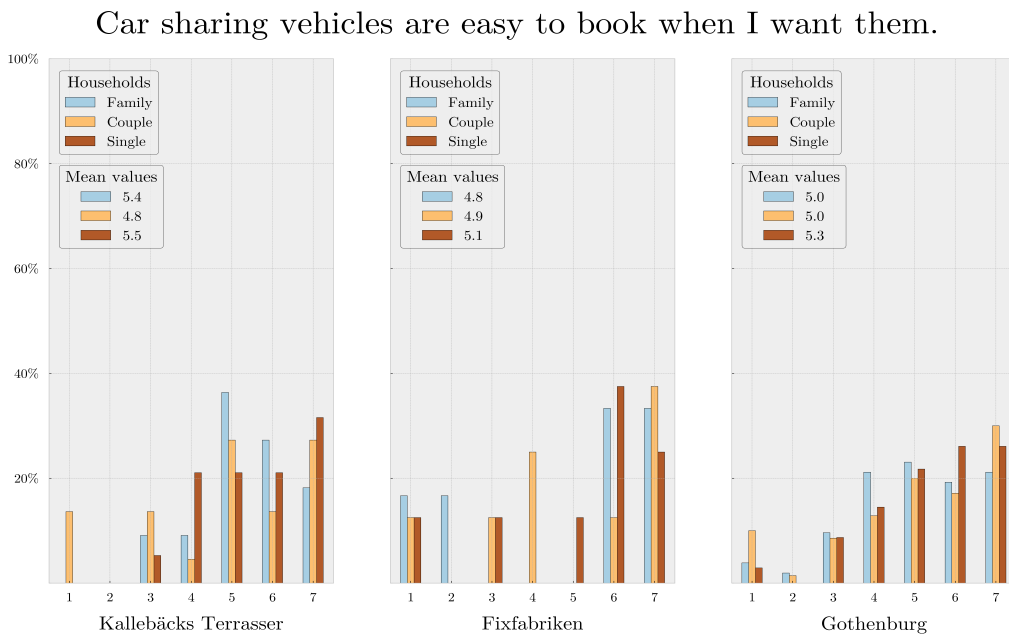


Figure 5.22: Experiences of how easy it is to book carpool vehicles, shown by household type and location.

6

Results - Interview with Stakeholders

Interviews with five different stakeholders have been conducted in order to understand and answer research questions 1a, 1b and 1c. The interviewed stakeholders are:

- Property developer at Fixfabriken (HSB)
- Property developer at Kallebäckers Terrasser (Wallenstam)
- Representative from the municipality of Gothenburg
- Carpool company operative in Gothenburg (OKQ8)
- External property developer, an entity within the City of Gothenburg, not affiliated with Fixfabriken nor Kallebäckers Terrasser.

The interviewed representatives will remain anonymous and will not be cited by name in the results below.

In order to organise the interviews, the following chapter has been divided into three sections: implementation, communication, and evaluation. Each subsection focusses on one of the three research questions.

6.1 Implementation of Mobility Agreements

How mobility measures are implemented by developers has a part in their usage later on. What is signed on paper does not always reflect how it works out in reality. Parts of the conducted interviews have therefore been dedicated to gain an understanding of how the different developers have implemented the mobility measures and their opinion on the process.

The interviewee from HSB that represents Fixfabriken explains that their main reason for signing mobility agreements comes from an economic perspective. This is due to the high costs associated with the construction of large parking facilities, especially in a dense urban environment. However, the interviewee also points out that fewer parking spots reduce the overall attraction of the project, making the apartments harder to sell. The interviewee continues and points out that offering a free 30-day public transport card (which is part of the agreement) is expensive. Therefore, before offering the transit pass, residents are asked if they want the card or not. Doing this prevents the developer from using their resources in an inefficient

way.

The initially implemented bike pool was removed and replaced by a carpool, due to low usage. The cargo bikes were stolen and not replaced because of financial reasons, although the cargo bike parking still exists. The interviewee expressed frustration with the lack of interest from the housing association board regarding the implemented mobility measures. For example, the low enthusiasm has resulted in a two-tier bicycle rack costing over 100 000 SEK lying unassembled in one of the property garages.

The interviewee explained that HSB had chosen to increase the number of fixed parking spaces from 75% to 100%, as they questioned the fact that only a limited number of residents are allowed a fixed parking space. However, the representative interviewed expresses criticism towards non-fixed parking spaces, describing them as “*a bit into the personal sphere*”. However, disability spots were fixed for accessibility reasons.

The Wallenstam interviewee representing Kallebäck's Terrasser, stated that their main motivation for signing a mobility agreement was to reduce the amount of parking spaces required. The interviewee also experiences that the mobility agreement was seen as a requirement from the municipality to obtain a building permit.

Wallenstam continues to explain that residents who rent a parking space are allowed a place in one of the garages, but not a specific one. It is assumed that not all parking spaces will be used at all times, resulting in the property owner overselling the parking spots. Furthermore, the interviewee points out that many mobility solutions are “A - A”, meaning that the vehicle must be returned to the same location, a solution that often does not reflect people's demand. Instead, it is advocated for A - B solutions, where a vehicle can be picked up and left at a different location, like the Styr & Ställ bicycles that are already implemented in Gothenburg.

The external property developer, who is part of the municipality-owned company Framtiden AB, describes in the interview that due to them being owned by the municipality, they have identified mobility agreements as a tool to achieve the city's environmental and climate goals. It also reduces congestion, as Gothenburg continues to grow. Sustainable urban development is therefore the primary driving force for the implementation of mobility measures, while project economics in new developments also play a crucial role.

At the time of the interview, this external property developer had no completed residential project with mobility agreements, although the first residents moved in as of April 2025. The interview also reveals that they have focused on implementing mobility measures in existing properties, with mixed results.

6.2 Communication

For mobility options to be used and to actually contribute to reduced car usage, residents must know about them and want to use them. A mobility measure that is unknown to most residents or too complicated to use is unlikely to succeed, regardless of how good the measure is. Parts of the interviews have therefore been focused on the different stakeholders view on the subject and how the communication has been to the residents.

6.2.1 Communication when Selling

An important part of the communication and the very first step, is to make residents aware that a mobility agreement has been signed. The property developer at Fixfabriken points out that some people who move in, or are interested in moving in, believe that the lack of parking is unattractive. The interviewee then points out that they must explain that this is to make people change and that the society needs to change, even though not everyone is equally interested in it.

One of the other developers describes that when moving in, all residents receive an information kit that describes mobility measures. This is a requirement of the agreement. However, it is generally implemented very differently. The interviewee points out that they also try to inform that the property has mobility measures before it is sold or rented out. Although the developer is self-critical about this and said that the early information could be carried out better, which would increase the satisfaction of the residents in the long term.

The representatives from the municipality of Gothenburg described that they have talked to developers about making standardised communication material. Some developers ask for it, while others want to do it their own way. What would be best is not clear and has not been discussed enough yet, according to the interviewee.

6.2.2 Communication Over Time

One subject that came up in several of the interviews is how developers are using a phone application to spread information. The developer at Kallebäcks Terrasser stated the following:

“The fact that we have a tenancy app where we have good direct contact with our tenants is good. It is the same app that is used to book the laundry room etc. So, the app is always used, making it a natural way for us to reach out and for the residents to see it. I think that has been a successful factor.” (Translated from Swedish)

The importance of having an application to reach out to residents is also made clear by the carpool company. They would appreciate being seen in these tenancy

applications in order to advertise the carpool service. It is said to not have to be a complete booking tool, but just a banner. The interviewee points out the often technical difficulties that may halt this development. There are often several stakeholders with different interests, and it takes many resources to adapt this application to every housing association.

Another measure that has a similar purpose to the tenancy app is the information screens installed in the entrances. These screens are a mobility measure and are installed in both developments. The developer in Kallebäcks Terrasser points out that they always install these screens nowadays (in both mobility and non-mobility agreement properties) and that they therefore got a "free" mobility measure by having it display public transport departures. Interviewees in both areas pointed out that in their experience, very few use the screen as intended. Residents find it easier to check the same information on their phones rather than standing in the hallway looking at the screen to see when the next tram leaves.

Another way of communicating about mobility measures to residents is by the annual mobility activity. This is an additional mobility measure according to Section 4 that both developments have agreed on. One of the developers said the following during the interview:

"In the agreement we have the mobility activity that we invite to that has been successful. We also have invited a bike repair shop that has been appreciated, so they have been there and fixed peoples bikes and tried to encourage more residents to cycle." (Translated from Swedish)

6.2.3 Communication when Handing Over to Housing Association

In multiple interviews, a major challenge was discussed: how the process of transferring the property from the developer to the housing association is handled. One of the municipality representatives emphasised that between the granting of the building permit and the final notice being issued, the board consists of representatives from the developer. However, when the property is done moving in, the board is changed to only include residents. These transfers are said to create challenges in communication due to the many steps and people involved, especially since the mobility agreements represent only a small part of all the paperwork the board has to deal with.

The representative from the municipality said the following:

"It is a challenge, to go from a developer whose highest priority is not the mobility agreement to a housing association who has absolutely zero experience with mobility. In the best of worlds there is a cycling enthusiast who loves it, but often that is not the case, and the agreement can be a burden for the association to maintain, but of

course it could also be an opportunity.” (Translated from Swedish)

The interviewee continues by saying that if the board is not aware or interested in the mobility agreements, it is obviously difficult for them to communicate this to the residents, resulting in lower usage. The municipality would appreciate being contacted when the property is moved in and sold by the developer. That would allow the newly assigned board to ask questions to the municipality and for them to know how the agreement is thought to work out in reality. Although that would allow the municipality to inform and discuss the agreements more with the housing association, the opportunities to do that are not there right now.

The challenge of the transfer process is also noted by the carpool company. The interviewee points out that it is far from obvious that even one single person who was a member of the first housing association board is still in it after ten years when the agreement runs out. The cost of the carpool therefore comes up as a surprise when a potential extension to the contract should be written, and the risk of it being down prioritised is big.

6.3 Evaluation

To ensure that mobility agreements are followed over time, communication between the municipality and property owners is of great importance. This section presents the results of three interviews: one with three representatives from the City of Gothenburg, and one interview each with the property developers Wallenstam (representing Kallebäck's Terrasser) and HSB (representing Fixfabriken).

6.3.1 The Municipality's Role in the Evaluation Process

In the interview with the representatives from the City of Gothenburg, it became clear that they are the ones responsible for signing all mobility agreements. The communication between them and the developers is therefore important and plays a role in the outcome of the agreement.

According to one of the interviewees from the City of Gothenburg, there is still no established process for how the follow-up of the mobility agreements should be carried out. Currently, follow-up is conducted in various ways depending on the project, in order to test and evaluate what works best in practice. The flexibility in the follow-up process is due to the fact that the concept of mobility agreements is still quite new. However, the municipality states that they maintain a register for each mobility agreement, which includes contact information for those responsible for each project. A recurring issue is that these contact persons often change jobs, which, according to the municipality, complicates the follow-up process.

One of those responsible for the mobility agreements further explained that since 2022, the municipality has been inviting all property owners to joint meetings. These

meetings take place about once or twice a year and aim to create dialogue and follow up on progress. Although participation is voluntary, a large proportion of property owners, especially the larger actors, usually attend.

Furthermore, one of the interviewees from the City of Gothenburg explained that in 2022 the municipality sent out a survey to all property companies with mobility agreements to follow up on how far each project had progressed. For the projects that were completed and occupied, a more in-depth survey was sent out. Simultaneously, the property developers were also informed that a site visit would be conducted to verify that the information in the survey matched the reality. The results of the follow-up were mostly positive, with most projects having fulfilled what was stated in the mobility agreements.

6.3.2 Evaluation in Kallebäcks Terrasser

In the interview with Wallenstam, the representative expressed that they had relatively limited contact with the municipality during the course of the project. The representative believed that the project would likely have benefited from more frequent contact to follow up on results and revise the agreement accordingly.

The importance of exchanging experiences between property developers and the municipality was also emphasised. One highlighted example was the Forsåker project in Mölndal, where Wallenstam, drawing on experience from Kallebäcks Terrasser, was able to contribute valuable insights:

“I think many more would have benefited from the information sharing we had there, but perhaps there should have been more active work with the municipalities being involved and facilitating that exchange of information to make it easier for everyone who is going to work with these services.” (Translated from Swedish)

The representative from Wallenstam suggested that the municipality could take a more active role in future projects in transferring knowledge and information to avoid repeating previous mistakes. It is also noted that the agreement is strict, and even though the developers see that not all pool cars are being used, they still have to be there. Only costing money and creating a non-sustainable economic situation since the demand is not there.

Regarding the car and bike pool, the representative from Wallenstam stated that all follow-up is handled by Elbilio, who then reports the results back to Wallenstam. This process has worked smoothly, as all vehicle reservations are done through Elbilio' app. However, from the evaluation performed by Elbilio, it was found that the demand for the number of cars was lower than what was stated in the agreement. Wallenstam would have appreciated more continuous communication with the municipality to manage such issues. The representative emphasised that while the municipality had good intentions with the agreement, the actual demand does not always align with planning, which can result in high costs for underutilised mo-

bility solutions.

6.3.3 Evaluation in Fixfabriken

In contrast to Kallebäck's Terrasser, the representative from HSB experienced the evaluation process in Fixfabriken as more structured and consistent. HSB is satisfied with the communication and points out that the process after signing the agreement was flexible. The interviewee pointed out that they identified that the bike pool had low usage. The developer therefore negotiated and replaced the bike pool (that was a star measure) with an extended carpool that was assessed to have the same value.

“And then it was okay for the city, so we had to rewrite that. So it was very pragmatic of the municipality. And I think they handle it well, they are responsive, flexible, and agile in their communication with us and what we can do. So I would say it worked well.” (Translated from Swedish)

The HSB representative also explained that they initially had the responsibility to deliver what was stated in the mobility agreement. Therefore, HSB was responsible for communication with the municipality during the early stages. Once the project was completed, the property was handed over to the housing association board to manage. During that transition, HSB had the responsibility of ensuring that communication between the housing association and the municipality functioned smoothly. Nowadays, the housing association and the municipality meet about once a year to follow up on the mobility agreement.

The follow-up of the carpool is conducted in collaboration with OKQ8, and the interviewee expressed that the cooperation and follow-up work very well.

“We actually have a follow-up on our carpool. We have a good collaboration with OKQ8, and our carpool in Fixfabriken is very appreciated.” (Translated from Swedish)

7

Results - Site Visit

As a complement to the survey data and conducted interviews, site visits were made at each residential area to gain a deeper understanding of the local conditions. During these visits, the focus was on documenting the implementation of the agreed mobility measures, such as bicycle parking, service areas, carpool, and real-time departure boards. In addition, communication of these measures to residents was observed, as well as the extent of follow-up and management. A summary of the observations for each area is presented in the following chapter.

7.1 Kallebäcks Terrasser

The visits to Kallebäcks Terrasser were made on a weekday morning and afternoon. The afternoon visit was guided by a representative from Wallenstam. Regarding the implementation of the mobility agreements, it was disclosed that Kallebäcks Terrasser plans to have a total of 18 bicycle storage rooms once all blocks are fully constructed and occupied. These bicycle rooms are located on the ground floor of each building and are, in most cases, intended for the residents of the respective building. All bike rooms were well equipped and some had two-tier bike racks, pumps, and lockers that allowed secure storage and charging for bicycle batteries. Figure 7.1 shows the bicycle rooms. The well-equipped bicycle rooms are part of the mobility measure aimed at providing attractive and theft-secure bicycle parking.



Figure 7.1: The figures shows the bicycle rooms in Kallebäcks Terrasser including public work stands and a locker for bike batteries.

As part of the ongoing follow-up process, regular removal of abandoned bikes is carried out to prevent the bike rooms from becoming overcrowded. In addition to indoor bike rooms, standard outdoor bike racks were placed outside the building. The use of these was generally low, except for the racks located outside the elementary school, which were frequently used.

Once the entire Kallebäck's Terrasser development is completed, a total of ten car-pool parking spaces with vehicles from Elbilio will be available. Currently, six electric cars are in use, distributed with two vehicles per street that crosses residential blocks. Elbilio also provides a bicycle pool for the area, offering both electric and cargo bikes, see Figure 7.2. This service also includes theft protection and follow-up, meaning that stolen bikes have been replaced through Elbilio.



Figure 7.2: Electric bikes and cargo bikes provided by Elbilio.

The communication surrounding mobility measures was generally perceived as well thought out and clear during the site visit. At both the car and bike pool locations, clear signs with instructions on how to use the vehicle were available, see Figure 7.3. Other mobility solutions, such as bicycle storage rooms, were also clearly marked with bicycle logos. This visual communication helps residents easily identify the locations of available mobility solutions. In addition, all entrances were equipped with real-time departure boards, showing current bus departures in the areas, strengthening access and awareness of public transportation.

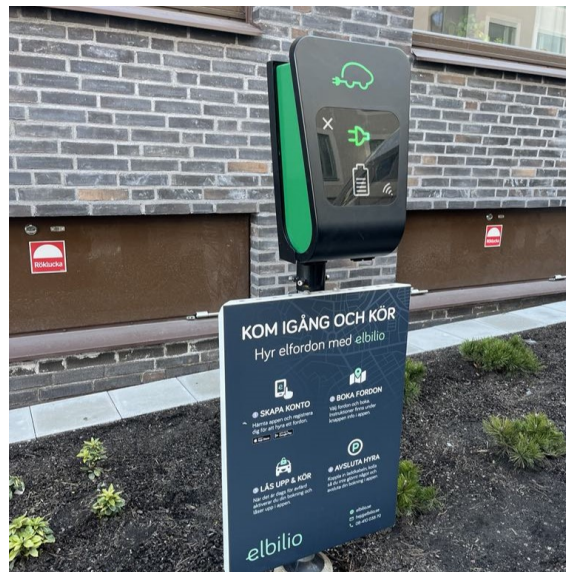


Figure 7.3: Instructions on how to use the carpool in Kallebäck's Terrasser.

7.2 Fixfabriken

The two visits to Fixfabriken were conducted on weekdays, one in the morning and one in the afternoon. The afternoon visit was guided by HSB. The implementation that was observed during these visits included well-equipped bicycle service rooms, designated carpool parking spaces with cars provided by OKQ8 and communal rooms with workspaces. Three shared cars were located between the four residential blocks, with parking spaces marked with a sign. The carpool is shown in Figure 7.4. There were designated parking spaces for cargo bikes. However, no cargo bikes were present at the time. Bikes had previously been purchased by Balder and HSB, but were stolen and had not been replaced since.



Figure 7.4: A car from the carpool in Fixfabriken.

7. Results - Site Visit

Both accessible indoor bicycle storage rooms and standard outdoor bicycle racks were available, although residents primarily made use of the indoor facilities (see Figure 7.5). During the site visit, it was observed that the bicycle rooms on the ground floor facing the street were highly secured with reinforced glass. They were located in areas that are difficult for non-residents to access, which also increases security.



Figure 7.5: One of the indoor bicycle rooms in Fixfabriken.

To facilitate communication with residents, real-time departure boards were installed, providing updates on both public transport and mobility measures. The real-time departure board is shown in Figure 7.6. For instance, users could access information on how the carpool system operates, along with other relevant updates through the resident app. However, there was limited visual signage that indicated the location of mobility facilities, such as bicycle rooms.



Figure 7.6: A real-time departure board in Fixfabriken, located in one of the entrance, with information about the carpool.

7. Results - Site Visit

Since Balder and HSB have transferred ownership of Fixfabriken to the housing association board, which now oversee the property management, there appears to have been a shift in priorities concerning the mobility agreements. This has affected follow-up efforts. An example is the case of costly two-tier bicycle racks that have been purchased but remain uninstalled and unused in the garage (see Figure 7.7).



Figure 7.7: An uninstalled two- tier bicycle rack in one of Fixfabriken garages.

8

Discussion

The following section discusses and highlights the key results in the context of our research questions. The survey results will be connected with what was established from interviews, site visits, and area analysis to anchor the results and to come to a conclusion.

8.1 Implementation of the Mobility Measures

As seen in Figure 5.15 (Considering how I travel today, it is easy to do my daily activities.) we can see that the mean values are rather high for residents with and without a car. The initial hypothesis was that properties with mobility agreements would show lower satisfaction among car owners. However, these results show that the convenience of driving probably outweighs any disincentives to those who drive. It was then realised that it is hard to make it easier to not own a car, compared to having a car. A car increases the feeling of comfort, flexibility, and freedom. According to Lagrell and Gil Solá [30], daily needs such as commuting or going to the gym could be done without a car, while social activities are usually harder to do without a car, especially for families and the elderly. Not having a car is seen as an obstacle and increases the feeling of being dependent on others [30]. Since people are often used to having a car, it is hard to provide a better alternative. The goal may be to make it easy not to have a car compared to making it easier.

As seen in Figure 5.15 (Considering how I travel today, it is easy to do my daily activities.) the difference between the mean values is not that large and the mean values are greater than the median value (3.5) indicating that residents can travel quite easily without owning a car. The result is about the same in both Kallebäcks Terrasser and Fixfabriken, as well as the rest of Gothenburg. This can be a sign that mobility agreements have an impact on residents travel behaviours.

Another aspect to take into account when evaluating this survey question is that the daily activities probably vary for the residents. Some people might work on the other side of Gothenburg, and therefore it is not convenient for them to use public transport, while for others public transport might be an optimal choice of transportation. However, from Figure 5.17 (Walking is an efficient way to travel to shops and activities in my neighbourhood), one can notice slightly more positive results from families in both Fixfabriken and Kallebäcks Terrasser compared to singles and couples. That is, families without a car find it easier to walk to their daily activities.

This is an interesting finding, as Lagrell and Gil Solá state that families are one of the most car-dependent household groups [30]. The fact that both Kallebäcks Terrasser and Fixfabriken have implemented both an elementary school and a preschool in the areas might explain why families in these two areas report fewer difficulties managing daily life without a car. Westman et al. have done research in the area and found that one reason for major car dependency for families is driving their kids to school and somewhat also sporting activities [31]. With a school in the area, driving there is not necessary and the overall car dependency decreases. Concluding that having schools in close proximity to the area is a great way of reducing car use and dependency for families.

Although being an attractive area for families, with schools, playgrounds, and sporting facilities, it is important to evaluate the need for all types of households when developing an area with the aim of reducing car dependency. The needs of singles and couples may not have been given the same amount of consideration. This could partly explain why these groups have lower results than families. However, for households who own a car, it does not seem to be a large difference between household compositions. This could be explained by the fact that households with cars do not have the same need to walk to their daily activities.

An additional factor that may have influenced how residents perceive the implementation of mobility measures is the area's topography. In section 5.3.5 (Walking is an efficient way to travel to shops and activities in my neighbourhood) it is clear that the mean value in Fixfabriken (4.9) is higher than in Kallebäcks Terrasser (4.5). This outcome may be described by the differences in topography. During the site visits, it became clear that Fixfabriken is a more walkable area with flat terrain, while Kallebäcks Terrasser is significantly more elevated, with numerous stairs.

The results thus indicate that the implementation of the mobility agreement may have the best conditions for success and lead to more satisfied residents, in areas where the topography is more flat. During the site visits, it became clear that elevated terrain can act as a barrier for choosing cycling or walking instead of driving, especially when residents in the area expressed that cycling uphill is physically challenging. Simultaneously, it is important to emphasise that convenience often plays a significant role in people's behaviour. Even if mobility solutions are available, it may be more natural for residents in an elevated area to choose the car over the bike, when the more sustainable transport demands greater physical effort.

8.1.1 Influence of the Free Transit Pass

When studying the implementation of mobility agreements, we believed it would be interesting to study how the implementations influence the residents travel behaviours. For both areas, residents were offered a 30 day public transport when they moved in as part of the mobility agreement.

Studying the graphs in Figure 5.18 (Did the transit pass influence how frequently

you use public transport), it can be seen that the mean values in all subgroups are rather similar. The lowest being for non-car owners in Fixfabriken. By only comparing Kallebäck's Terrasser and Fixfabriken, it was observed that the mean value in Kallebäck (4.6) was slightly higher than in Fixfabriken (4.2). The problem with this question is that it is not possible to know if the free transit influenced the residents to use it more or less frequently. However, as shown in Figure 5.1 (Travel time per week and person by mode and area), residents in Kallebäck's Terrasser report using public transport more frequently per week compared to both Fixfabriken and the whole Gothenburg. This might reflect the higher mean value in Kallebäck's Terrasser regarding the impact of the free transit pass.

8.1.2 Carpool

When examining the graphs in Figure 5.21 (Car sharing vehicles are located in a convenient place in or near my apartment), residents in both Kallebäck's Terrasser and Fixfabriken are more satisfied compared to the overall Gothenburg area. There is also a noticeable difference between Kallebäck's Terrasser and Fixfabriken, with Fixfabriken residents slightly more satisfied with the placement of car sharing vehicles. The next two paragraphs present two main reasons that could explain this difference.

First, Fixfabriken has only three available cars, all centrally located among the buildings (see Figure 7.4). In contrast, Kallebäck's Terrasser currently has six available cars, distributed such that two cars are placed within each residential block.

Secondly, as mentioned before, the terrain differs significantly between the two areas. Kallebäck's Terrasser has a more elevated terrain (described in Subsection 4.2.1), compared to Fixfabriken's relatively flat terrain (described in Subsection 4.3.1). The elevated terrain in Kallebäck's Terrasser requires spreading out the placement of the cars, as buildings are situated at different elevations, making a single central location impractical. Despite slightly lower satisfaction ratings in Kallebäck's Terrasser, both areas still show that their carpool placements are more convenient compared to Gothenburg overall.

8.1.3 Bike Pool

Regarding the bike pool service, a direct comparison between Fixfabriken and Kallebäck's Terrasser is not feasible since Fixfabriken currently does not offer a bike pool service. Comparing Kallebäck's Terrasser with Gothenburg overall, there is not a significant difference in satisfaction. However, a notable observation is that some respondents rated the bike pool location as low as 2, indicating dissatisfaction. One possible reason for this dissatisfaction was observed during the site visit. The placement of the bike pool service in a building at the top of the hill makes access challenging for some residents.

As illustrated in Figure 5.3 the residents in both areas rarely or never use the shared bike pool. This raises questions such as whether a bike pool is a reasonable mobility measure to justify a reduction in the parking requirement. A likely reason for the low usage is explained in the interview with a representative from Wallenstam. It was pointed out that the current bike pool operates as an A-A solution, which is believed to be perceived as impractical by the residents and therefore likely a reason for the low usage. Instead, one solution to this is to implement a bike pool as an A-B solution. This would potentially increase the usage. However, this would require more coordination between different mobility providers as well as a broader collaboration at the municipal level. This is because an A-B solution is more difficult to tie to a specific mobility agreement. An alternative would be to operate the bike pool through an external company, such as in Kallebäck's Terrasser. If this company operates in several places in the city, it enables bikes to be rented in one place and returned in another. This would also enable the stolen cargo bikes to be replaced by the responsible carpool company, instead of the property owner having to cover expensive replacement costs, as in Fixfabriken.

8.1.4 Motivation Behind Implementation

From the interviews, it is clear that the motivation behind implementing mobility measures is different among property owners. The reason for adopting mobility measures falls into three categories: economic, environmental, and duty. Both Wallenstam and HSB have stated that one reason for implementing mobility measures was to gain the reduction in MPR, this to save money during development. However, through the interview with the external property developer, not affiliated with Kallebäck's Terrasser or Fixfabriken, it became clear that their driving force for implementing mobility agreements was sustainable urban development.

This contributes to differences in implementation. For instance, focusing on saving money may result in choosing the mobility measures that are the easiest to implement, while wanting to promote a sustainable city might make them choose the measures that are more environmentally targeted. This could be due to the municipality having environmental demands, for example, becoming climate neutral by 2030. Of course, the other property developers also have to be part of this demand, but the municipality might be working from the inside out to achieve this goal.

No matter the motivation behind signing a contract with the municipality regarding mobility measures, the result is a path toward a more sustainable city with less car use and more shared travel. However, the result opens up for discussion regarding who to focus on when choosing who should implement mobility measures. We believe that for mobility solutions to work properly, the motivation behind implementing them should preferably be sincere to the environment. At the same time, it is hard to ignore the fact that private companies need to have an economic motivation for the implementation in order to operate as a company. One potential solution to increase the effectiveness of the agreements could be that the company includes an

environmental representative in the implementation process. This ensures that the motivation for implementing the mobility agreement is a balance between economical and environmental motivations.

8.1.5 Involvement of the Carpool Companies

Another topic worth discussing is whether carpool companies can be involved earlier in the process, already at the stage when mobility agreements are created. Involving not only the municipality and the developers, but also a carpool company could be beneficial for all parties, as it probably would reduce the likelihood of communication problems arising later on. Ideally, this would also minimise the need for future interventions by the municipality. If a partnership exists between the developer and the carpool company, they can together determine the appropriate number of vehicles to provide. Both parties would also gain clarity about a stable and predictable revenue stream.

In an interview with a representative from a carpool company, it was mentioned that it is challenging to join the process at a later stage, especially when financial agreements are already in place. It is much harder to adapt to existing conditions than it is to participate early and influence the terms from the outset. This is further highlighted by Marsden. G, where the importance of including all stakeholders while writing policies in the transportation sector is discussed [32]. This, together with what was found from the interviews, supports the fact that to create a sustainable agreement where all parties can deliver on what is decided, one needs to include all stakeholders and parties from an early stage.

8.1.6 Demographically Differences

The differences in results of the implementation of the mobility agreement can be explained by the different demographic conditions in the two areas. The fact that the residents in Fixfabriken are generally older and have a higher income than the residents in Kallebäcks Terrasser may have an impact on the outcome of the mobility agreement implementation. Generally speaking, people with a higher income tend to own a car [33], which may reduce their interest in using mobility solutions. The overall attitude towards mobility likely plays a central role in the outcome of the mobility agreements. In an area like Fixfabriken, where a larger portion of residents own a car, there might be less interest in services like bike and car pools. In contrast, Kallebäcks Terrasser has younger residents with lower income, who may not own a car and therefore find these mobility services more useful. At the same time, there is probably a higher risk of dissatisfaction with the mobility agreements in an area with many private cars, as the mobility agreements have replaced a number of parking places. Therefore, the mobility agreement makes it more difficult to own a car. This idea is supported by Figure 5.7, where residents in Kallebäcks Terrasser are slightly more satisfied with the mobility agreement than residents in Fixfabriken.

8.2 Communication of the Mobility Measures

This section will discuss the results regarding how the mobility measures are communicated in the different areas. It also presents possible reasons for the outcome, as well as ideas on how to increase the residents familiarity with the mobility measures.

8.2.1 Communication of Carpool

As seen in Figure 5.22 (Car sharing vehicles are easy to book when I want them), the mean values in Kallebäckers Terrasser are higher than in Fixfabriken. It is also noticeable that a higher percentage of residents in Fixfabriken are very negative to the question (selected 1 on the 1-7 scale) compared to Kallebäckers Terrasser, where the responses are more evenly distributed. This could possibly be a consequence of the difference in communication at the two locations. During the site visits, it was noted that a greater focus on visual marketing and advertisements of the mobility measures was implemented in Kallebäckers Terrasser, with large signs and bike rooms in prime locations. Figures 8.1 and 8.2 shows the differences of how the carpool is presented in the areas. At the same time, Fixfabriken has information about the carpool on their information screens and lets the residents know how to use them on their website.

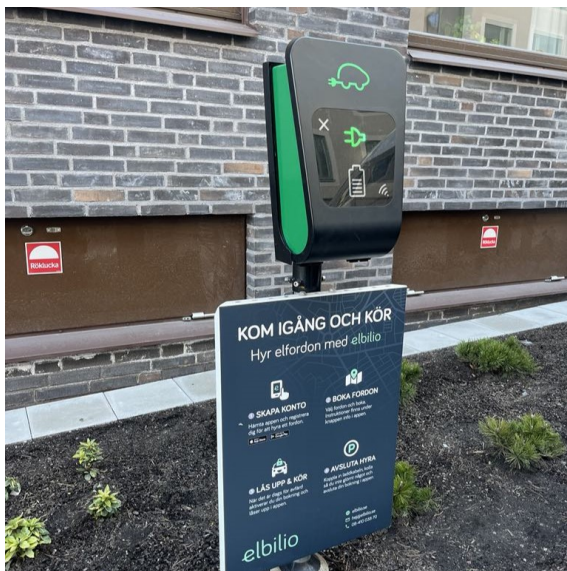


Figure 8.1: Picture of the carpool parking spot in Kallebäckers Terrasser taken during the site visit.



Figure 8.2: Picture of the carpool parking spot and car in Fixfabriken taken during the site visits.

Residents in Fixfabriken are generally older than in Kallebäckers Terrasser, according to the demographic analysis done in section 4.1, this could also have an implication

on how the communication would be conducted the best. With younger residents a phone application may be better suited, like Wallenstams tenancy app, while for residents that are older (65+) communication by mail or on the information screens in the entryways may be more appreciated. Gerd Paul confirms this by stating the fact that people over 60 years old are less likely to use a mobile phone, and that this generational gap is not expected to decrease in the near future [34]. This means that Fixfabriken, with its older population, has favourable conditions for reaching its residents by not only relying on online communication.

From the interviews, it also became clear that the booking of the cars in the carpool was always done in a separate application and that the operating companies would appreciate being more integrated in the tenancy app or housing association website. Although this is somewhat true in Fixfabriken, residents still need to download a separate app to use and book the car sharing vehicle. Good advertisement and communication between applications could minimise this issue. Figure 5.22 (Car sharing vehicles are easy to book when I want them) shows that some residents are still unhappy with the booking experience, despite the developers efforts to make it as seamless as possible. Fixfabriken has a slightly lower mean value, possibly due to the fact that people over 60 years old have less experience with mobile devices [34], as discussed in the previous section.

The results also show that more communication is always good. In this case, it is hard to overdo it, so if the developer has the opportunity, it is favourable to have clear signs and make people see the mobility measures. While this mainly applies to the carpool in this specific question, we believe it is a general phenomenon and could be applied to other measures as well, such as cargo bike pools or co-working rooms. The more people who know about it, the more people will use it.

8.2.2 Familiarity of the Mobility Measures

It is clear that the two areas have a different approach on how to promote their mobility measures. Kallebäcks Terrasser uses illustrations to show where the bicycle parking and service rooms are located, while Fixfabriken does not. In Figure 5.11 (I am familiar with the mobility measures in my building) we can see that in general the residents of Fixfabriken have a better awareness of where the mobility solutions are located. This indicates that, even though graphically advertising probably does not reduce the knowledge of mobility solutions, it might not improve it either. Kallebäcks Terrasser emphasized their app, as a way to communicate, which probably suited their younger residents. Meanwhile, Fixfabriken used more physical information, which probably matched the needs of older residents. The fact that these different approaches led to quite similar results suggests that there is no “correct” way to communicate the mobility measures. Instead, analysing the target demographic in the area can be useful in order to tailor the communication to the specific groups of residents.

It is also insightful to compare car owners and non-car owners. Figure 5.12 (I am familiar with the mobility measures in my building) demonstrates that non-car owners in Kallebäck's Terrasser report higher familiarity with mobility measures compared to car owners. This likely reflects that households without a private vehicle are more receptive to alternative mobility services and pay greater attention to related communications. In Fixfabriken, 42% of non-car owners gave the highest familiarity rating of 7, compared with 36% of car owners. Both figures indicate strong familiarity, yet the difference suggests that car owners remain slightly less aware of their mobility measures.

This difference emphasizes the importance of effective communication strategies. If Fixfabriken, Kallebäck's Terrasser and similar developments aim to elevate car owners familiarity to match that of non-car owners, it is essential to enhance and broaden communication efforts. This includes clear and accessible app notifications, informational screens in entryways, printed welcome materials, targeted email reminders, and visible outdoor signage that clearly indicates the locations of car and bike pool services. Placing information about the mobility measures in places where car owners are likely to be, such as in garages, can also be an effective way to increase awareness in this target group.

8.2.3 Annual Mobility Activity

A mobility measure that both Kallebäck's Terrasser and Fixfabriken have adapted is the annual mobility activity. From the conducted interviews, the developers described the days as successful and a good way to reach out to the residents. The agreements do not state exactly how the activity day should include or look like, but Wallenstam explains that they invited a bike-repair shop and encouraged residents to come and get their bikes fixed. In Fixfabriken the carpool company gave out advertising and answered questions. This mobility measure allows for creativity and freedom, possibly making it very valuable, but if the interest is not there from the property owner or housing association, it could also become a burden, where only minimum effort is put in, resulting in low utility.

According to Figure B.3, about the residents view on the mobility activity's effect on lowering car usage, the results are low. This might be due to a relatively low actual usage. It is a fairly niche day, and residents who are not interested in, for example bikes, will probably not participate. This could be avoided by making the day interesting for more residents with different interests and different ages. The mobility day could also be combined with other activities. That would make more people take part, but it might also put away some focus on the actual mobility factor. The low responses in the survey might also be due to how the question was formulated. The question asked concerns how effective the mobility activity is on reducing the need to own and/or use a car. While people might appreciate the activity, its main point might not be to make people sell their car, but to make it easier and help those without cars and accommodate their travel needs in a better way. In

conclusion, the annual mobility activity is a good way of communicating about the implemented mobility measures as well as a way of advertising and encouraging its use. While the survey results are quite low, that might not represent its effectiveness.

8.2.4 Difference Between Owned and Rented Apartments

One topic that was discussed in almost all interviews is the fact that Kallebäck's Terrasser consists of rental apartments, while the studied properties in Fixfabriken exclusively consist of tenant-owned apartments. This creates both opportunities and difficulties for the different areas. The familiarity with the location of the mobility measures could depend on the type of apartments the property developer is building. It is more of a commitment to buy an apartment, rather than renting, and that might encourage the tenants to do more research beforehand, resulting in greater familiarity with the area. People who live in rental apartments also tend to move more frequently. According to Boverket, residents in rented apartments are 13 percentage points more likely to move than residents owning their apartment [35]. This makes the general familiarity with the area lower, which might make illustrations and visual branding more important, perhaps explaining why Kallebäck's Terrasser focuses on this while Fixfabriken does not.

Regarding communication, one key takeaway from the interviews is that it is often easier for rental developers than for developers who build tenant-owned apartments. This is mainly because when the housing association takes over the property, there is a change in the owning structure and a lot of information can easily get lost. This is highlighted in the interview with HSB where the representative explains how the developer bought a two-tire bicycle rack for over 100 000 SEK, that the housing association still has not put up due to their lack of both interest and knowledge. Rental property owners, on the other hand, have a longer perspective. They are the ones responsible for both implementation and managing the mobility measures over time. This eliminates any gaps in the communication and creates better opportunities for building relationships with both residents and the municipality. Interestingly though, the conducted interviews made it clear that the developer at Fixfabriken was happier with the communication with the municipality than the developers at Kallebäck's Terrasser, this is discussed in more detail in Section 8.3 below.

While this communication issue that appears when the housing association takes over is a large problem, the ones responsible in a housing association have a normal life and do the work voluntarily, while big developers such as Wallenstam have professional people working with mobility questions full time. One important thing that could be done is to give the housing association the best opportunities to succeed despite their limited resources. This could be done by clear communication and information from the municipality, but also by the property developer. The new board has to know both why and how the agreements are implemented in the building. Setting up guidelines and making sure not to leave any unfinished work to the housing association are ways of avoiding communication difficulties, as well

as making sure that the new board members and the property developer have a continuous dialogue during the handover process.

8.3 Communication with Municipality and Evaluation

When examining how the different developers experienced communication with the municipality and the evaluation of the mobility agreements, it was discovered that the developers had a relatively different experience. The developer at Fixfabriken perceived the contact as continuous and straightforward, while the developer in Kallebäcks Terrasser expressed that they had almost no contact with the municipality after the agreement was signed.

One likely reason for these differences is the fact that the mobility agreement in Fixfabriken required to be revised several times, which in turn led to more communication with the municipality. Additionally, Fixfabriken required more coordination since it was not the same company that built and managed the area. Consequently, new communication was needed when the housing association took over, as they were not involved in the original agreement. In contrast, Kallebäcks Terrasser had the same company responsible for the building and development, which likely contributed to a smoother implementation of the mobility agreement and less need for help from the municipality.

From one of the interviews with a developer, it became clear that writing a more flexible agreement was desired. The fact that the mobility agreements are a relatively new phenomenon without that much evaluation, was identified as a challenge. The developer at Kallebäcks Terrasser showed frustration about the fact that even though not all cars were being used in the carpool, they still had to add two more cars when the next blocks moved in. Having to implement all mobility measures, even if they are not used, is costly for the developer. This is money that could have been spent on more useful things, preferably connected to mobility.

An idea would be to see an agreement where, for example, a large capacity was put in place during construction but the actual solutions were implemented over time when the demand goes up. While this is great to save money, the fact that mobility solutions create a new way of living that people are not used to, someone needs to break ground. This means that an overcapacity is needed and will open future opportunities for the whole city to reach their climate goals, being the municipalities main point with the mobility agreements. Writing such a flexible agreement will also create difficulties for the municipality, both making their workload larger but potentially also allowing for developers not actually interested in mobility to avoid implementing some of the measures, only allowing them a lower parking number but no countermeasures.

8.4 Suggestions for Further Research

Mobility solutions are a relatively new approach to reducing car use and ownership. Therefore, more research is necessary for further sustainable development within the subject.

It would be beneficial to conduct longer-term studies on the use of mobility solutions as behaviour change can take a long time, and mobility agreements are a new and unfamiliar concept to most people.

It is possible to evaluate the remaining properties that participated in the survey. This is to investigate if their results would follow the same pattern as the results from this thesis or if there are any significant differences. An analysis like that could give a deeper understanding of how different conditions affect the use of mobility measures. It can also contribute to the identification of possible trends or deviations between the areas.

We recommend further exploration when it comes to exposure of visible mobility measures and if it has an effect on the use of and attitude towards mobility solutions. There was a difference between how the two areas of study had visually implemented their mobility solutions, and it would be interesting to understand how this affects usage.

Further research can focus on how socioeconomic background plays a role in the use of mobility solutions. Understanding how different groups in society make use of the solutions provided can be key to developing future mobility agreements in a more inclusive and effective way. A specific group we have mentioned before is the elderly, who own cars where the main use is short shopping trips. It could be interesting to gain knowledge on what would help this group make a behavioural change and convert to using a car pool instead. Possibly leading to less car ownership.

8.5 Sources of Error and Limitations of the Research

During the project, sources of error and limitations have been noted. The most severe ones are discussed below.

One potential error is the fact that the survey was sent out in spring 2024 and the site visits were conducted during spring 2025. Since the areas are still under construction, more and more residents are moving in, and the areas are more developed now than when the survey was made. Perhaps there have been more shops open or public bike parking built during the last year, or the area might feel easier to walk in due to less construction. This also means that all of the now completed blocks are not a part of the survey. In Fixfabriken for example, only two blocks were a

part of the survey, whereas for spring 2025 at least six blocks were moved in. This creates a gap in the survey data, but the assumption that the answers would be approximately the same has been made.

Further on, site visits and interviews for the Fixfabriken area have only been conducted with one developer (HSB). The other developer in the area (Balder) was not attending. According to the interviews, the developers collaborated and signed the agreement together. Therefore, we assume that the same measures were implemented and the information we got from HSB was used for the whole area.

Another source of error is the survey itself and the fact that after dividing the responders into smaller subgroups, the response rate sometimes gets very small. This means that the results are based on relatively few answers, which can create a large margin of error and one response can influence the mean value an unproportionate amount. By supporting the survey data with the interviewees and/or site visits, however, we have anchored the results from both methods, creating more reliable conclusions.

When splitting the survey responses into smaller subgroups (household, income etcetera.) it was noted that not all responders were a part of any group. This is because some respondents answered the demographic questions incorrectly. While this might have an influence on the results, this margin of error is considered relatively small. Another response that was seen as incorrect was in table 5.5, where only one responder said they received a 90-day free transit pass. According to the signed mobility agreement in Fixfabriken the property developers only handed out 30-day passes. This answer can therefore be seen as incorrect.

9

Conclusion and Recommendations

The aim of this project was to investigate two residential areas where mobility agreements have been implemented in order to reduce their parking number and the residents car usage. By analysing factors such as topography, proximity to amenities, perceptions of implementation, communication strategies, and residents opinions, key factors for improving the implementation of mobility agreements have been identified.

When considering the implementation of the mobility agreements, a few successful patterns have emerged. To enable residents to travel and live without a car, it is important to conduct an analysis early in the project on which target groups are thought to move in and what special needs these groups require. If the development aims to attract young couples and single households, proximity to restaurants and stores might be important. Families with children are likely to need nearby schools, playgrounds, and sporting facilities, while retired residents may prioritise access to healthcare centres and social places. Adapting the area to the needs of the target group is especially useful in the development of large new residential areas, as these have the potential to offer more than just housing. If essential services and amenities can be placed within walking distance, the need for a car is reduced, increasing the likelihood that residents will choose not to own one.

The purpose of implementing mobility agreements varies between different projects and developers. However, if the goal is to increase the use of mobility measures while also ensuring resident satisfaction, it may be an advantage to implement the agreements in flat areas. If the agreements are implemented on more hilly terrain, a more strategic placement of mobility solutions is required to obtain the same results as in a flat area. For example, placing bike and carpool vehicles in accessible, lower locations throughout the area would be optimal. Ideally, there should be one bike or carpool vehicle per building, reducing walking distance and thereby increasing usage. Involving individuals with a strong environmental commitment in the agreement can also have a positive impact on the outcome, as such individuals often bring greater dedication and help ensure that the measures are implemented and communicated effectively.

When it comes to communication, it became clear that more communication is generally always better. Especially if the property consists of rented apartments, since they often have a bigger turnover rate than tenant owned ones. However, what is worth noticing is how communication differs between properties and target groups.

If the property has a large population who are over 65, it might be a good idea to use more physical information such as letters and the annual mobility activity. While a property with a larger percentage of young residents and families could be better off using a tenancy application on their phones. Since the goal of the mobility agreement is to lower car usage, one key part of communication is to reach out specifically to car owners. By advertising and informing about the mobility measures at places where car owners locates, is one great way of aimed communication. For example, placing banners in the garages or informing about the available measures when applying for a parking spot are great ways of reaching out to car owners specifically.

The annual mobility activity was found to be appreciated by the developers, while the survey gave some mixed results. One way of making it more attractive and increasing its usage is to make it appealing for all different age and target groups. This could be done by combining it with other activities or making a bigger effort to make it interesting and well advertised. Although it is important to still focus on mobility and not wander too far away from the purpose of the mobility activity.

Another observation from the study is the difference in outcomes between rental apartments and tenant-owned apartments. Communication problems and uncertainties about who is responsible for the agreement are generally more common in tenant-owned apartments. Here, there is a risk that the housing cooperation board does not have an interest in mobility or has the knowledge, especially since they were not involved when the agreement was made. This results in a higher workload for both the board and the municipality, which can be avoided when the same actor both constructs and manages the properties, usually the case in rental properties.

In terms of evaluation, this study shows a need for a more structured evaluation process. Even though the mobility agreements are still new and the follow up needs to be adapted to the specific conditions of each project, this study highlights the need for a clear evaluation template. This would minimise the risk that certain properties fall between cracks and do not meet the requirements set by the agreement.

The municipality has shown interest and flexibility in the agreements, especially when the developers have asked for help. Although this is good and can help with both implementation and evaluation, it comes down to a question about resources, money, and time of the municipality. This study has found that communication often falls on the developers. This could create a sense that developers are left alone in the implementation of the agreement. By instead establishing a template or process for evaluation, misunderstandings could be eliminated and with more flexible agreements, they could be better optimised and potentially scaled up as the demand increases.

However, it is also important to remember that developers are allowed a lower parking number through these agreements and therefore need to live up to the countermeasures that come with it. While mobility costs money and resources, it has allowed for cost cutting earlier in the project and has to be seen as opportunity and

not as a burden by the property managers, no matter its owning structure.

In conclusion, it is important to emphasise that there is no simple solution for how to implement the mobility agreements. Instead, it is important to analyse the different conditions of the area and design the agreement according to these. Naturally, some areas will have more favourable conditions, such as flat terrain and proximity to great communication and services. Thus, in order to reach the main goal of reducing car ownership, these agreements must be implemented in areas where there is high car dependency. Regardless, it is important to acknowledge that these mobility agreements have a clear potential to contribute to the city of Gothenburg's goal to become climate neutral by 2030. With thoughtful planning and structured communication with both residents and the municipality, these agreements can serve as a tool for shifting from car travel towards a more sustainable travel behaviour.

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A

Appendix A - Interview questions

The following sections are the questions asked to each respective company or stakeholder regarding mobility agreements. The interviews were conducted in Swedish and subsequently translated into English by the authors.

A.1 Interview Questions for HSB

- What motivated you to implement the mobility agreements?
 - Economic reasons?
 - Environmental concerns?
 - To make the residential area more attractive?
- What mobility solutions do you offer?
 - Which ones are the most appreciated or most used?
- What went well during the implementation of the mobility agreements?
 - What was easy?
 - What was difficult?
- If you were to do this again, is there anything you would do differently?
 - How have the solutions developed since the first residents moved into Fixfabriken?
- Do you believe Fixfabriken's geographical location (its placement within Gothenburg, topography, etc.) has influenced the outcomes of the mobility agreements?
 - If so, how?
- How do you communicate information to the residents and ensure that they are aware of their benefits?
- Do you collect any data on how the implementation of the mobility solutions has gone?
 - For example, appreciation, usage levels?
- Carpool:
 - What factors were considered when deciding on the location and number of vehicles?
 - How do you monitor the usage of the carpool service? For example, booking data, user surveys?

A.2 Interview Questions for Wallenstam

- What motivated you to implement the mobility agreements?
 - Economic reasons?
 - Environmental concerns?
 - To make the residential area more attractive?
- What mobility solutions do you offer?
 - Which ones are the most appreciated or most used?
- What went well during the implementation of the mobility agreements?
 - What was easy?
 - What was difficult?
- If you were to do this again, is there anything you would do differently?
- Do you collect any data on how the implementation of the mobility solutions has gone?
 - For example, how appreciated they are, how much they are used, etc.?
- How do you communicate information to the residents and ensure that everyone is aware of their benefits?
- Do you believe Kallebäck's geographical location has influenced the results of the mobility agreements?
- What is the parking ratio (p-tal)?
 - What is the actual demand?
- Carpool:
 - What factors were considered when deciding on the location and number of vehicles?
 - How do you follow up on the usage of the car-sharing service? For example, booking data, user surveys?

A.3 Interview Questions for Bostadsbolaget

- How do you work with mobility agreements or mobility in general?
- What motivates you to implement mobility agreements?
 - Economic reasons?
 - To reduce parking ratios?
 - Sustainability?
- Some background on mobility:
 - What are mobility agreements?
 - What is the most difficult part of implementing them?
- What are the reasons that not all developments implement or include mobility agreements?
- Approximately how many new developments have a mobility agreement?

- What does the process look like from start to finish?
 - Does it begin before the detailed development plan is finalized?
- What limitations or challenges do you see with the mobility agreements?
- What has worked best with mobility agreements?
- How do you follow up on mobility agreements and their outcomes?
- Communication:
 - How do you inform residents?
 - How aware are tenants of the mobility solutions, and how do they use them?
- Are there any successful examples where implementation has gone particularly well?
 - Why do you think it was especially successful there?
- Do you have mobility solutions without a formal agreement with the municipality?
 - Are there any advantages?
 - Does it make the area more attractive to live in?

A.4 Interview Questions for OKQ8

- How does your collaboration with housing companies work within the framework of mobility agreements?
- How does carpool usage at Fixfabriken compare to other “partner properties”?
- Which parts of Fixfabriken do you cover?
 - Are you the only carpool provider there?
- What factors were considered when deciding on the location and number of vehicles?
- Are you satisfied with the level of usage?
 - Is the usage at Fixfabriken representative of the rest of Gothenburg?
- Who bears the costs at Fixfabriken, you or HSB/Balder?
- Is it you or the property owner who handles communication about the service to residents?
 - If it’s you, how do you do it?
- What challenges do you see?
 - Both internal challenges and general ones within the industry?
- How do you encourage people to use the carpool service?
- Are there any common misconceptions, prejudices, or barriers that prevent people from using the carpool service?
- What types of tenants use the carpool service the most?
 - Do you see any trends in user behavior?

- Do you experience increased demand for carpool and mobility agreements?
- How does the booking system work?
 - Do you think it would be beneficial or is there any interest from your side to integrate the booking system with building-related services (such as booking laundry time)?
- How does the handover between the developer and the housing association (BRF) work?
- Would you like to be involved in the mobility agreement process at an earlier stage in future projects?

A.5 Interview Questions for the Municipality

- Can you describe what mobility agreements are?
- Why did you conduct the survey study?
- How are mobility agreements currently followed up?
 - Who is responsible for the follow-up?
- What challenges do you see with mobility agreements?
- What is the most difficult part of implementing mobility agreements?
 - Why do you think not all developments choose to implement them?
 - Approximately how many new developments have a mobility agreement?
- Do you have any influence on how the measures are communicated to residents?
 - Have you noticed any specific challenges or shortcomings in communication?
 - How do you address those challenges?
- Could you tell us a bit about the public bike-share system “Styr & Ställ”?
- Parking:
 - Are property owners free to set any parking price they want, or is it regulated?
 - Who is responsible for setting the price?
- Public Transport:
 - How are residents informed about the public transport benefits included in mobility agreements?
 - What has worked best when implementing public transport solutions?
 - Which actors (e.g., Västtrafik) do you collaborate with during implementation?
- What mobility measures from “Stjärnpaketet” have been implemented in Kallebäck and Fixfabriken?
- What do you think has worked well in each of the areas (Kallebäck and Fixfabriken) regarding the implementation of mobility measures?
 - What different challenges have you encountered in each of the two areas?

- What factors do you believe are important for achieving the most positive outcome possible?

B

Appendix B - Additional Graphs

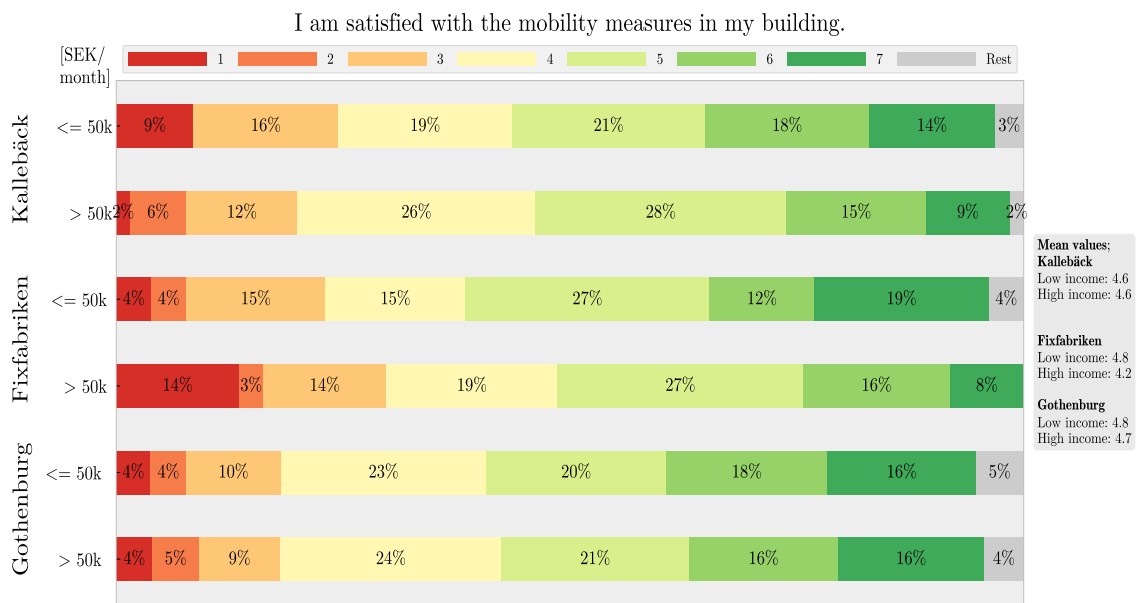


Figure B.1: The residents satisfaction of the mobility agreement in their respective area, depending on their income.

B. Appendix B - Additional Graphs

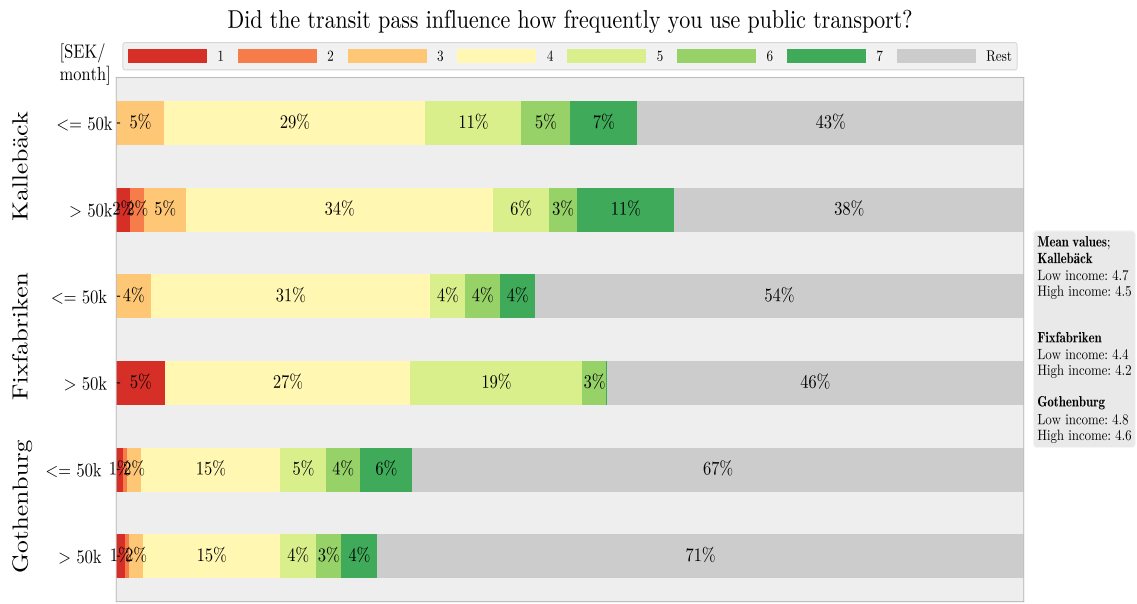


Figure B.2: Influence of the transit pass on public transport usage, categorized by income level and residential area.

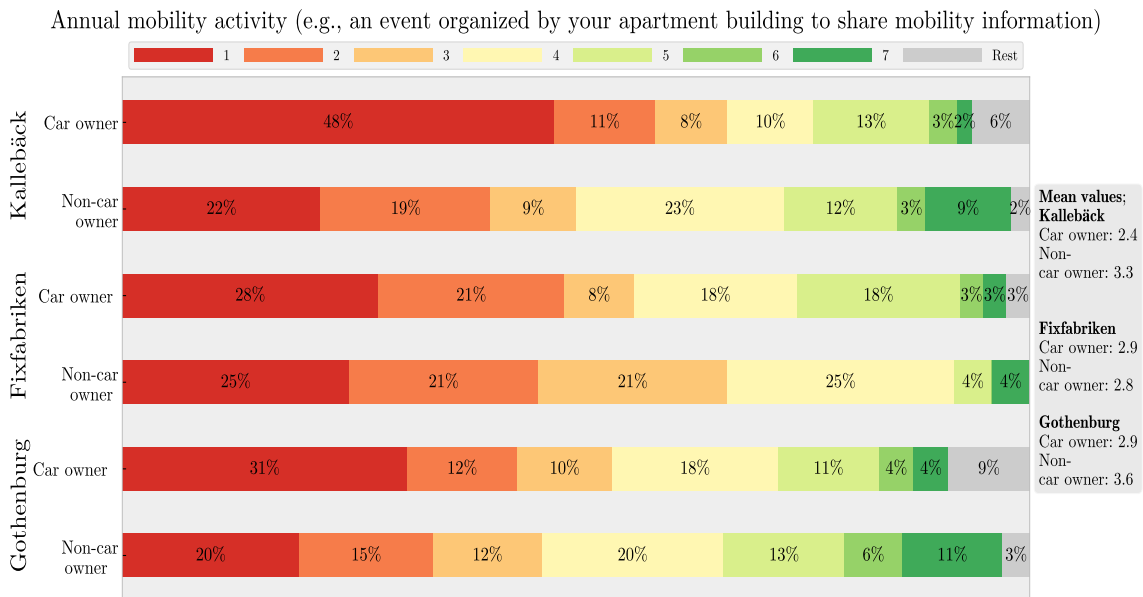


Figure B.3: Survey responses on annual mobility activities organized by the apartment building, such as events for sharing mobility-related information, shown by car ownership and residential area.

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