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Summary sheet

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Subpartner: Tønsberg kommune	TK	Norway
Promotion of Operation Links with Integrated Services	POLIS	Belgium
City of Amsterdam	AMS	Netherlands
City of Leuven	LEU	Belgium
University of Antwerp	UAntw	Belgium
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4	05/05/2025	UAntwerp	Third version, including Leuven pilot 3	
5	10/07/2025	UAntwerp	Final version, including Rotterdam pilots	

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Executive summary

This impact report assesses the effects of three different pilots being conducted in the cities of Leuven (BE), Rotterdam (NL) and Tønsberg (NO) respectively, and identifies opportunities for further progressing towards their objective of increasing the awareness of, access to and actual uptake of shared mobility hubs. The pilot from Leuven analysed in this report focuses on the introduction of shared mobility hubs at community centres, where visitors were made aware of these mobility services and could make free use of them, while residents living near the community centres were also allowed to make use of the bundled shared mobility services (so-called second-line testers). Rotterdam established in three pilot areas shared mobility hubs, allowing residents living in those neighbourhoods to make use of the shared mobility services through a MaaS application using a mobility budget. Lastly, Tonsberg introduced three shared mobility hubs, which differed in the additional non-mobility services and infrastructure that was added to them.

The impact assessment focused on three aspects, namely (1) identifying the profiles of residents in the pilot areas and their travel behaviour and knowledge of shared mobility hubs during the pilot, (2) calculating the number of potential users who have improved access to shared mobility services due to the implementation of the pilot hubs and (3) identifying the cost components associated with the different types of hubs and the way the pilot cities govern those types of hubs.

As the three pilot cities followed a different approach and established their mobility hubs in very different settings, it is difficult to extract general results. However, there are some interesting common findings from the three pilot areas.

First, the extent of how sustainable citizens travel and their ownership of private vehicles, differed between the pilot cities, where Rotterdam and Leuven saw much more citizens using bicycles or public transport and car ownership was relatively low, compared to Tønsberg which still had a car-dominant travel pattern. This affects the potential use case that shared mobility could still offer if the majority of the citizens already travel in a sustainable manner. However, across all three pilot areas, there are similar trip purposes for which shared mobility, and especially car and cargo bicycle sharing, could present a valid alternative, such as going to the supermarket and visiting friends and family. There is still a considerable share of people taking the car for these purposes, as they require carrying capacity for the former purpose or the travel distance is high for the latter purpose. Furthermore, considering actual usage of shared mobility and awareness regarding shared mobility hubs, across all three pilots, only a very small number of people had already used shared mobility services or knew what the concept of shared mobility hubs entailed. To this regard, the pilots have contributed to improving the awareness of citizens regarding the shared mobility hub concept, while this was not always translated into actual usage of the hubs. This could only be validated for the case of Rotterdam, where actual trip data indicated that there was an increase of trips starting or ending at the hubs and in the neighbourhoods, compared to the previous situation where no hubs or mobility budget was available.

Second, the majority of the hubs were installed at locations where the availability of certain types of shared mobility services was non-existent or limited. It is clear that the hubs allowed other target groups to test out shared mobility in general, or a specific shared vehicle that could offer a use case for them. This significantly increased the number of citizens having access to a variety of shared mobility services. As stated above, we could only validate an increased usage of services in the pilot areas of Rotterdam, where pilot residents were granted a free mobility budget for using them.

Third, the complexity of the pilot hubs significantly impacts the associated investment and operational costs. Depending on the objective of the hub (and the network), the pilot cities opted for different hub typologies, which could require considerable investments in redeveloping public space and keeping the additional non-shared mobility-related services operational. We could not identify whether the chosen hub design and composition also impacted the extent to which people were aware of and made use of the hub services.

In conclusion, the findings suggest that it cannot be expected that short-term pilots will cause a significant shift towards the provided shared mobility services. However, they do increase awareness and access to a variety of services, and providing free access to services increases the number of new users, allowing them to become aware of the concept of mobility hubs and acknowledge the use cases that such shared mobility services can offer. The pilot cities could consider, based on the current travel behaviour and travel patterns of pilot residents, which kind of shared mobility services are most suitable for these locations, so they can provide a valuable alternative to private car usage. Furthermore, it is important to look for a balance between the complexity, the investment and operational costs and the objective of the hub, as these aspects are closely connected to each other.

1. Introduction

The following chapters describe the concept of mobility hubs, the nature of the ShareDiMobiHub project and the pilot locations for the participating cities.

1.1. ShareDiMobiHub project

The Shared and Digital Mobility Hubs (ShareDiMobiHub (SDMH)) project wants to improve multimodal accessibility, by increasing the awareness of and stimulating the uptake of shared mobility hubs. Seven pilot regions and cities are planning for or actually deploying shared mobility hubs, each within a different context, on a varying scale and using a different approach. The project is structured into two main work packages: 'Piloting' and 'Upscaling'. The former focuses on introducing and testing new mobility hub locations and approaches, with the aim of engaging new target groups and increasing the use of shared mobility services at these hubs, while the latter focuses on expanding the existing network of mobility hubs within a city or extending it to a wider region. This report will describe the results of the impact assessment being carried out for the pilots carried out within the 'Pilot' work package.

1.2. Mobility hubs: A literature review of the potential impacts

The widespread use of shared vehicles among European cities underlined the potential of shared mobility (SM) to connect citizens from diverse backgrounds to places that otherwise remain inaccessible. The potential of shared mobility to address accessibility challenges dwindled with the unorganised manner in which vehicles were parked in the cities, adding extra pressure to the public space. Mobility hubs rise to organise the transport offer and provide a fixed location for vehicles.

Mobility hubs are defined as physical locations where users can switch between mobility services, e.g., buses, trains, shared (e-)bikes, shared e-scooters, etc. Additionally, they often include information about public transport (PT) schedules, directions to Points of Interest (POI) and extra services, e.g., charging stations, bike repair shops, parcel lockers, etc. (Geurs et al., 2023).

A successful design of mobility hubs should contemplate their role as both nodes and places (Arnold et al., 2023). Transport nodes are points of specialised vehicle interchanges, where the services and information available facilitate travelling between POIs. Complementary hubs as places emphasise the relationship between their surroundings to generate a more liveable urban environment through an offer of mobility that is relevant to the user. In this sense, mobility hubs potentially incorporate transport modes into the urban fabric, strengthening the accessibility and liveability of the space.

Studies about the impact of mobility hubs have become more robust in recent years. For instance, decision-makers in Heinsberg, Germany, built a model to evaluate mobility hubs' potential to improve intermodal accessibility to various POIs in rural settings (Frank, Dirks & Walther, 2021). They uncovered that the new travel itineraries could improve accessibility to frequent, e.g., restaurants, sports facilities, and infrequent POIs, e.g., cinemas. Given the current connectivity to the workplace through public transport and private vehicles, the new travel itineraries of mobility hubs would potentially improve workplace accessibility almost threefold. In Finland, the project SPARCS examines the design of different hub scales in 3 areas in Espoo. The project focused on offering sustainable (e-)mobility options to tackle the high level of car commuters and repurpose the space to improve walking and biking conditions[1]. Additionally, the SmartHubs project[2] recently tested and assessed the impact of shared mobility hubs in

[1] https://sparcs.p.blends.be/wp-content/uploads/SPARCS-Biking-in-Espoo-T3_4-internal-report-v1_2.pdf
[2] https://www.smartmobilityhubs.eu/

five large metropolitan areas, namely Brussels, Vienna, The Hague-Rotterdam, Munich and Istanbul. They analysed the impact of mobility hubs on accessibility, resilience, behavioural change, equity and integration with public transport, while they also developed a location, co-design and appraisal tool for developing new mobility hubs. Their recommendations on how to make mobility hubs smarter can be found here[3].

Based on these findings, mobility hubs can stimulate sustainable transport modes, connect urban and rural places with low public transport coverage, offer options to car users, and bridge the transport and planning system in mixed-use spaces. To continue strengthening the case to build mobility hubs, the ShareDiMobiHub project aims to increase the uptake of shared mobility hubs to improve multimodal accessibility, steer car users towards sustainable mobility and provide alternative transport modes to multiple demographic groups.

1.3. Location of the ShareDiMobiHub pilots

The pilots are located in three cities, as shown in Figure 1. Two of these cities, namely Leuven and Tønsberg, are also involved in scale-up activities. Although the general theme of the pilots is to prompt the use of sustainable shared mobility, each city deploys their initiative considering a specific target population. The difference in demographics leads to exercising particular strategies to attract users to the hub locations and gather information for the impact assessment. More information regarding the best practices of the approaches that the three pilot cities followed can be found in deliverable 11 from WP 1.

- Leuven: The three mobility hubs in Leuven are located on the Groefstraat, Artillerielaan and Lolanden. The city partners with the Mannenstraat, Sint-Maartensdal and Casablanca community centres. The target demographics include, but are not limited to, low-income citizens.
- Rotterdam: In total of five hubs located in two areas of the city. The hubs aim to attract immigrants and disadvantaged population to become familiar with shared mobility.
- Tønsberg: The city pilots three mobility hubs targeting commuters and local workers. The largest one is located close to the Central train station. One hub is in Kaldnes, next to the pedestrian bridge crossing the bay, and the smallest hub is at St Olavsgate Street.

[3] smartmobilityhubs.eu/_files/ugd/c54b12_1dcec154d4344f96b00182d0777fd50c.pdf

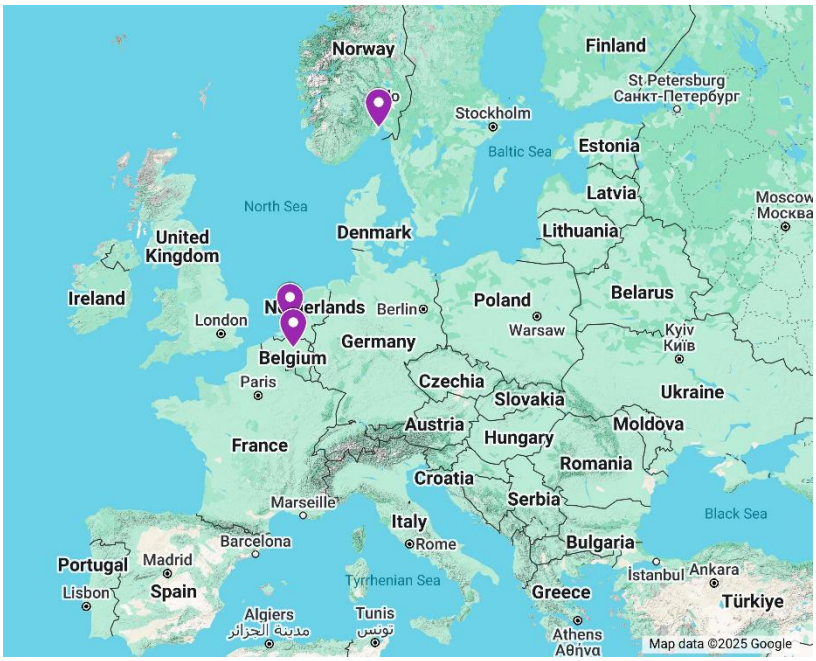


Figure 1: Location of SDmobility hub pilots

A summary of the types of shared vehicles available on each hub is presented in Table 1

Table 1: Shared mobility options in SDmobility hub pilots

	Bicycle	E-bike	Cargobike	E-scooter	Moped	Car
Leuven						
Mannenstraat	x	x	x			x
Sint-Maartensdal	x	x	x			x
Casablanca	x	x	x			x
Rotterdam						
Franselaan		x	x		x	
Jacob van Campenweg		x	x		x	
Kraaienstraat		x	x		x	
Oosterflank		x	x		x	
Prinsenlaan		x	x		x	
Tønsberg						
Central station		x				x
Kaldnes		x		x		
St Olavsgate				x		

The following describes each city's general geographical characteristics and current mobility landscape and provides further details about the pilots.

1.4. City of Leuven, Belgium

The three hubs in Leuven (Figure 2) include the same number and types of vehicles; however, the neighbourhoods' geographical locations differ. The Mannenstraat hub is situated near the city's outer ring, adjacent to a bus stop in a predominantly residential area with small urban green spaces. The LUCA

School of Arts is 650m east, and a large hospital is 1,2km further east. This area has a relatively higher proportion of low-income residents compared to the other two hubs.

The Sint-Maartensdal hub is approximately 1,8 km northwest from the Mannenstraat, and 700m away from the centre of the city (Oude Markt). The area comprises hotels, parking lots, large supermarkets and a cinema around 500 to 700m away, thus, it has a higher land-use mix. Green and outdoor spaces are more limited, and the average income level is higher compared to the Mannenstraat.

Casablanca is outside of the outer ring of Leuven, 1km east from the main train station in Leuven. While it is primarily residential, there is a sports centre with multiple facilities approximately 600m away, as well as a hall with restaurants and activities at the same distance.

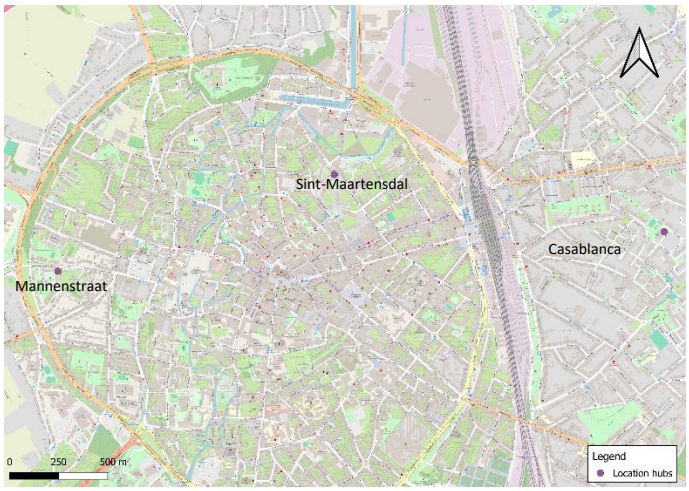


Figure 2: Location pilots in Leuven

1.5. City of Tønsberg, Norway

The three hubs in Tønsberg are located in the premises of public transport, but they are different in terms of the number of services and shared mobility (see Table 1 and Figure 3) offered. Hence, the three of them are designed for different scales. The first hub is next to Tønsberg station; besides bike renting, e-scooters and car sharing, it offers taxi services, bicycle repair, bike parking, pick-up points for parcels and information points with wayfinding. Sørbyen (St Olavsgate) and Kaldnes hubs offer the same shared mobility services, with the difference that Kaldnes also features bike parking, pick-up points for deliveries and wayfinding. Sørbyen is a small-scale hub with only cars and e-scooter shared services.

Regarding the geographical location, Kaldnes is near the river and a walking bridge in a mixed residential-working area. Similarly, Tønsberg station and Sørbyen are mixed land-use, with the difference that there are more companies located on the premises of Sørbyen, but more people working around the Tønsberg station.

Figure 3: Location pilots in Tønsberg

1.6. City of Rotterdam, The Netherlands

The five mobility hubs in Rotterdam are distributed across two areas located to the east and west of the city centre. In the east, the Jacob van Campenweg, Oosterflank, and Prinsenlaan hubs are situated within the Het Lage Land & Oosterflank area, which is characterised by a relatively higher degree of mixed-use development. In the west, within the Oud-Mathenesse sector, the Kraaienstraat and Franselaan hubs are located in predominantly residential neighbourhoods.

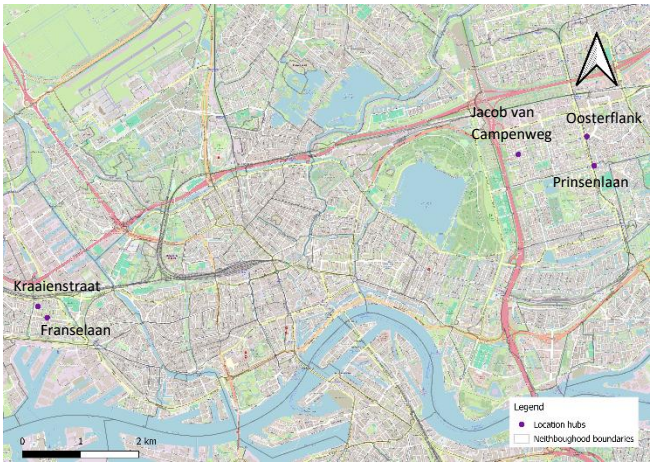


Figure 4: Location pilots in Rotterdam

The primary objective of these pilot projects is to expand the availability of shared mobility services to better reach low-income residents and to explore the potential impact of mobility hubs on local accessibility and short-term modal shift.

2. Methodology

The following chapter describes the three different themes and methods of the impact assessment. Each theme aims to gather insights such as awareness of the concept and location of mobility hubs, trip purpose

and distance, barriers to shared mobility, mobility patterns and economic investment needed to build pilots on different scales. The impact assessment evaluates the indicators presented in Table 2.

Table 2: Impact assessment indicators

	Theme	Methods	Data gathered	Indicators for analysis
1	Sustainability	Surveys	Knowledge mobility hub Ownership and subscriptions to transport Demographic information Trip distance and transport choice Barriers to taking SM	mobility hub knowledge growth (%) Short-distance trips done by car (%) Infrequent trips done by car (%) Barriers to taking SM
1.1	End-user	Mobility dashboard	Number of trips	Number of trips per mobility hub
2	Accessibility	Isochrone areas (GIS)	Number of people living in proximity to an mobility hub	Total increase in people living close to transport modes (%)
2.1	End-user	Mobility dashboard	Origin-Destination data	Frequented places
3	Economic	Survey and interviews	Total Cost Operation and governance model	Relation between costs and complexity of the hub

2.1. Sustainability theme

The sustainability theme aims at understanding the potential impact mobility hubs have on travel behaviour and transport ownership. To that end, the theme gathers information about modal choice for several regular destinations, the approximate distance travelled for each one and the frequency of these trips. In addition, the theme explores the barriers to PT and SM, changes in the knowledge of mobility hubs, vehicle ownership, and subscriptions to PT and SM. This part of the impact assessment employs benchmark (ex-ante) and post-implementation (ex-post) surveys to collect the information. The analysis recognises that the interventions' short duration and small scale will not significantly impact modal choices. Still, the survey results show the current mobility profile and support the future development of long-term interventions.

The benchmark and post-implementation surveys have the same sections for the general content (Figure 5). The surveys are applied to residents living 500m from the hub location and citizens passing close to the pilot. Thus, the survey targets people potentially in contact with the hub (see the identification of catchment areas in Table *4*).

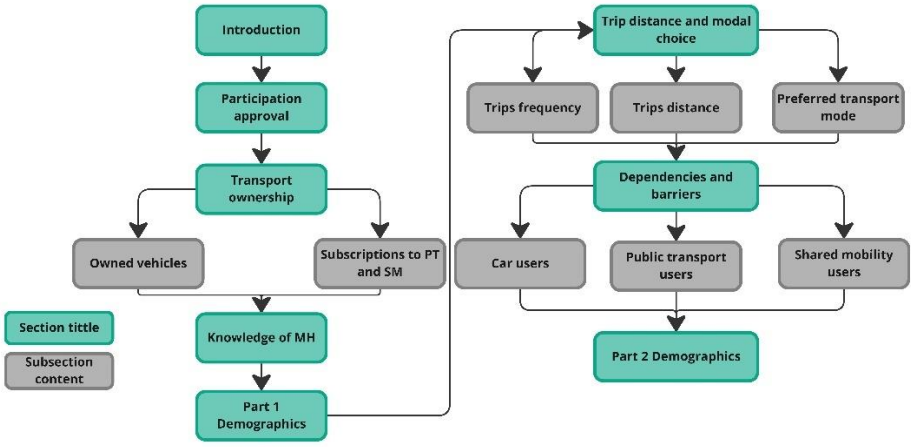


Figure 5: Content of the benchmark and post-implementation SDmobility hub survey

The first part of the survey includes an introduction, during which respondents get information about the goal of the survey and data treatment consent. The second part of the survey collects information about the vehicles owned at home and if the respondent has a pass for PT or SM, e.g., a monthly or annual pass, pay-per-trip, etc. Following the transport ownership section, the participants answer questions about their knowledge of mobility hubs, e.g., familiarity with the concept and previous experience. The section also includes information about the definition of a mobility hub in case the participant is unfamiliar with the concept. After that, there is a section dedicated to collecting demographic data. The fifth and sixth sections gather information about modal choice and frequency of travel per trip purpose, barriers and reasons to take the private car, PT and SM. The survey ends with some extra demographic questions.

Whilst there was a general survey applicable to all pilots, each city could adapt or add some questions depending on its priorities. Ultimately, these modifications resulted in 3 surveys with the same sections but slightly different questions (see Appendix). Each city was appointed to apply the survey in the way they deemed possible, whether this was through on-site interviews or online through QR codes. The results of the survey are stored on the Qualtrics platform.

Cities were required to gather a sample size corresponding to the minimum coverage mentioned in the Handbook of Transport Modelling[4]. The authors recommend calculating a minimum sample of 10% of the population for cities with fewer than 50,000 inhabitants. In this case, the representative sample is based on the area's density of 500m (the equivalent of 5 minutes of walking) around the mobility hub's location. The distance corresponds to the catchment area of the vehicles in the hub, in this case, the catchment area of shared cars (Table *4*). Although the sample size is too small for some cities to draw conclusions, the constraints, time, and budget led to setting the valid sample size, as shown in Table *3*.

Table 3: Sample size per city in number of people

	Population	Population within 500m	Calculated sample
Leuven	104,009	444	44
Rotterdam	341,460	750	75

[4] Hensher, D. A., & Button, K. J. (Eds.). (2007). *Handbook of transport modelling*. Emerald Group Publishing Limited.

Tønsberg	55,387	92	9

The sample should adequately represent the neighbourhood's demographics, e.g., gender, age, migration background, etc. In the particular case of Tønsberg, the low population density around the hubs results in a small sample size. However, as only nine respondents do not constitute an adequate representation of the neighbourhood, we target the same number of respondents as Leuven, the next city in population size. For cities with more than one hub, it was recommended to achieve the sample size around each hub.

Reporting on this assessment takes place in six sections: Socio-demographics, Transport ownership and travel behaviour, Perception towards conventional and shared mobility, Usage of shared mobility, Knowledge and usage of mobility hubs

2.2. Accessibility theme

The theme measures how proximity to the hubs potentially increases the physical (potential) accessibility to transport. There are many different forms to measure spatial accessibility. The analysis is carried out using non-behavioural opportunity-based measures on a macro level. Traditionally, non-behavioural methods do not consider how an individual's attribute changes the potential accessibility, e.g., a newly arrived immigrant and a local living close to a car-sharing station would be equally attracted to the hub. Thus, our analysis considers the potential accessibility gains, assuming individual characteristics and trip purpose do not influence the likelihood of walking towards transport.

The catchment area is defined as the distance (disutility) operationalised through the average distance users are willing to walk to specific transport modes. Based on the summary of Table 4, we used buffers of 300m (for scooters, mopeds and bikes) and 500m (for carsharing and cargo bikes). The areas are defined based on the actual distance along the road network, and they assume the population is equally distributed in the statistical sector. The isochrones' service area (catchment area) is set up with the option Iso-areas as Polygons from the network analysis tool QNEAT3 found in QGIS. The base maps were subtracted from OpenStreetMap. Tønsberg and Rotterdam provided their network, whilst for the city of Leuven, the Wegenregister[5] was used. All cities provided census data with demographic characteristics per statistical sector.

Table 4: Catchment areas of different shared mobility options

Mode (shared)	Characteristics	Core service (m)	References
E-bikes	Free-floating (pilot)	400;	Pot et al., 2021;
Bikes	Docked	300; 250; 300; 250;	Kabra et al., 2020; Desjardins et al., 2022; Caggiani et al., 2020; Böcker et al., 2020;
E-scooters	Free-floating	320; 210; 203; 250;	Yan et al., 2021; Reck et al., 2022; Berg Wincent et al., 2023; Ham et al., 2021;
Cars	Station-based (one way);	500;	Boyaci et al., 2015;

[5] https://www.vlaanderen.be/digitaal-vlaanderen/onze-diensten-en-platformen/wegenregister

	Station-based (two-way);	500; 530;	Kumar & Bierlaire, 2012; Musso et al., 2012
Cargobikes	Round trip	500;	Assumes same as cars
Mopeds	FF	200;	Aguilera-García et al., 2020

To simplify the model, we assume that:

- Musso et al., 2012, mention that mixed land use might affect the willingness to walk to different shared car stations. The distance can increase to 800 or 900m or decrease to 400 – 200m in the case of mono-use land. Additionally, the higher density of the pick-up locations decreases the distance people are willing to walk to the station. For early stages, the walking ratio was higher than in mature systems. Our methodology assumes that the land use or maturity of the hub system does not affect the willingness to walk.
- For cargo-bike, the use cases are assumed to be similar to short-distance car travel (Bissel and Becker, 2024).

The number of potential users within the catchment area is calculated with the area generated by isochrones, using Equation *1*.

$$P_{hn} = \sum P_n \times I_n$$

Equation 1

Where:

P_{hn} = Total number of potential users of the hub at a distance *n*

C = Inhabitants of the intercepted neighbourhood

I_n = Percentage of area intercepted at distance *n* on each neighbourhood

n = Determined service area

2.3. Economic theme

The economic theme refers to assessing the costs each city incurred during the implementation and operation of the pilots. It highlights the types of costs and services that cities often outsource to transport providers and other third parties, as well as discusses the type of governance of the hub and its influence on cost. The theme also aims to classify the hubs based on typologies to understand the relationship between their scales and complexity.

First, cities must provide information about the costs and revenues relevant to the activities taken part to make the hub operational. These cost components are **capital** (infrastructure, vehicle, digital), **operational** (infrastructure, vehicles, marketing, other), and **administrative** (labour). They should also provide possible **revenues**, including the incomes generated via the pricing scheme and additional funding. The information is documented in a standardised Total Cost of Ownership (TCO) or cost model in MS Excel. This document includes tabs for entering each one of the components. Once the cities familiarised themselves with the TCO, semi-structured meetings were conducted with key stakeholders

to refine objectives, clarify TCO costs, and discuss the management and general governance models of the mobility hubs.

Besides the costs, the cities must indicate the stakeholder in charge of executing the activity, whether private or public. By knowing who performs the activity, it is possible to make inferences about the governance model of the hub.

The **governance model** explores the decision-making framework from a strategic perspective. For example, it discloses the role of the city, particularly in relation to the services and activities delegated to third parties. In addition to the TCO, the theme considered semi-structured meetings to further the understanding of the governance model.

After conducting meetings and the results of the TCOs, the hubs are categorised according to the six typologies presented in Weustenenk and Mingardo (2023). These typologies are community, neighbourhood, suburban, city edge, city district and city centre. To assign the hubs to each typology, there are four different properties to account for (See details in Figure 6):

- **Transport mode:** The transport mode with the largest catchment area plays a key role in determining the complexity, scale and location of the hub. Bigger transport modes, e.g., train, metro, have a higher catchment area and often include more services and facilities. For example, people are willing to walk longer to reach a train station—and these stations often include toilets or information points, compared to walking to a bus station – which people are often willing to walk less and, in most cases, does not include either of those services. Thus, the bigger the transport mode, the larger the scale and complexity of the hub.
- **Service and facilities:** The services and facilities available also determine the complexity of the hub. This is due to their relation with the transport mode. Two hubs can have the same transport mode(s), but one can offer more services and facilities than the other. For example, two regional hubs can both include train stations, but one can also offer tourism information points, turning it into a more complex hub.
- **Scale:** The scale is determined by both services and transport modes. The scale can be defined through the (physical) surface span and the market (catchment) area. The scale determines local, regional or national accessibility.
- **Location:** The location is determined mainly by the transport mode. It refers to the location in the transport network and its geographic location.

In summary, the first two properties i.e., transport mode and services and facilities, are fundamental in defining the typology of the mobility hub. Hubs with greater complexity typically integrate transport modes with larger catchment areas. Likewise, a higher quantity and greater diversity of services and facilities contribute to increased hub complexity. The last two properties, i.e., scale and location, are mainly determined by the dominant transport mode.

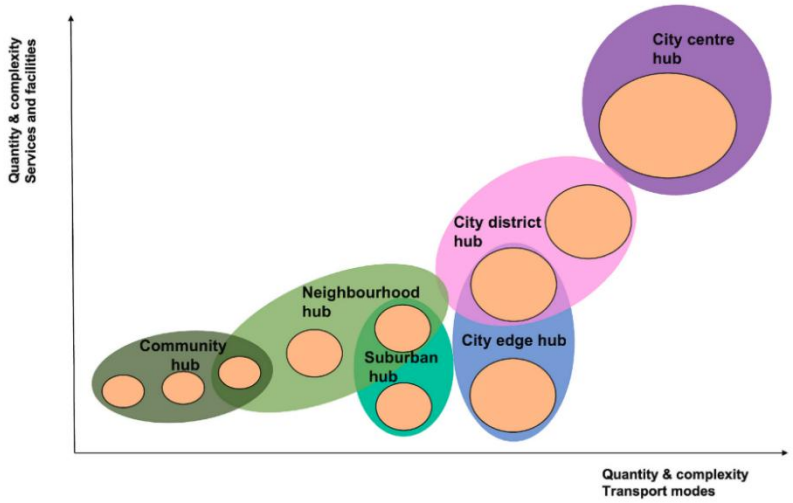


Figure 6 Typologies of mobility hubs taken from Weustenenk & Mingardo, 2023

3. Results of the impact analysis

The following are the results of the impact assessment applied to the pilots of the hubs on each city.

3.1. City of Leuven

3.1.1. Sustainability

The benchmark and post-implementation survey was applied to the three Leuven pilots (see Appendix). The dates and number of answers are shown in Table 5. The surveys conducted at the pilots in Leuven are focused on so-called second-line testers, inhabitants who live in the vicinity of the pilot hub and can make use of its shared mobility options. However, they are not allowed to make free use of the hub, as opposed to the actual target groups of the pilots, which are the visitors of the community centres where the mobility hubs are located. For the pilot in Mannenstraat, the answers were collected via in-person interviews in the community centre, house visits and flyers. The answers for the Sint-Maartensdal and Casablanca hub only collected interviews via flyers delivered at home and sending emails. The response rate is comparably lower using only this method. In the Mannenstraat hub, the number of respondents in the post-implementation survey is smaller than the calculated sample. Similarly, the answers about the mobility hubs located at Sint-Maartensdal and Casablanca are limited. The low level of response makes it difficult to trace conclusions about the impact of mobility hubs, i.e., car usage and barriers taking SM and mobility hub knowledge growth. The analysis of the surveys is limited to highlighting the potential of the mobility hub as an enhancer of SM for short trips and car travel.

Table 5: Number of survey answers per hub in Leuven

Hub name	Hub start and end date	Ex-ante survey	Ex-post survey
Mannenstraat	13/03/2024 - 13/08/2024	56	39
St Maartensdal	01/06/2024 - 31/09/2024	18	9

Casablanca	01/10/2024 - 31/01/2025	15	8

The following are the results from the baseline (ex-ante) and post-implementation (ex-post) survey, per hub. Some questions asked in the baseline are omitted in the post-implementation, and new questions are included in the post-implementation. In addition, we omitted some questions from the ex-post survey to limit the findings to the most relevant ones to the cities. In all cases, the results of the surveys will be available for all cities upon request. As stated above, the respondents to our surveys were second-line testers of the pilot hubs, while the feedback from the actual target groups, i.e. the visitors to the community centres, was gathered by Mobiel21, which conducted in-depth interviews with those first-line respondents. Their findings are reported in the following deliverable: 'WP1_Pilot_Deelmobiliteit_Buurtcentra_Leuven_Eindrapport'.

Mannenstraat hub

Socio-demographics

The first part of the demographics in the survey gathers information about their living situation, e.g., household composition and occupation, and capacity to drive both car and bicycle. Having a driving license and the ability to ride a bike are two necessary conditions to find the hubs an attractive point to rent shared mobility. In addition, people with children could find the (cargo) bike option appealing, given that some have children's seats.

Our results show that most people live alone or with their partner and have no children; only 10% of respondents in the benchmark survey said they do have children. Most of the respondents of both surveys stated they are either working full-time or are retired; about 10% of them are students. It is important to highlight that a significant number of respondents are aged 60+, which should be taken into account when interpreting the results.

The second part of the demographics gathers information about the age, gender, frequency of online working, immigration background, education and postcode of residence. From these results, we highlight that most respondents live in comfortable conditions and at least have a secondary education degree. Around half of the respondents from the ex-ante and ex-post work online at least once a week, and more than 60% do not have an immigration background.

Transport ownership and travel behaviour

The following are the results of the section on transport ownership and travel behaviour. First, it elaborates upon the respondents' ownership of personal vehicles and public transport subscriptions. The answers indicate that cars and bicycles are the most common vehicles found at home (Figure 7). More than half of the respondents own at least one car or bicycle. The ownership of mopeds, e-and cargo-bikes is limited to approximately a quarter of the respondents.

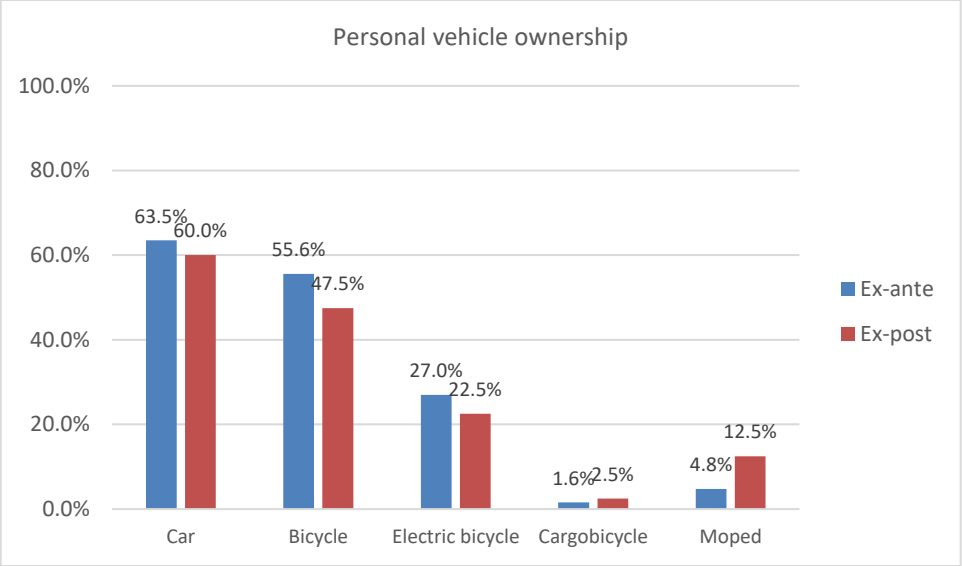


Figure 7: Personal vehicle ownership Mannenstraat, Leuven

Considering the subscriptions to public transport (Figure 8), half of the respondents for both surveys declared to have a monthly or yearly subscription to PT, whilst almost a fifth said they did not use PT at all. These high subscription levels can be attributed to the large number of older respondents, who typically rely more on public transport and are granted a reduction on annual public transport subscriptions.

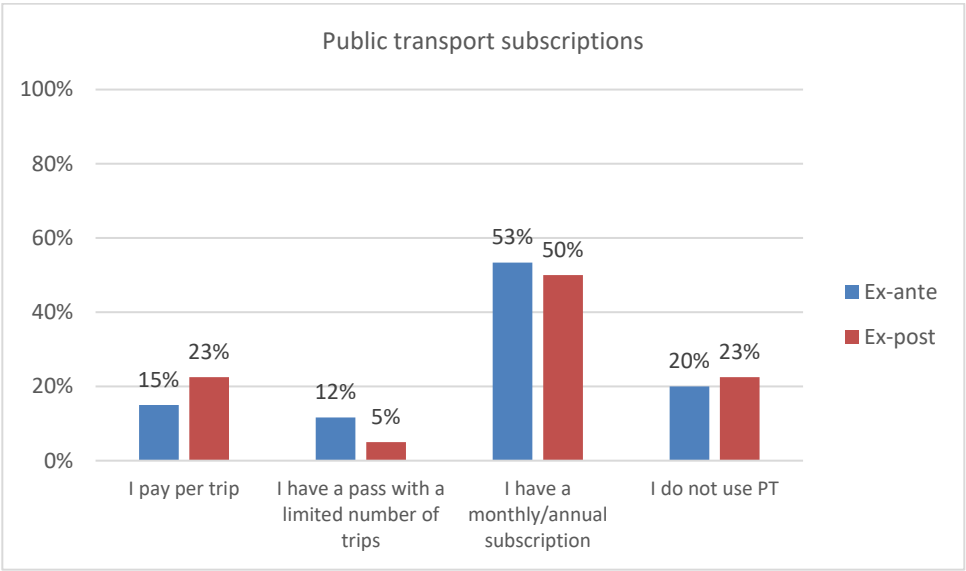


Figure 8 Public transport subscriptions, Mannenstraat, Leuven

Next, we report on respondents' travel behaviour. We inquired about trip distance, mode choice and trip frequency for eight different trip purposes. Not every trip purpose was displayed for every respondent, e.g. people being retired or unemployed could not indicate the trip purpose 'commuting from/to work'. The modal split from the respondents across all trip purposes is shown in Figure 9. Both ex-ante and ex-post survey indicate that the car is the preferred mode. However, 60 to 65% of the trips are being done

by sustainable modes of transport. These are mainly conventional modes, whereas usage of shared mobility modes is almost non-existent.

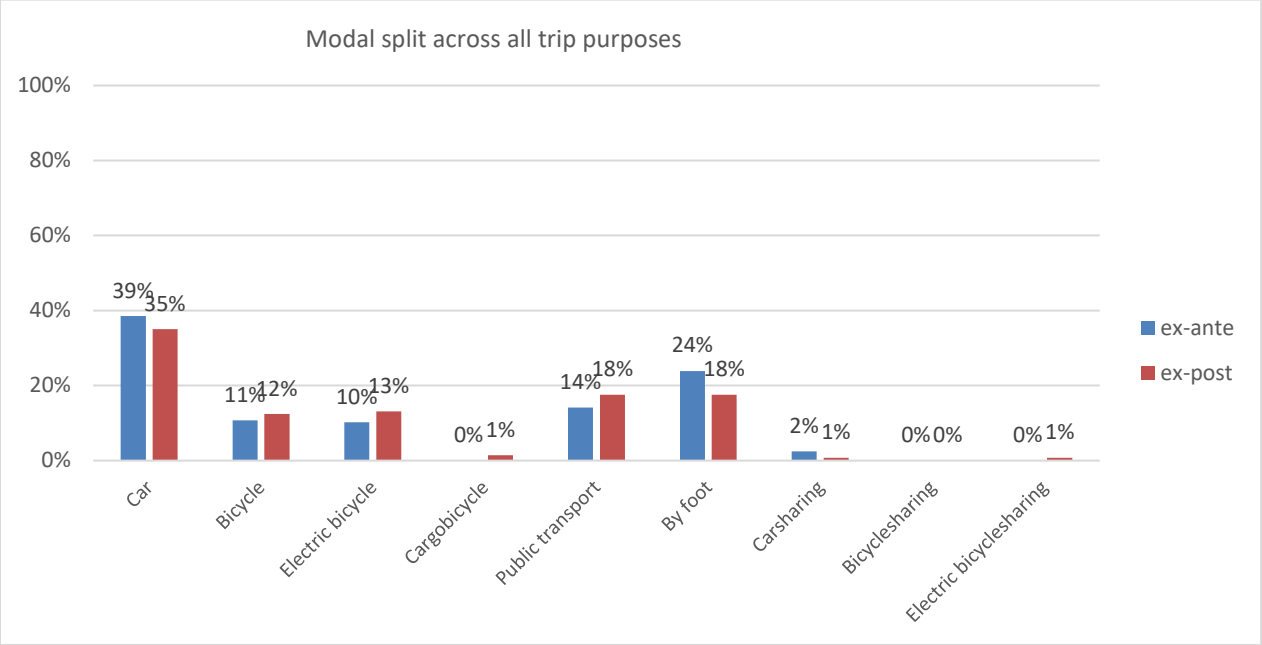


Figure 9 Modal split across trip purposes, Mannenstraat, Leuve

When considering trip frequencies, see Figure 10, it seems that leisure, i.e., cinema, sports, and going to the supermarket, are activities with the highest trip frequency. Commuting from/to work is also a high frequently performed trip purpose, but as many respondents are retired, this trip purpose is less indicated. “Visiting family” is a less frequent activity, but is indicated many times, while “visiting a client” activity is not considered in the analysis, given that it has a low response rate.

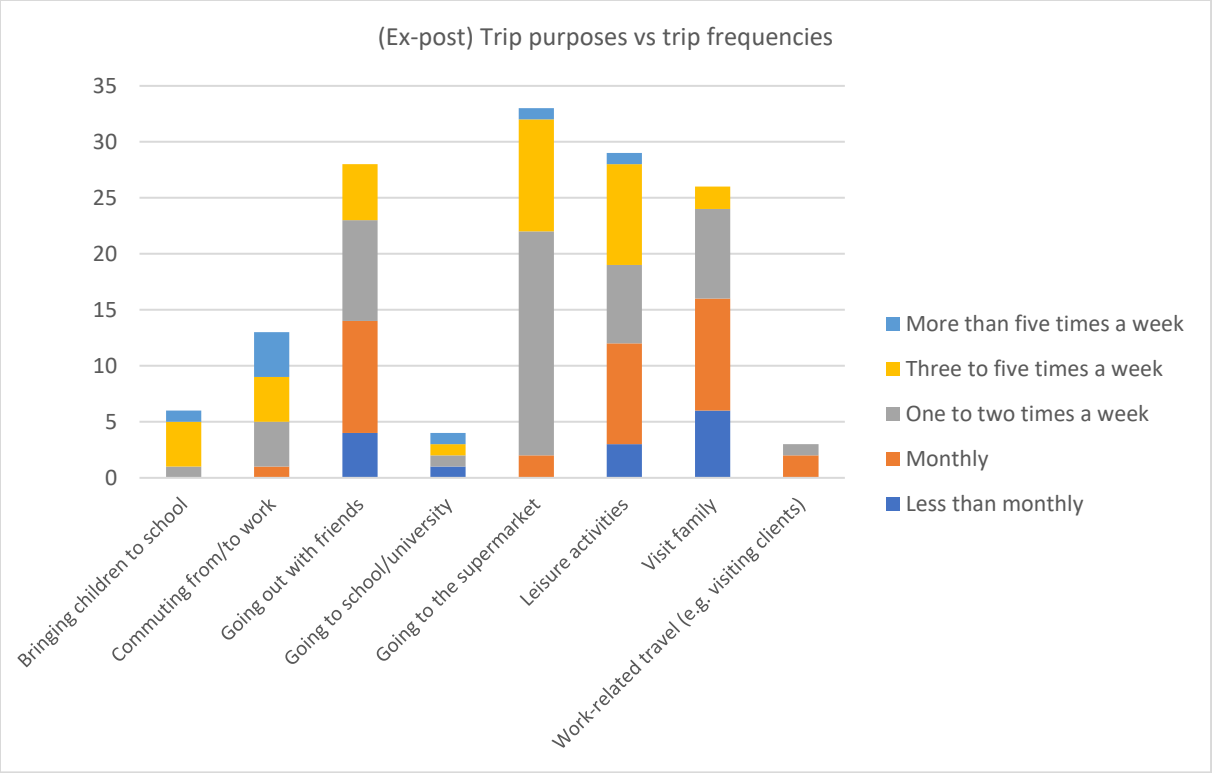


Figure 10 (ex-post) Trip purposes vs frequencies, Mannenstraat, Leuven

Next, it is relevant to show for what trip distances the respondents use various transportation services. As expected, our respondents travel small distances by foot and by (electric) bicycle. However, there is also a considerable number of trips (over 50%) being done by car which are less than 5km. This provides opportunities to use another mode of transport.

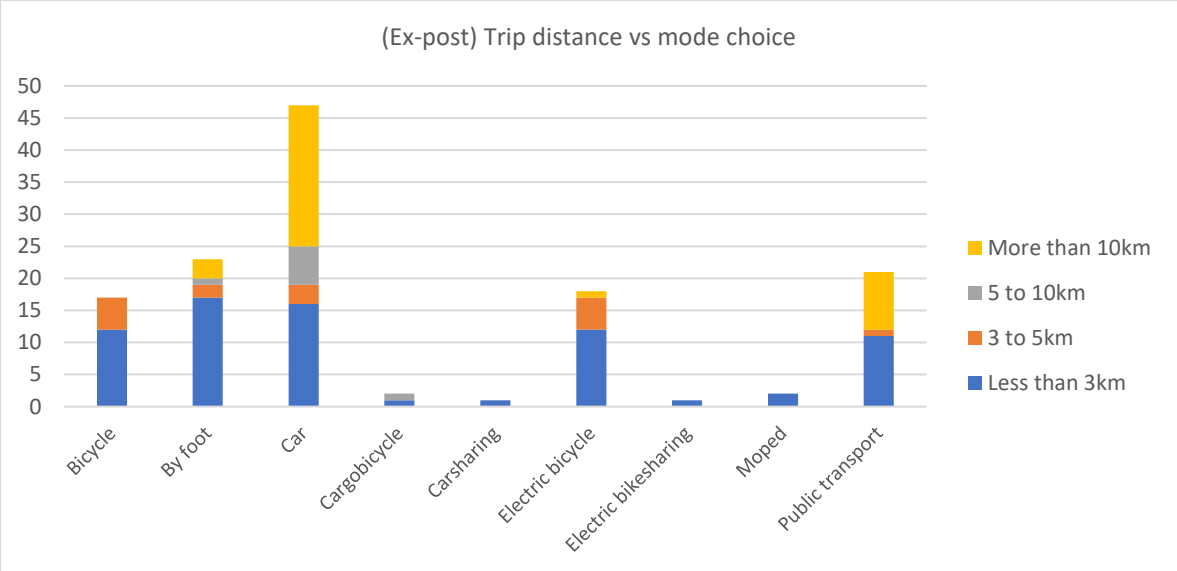


Figure 11 (ex-post) Trip distances vs mode choice, Mannenstraat, Leuven

In the next paragraph, we focus on trips that could offer opportunities for shared mobility substitution. As mentioned above, visiting family is a less frequent activity. As shown in Figure *12*, the car is the preferred mode for this trip purpose, for which the respondents typically travel further. This shows a potential use case for carsharing, which can serve as a substitute for a private car on those occasional moments when people go to visit their family.

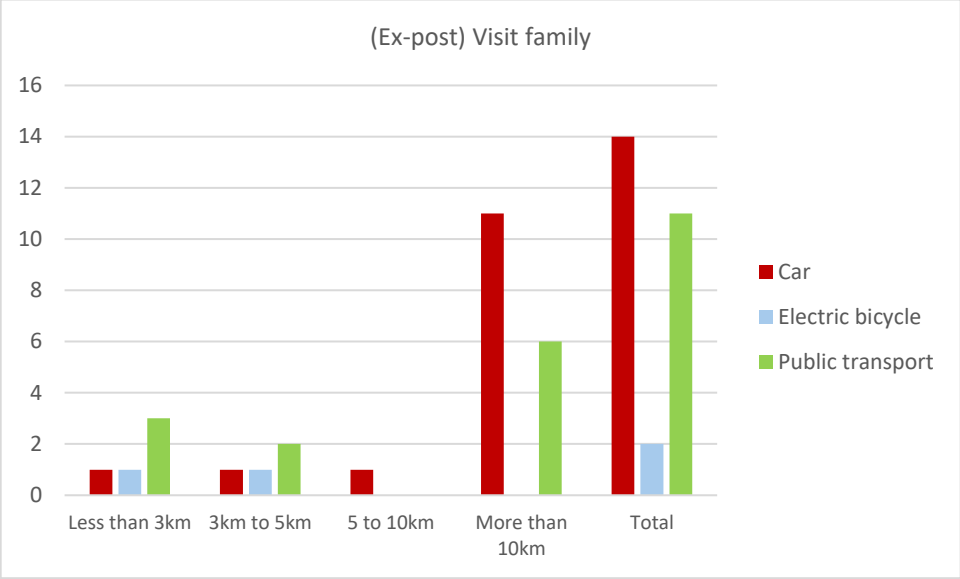


Figure 12 (ex-post) Trips to visit family

Next, considering frequent trips, we can see that people still use their car for very minor distances to go to the supermarket (see Figure *13*). As they have to carry their groceries, a car seems to be the preferred mode for this use case. However, as the distances are very small, a cargobicycle seem to be an ideal substitute, as it also offers carrying capacity.

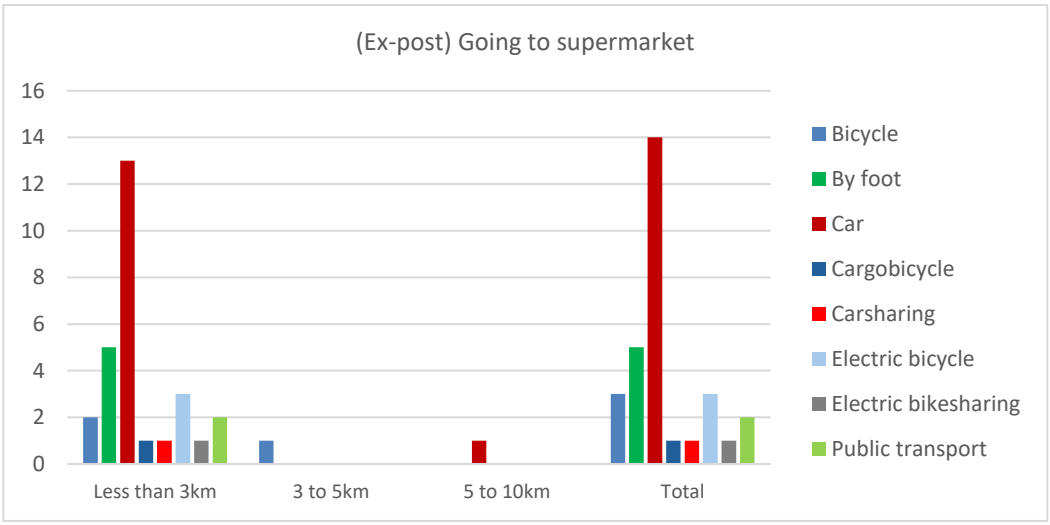


Figure 13 (ex-post) Supermarket trips, Mannenstraat, Leuven

Conversely, the frequent commute to/from work is primarily being done by car, but almost exclusively for large distances (see Figure *14*). The smaller distances are mainly being covered by a certain sustainable

transportation mode. In addition to the trip being done in a sustainable manner already, this trip purpose seems to be less opportune for shared mobility, as travelling daily for a long distance with a shared vehicle involves high costs.

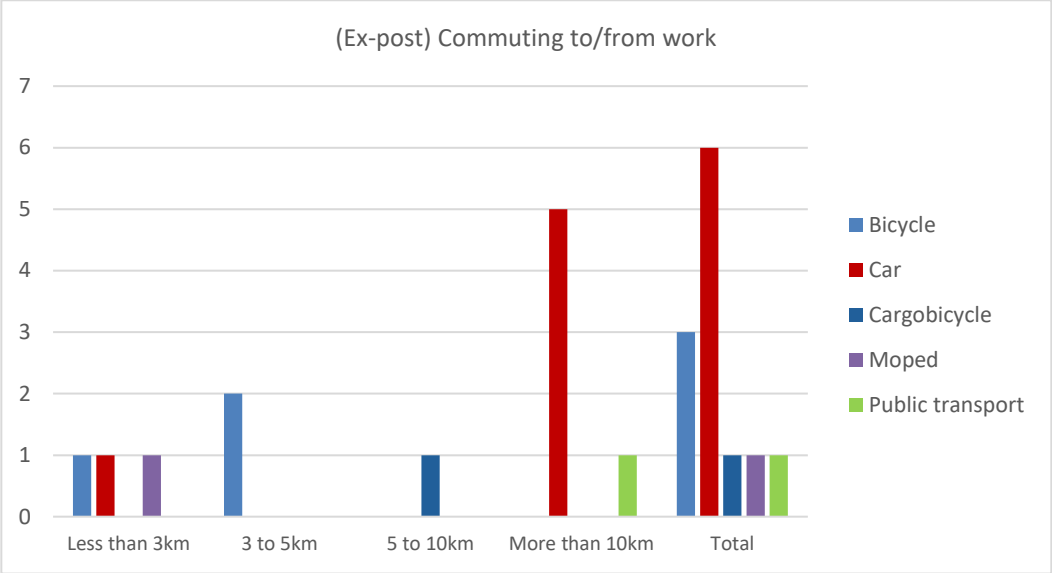


Figure 14 (ex-post) Commuting to/from work, Mannenstraat, Leuven

Perception towards conventional and shared mobility

This section contains three subsections aimed at gathering information about the obstacles and advantages that might hinder or prompt the use of private vehicles, public transport and shared mobility. We asked about the perceived cost, parking availability, usage and replacement intention, perception of travel time, convenience and availability. In the subsections of PT and SM, there are additional questions regarding the perception of safety in the stop or hop-in and -off area and the ease of navigating the system. We show the results of some interesting statements that indicate whether a potential modal shift is realistic.

First, the respondents do not seem to have problems with parking availability. We cannot draw a distinction between the preferred transportation mode of people experiencing more or less difficulties; it is both people travelling by car as well as people travelling by other modes that (dis)agree with the below-mentioned statement. This results in just a small number of respondents who can be incentivised to seek an alternative to their car because of parking difficulties.

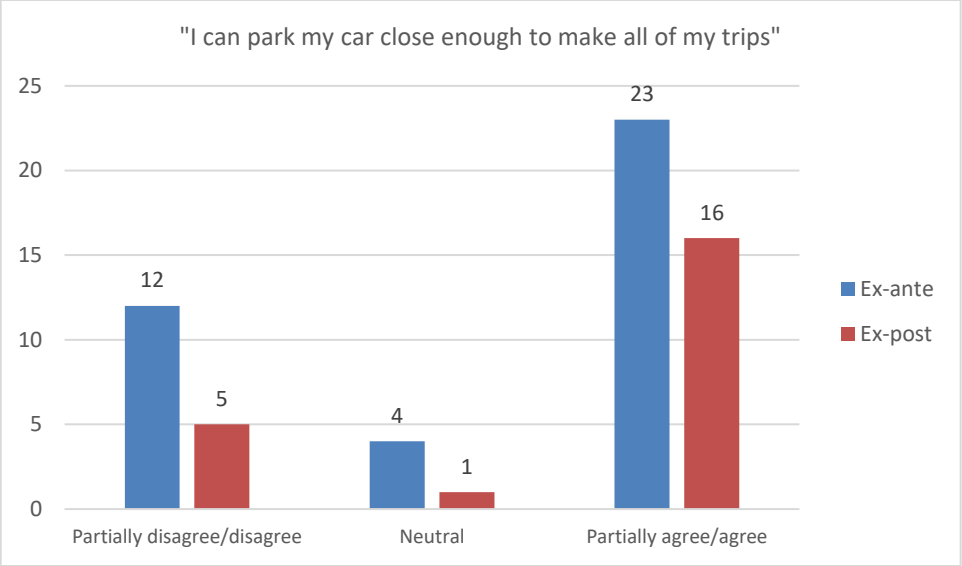


Figure 15 (ex-ante vs ex-post) perception parking distance, Mannenstraat, Leuven

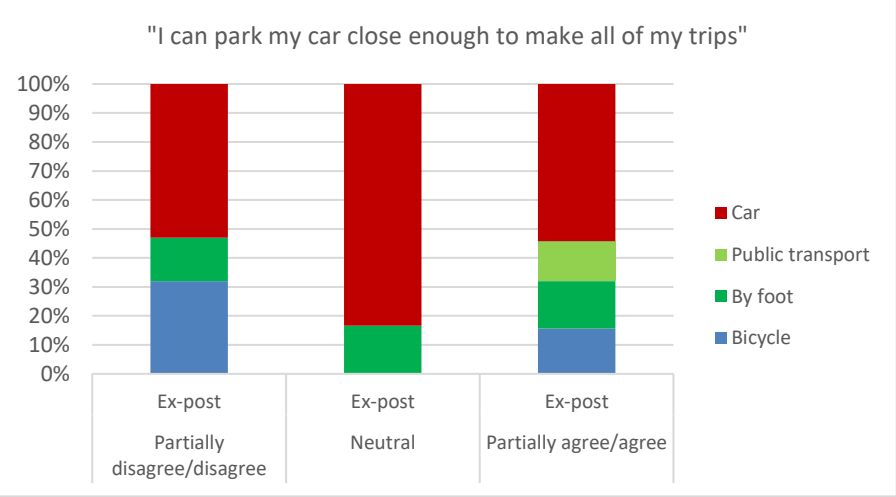


Figure 16 (ex-post) Perception to parking distance, Mannenstraat, Leuven

The respondents' intention to look for alternatives for private car ownership is being inquired with the following statement: "I am actively looking for alternatives for my private car". As can be seen in Figure 17, there is only a very small number of respondents actually agreeing with this. Furthermore, these are already respondents travelling mainly by other modes of transport (see Figure 18). This exemplifies the low potential for car substitution, as it is still perceived as a convenient, safe and reliable travel option.

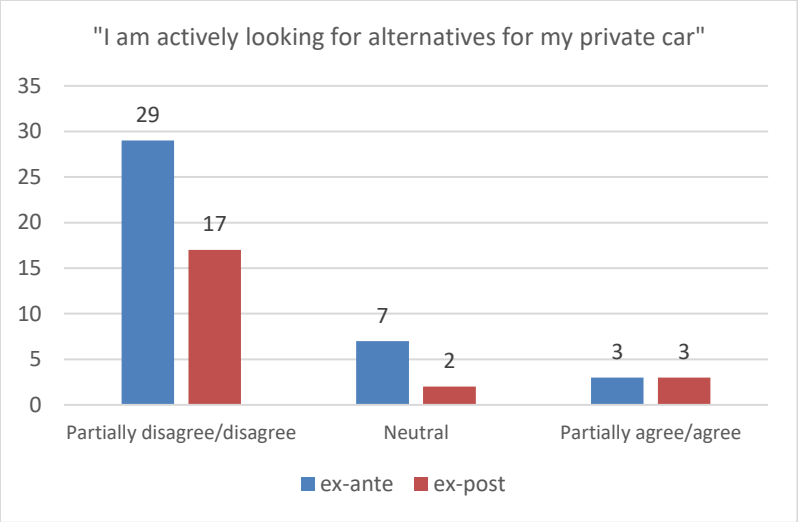


Figure 17 (ex-ante vs ex-post) Likelihood to use alternatives to car, Mannenstraat, Leuven

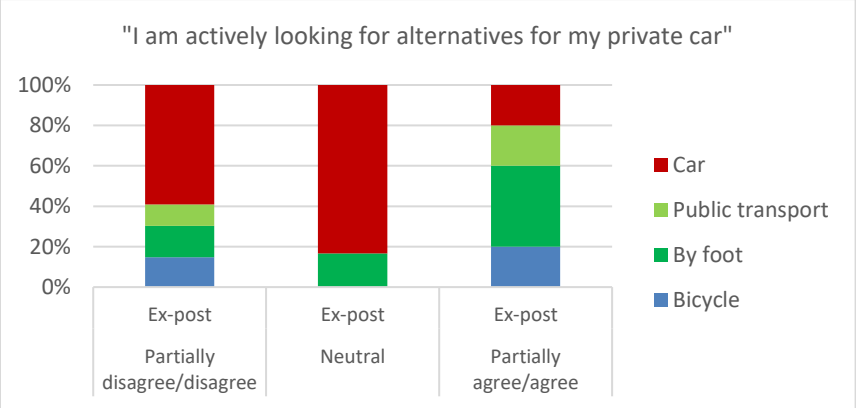


Figure 18 (ex-post) Likelihood to use alternatives to car, Mannenstraat, Leuven

When considering the potential for public transport, there are a larger number of respondents agreeing with the statement “I intend to use public transport more in the future” compared to the statements of car substitution (see Figure 19). However, again, those respondents agreeing with this statement already mainly make use of sustainable modes of transport, reflecting again the low potential of shift from the car to public transport (see Figure 20).

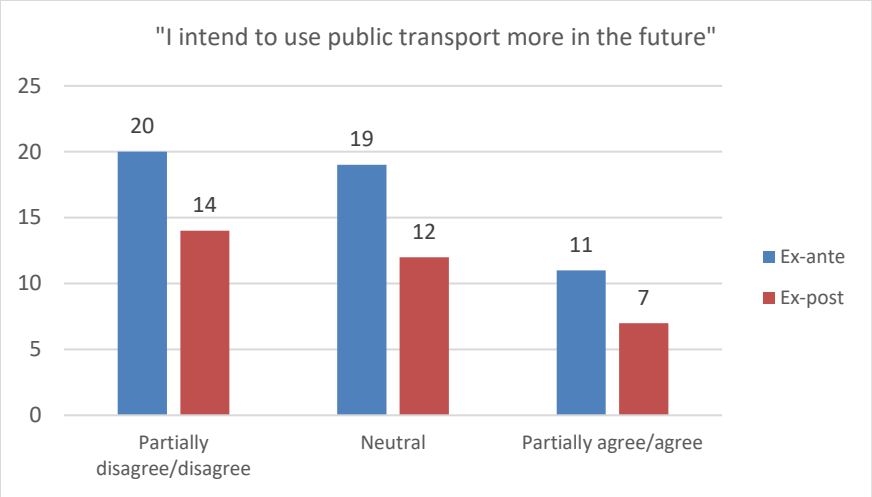


Figure 19 (ex-ante vs ex-post) Intention to use public transport, Mannenstraat, Leuven

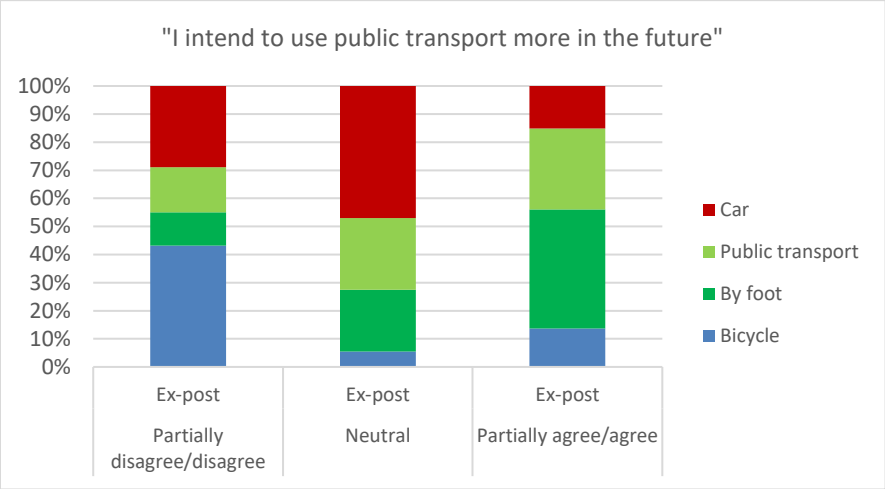


Figure 20 (ex-post) Intention to use public transport, Mannenstraat, Leuven

Usage (intention) of shared mobility

As Figure *9* already illustrated, the modal share of shared mobility was almost non-existent. This is also displayed in Figure *23*, where only six carsharing, one bikesharing and two cargobikesharing users were identified in the ex-ante survey, and only one carsharing, seven bikesharing and two cargobikesharing users were included in the ex-post survey. Therefore, we also inquired about the intention to make more use of shared mobility. There was a small portion of respondents, in both surveys, answering positively to their intention to make use of shared mobility (see Figure *21*). However, similarly to PT usage intention, these were mainly respondents already using sustainable modes of transport (see Figure *22*), which reduces the potential shift from the private car.

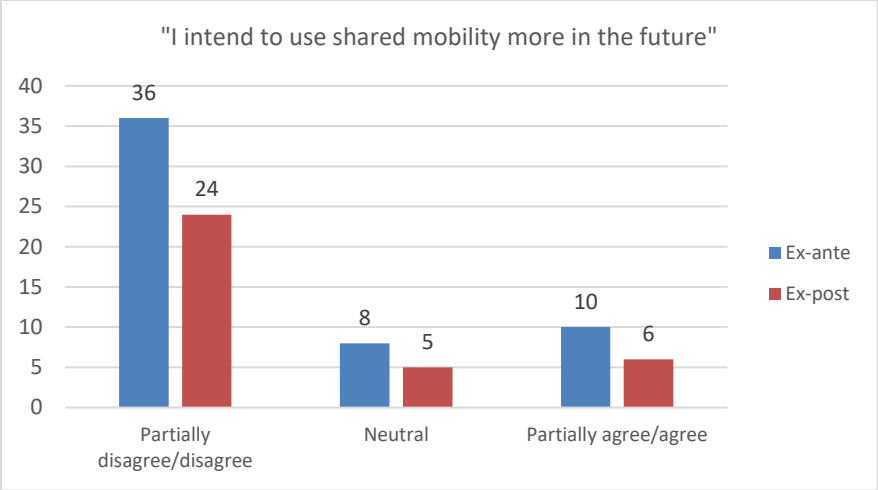


Figure 21 (ex-ante vs ex-post) Intention to use shared mobility, Mannenstraat, Leuven

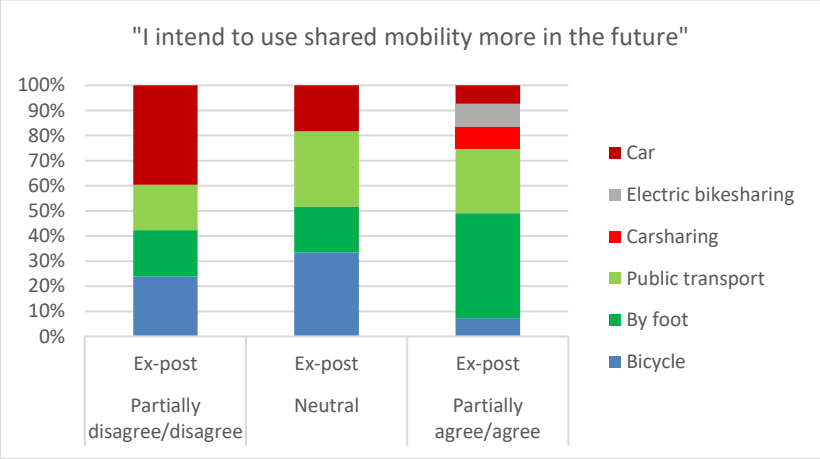


Figure 22 (ex-post) Intention to use shared mobility, Mannenstraat, Leuven

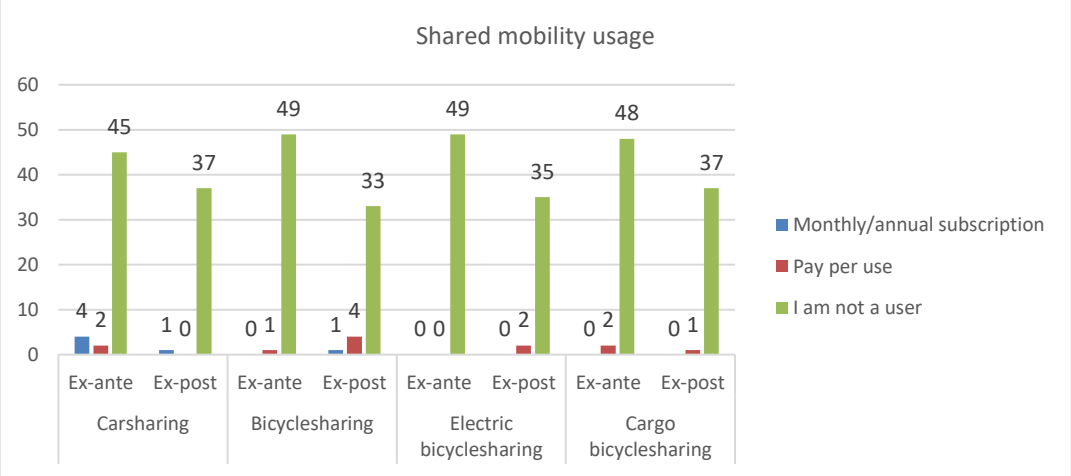


Figure 23 (ex-ante vs ex-post) Shared mobility subscriptions, Mannenstraat, Leuven

Knowledge and usage of mobility hubs

The section on knowledge of mobility hubs is intended to establish a basis for previous awareness of mobility hubs in the area. Leuven has an existing network of hubs called the “Hoppinpunten”. The Hoppinpunten are points where travellers can change between modes and are marked by an information pillar. The mobility hubs of the project and the Hoppinpunten have similar goals: to democratise the use of SM. However, the implementation of the pilots for the project underwent some dissemination strategies in cooperation with the neighbourhood centres to attract different first-line users, e.g., low-income and elderly population. Figure *24* illustrates that awareness and knowledge regarding the ‘Hoppinpoints’ have been improved after the implementation of the pilot mobility hub at the Mannenstraat. However, we have to take into account that the number of respondents for the ex-post survey is limited (39 in total). When considering active users of Hoppinpunten (ex-ante) and the pilot mobility hub at the Mannenstraat (ex-post), the number of respondents having used a mobility hub is very low; only four of our ex-post respondents made use of the pilot mobility hub (see Figure *25*). However, there was some initial intention to make use of mobility hubs, but it seems difficult to convert this into actual usage. Considering the reasons why our ex-post respondents did not make use of the pilot mobility hub, see Figure *26*, it seems that they do not see the added value of shared mobility, as their own private vehicles are more convenient to use. Furthermore, our large sample of older people led to a high number of respondents who could not use shared mobility vehicles, such as (cargo-) bicycles, due to restricted mobility. Lastly, we inquired about the potential impact of the pilot mobility hub becoming permanent on respondents’ transport ownership and subscriptions. Figure *27* illustrates that the impact would be minor, as only two persons consider replacing their car. Furthermore, there is an indication that the impact on public transport could be ambiguous, as the limited number of respondents see shared mobility hubs both as complementary and substitutionary to PT.

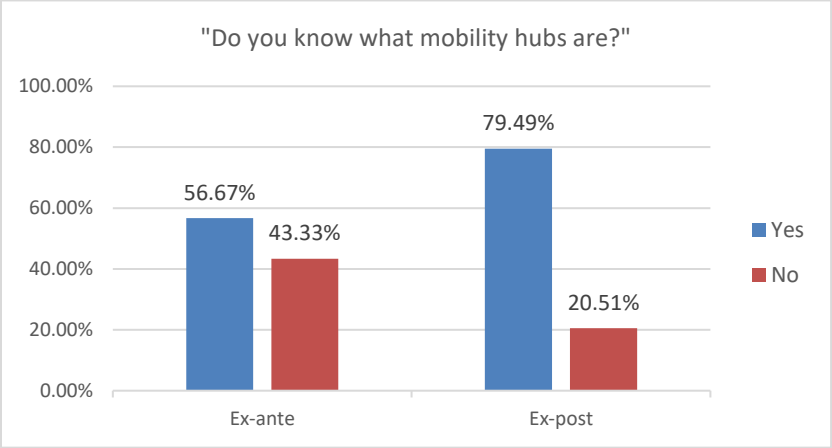


Figure 24 (ex-ante vs ex-post) Knowledge of mobility hubs, Mannenstraat, Leuven

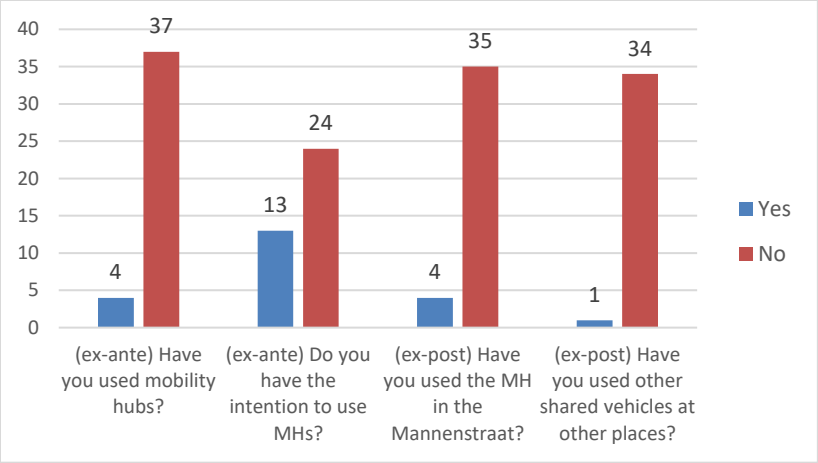


Figure 25 (ex-ante vs ex-post) Summary questions about knowledge of mobility hubs, Mannenstraat, Leuven

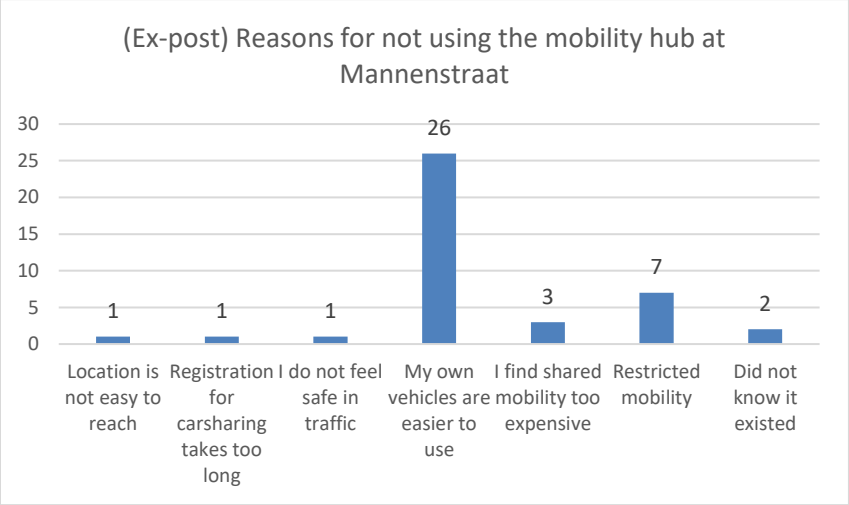


Figure 26 (ex-post) Reasons for not using Mannenstraat, Leuven

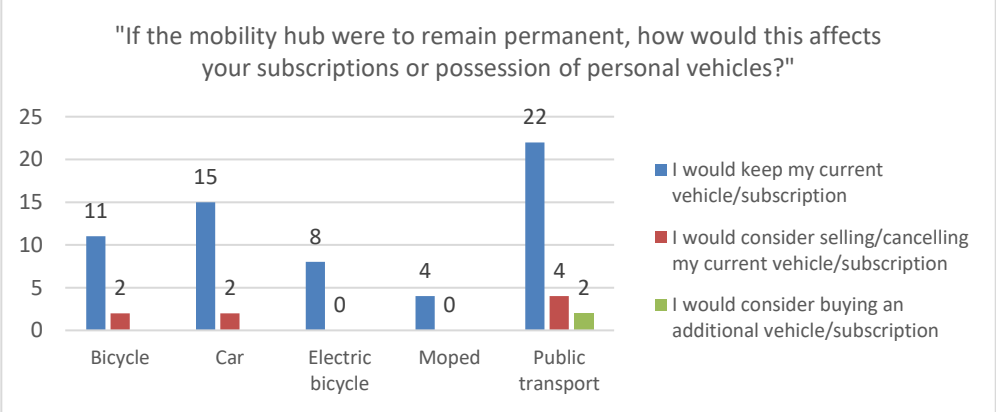


Figure 27 (ex-post) likelihood to change vehicles or subscriptions with mobility hub, Mannenstraat, Leuven

Sint-Maartensdal hub

The sample of respondents from the Sint-Maartensdal pilot is insignificant to the neighbourhood's population. Through the distribution of flyers, only 18 ex-ante and 9 ex-post respondents were captured. These only included second-line testers. The results of the sections are not comparable to those of the Mannenstraat. However, the same survey components discussed above are also described for this pilot, keeping in mind that this is based on a very limited pool of respondents.

Socio-demographics

The ex-ante and ex-post survey included mainly respondents with a high-education background and a comfortable living situation. In contrast to the results of the first pilot, these surveys had a more even age distribution, including both young, middle-aged and older people. Furthermore, the majority of the respondents worked full-time. The number of men and women responding to the ex-ante or ex-post survey is almost equal.

Transport ownership and travel behaviour

Despite the low pool of answers, the results of the means of transport that are owned correspond to the initial landscape of the city: bicycles and cars are the dominant modes owned by the respondents (Figure 28). It is remarkable that only 33% of the ex-ante respondents own at least one car, which is lower than expected. This could indicate an increased usage potential for shared vehicles.

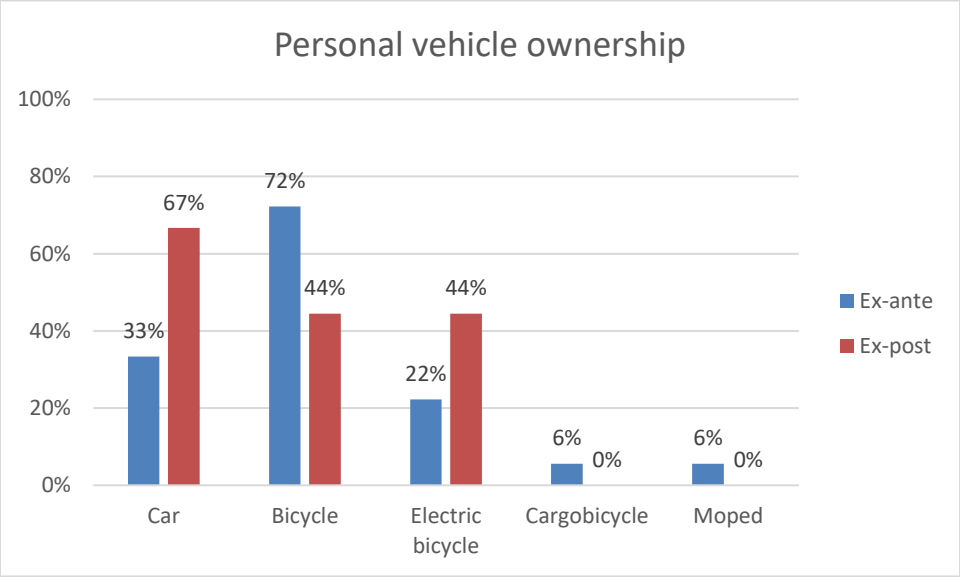


Figure 28: Personal vehicle ownership Leuven-Sint-Maartensdal

Considering the subscriptions to public transport (Figure 29), there is only a small portion of respondents not using public transport. In the ex-post survey, there is a high share of people owning a PT subscription, while in the ex-ante survey, people pay (and use) PT more on an as-is basis.

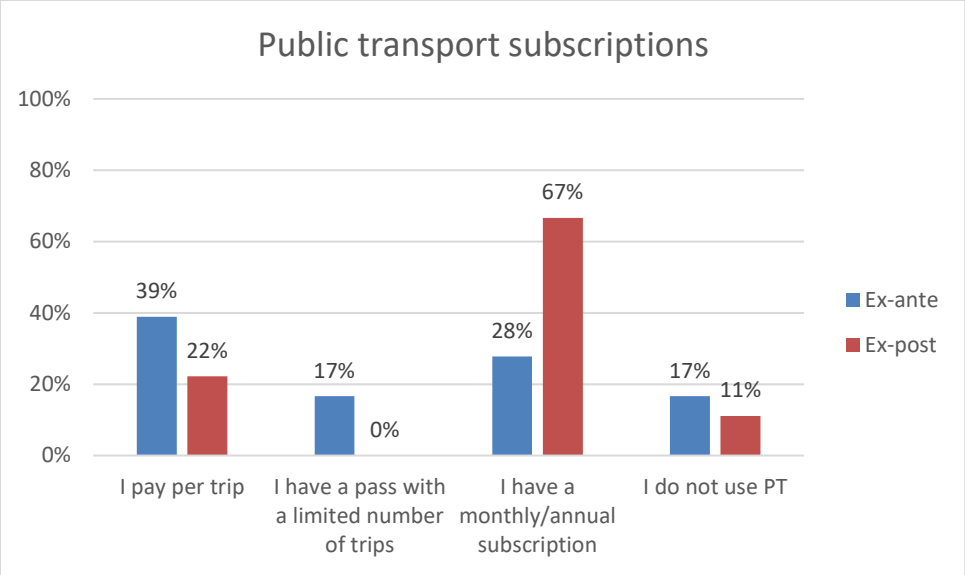


Figure 29: Public transport subscriptions, Leuven-Sint-Maartensdal

Next, we report on respondents' travel behaviour. The modal split from the respondents across all trip purposes is shown in Figure *30*. Contrasting the results from the Mannenstraat, the respondents from both ex-ante and ex-post surveys now mainly travel by sustainable modes of transport across different trip purposes. This is in line with the low ownership level of private cars and high usage and subscription levels of PT. However, still, the usage of shared mobility modes is almost non-existent, with some carsharing trips in the ex-ante survey (in line with car ownership being particularly low in this survey).

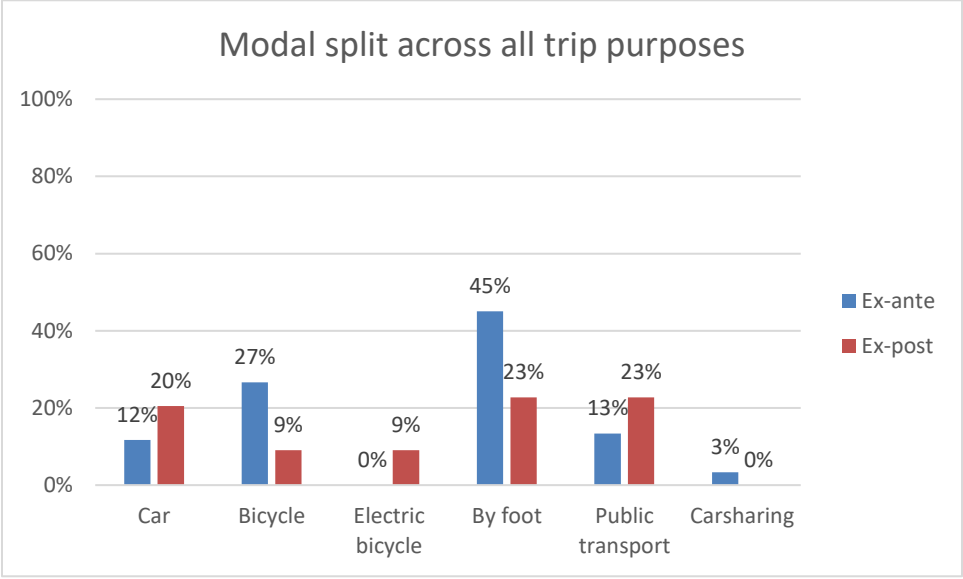


Figure 30: Modal split across all trip purposes, Leuven-Sint-Maartensdal

When considering trip frequencies, see Figure *31*, similarly to pilot Mannenstraat, going to the supermarket and commuting to the office are highly frequent trips that almost all our respondents from the ex-post survey conduct. “Visiting family” is a less frequent activity, but still indicated regularly.

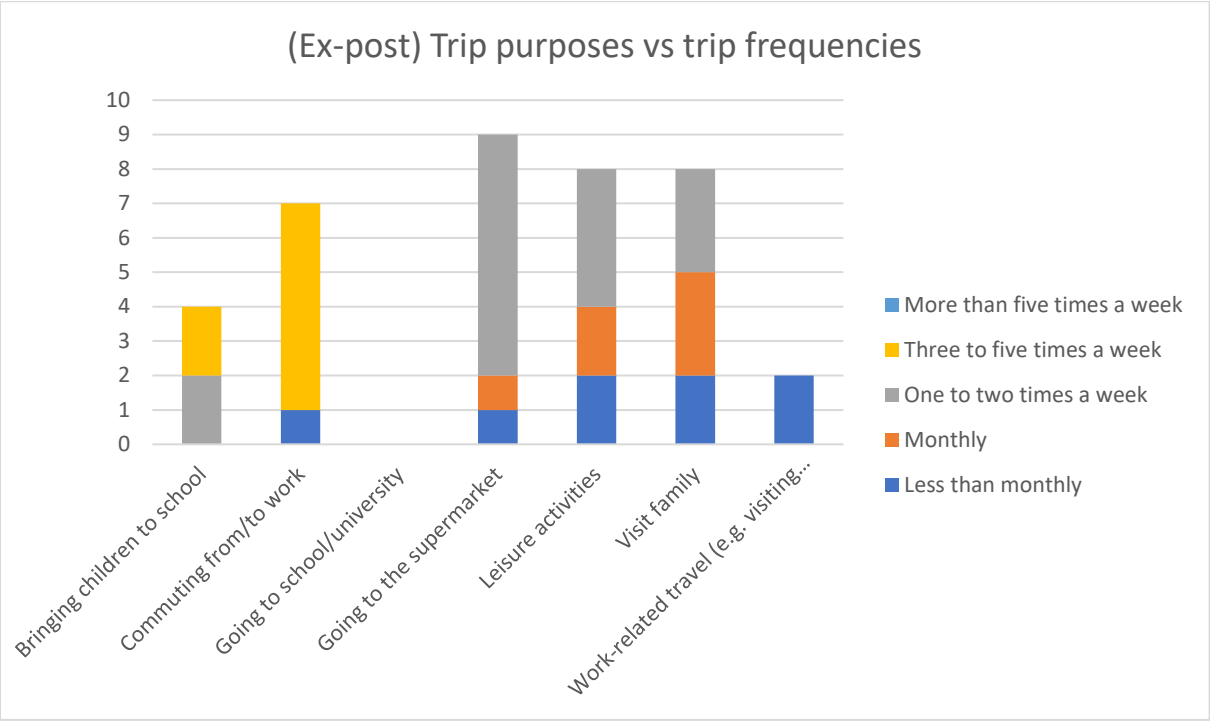


Figure 31: (ex-post) Trip purposes vs trip frequencies, Leuven-Sint-Maartensdal

Next, it is relevant to show for what trip distances the respondents use various transportation services (Figure *32*). As expected, our respondents travel small distances by foot and by (electric) bicycle. Contrasting the results from Mannenstraat, the car is mainly being used for trips longer than 5km. It could offer opportunities for shared electric bicycles or cars, but mainly for infrequent trips.

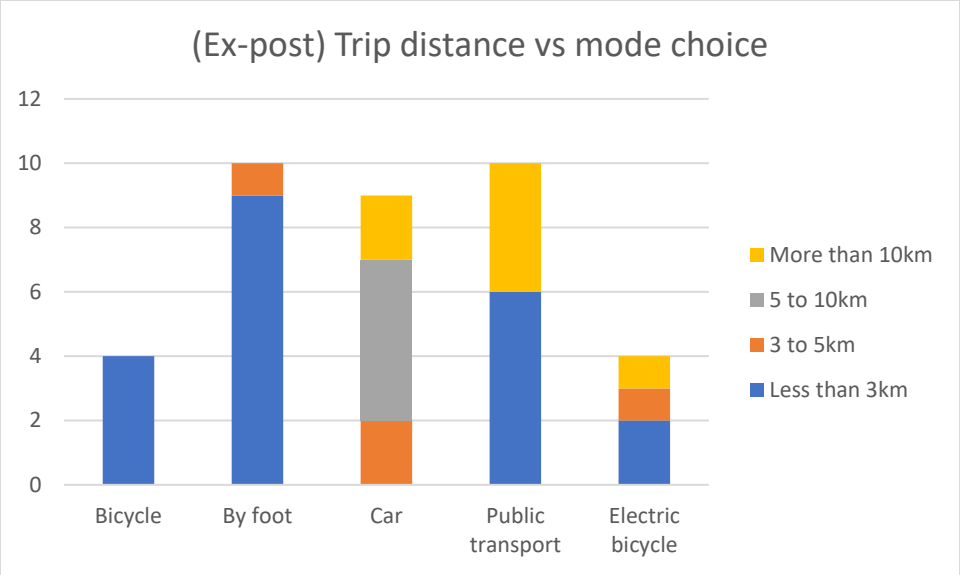


Figure 32: (ex-post) Trip distance vs mode choice, Leuven-Sint-Maartensdal

In the next paragraph, we focus on trips that could offer opportunities for shared mobility substitution. As mentioned above, visiting family is a less frequent activity. As shown in Figure *33*, the car is the preferred mode for this trip purpose, for which the respondents typically travel further. This shows a potential use case for electric bike sharing or car sharing, which can serve as a substitute for a private car on those occasional moments that people go and visit their family.

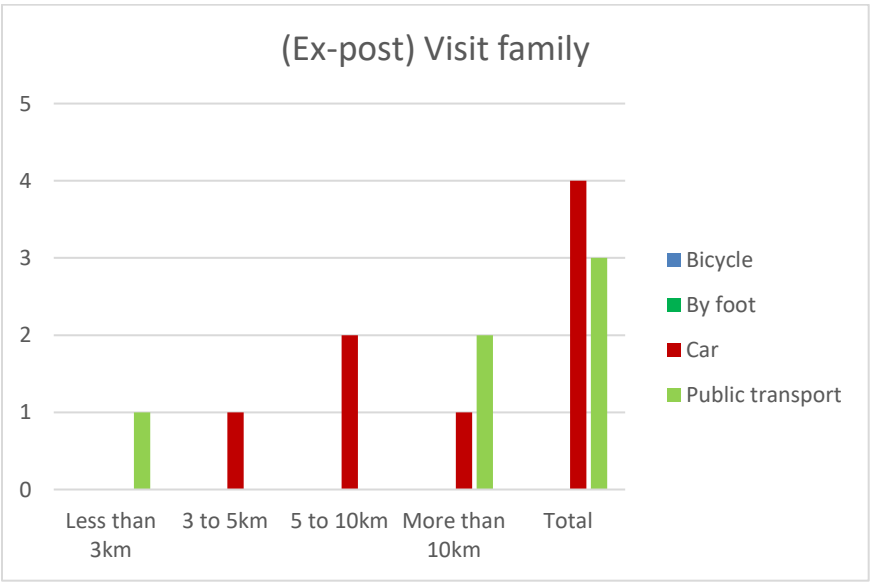


Figure 33: (ex-post) trips to visit family, Leuven-Sint-Maartensdal

Next, considering frequent supermarket trips, the car is not used for very small distances, as people go mainly by foot or even public transport to go to a neighbourhood supermarket. However, when distance increases, the car is the preferred mode (Figure *34*). A shared cargo bicycle is probably not an ideal substitute for those longer distances, reducing its potential in this pilot compared to Mannenstraat.

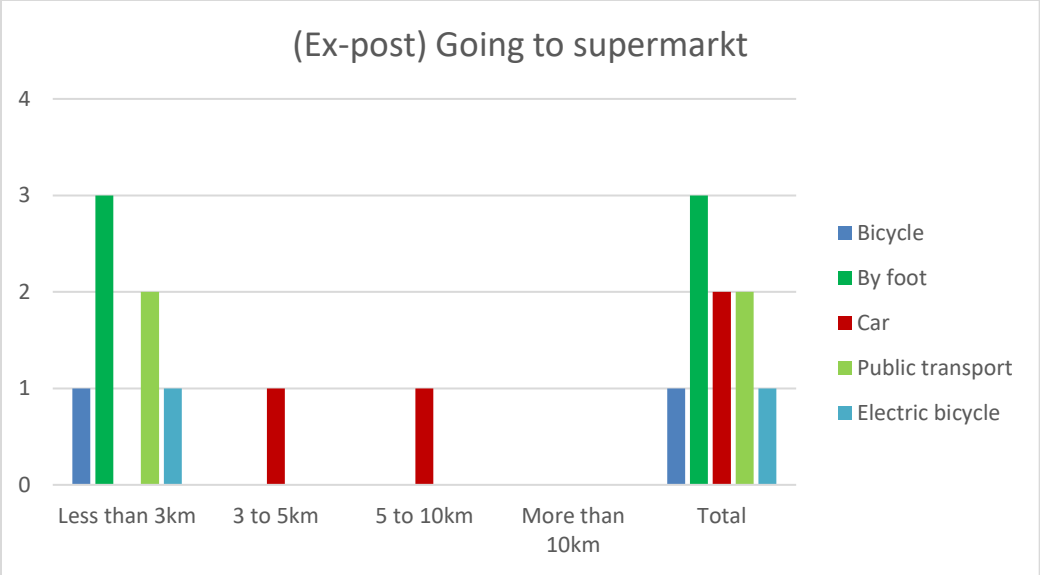


Figure 34: (ex-post) trips to supermarket, Leuven-Sint-Maartensdal

Perception towards conventional and shared mobility

Similarly to the perceptions-section of the Mannenstraat, this section shows the results of some statements that indicate if a potential modal shift is realistic.

First, the respondents do not seem to have problems with parking availability (Figure *35*). We cannot draw a distinction between the preferred transportation mode of people experiencing more or less difficulties; it is both people travelling by car as well as people travelling by other modes that (dis)agree with the below-mentioned statement (Figure *36*). This results in just a small number of respondents who can be incentivised to seek an alternative to their car because of parking difficulties.

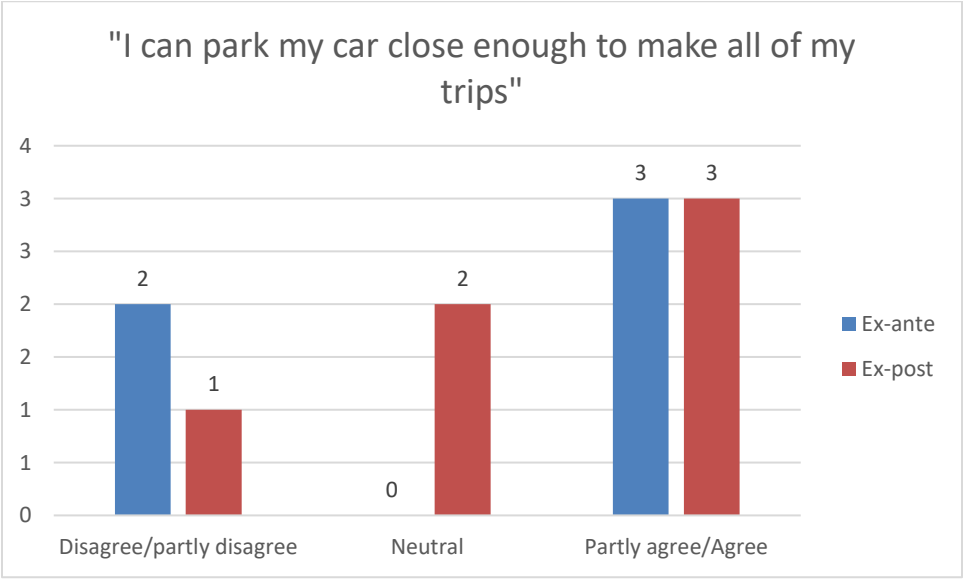


Figure 35: (ex-ante vs ex-post) perception parking distance, Leuven-Sint-Maartensdal

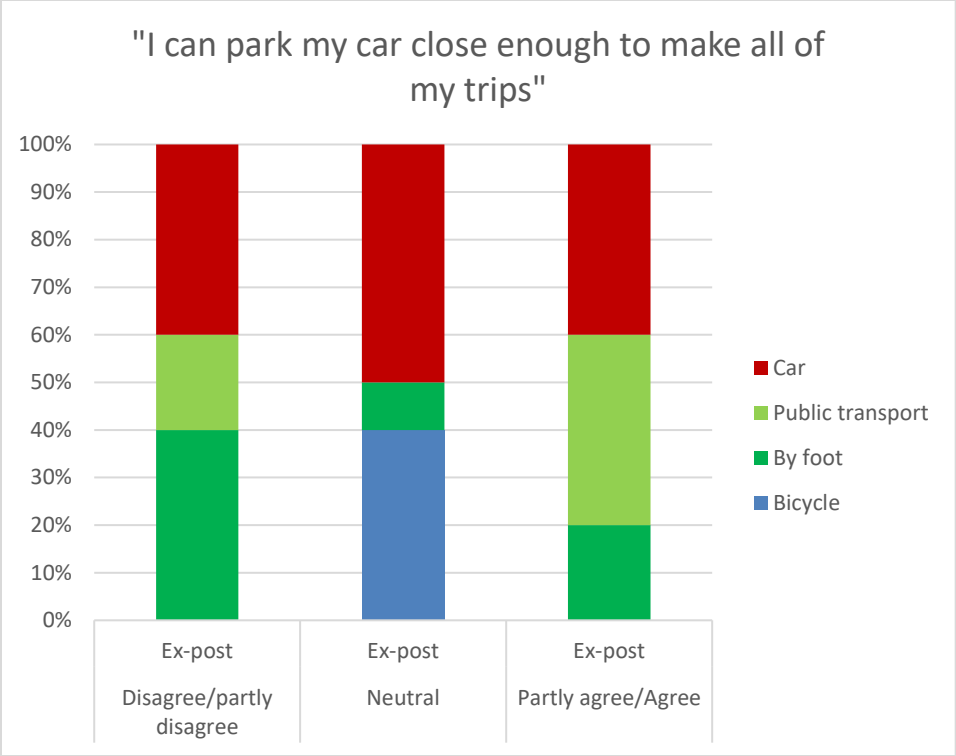


Figure 36: (ex-post) perception parking distance vs modal split, Leuven-Sint-Maartensdal

The respondents' intention to look for alternatives for private car ownership is being inquired with the following statement: "I am actively looking for alternatives for my private car". As can be seen in Figure 37, there is only a very small number of respondents actually agreeing with this. The ones agreeing to this (only ex-post), do travel some trips with their car, which can be substituted (Figure 38). However, it exemplifies the low potential for car substitution, as it is still perceived as a convenient, safe and reliable travel option.

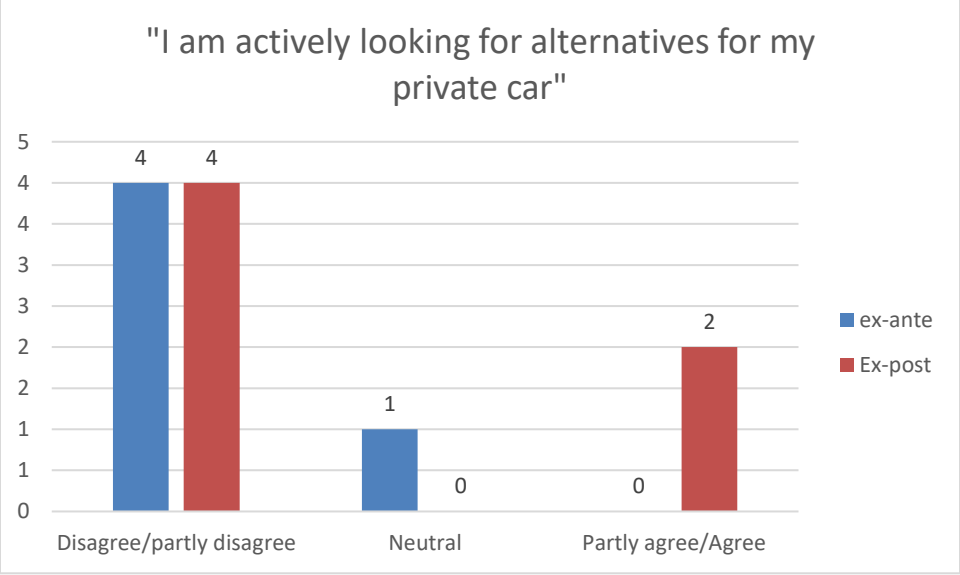


Figure 37: (ex-ante vs ex-post) Likelihood to use alternatives to car, Leuven-Sint-Maartensdal

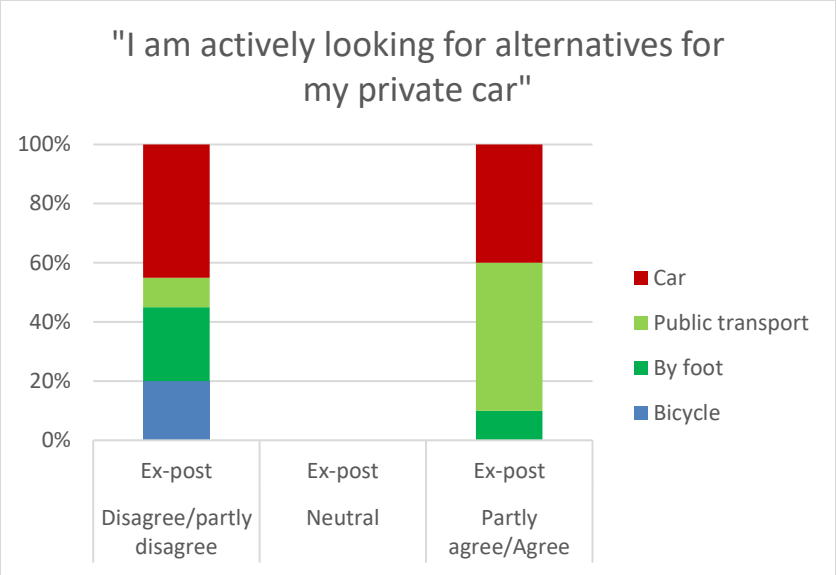


Figure 38: (ex-post) Likelihood to use alternatives to car vs modal split, Leuven-Sint-Maartensdal

When considering the potential for public transport, there is already a large number of respondents using this mode of transport. Therefore, agreeing with the statement “I intend to use public transport more in the future” is limited (Figure 39). The ex-post respondents disagreeing with this statement are mainly travelling by bicycle and do not feel the need to shift towards PT. The one ex-post person agreeing with this statement already has a very sustainable way of travelling, thus there is no shift potential from car to PT (Figure 40).

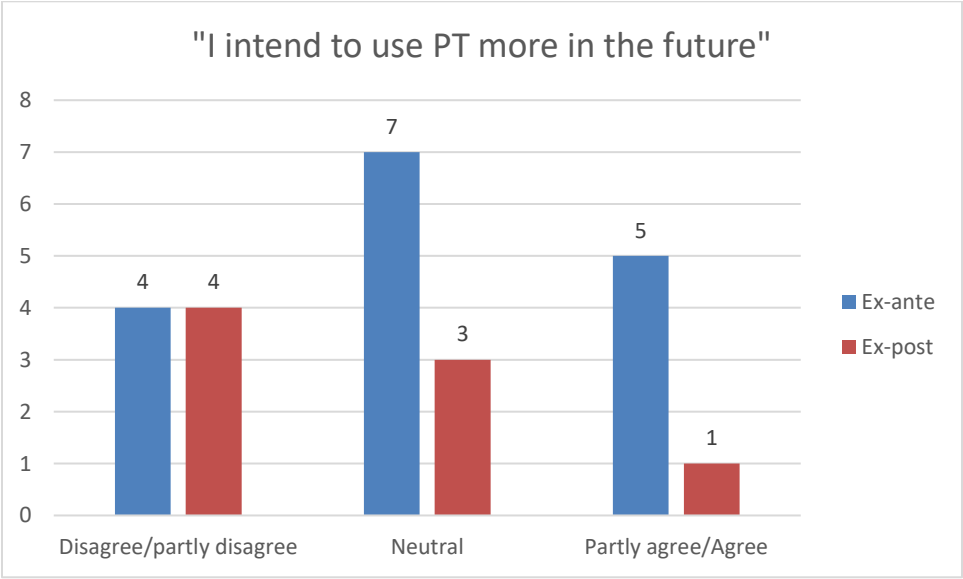


Figure 39: (ex-ante vs ex-post) Intention to use public transport, Leuven-Sint-Maartensdal

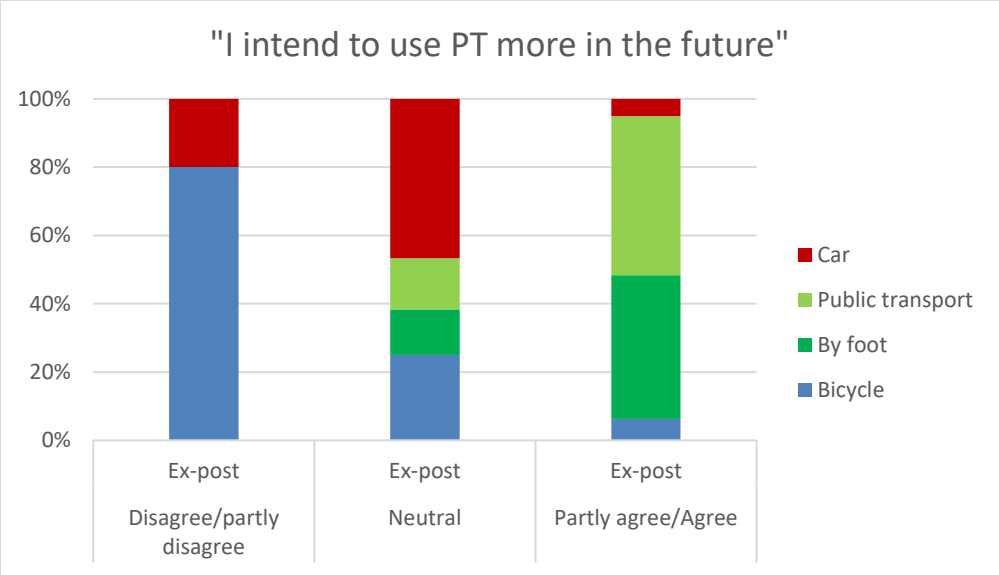


Figure 40: (ex-post) Intention to use public transport vs modal split, Leuven-Sint-Maartensdal

Usage (intention) of shared mobility

As Figure *30* already illustrated, the modal share of shared mobility was almost non-existent. This is also displayed in Figure *43*, where only one carsharing and one electric bikesharing user were identified in the ex-ante survey, and only one carsharing, two bikesharing, one electric bikesharing and three cargobikesharing users were included in the ex-post survey. Similarly to the Mannenstraat, there is higher usage across the ex-post respondents. We also inquired about the intention to make more use of shared mobility. It is remarkable that in the ex-ante survey the intention is higher, whereas the respondents from the ex-post survey, who already made use of shared mobility, seem more reserved in their intention (Figure *41*). The two persons intending to make more use of SM, are now mainly travelling by PT (Figure *42*).

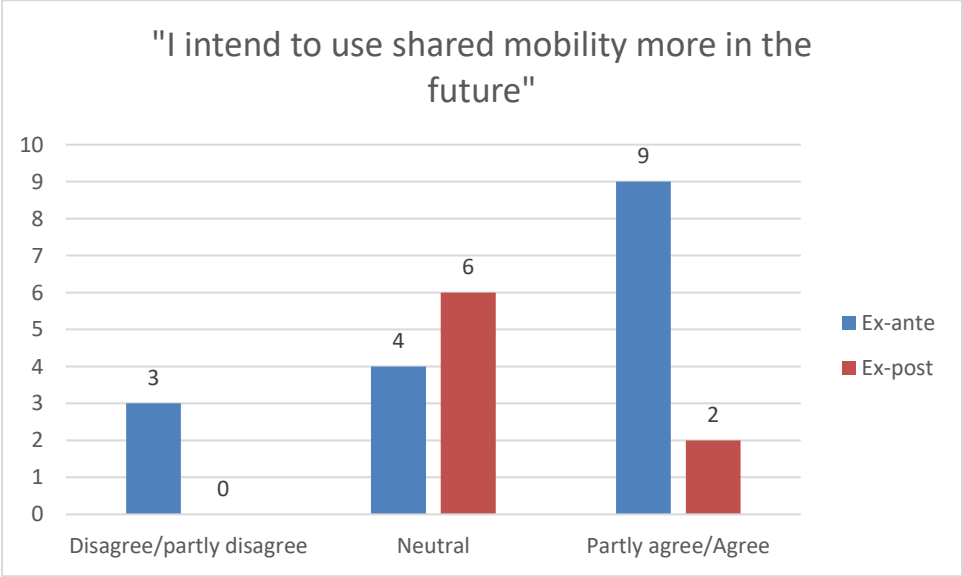


Figure 41 (ex-ante vs ex-post) Intention to use shared mobility, Leuven-Sint-Maartensdal

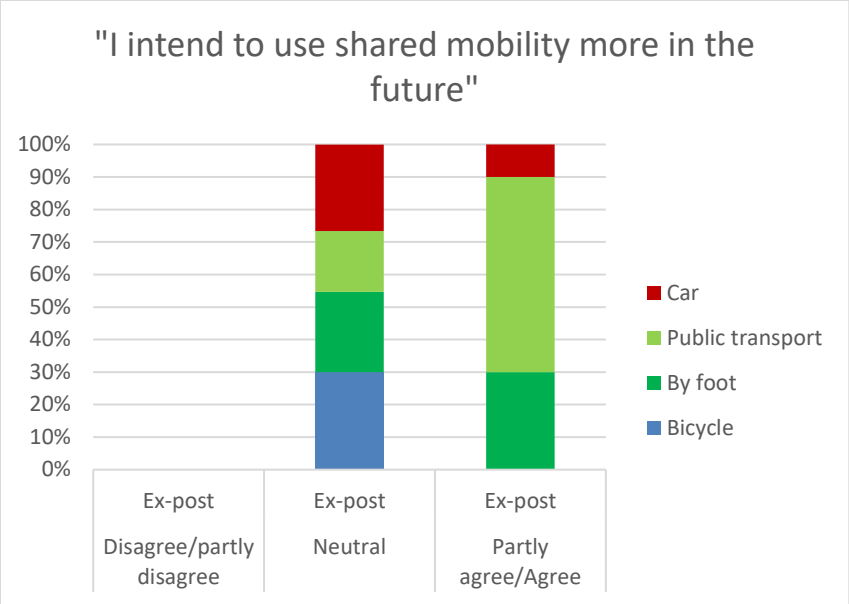


Figure 42: (ex-post) Intention to use shared mobility, Leuven-Sint-Maartensdal

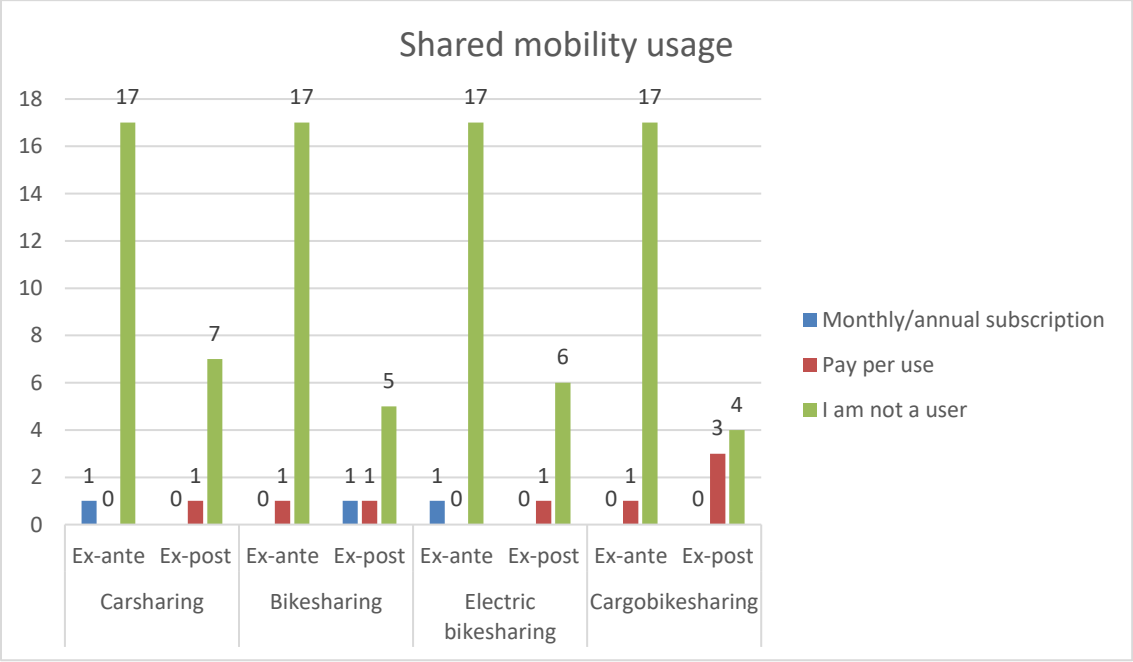


Figure 43: (ex-ante vs ex-post) Shared mobility subscriptions, Leuven-Sint-Maartensdal

Knowledge and usage of mobility hubs

Similarly to the Mannenstraat hub, the ex-post respondents have improved knowledge about the concept 'Hoppinpunt' (Figure *44*). However, we have to take into account that the number of respondents for the ex-ante and ex-post surveys is limited. When considering active users of mobility hub (ex-ante), the number of respondents having used a mobility hub is very low, or they were not aware they have used a 'Hoppinpunt'; we managed to include actual users of the pilot mobility hub in the ex-post survey, where six out of nine did make use of some of the shared mobility services (see Figure *45*), mainly carsharing

(Figure *46*). There was also an initial intention to make use of mobility hubs (ex-ante), but we cannot assess whether this was converted into actual usage. Considering the reasons why our ex-post respondents did not make use of the pilot mobility hub, see Figure *47*, it seems that the registration process was too difficult and time-consuming, apart from the notion that private vehicles are more convenient. Lastly, we inquired about the potential impact of the pilot mobility hub becoming permanent on respondents' transport ownership and subscriptions. Taking into account the very small number of users (only six), Figure *48* illustrates that the car is indicated two times to be replaced, whereas other modes are less indicated.

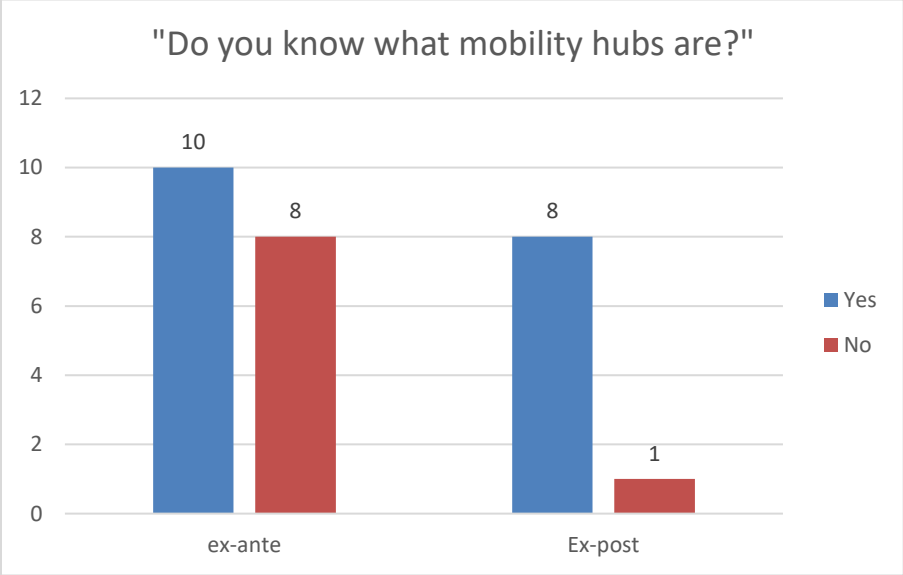


Figure 44: (ex-ante vs ex-post) Knowledge of mobility hubs, Leuven-Sint-Maartensdal

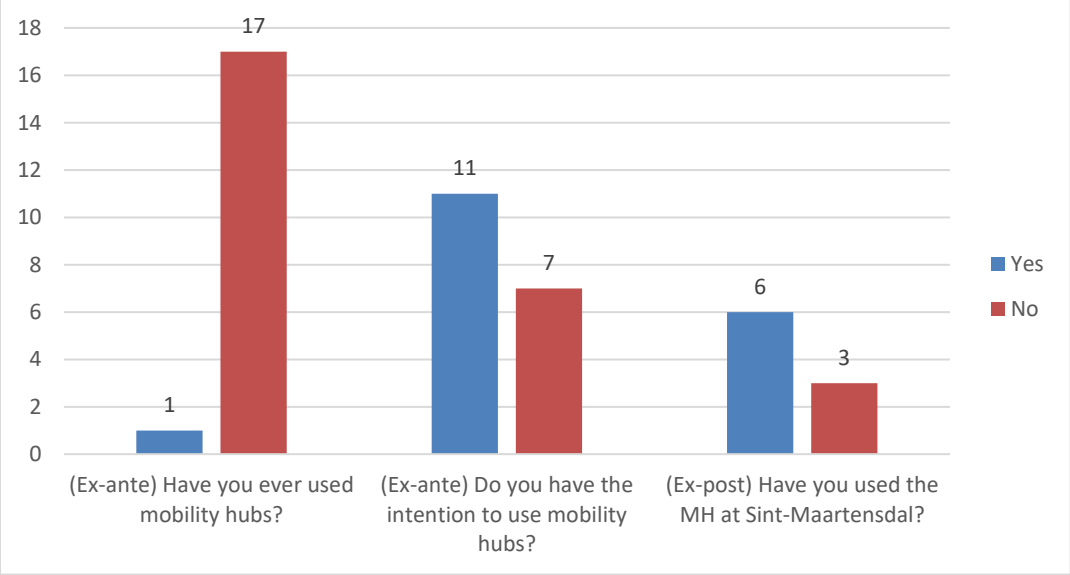


Figure 45: (ex-ante vs ex-post) Summary questions about knowledge of mobility hubs, Leuven-Sint-Maartensdal

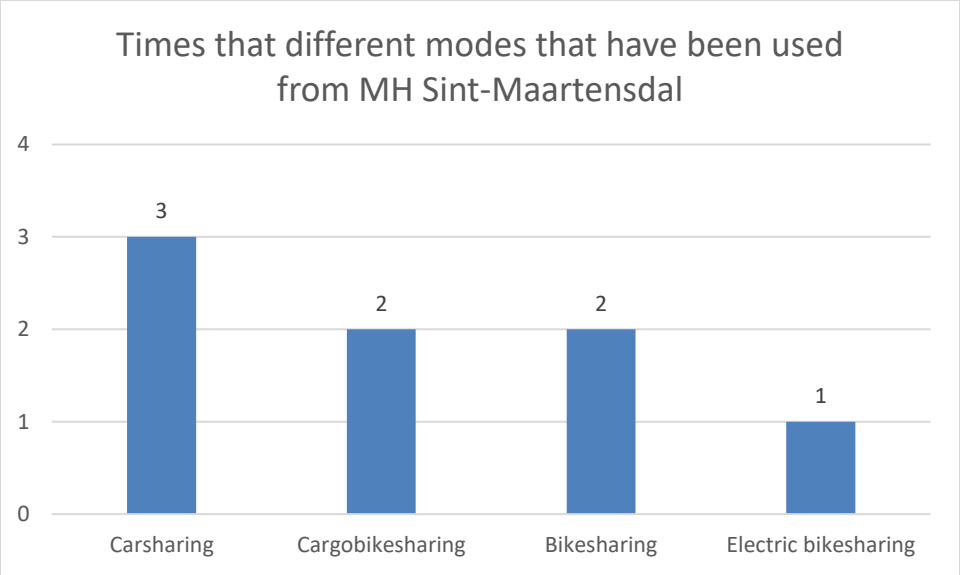


Figure 46: Usage at mobility hub, Leuven-Sint-Maartensdal

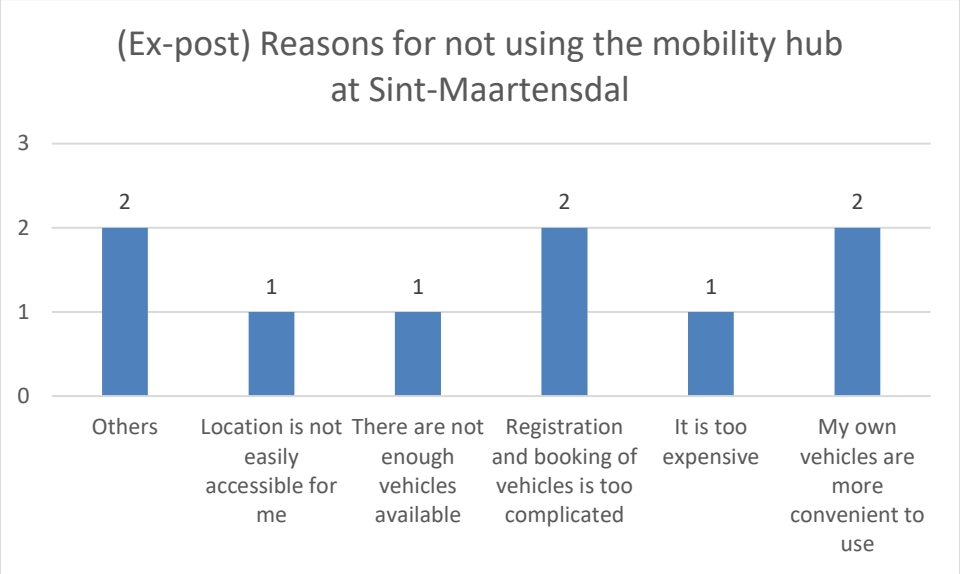


Figure 47: Reasons for not using mobility hub, Leuven-Sint-Maartensdal

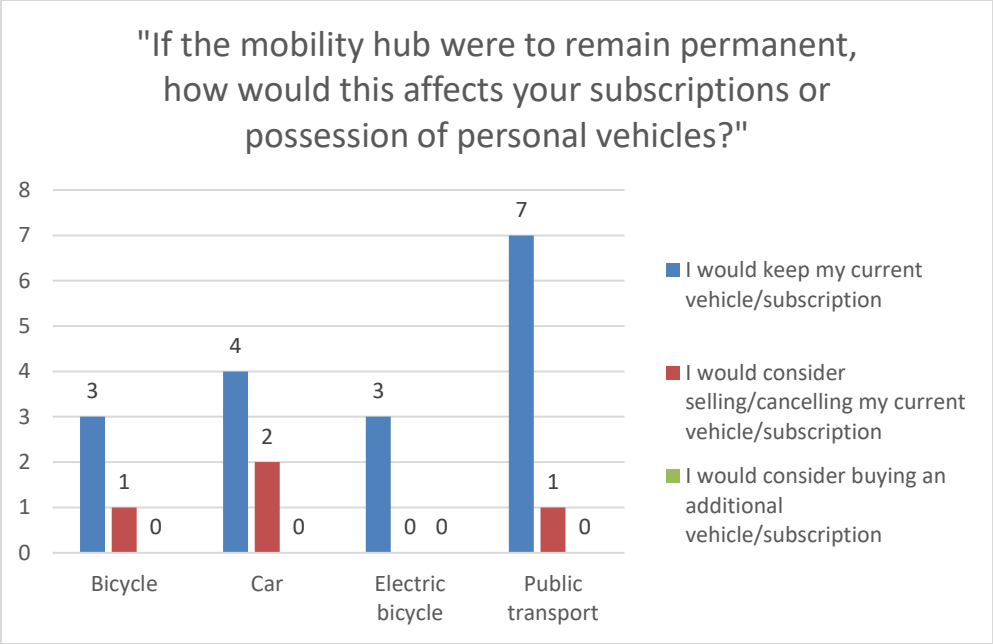


Figure 48: (ex-post) likelihood to change vehicles or subscriptions with mobility hub, Leuven-Sint-Maartensdal

Casablanca hub

Similar to the case of Sint-Maartensdal, the sample of respondents from the Casablanca pilot is insignificant to the neighbourhood's population. Through the distribution of flyers and sending out emails, only 15 ex-ante and 8 ex-post valid responses were captured. These only included second-line testers. The same survey components discussed above are also described for this pilot, keeping in mind that this is based on a very limited pool of respondents.

Socio-demographics

The ex-ante survey included mainly respondents with a high-education background and a comfortable living situation, while the ex-post sample was composed of more respondents with a lower education background and who indicated they have a rather uncomfortable financial living situation. The ex-ante survey had a rather even age distribution, however only one respondent was older than 60. The limited number of respondents from the ex-post survey were mainly between 36 and 60 years old. Considering their employment status, the majority of the ex-ante participants worked part or full-time, while for the ex-post participants, half of them did not work. Lastly, the number of men and women responding to the ex-ante or ex-post survey is almost equal, with a slightly higher number of women in both samples.

Transport ownership and travel behaviour

Both samples show a very low ownership of cars, as only 27% and 25% of the ex-ante and ex-post respondents respectively own at least one car. This contrasts with the ownership levels around the other two mobility hub locations. The bicycle, be it a normal, electric or cargo bicycle, is owned by almost all respondents (Figure *49*). This means that our limited sample will already be travelling in a sustainable manner, which could increase the potential for shared mobility uptake, but not for shifting from cars towards sustainable modes of transport.

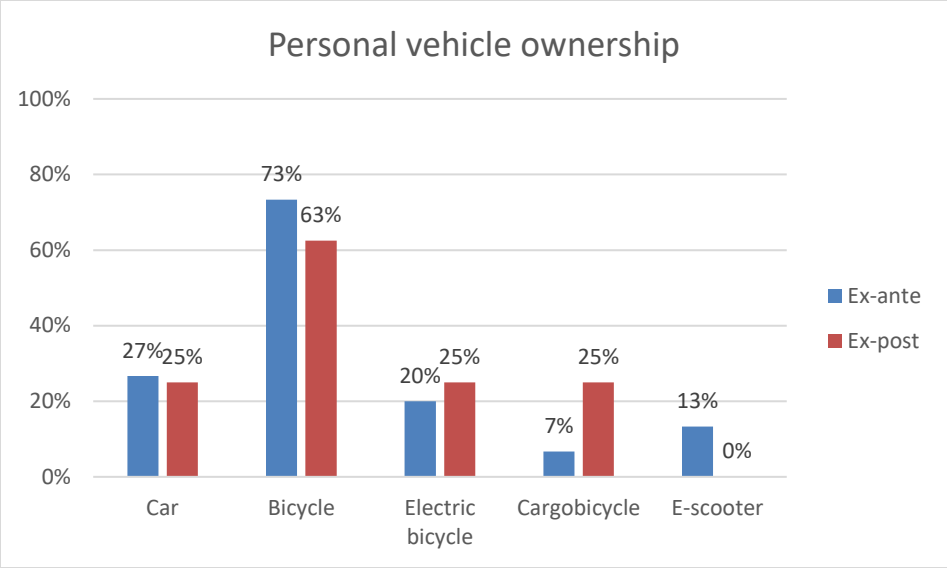


Figure 49: Personal vehicle ownership Leuven-Casablanca

In line with the low car ownership levels, the usage of and subscriptions to public transport are considerably higher than the other two pilot areas (Figure *50*). There are almost no respondents who do not use public transport, while the share of subscriptions is very high for the ex-post sample. This could indicate that they will rely for certain types of trips on public transport, for which shared mobility could add more flexibility.

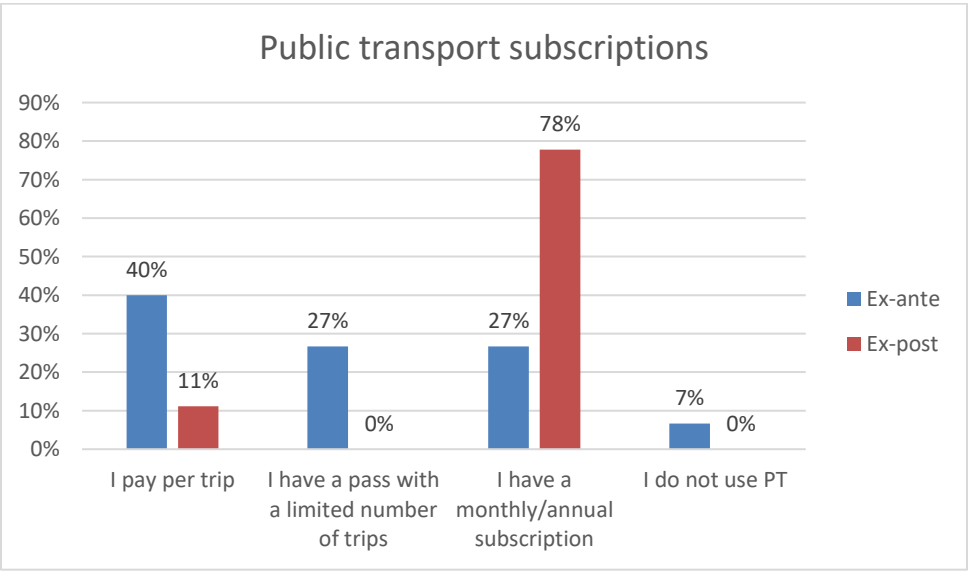


Figure 50: Public transport subscriptions, Leuven-Casablanca

Figure *51* further reflects the sustainable travel behaviour of both samples. Something remarkable is the actual usage of shared bicycles and car services within the sample of ex-post respondents. We do not know whether this is due to the implementation of the mobility hub, but as expected, people who already travel sustainably show a higher intention to also make use of shared mobility services.

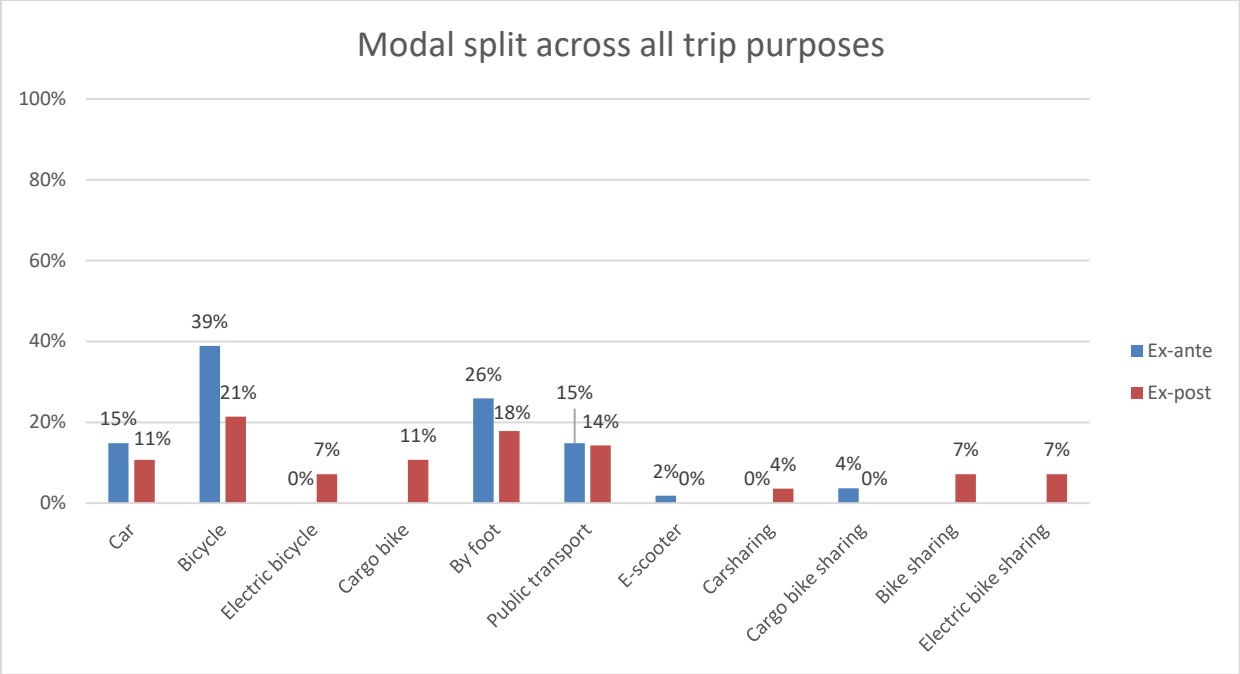


Figure 51: Modal split across all trip purposes, Leuven-Casablanca

When considering trip frequencies from both ex-ante and ex-post surveys (see *Figure 52*) similarly to the other two pilots, going to the supermarket and commuting to the office are highly frequent trips. "Visiting family" is a less frequent activity, but is still indicated many times as a trip purpose, same as leisure activities.

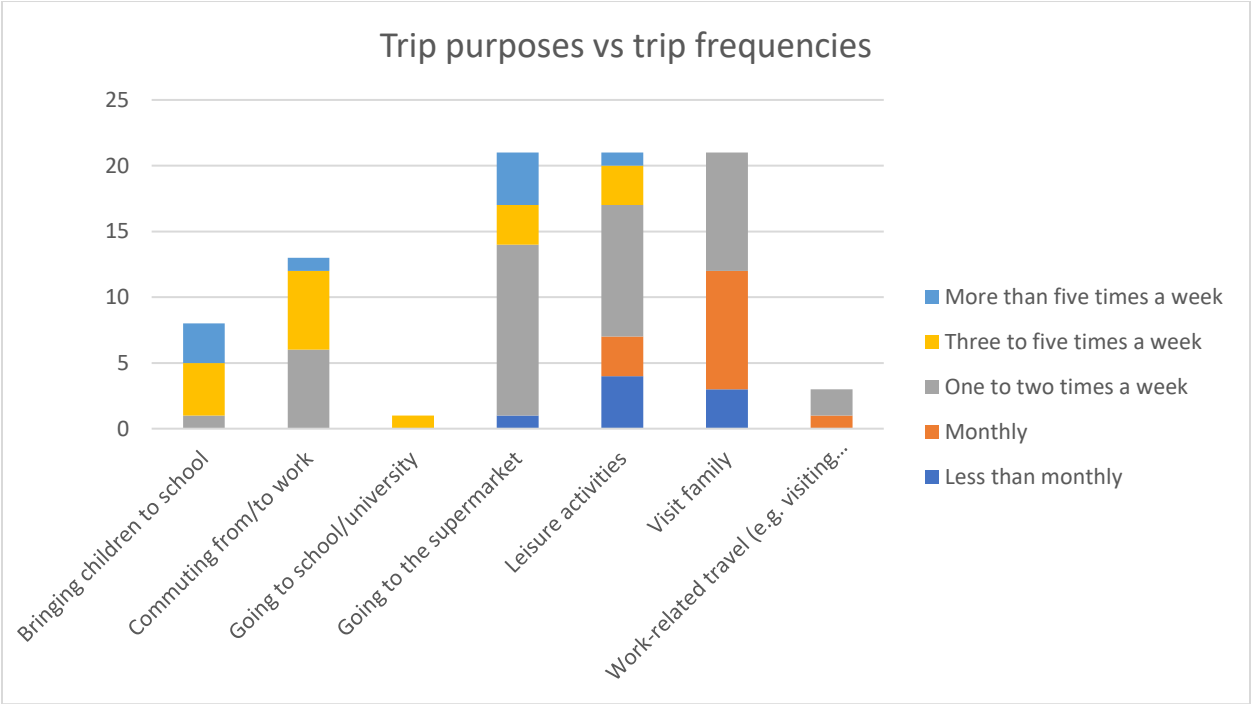


Figure 52: Trip purposes vs trip frequencies, Leuven-Casablanca

Next, it is relevant to show for what trip distances the respondents use various transportation services (Figure *53*). Somewhat unexpected, there are a small number of trips on foot longer than 5km, but in general, the trip patterns are as expected, with longer trips for public transport. There is still potential to replace the small number of car trips that are less than 10km. It could offer opportunities for shared electric bicycles or cars, but mainly for infrequent trips.

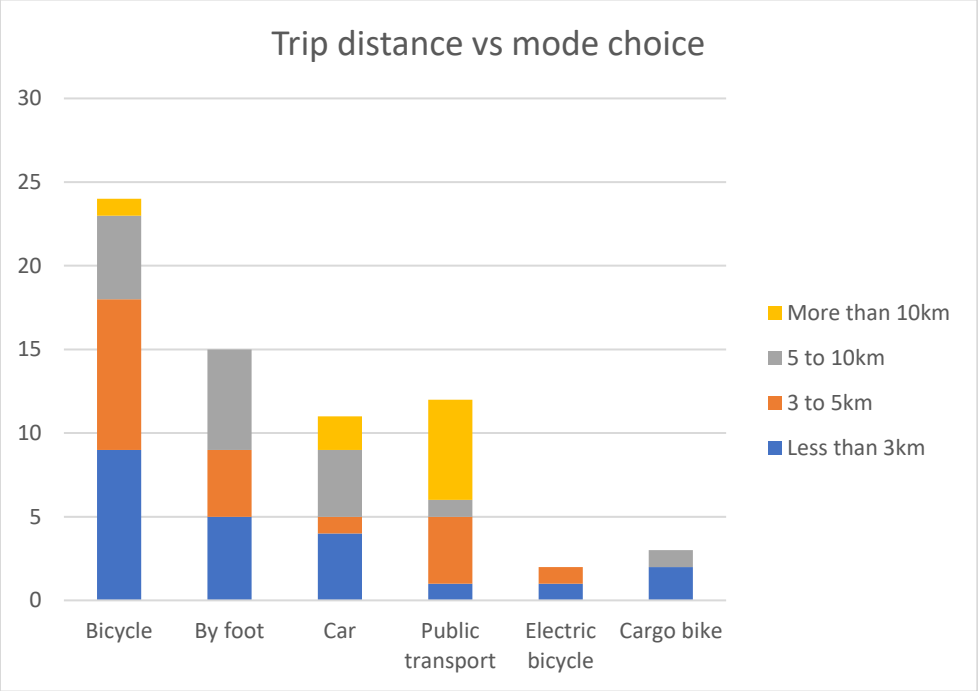


Figure 53: Trip distance vs mode choice, Leuven-Casablanca

In the next paragraph, we focus on trips that could offer opportunities for shared mobility substitution. As mentioned above, visiting family is a less frequent activity. As shown in *Figure 54*, the car, but also public transport are the preferred transportation modes for this trip purpose, for which the respondents typically travel further. This again shows a potential use case for electric bike sharing or car sharing, which can serve as a substitute for a private car on those occasional moments that people go and visit their family.

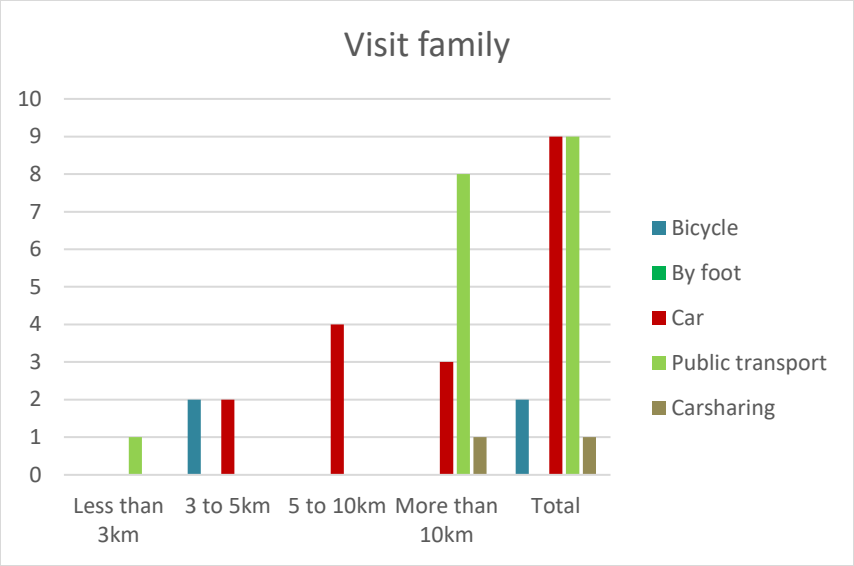


Figure 54: Trips to visit family, Leuven-Casablanca

In line with the other pilots, the frequent trips to the supermarket are typically short and being done by bicycle or by foot. However, half of the small number of car trips to the supermarket are less than 3km, which could be easily substituted by another form of sustainable transport (Figure *55*).

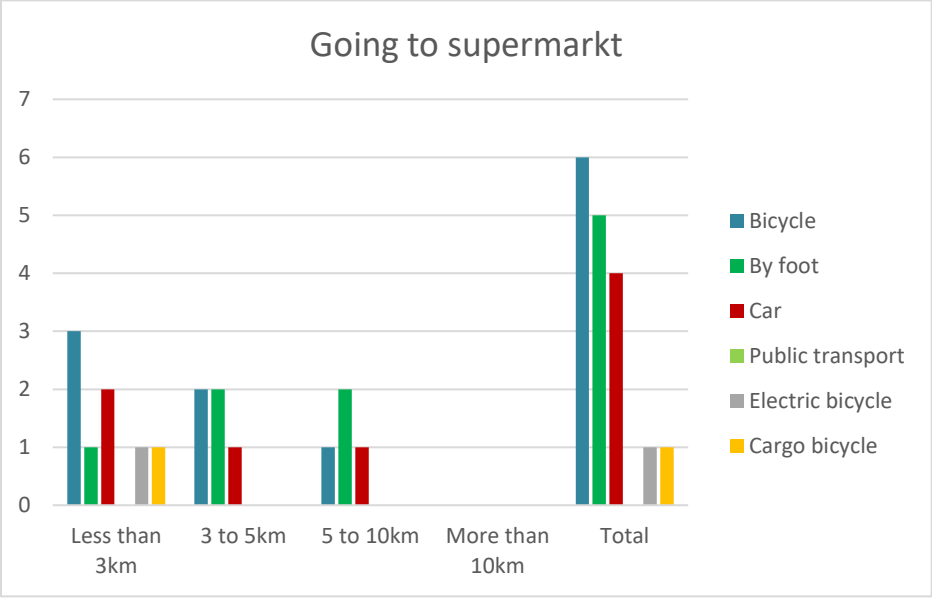


Figure 55: Trips to supermarket, Leuven-Casablanca

Perception towards conventional and shared mobility

This section shows the results of some statements that indicate if there is intention to replace car travel by some other type of (shared) transportation.

First, there are two statements that were only shown to car owners. As our sample is very small (four and two respondents having at least one car in the ex-ante and ex-post sample respectively), the perceptions

from these statements are difficult to assess. However, five out of six respondents do not seem to have problems with parking availability (Figure *56*). This results in a very small number of respondents who can be incentivised to seek an alternative to their car because of parking difficulties. This is also reflected by Figure *57*, which indicates that there are almost no car owners actively looking for alternatives to their car.

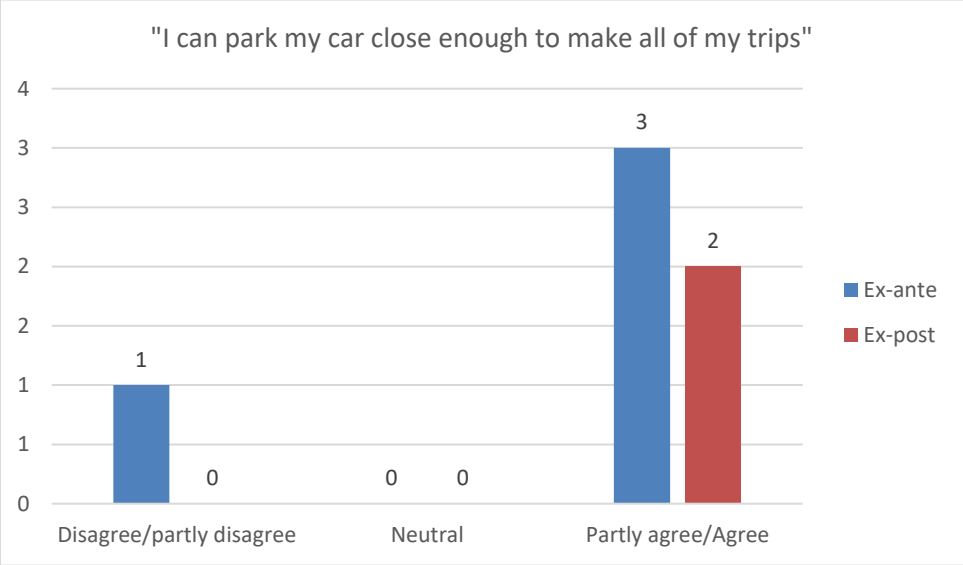


Figure 56: Perception parking distance, Leuven-Casablanca

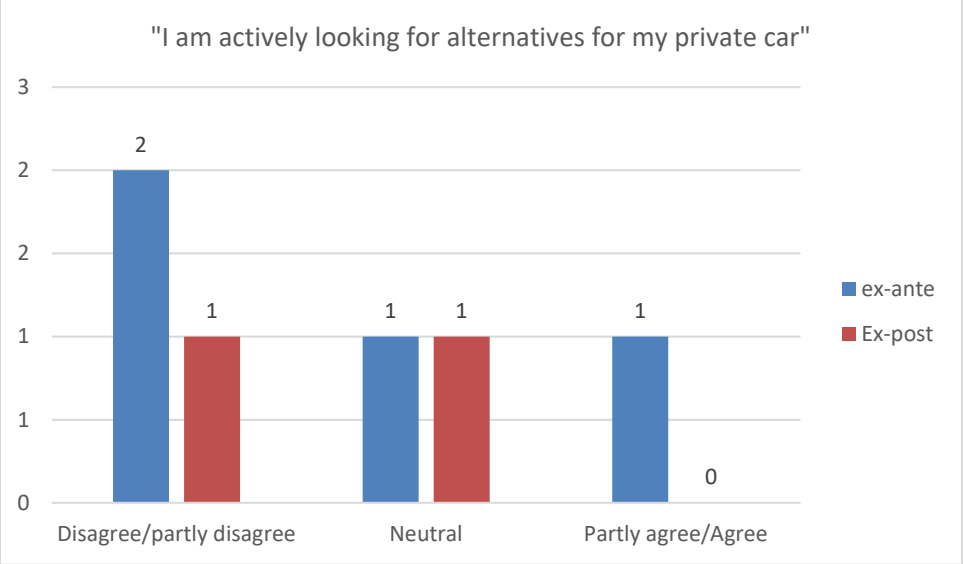


Figure 57: Likelihood to use alternatives to car, Leuven-Casablanca

When considering the potential for public transport, there is already a large number of respondents using this mode of transport. Therefore, agreeing with the statement “I intend to use public transport more in the future” is limited, both for ex-ante as ex-post respondents (Figure *58*).

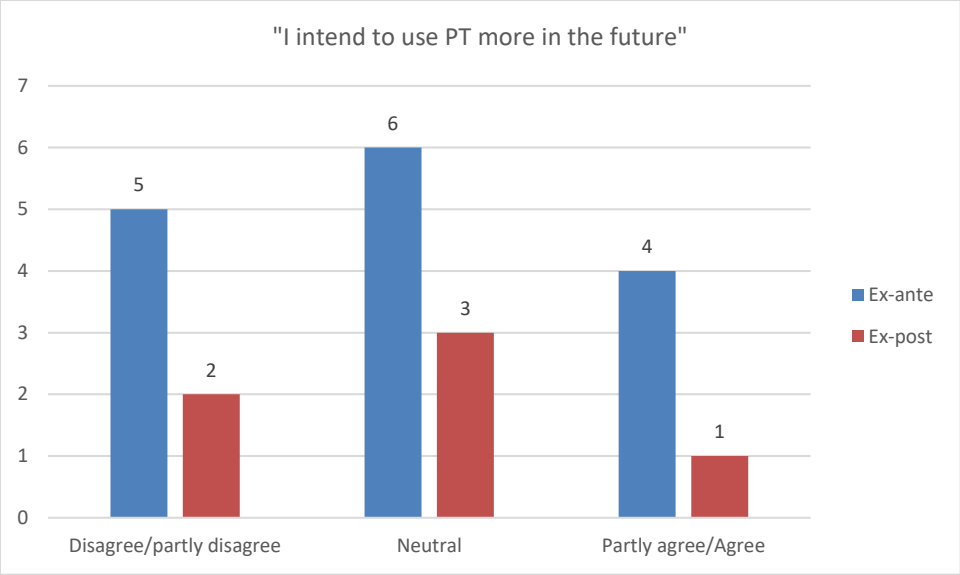


Figure 58: Intention to use public transport, Leuven-Casablanca

Usage (intention) of shared mobility

Figure *51* illustrated that the modal share of shared mobility was almost non-existent in the ex-ante sample, but there were some trips being done by shared services in the ex-post sample. This is partly displayed in Figure *61*, where the share of users of sharing services increased in the ex-post sample compared to the ex-ante sample. We also inquired about the intention to make more use of shared mobility. Similar to the other two pilot areas, the intention is higher for the ex-ante survey, whereas the respondents from the ex-post survey, who already made use of shared mobility, seem more reserved in their intention (Figure *59*). The twelve persons intending to make more use of SM (nine ex-ante and three ex-post), were already mainly travelling by sustainable modes of transport (Figure *60*).

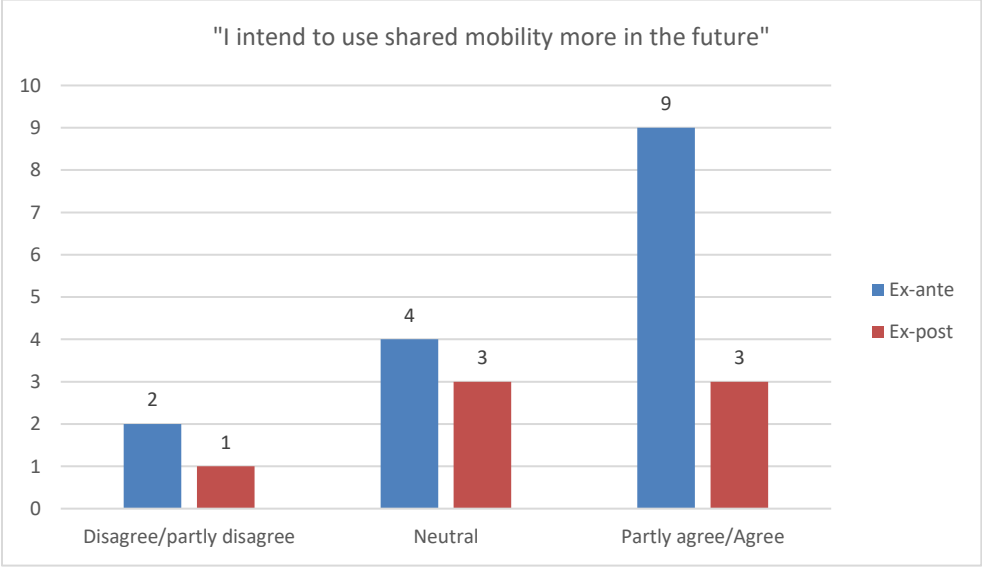


Figure 59: Intention to use shared mobility, Leuven-Casablanca

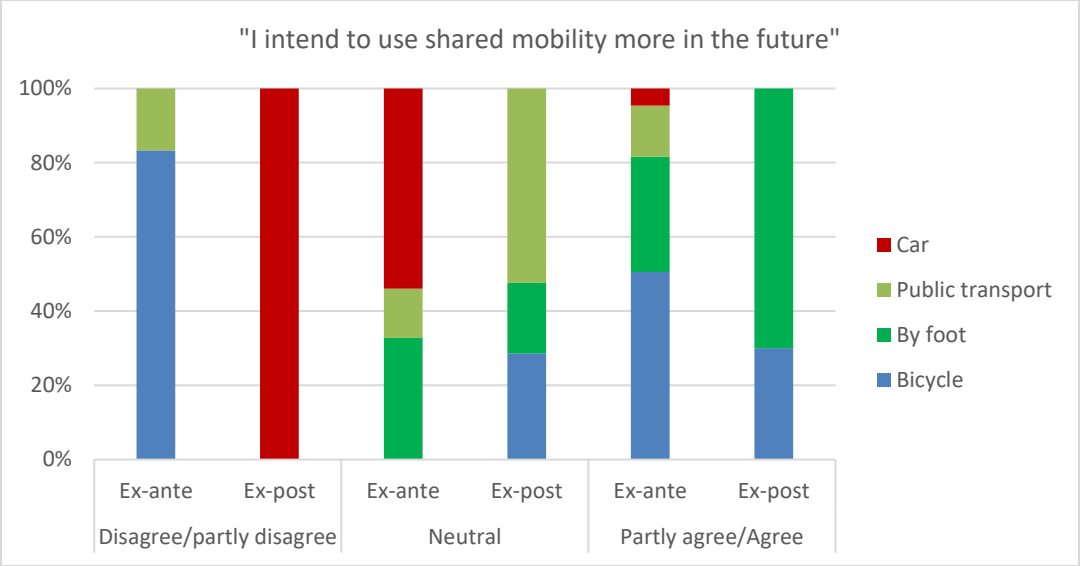


Figure 60: Intention to use shared mobility, Leuven-Casablanca

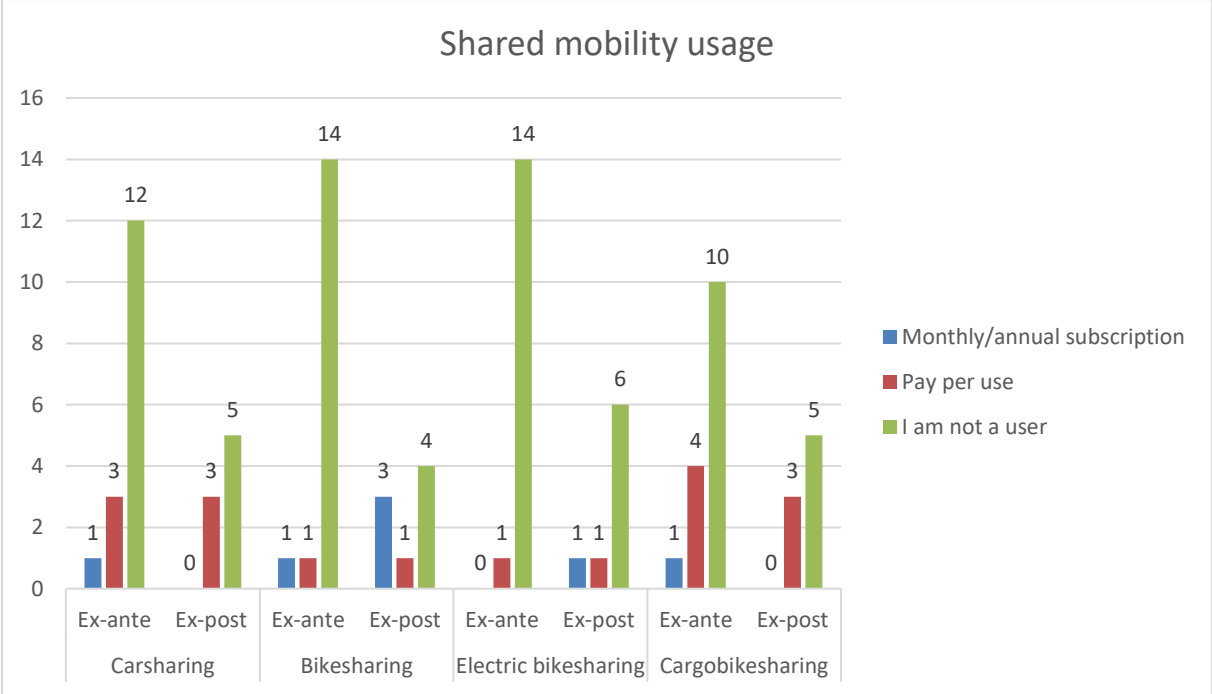


Figure 61: (ex-ante vs ex-post) Shared mobility subscriptions, Leuven-Casablanca

Knowledge and usage of mobility hubs

Contrasting the other two pilots, the ex-ante respondents already had good knowledge regarding the concept 'Hoppinpunt, and this also remained for the ex-post sample (Figure *62*). However, we have to take into account that the number of respondents for the ex-ante and ex-post surveys is limited. When considering active users of mobility hubs (ex-ante), the number of respondents who have used a mobility

hub is low (only four), but there is some intention to make use of the mobility hubs among those who did not yet make use of it; however, we managed to include actual users of the pilot mobility hub in the ex-post survey, where five out of eight did make use of some of the shared mobility services (see Figure *63*), mainly carsharing (Figure *64*). Considering the reasons why our ex-post respondents did not make use of the pilot mobility hub at Casablanca, see Figure *65*, it seems that the registration process was too difficult and time-consuming, together with the notion that the location of the mobility hub was too hard to reach. Lastly, we inquired about the potential impact of the pilot mobility hub becoming permanent on respondents' transport ownership and subscriptions. Taking into account the very small number of users (only five), Figure *66* illustrates that the car is indicated one time to be replaced, while also one public transport subscription, a cargo bicycle and a conventional bicycle would be replaced.

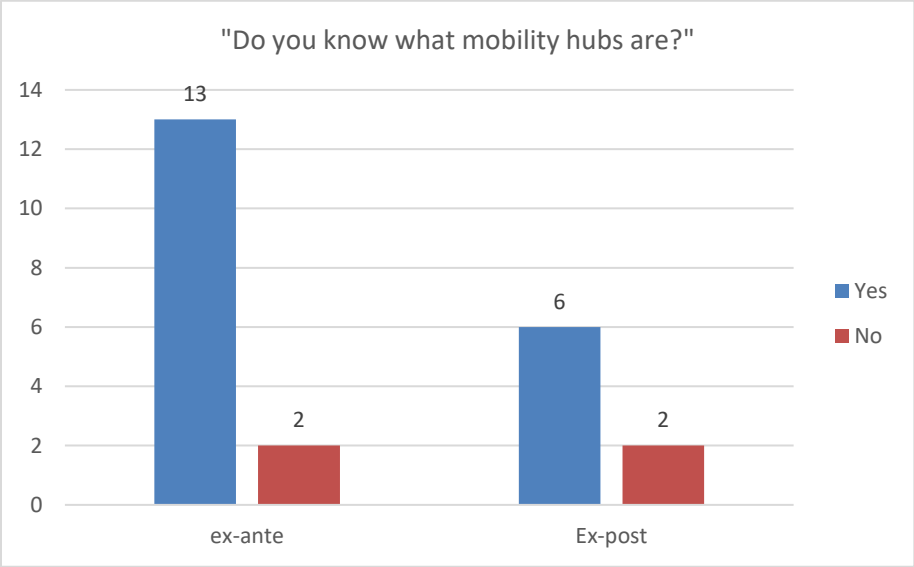


Figure 62: (ex-ante vs ex-post) Knowledge of mobility hubs, Leuven-Casablanca

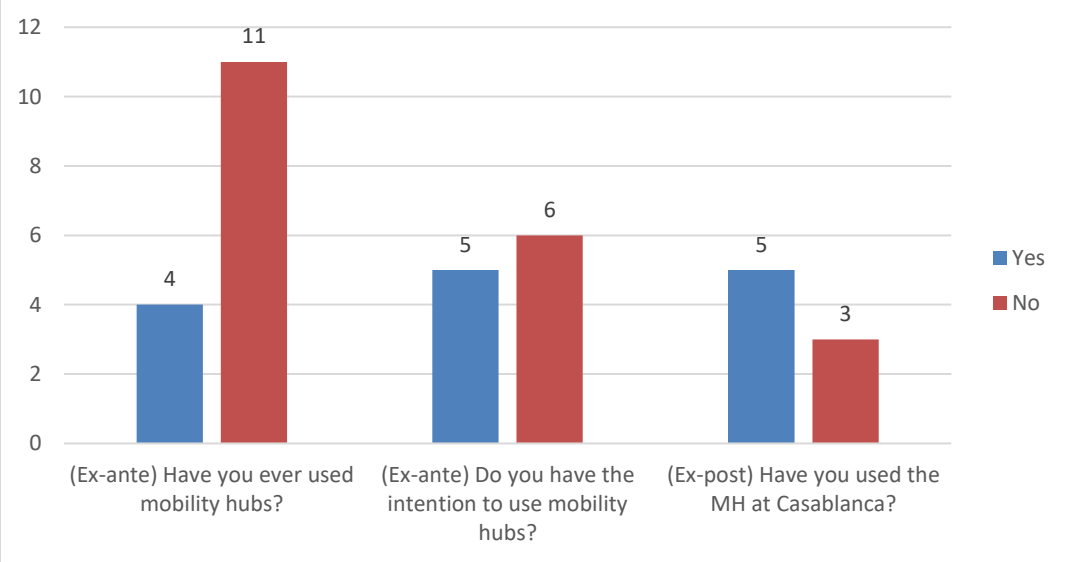


Figure 63: (ex-ante vs ex-post) Summary questions about knowledge of mobility hubs, Leuven-Casablanca

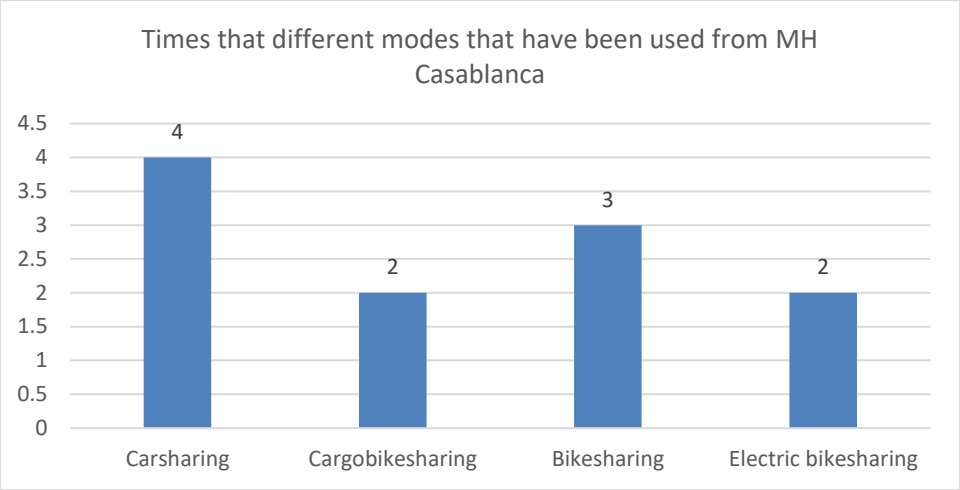


Figure 64: Usage at mobility hub, Leuven-Casablanca

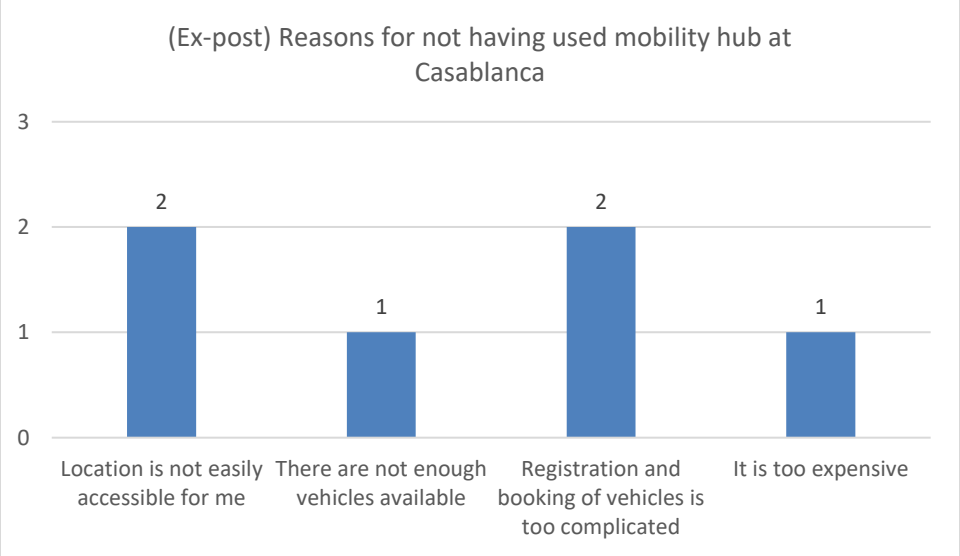


Figure 65: Reasons for not using mobility hub, Leuven-Casablanca

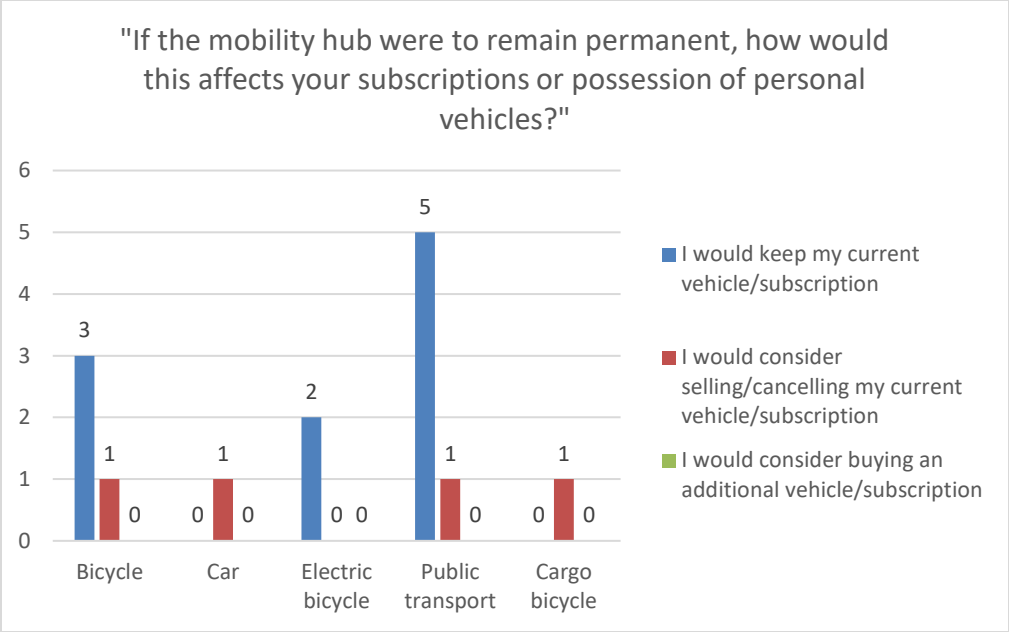


Figure 66: (ex-post) likelihood to change vehicles or subscriptions with mobility hub, Leuven-Casablanca

3.1.2. Accessibility

The three hubs in Leuven include the same number and types of vehicles (see Table 1); however, the neighbourhoods' geographical location and demographic characteristics of the hubs differ. To mirror real accessibility, we calculated the distance over the road network. Hence, the presence of parks or parking will increase the distance to the hub and consequently reduce the hub's attractiveness. In addition, topological conditions, i.e., uphill paths and congested roads, could also decrease the service area generated by the hub. That said, the explorative analysis from the accessibility theme does not consider the topological conditions when calculating the service area. However, they are important to keep in mind when making recommendations about the hub locations.

All service areas include several outdoor recreational spaces, reducing the housing density and the number of residents living in the immediate vicinity. The visual representation of the service areas of 300m and 500m for all hubs is displayed in Figure 67.

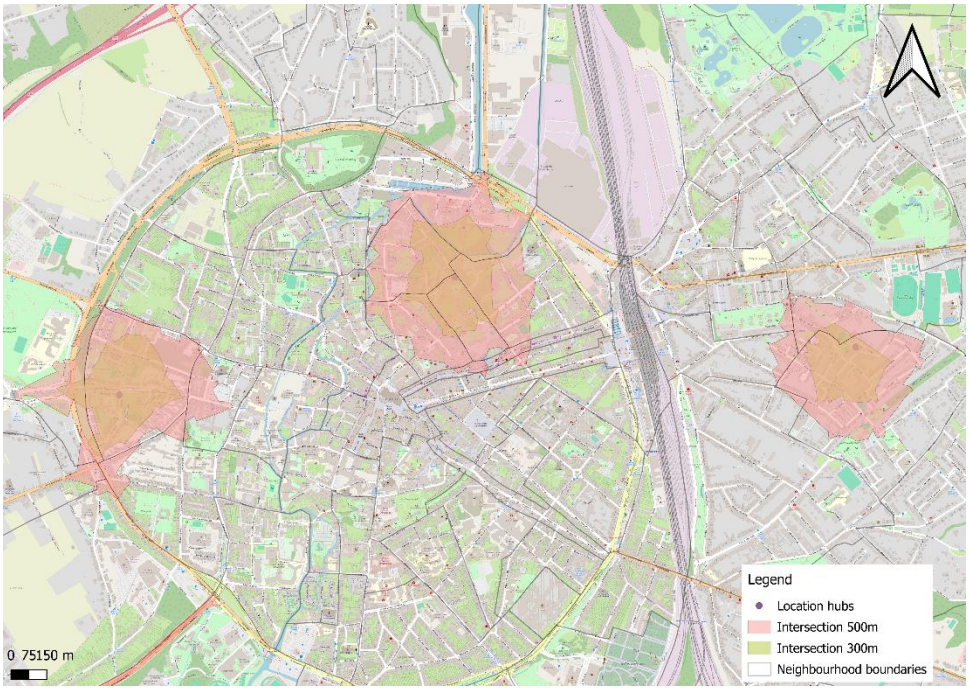


Figure 67: (From left to right) Catchment areas of mobility hubs Mannenstraat, Sint-Maartensdal and Casablanca in Leuven

Following Equation *1*[6], the total inhabitants per hub and per mode are in Table 6. The table also shows the potential users per age bracket, calculated from the percentage of people of a certain age living in the neighbourhood.

	300m						500m					
	Potential users per age brackets						Potential users per age brackets					
Hub name	18-24	25-34	35-44	45-59	60+	Total	18-24	25-34	35-44	45-59	60+	Total
Mannenstraat	159	311	134	153	204	962	325	676	287	322	433	2043
Sint-Maartensdal	166	398	226	279	331	1401	497	1159	562	669	802	3689
Casablanca	34	49	62	70	87	302	127	191	212	236	284	1050

Table 6 Summary potential users per age brackets in each hub, Leuven

3.1.3. Conclusions

The analysis in section 3.1.1 highlighted the potential for shared mobility among infrequent long-distance car users (for hedonic purposes) and frequent short car trips (to the supermarket) in Leuven.

The most frequent trips with the shortest distance travelled are to the supermarket. Hedonic trips, related to leisure activities such as going out with friends, have a more flexible and discretionary nature compared to going to the supermarket, bringing kids to school or going to school/university. The latter are considered utilitarian trips, as they are undertaken for practical reasons, and they are tied to significant responsibilities to maintaining a good quality of life. Utilitarian trips are typically tied to specific schedules, with relatively consistent durations and distances, as they are often done multiple times a week. In contrast, hedonic trips allow for greater flexibility, with travellers occasionally varying their trip distance and duration.

[6] Eq. 1: Total number of potential hub users at a distance n = Inhabitants of the intercepted neighbourhood x percentage of area intercepted at distance n on each neighbourhood

Hedonic and utilitarian trips present different challenges when evaluating the potential of trip replacement using SM. Hedonic trips require flexibility, allowing travellers to decide relatively last minute how far they want to go and how long they wish to stay. These might also be better served with a variety of vehicles. In the Leuven case though, shared cars have high potential for the infrequent long trips that are mad in the neighbourhood. On the other hand, utilitarian activities require a dependable system that facilitates conducting time-sensitive tasks. A mobility hub that guarantees vehicles during certain times of the day could replace some short-distance utilitarian activities. In addition, with the supermarket trips in mind, shared cargo bikes seem to be a vehicle with high potential.

This seems to be confirmed by the data from the dashboard, which tracks the actual usage. Although it is difficult to infer trip purposes from the usage data that is available online, we do see (next to the e-bikes), a relatively high cargobike usage. In addition, looking at the heatmap of locations where the cargo bikes were paused (Figure *68*), we do see many of the hotspots are linked to supermarkets.

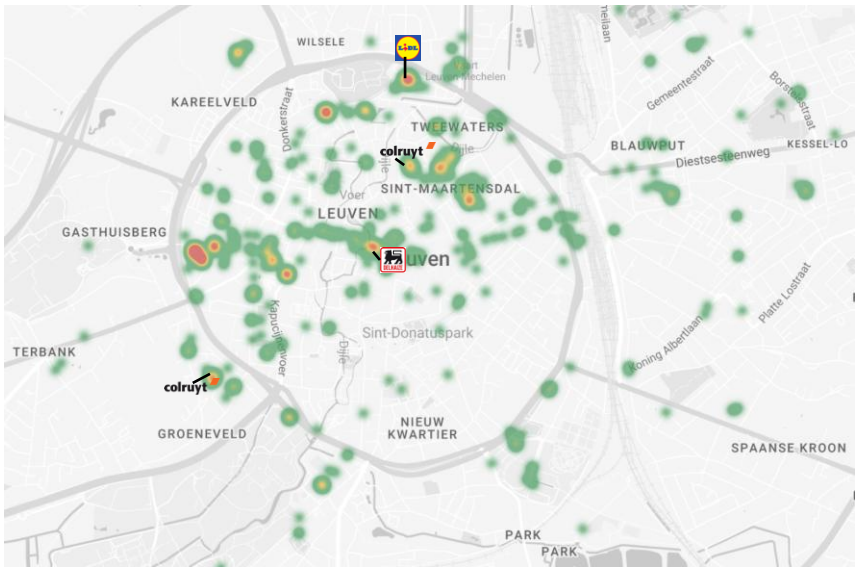


Figure 68: Cargo bike usage in Leuven

Hence, we attempt to calculate the potential CO2 savings for the trips taken during the pilots. For this purpose, we calculate the potential replacement of the car trips to the supermarket based on extensive research on the potential of bikesharing systems to replace car trips (Teixeira, Silva & Moura, 2020). However, a bikesharing system differs from a mobility hub in terms of complexity and vehicles available. Thus, a replacement factor of 5% and 10% is applied, representing the first quartile and median of the modal shift replacement ratio reported in several bikesharing studies (Teixeira, Silva & Moura, 2020).

The potential trip replacement is calculated using the weighted average value of the reported supermarket trips. In the ex-ante results, there are 35 answers from people reporting going 1 or 2 times a week; 8 answers for 3 to 5 times a week; and 5 answers to more than 5. The result of the weight average value is as follows:

$$(1.5 \times 35) + (4 \times 8) + (6 \times 5) = 114.5 \sim 115$$

A group of 48 people in the Mannenstraat neighbourhood reports to conduct 115 trips to the supermarket in a week, which is equivalent to on average 2 trips per person in a week. With 757 potential users from

18 to 59 years old within the 300m radius (see 3.1.2) and 56% who conduct their supermarket trips by car in the ex-ante survey, the total amount of car trips to the supermarket becomes:

$$757 \times 0.56 \times 2 = 849$$

With the replacement factors mentioned above, and using the European Cyclists' Federation (ECF)calculation on potential CO2 savings depending on the vehicle type, we obtain the potential CO2 savings for the assumed trips that can be replaced.

Table 7: Potential CO2 savings for supermarket trips

Trip frequency (week)	Replacement factor	Potential trips saved	Km travel	CO2 g/km (gas)	CO2 g/km (diesel)	CO2 saved g (gas)	CO2 saved g (diesel) per week
849	0.05	42	3	259	231	32634	29106
849	0.1	85	3	259	231	66045	58905

3.2. City of Tønsberg

The city of Tønsberg piloted three mobility hubs in key areas of the city. The survey was conducted simultaneously among all pilots through a third party. In total, 791 responses were gathered, of which 464 were valid for the analysis. The heavy snowfalls prevented the city from maintaining the available shared mobility vehicles, which delayed the post-implementation survey.

The number of survey responses is presented in Table 8. The results of the ex-ante survey are presented collectively between all mobility hub sites, as opposed to per pilot location.

Table 8: Number of survey answers per hub in Tønsberg

Hub name	Hub start and end date	Ex-ante survey	Ex-post survey
All three hubs (Central station, Kaldnes, St. Olavsgate)	x	464	Delayed

3.2.1. Sustainability

Socio-demographics

The demographics show that most respondents are employed (77%) and cohabitating with a partner and or children. The high number of driving licenses (92% of the respondents have a driving license) is somewhat unsurprising, knowing that using a car for short and long-distance travel is one of the challenges Tønsberg looks to tackle with the mobility hubs. Looking at the age distribution, the majority of the respondents is between 36 and 60 (65%), while relatively less younger people (only 2% aged between 18 and 25, while 14% aged between 26 and 35). Furthermore, there are significantly more women that participated (72%) compared to men (28%).

Transport ownership and travel behaviour

The following are the results of the section on transport ownership and travel behaviour. When considering the findings of vehicle ownership, see Figure *69*, it is remarkable that almost all respondents own at least one car (in line with the high share of respondents having a driving license). Furthermore, the results indicate that more than half of the respondents own at least one bicycle. In contrast to Leuven,

there is a small portion of respondents owning an electric scooter, while cargo bikes seem to be very niche still.

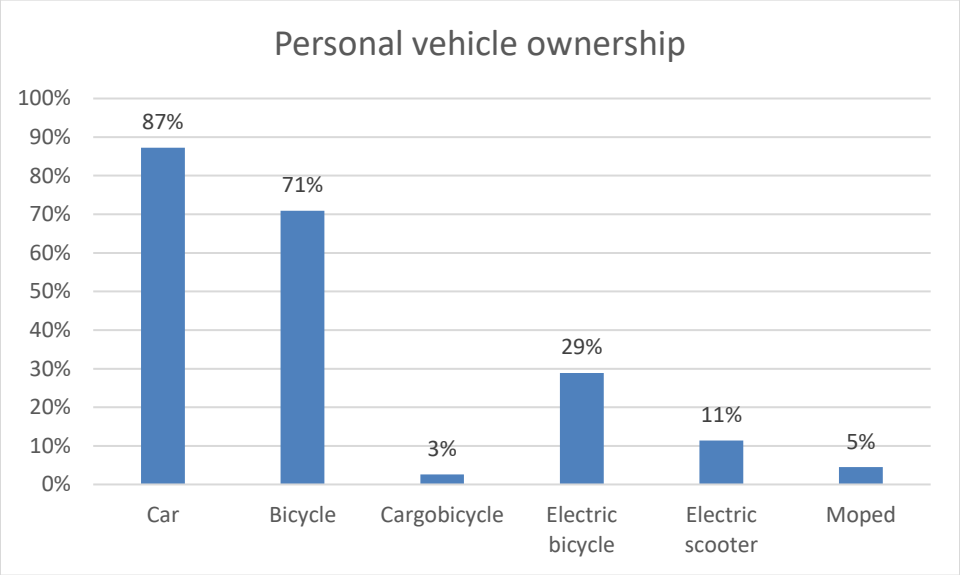


Figure 69: Personal vehicle ownership Tønsberg

Considering the subscriptions to public transport (Figure *70*), there is only a small portion that does not use public transport. However, regular use is also not expected, as only 14% of the respondents have a subscription. The majority of the respondents use PT periodically, paying on a per-trip basis. These results are different from those in Leuven, where the share of respondents having a PT-subscription was significantly higher.

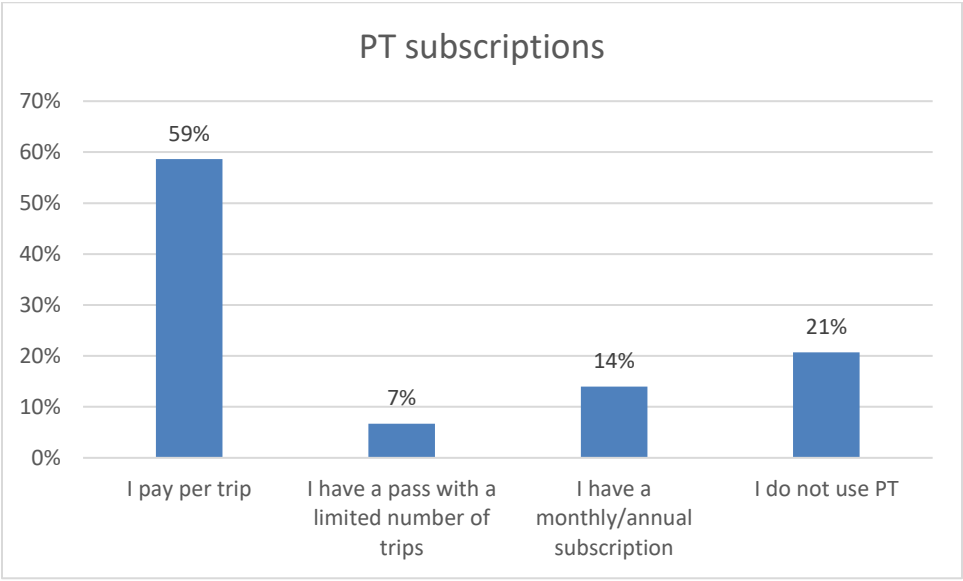


Figure 70: Public transport subscriptions, Tønsberg

Next, we report on respondents' travel behaviour. We inquired about trip distance, mode choice and trip frequency for eight different trip purposes. Not every trip purpose was displayed for every respondent,

e.g. people being retired or unemployed could not indicate the trip purpose 'commuting from/to work'. The modal split from the respondents across all trip purposes is shown in Figure 71. As expected on the vehicle ownership numbers, the car is the preferred mode, being used for 65% of all trips. The share of bicycle trips is very low compared to Leuven, while people with a PT subscription also seem to regularly use PT for different trip purposes. These are mainly conventional modes, whereas usage of shared mobility modes is almost non-existent.

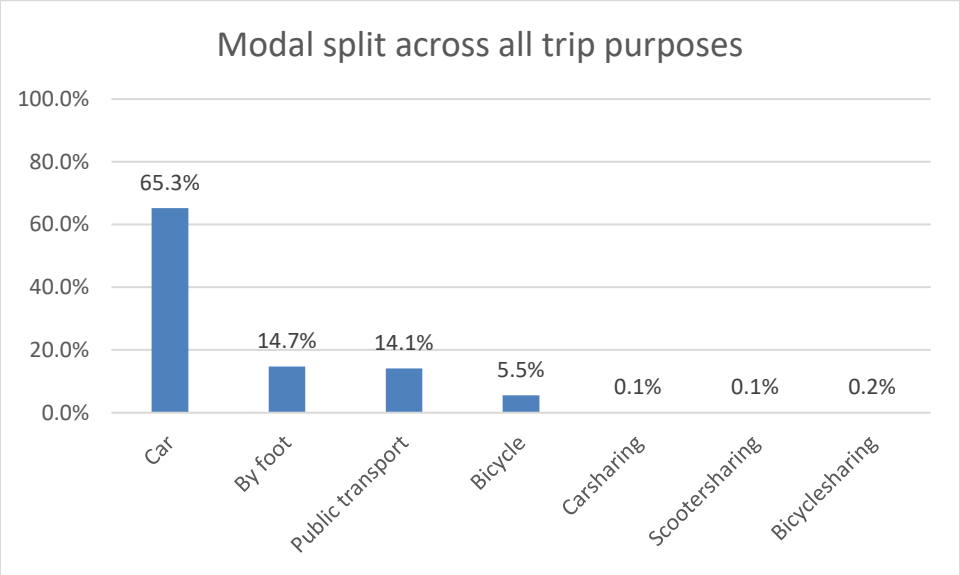


Figure 71: Modal split across trip purposes, Tønsberg

When considering trip frequencies, see Figure 72, it seems that leisure, going to the supermarket and commuting from/to work are activities with the highest trip frequency. Visiting family and going out with friends are less frequent activities, but indicated many times. As our sample does not include many young people, the activity 'going to school/university' is less indicated.

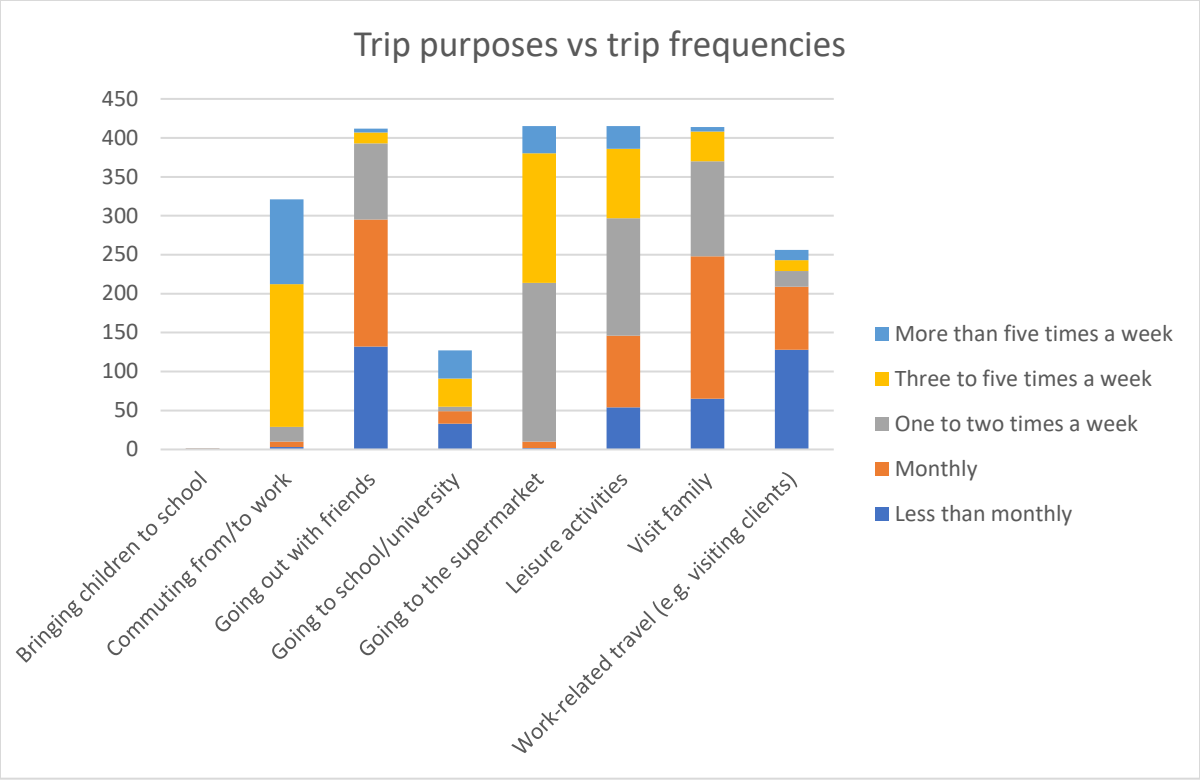


Figure 72: Trip purposes vs frequencies, Tønsberg

Next, it is relevant to show for what trip distances the respondents use various transportation services (see Figure 73). As expected, our respondents travel small distances by foot and by bicycle. However, there is also a considerable number of trips (over 30%) being done by car which are less than 5km. This provides opportunities to use another mode of transport. Public transport seems to be mainly used for travelling outside the city, as the majority of the trips are over 10km.

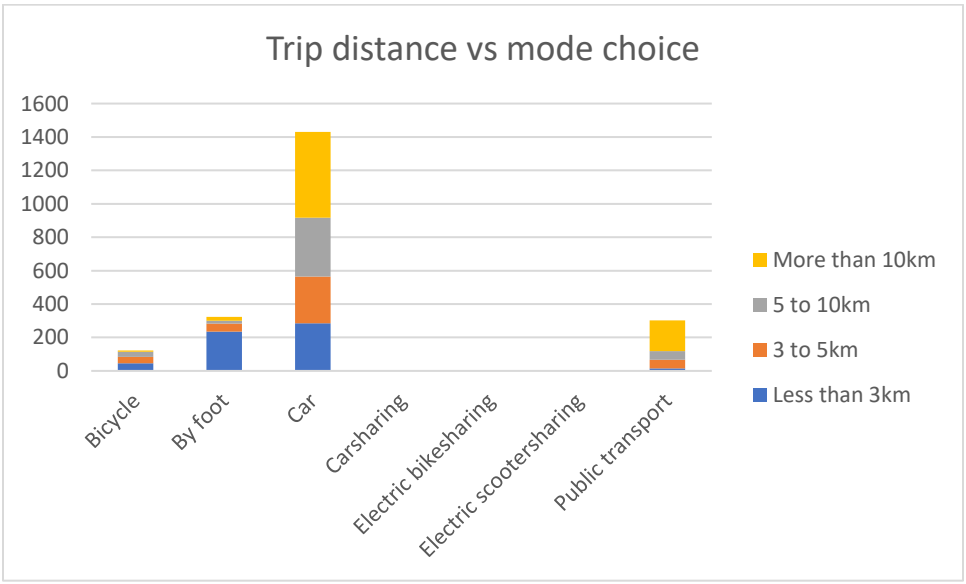


Figure 73: Trip distances vs mode choice, Tønsberg

In the next paragraph, we focus on trips that could offer opportunities for shared mobility substitution. As mentioned above, visiting family is a less frequent activity. As shown in Figure 74, the car is the most preferred mode for this trip purpose, for which the respondents typically travel further. This shows a potential use case for carsharing, which can serve as a substitute for a private car on those occasional moments that people go and visit their family. There is still a considerable number of infrequent trips being done by car to visit family that lives within 5km travel distance. This also provides an opportunity for alternative modes of transport.

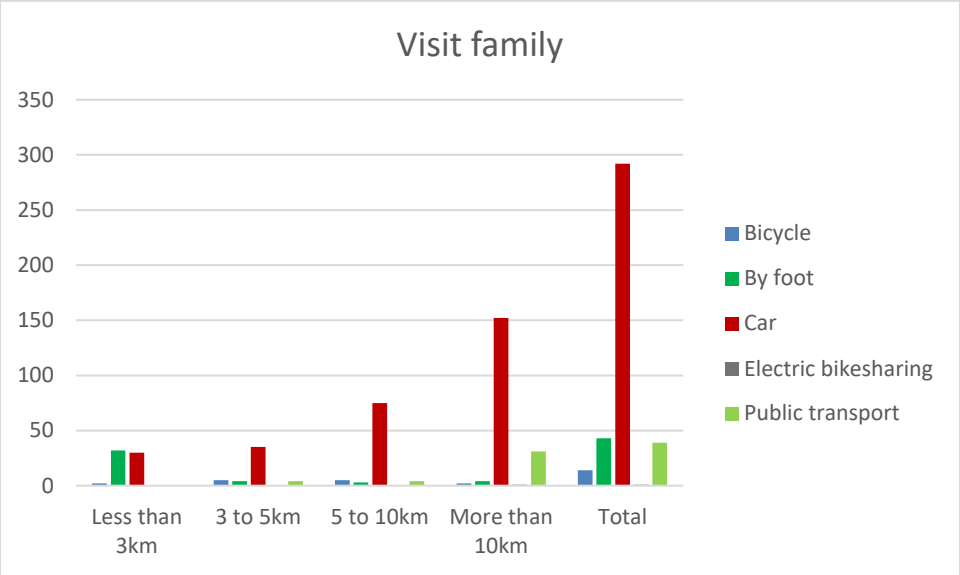


Figure 74: Trips to visit family, Tønsberg

Next, considering frequent trips, we can see that people still use their car for very minor distances to go to the supermarket (see Figure 75). The car is even the main mode for distances less than 3km. As people have to carry their groceries, they seem to see no alternative to their car. However, as the distances are very small, a cargo bike seems to be an ideal substitute, as it also offers carrying capacity.

Figure 75: Trips to supermarket, Tønsberg

Conversely, the frequent commute to/from work is primarily being done by car, but not for very small distances (see Figure 76). The smaller distances are mainly being covered by foot, but the car still dominates the bicycle for these smaller distances. Public transport holds a small share, but almost exclusively for commutes to work longer than 10km.

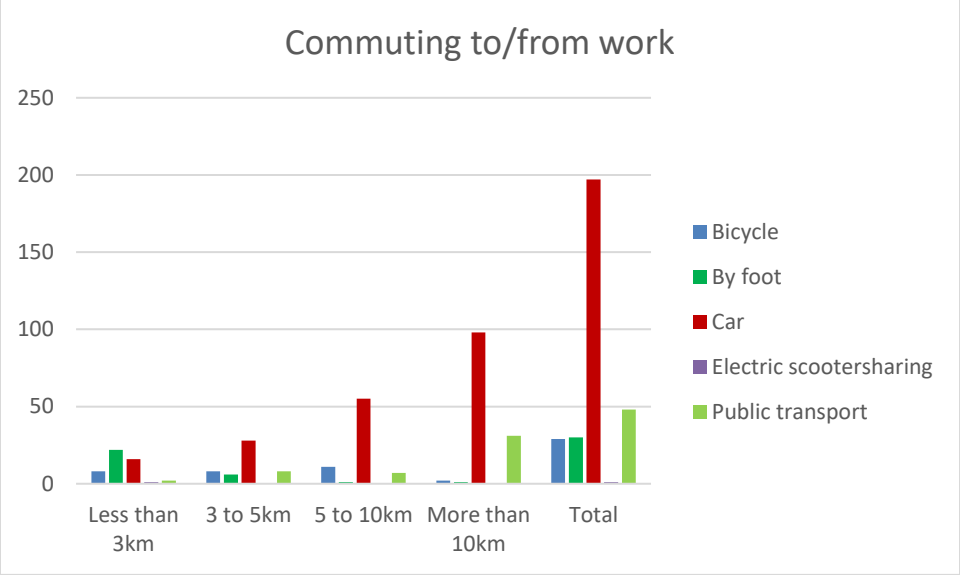


Figure 76: Commuting to/from work, Tønsberg

Perception towards conventional and shared mobility

This section contains three subsections aimed at gathering information about the obstacles and advantages that might hinder or prompt the use of private vehicles, public transport and shared mobility. We asked about the perceived cost, parking availability, usage and replacement intention, perception of travel time, convenience and availability. We show the results of some interesting statements that indicate if a potential modal shift is realistic.

First, the respondents do not seem to have any problems with parking availability (see Figure *77*). Almost all respondents (partly) agree with the statement 'I can park my car close enough to make all of my trips'. However, we can draw a distinction between the preferred transportation mode of people experiencing more or less difficulties; the higher the agreement level, the more they use the car (see Figure *78*). This results in just a very small number of respondents that can be incentivised to seek an alternative to their car because of parking difficulties.

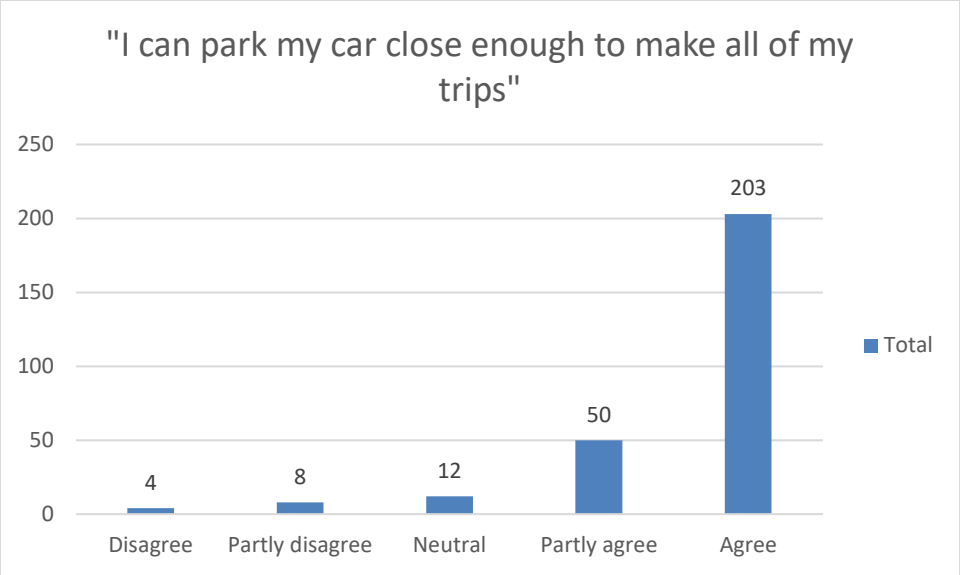


Figure 77: Perception parking distance, Tønsberg

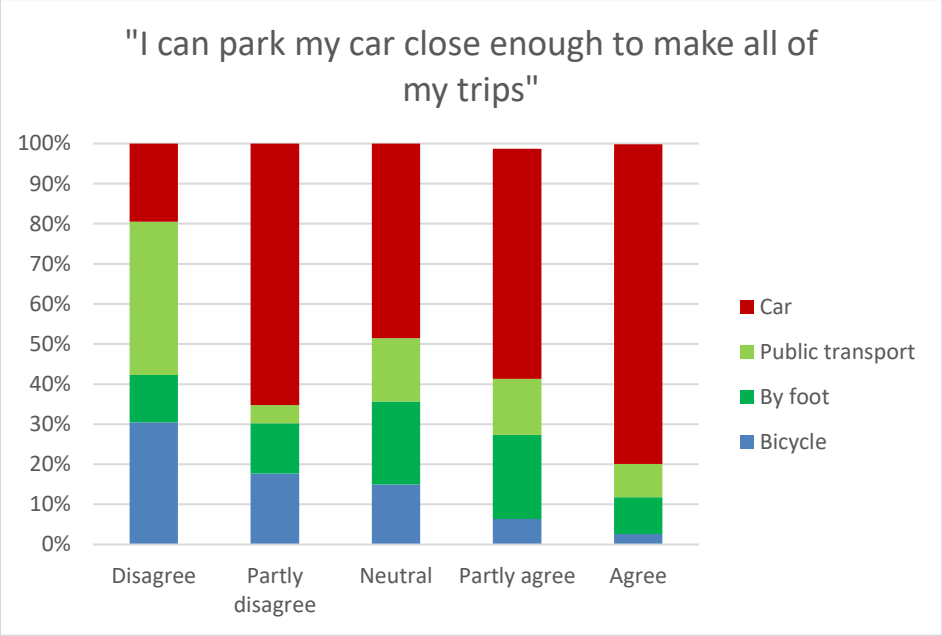


Figure 78: Perception to parking distance vs modal split, Tønsberg

The respondents' intention to look for alternatives for private car ownership is being inquired with the following statement: "I am actively looking for alternatives for my private car". As can be seen in Figure *79*, there is only a small number of respondents actually agreeing with this. However, particularly for the respondents partly considering alternatives, there is high car usage (see Figure *80*). This contrasts with Leuven, as there actually is a small number of car users actively looking for alternatives, whereas in Leuven this potential was minor.

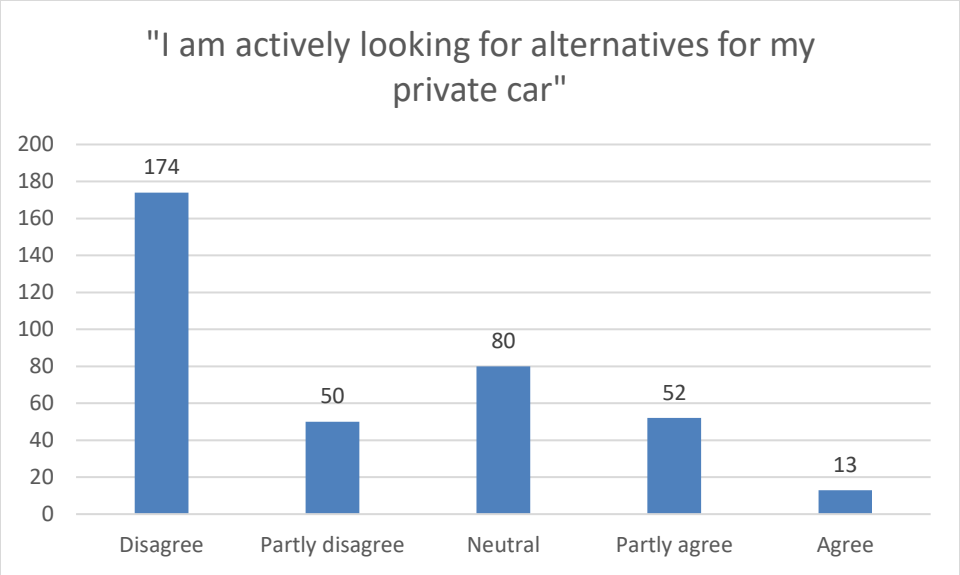


Figure 79: Likelihood to use alternatives to car, Tønsberg

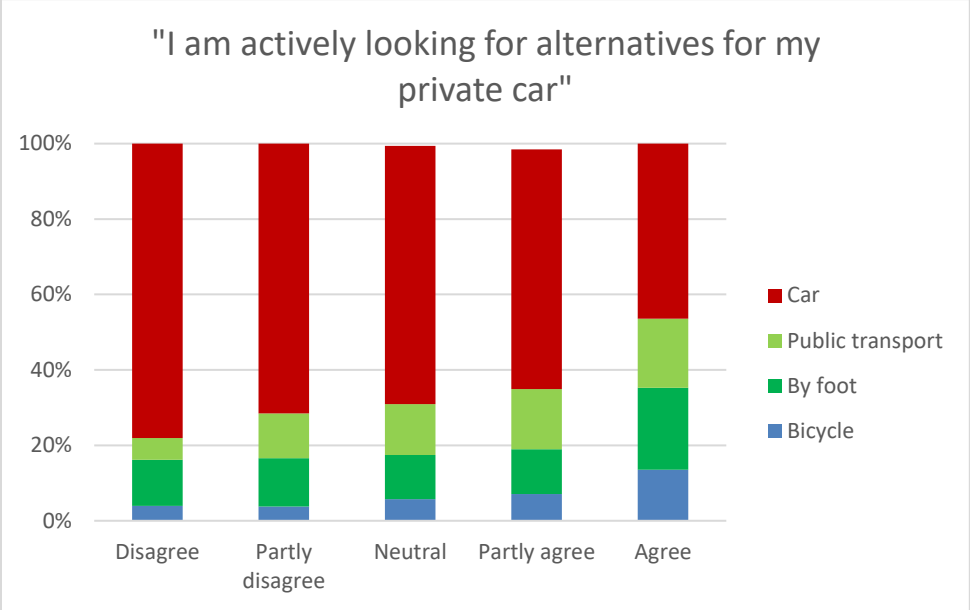


Figure 80: Likelihood to use alternatives to car vs modal split, Tønsberg

When considering the potential for public transport, there is a larger number of respondents agreeing with the statement “I intend to use public transport more in the future” compared to the statements of car substitution (see Figure *81*). Again, there is a distinction between the people agreeing and disagreeing with this statement. The higher the agreement, the more they already use some kind of alternative transportation mode (see Figure *82*). However, there is some potential for shifting from car towards PT.

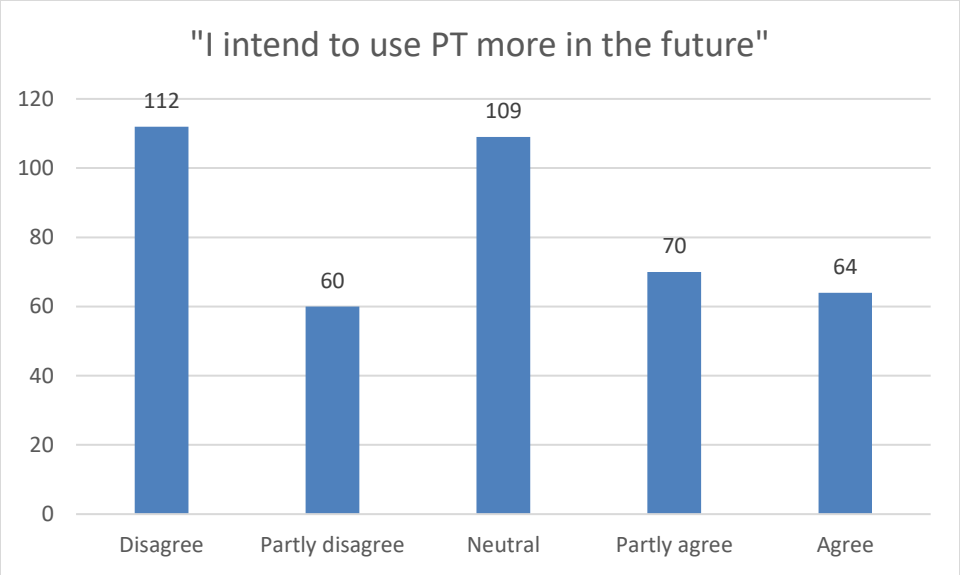


Figure 81: Intention to use public transport, Tønsberg

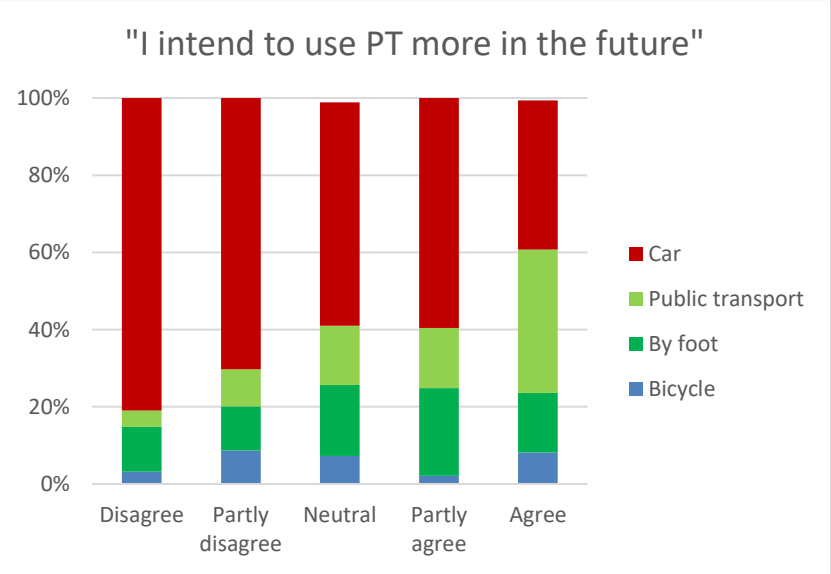


Figure 82: Intention to use PT vs modal split, Tønsberg

Usage (intention) of shared mobility

As Figure *71* already illustrated, the modal share of shared mobility was almost non-existent. This is also displayed in Figure *85*, where only 10 shared cars, 13 shared bikes and 13 shared e-scooter users were identified. On our total survey sample, these are very limited numbers. Therefore, we also inquired about the intention to make more use of shared mobility. Similarly to the statement of looking for alternatives, only a very small number of respondents actually intends to make more use of shared mobility, while a larger portion considers it (see Figure *83*). Again, the respondents indicating higher intention also showed more sustainable travel behaviour, reducing the potential shift from the private car (see Figure *84*).

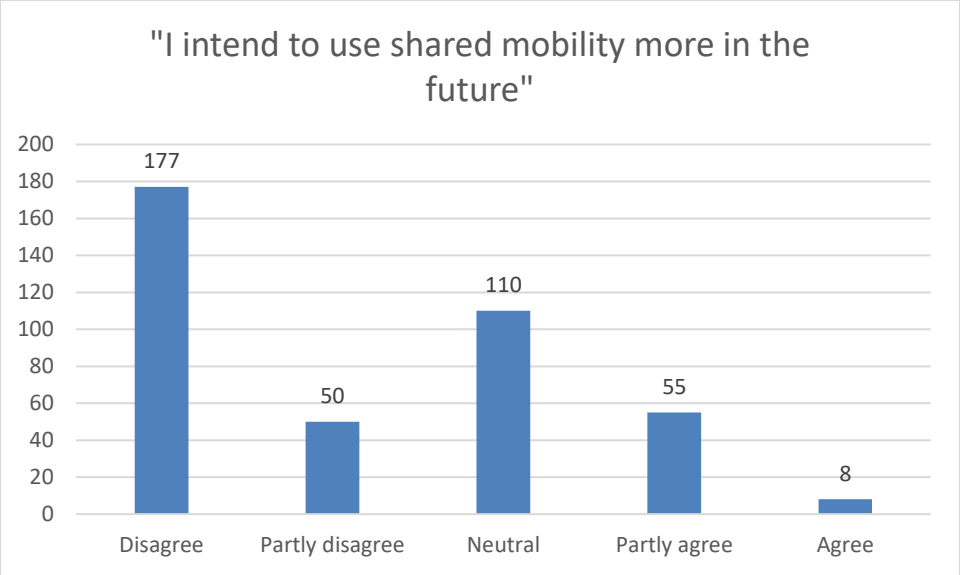


Figure 83: Intention to use shared mobility, Tønsberg

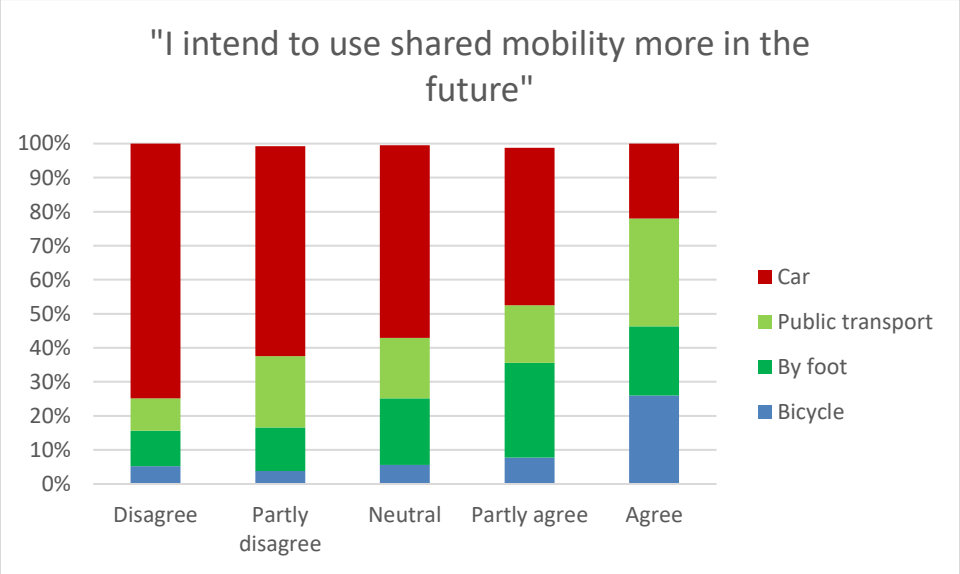


Figure 84: Intention to use shared mobility vs modal split, Tønsberg

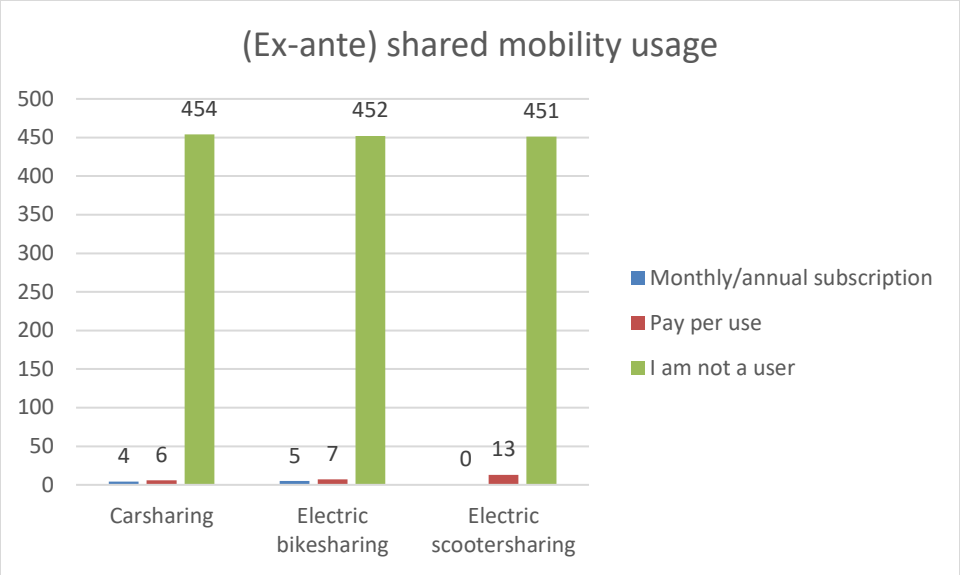


Figure 85: (Ex-ante) Shared mobility usage, Tønsberg

Knowledge and usage of mobility hubs

The section on knowledge of mobility hubs is intended to establish a basis for previous awareness of mobility hubs in the area. It seems that quite a number of respondents already know the concept of a mobility hub (more than 60%), but this is not translated into actual usage (see Figure *86*). Interestingly, the number of respondents who did make use of a mobility hub is higher than the number of respondents who made use of shared mobility. This is also indicated in Figure *87*, where the non-shared mobility services, such as bicycle parking, taxis, parcel lockers or bicycle repair shop, are primarily being used. This means that respondents used the non-shared mobility services less than the other services, such as private bicycle parking and the bicycle repair service. It has to be seen whether the high intention that the respondents show to make use of a mobility hub (over 70% intend to make use of a mobility hub in the near future), will be translated into increased usage of non-shared mobility related services, or whether it will be converted into increased usage of shared mobility. Based on Figure *83*, it will still be a challenge to convince the respondents of the potential value of shared mobility, especially for infrequent or small-distance trips.

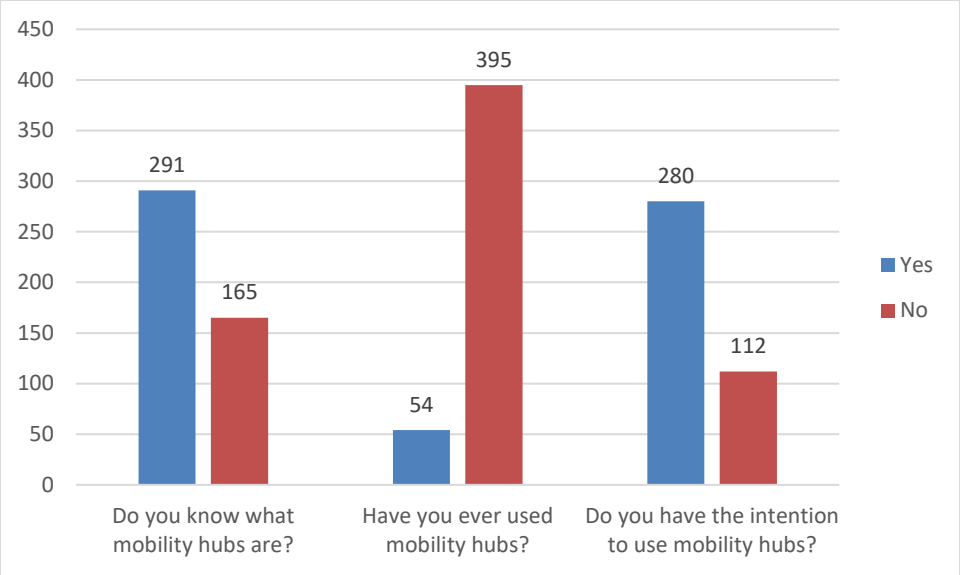


Figure 86: (ex-ante) Summary questions on mobility hub knowledge and usage (intention), Tønsberg

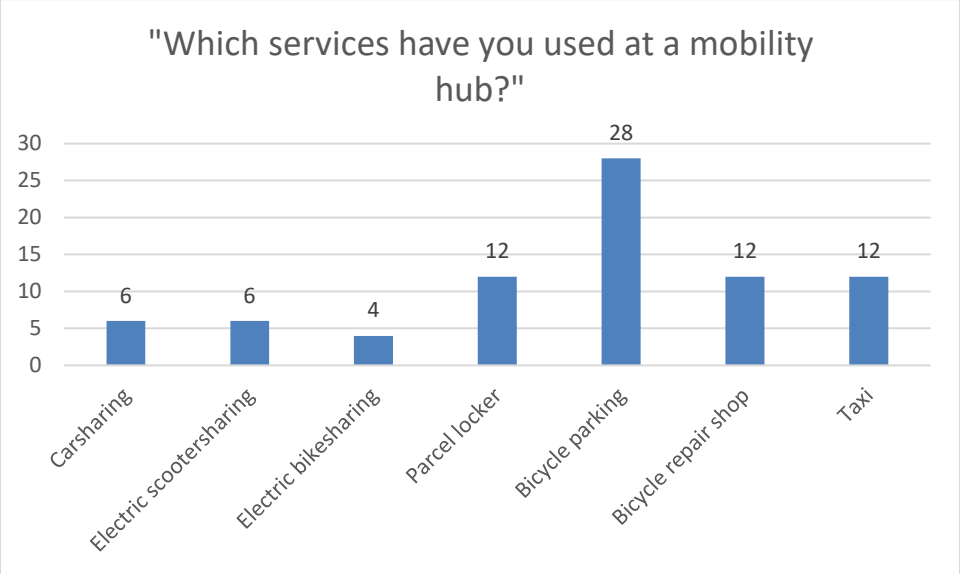


Figure 87: (ex-ante) Services already used at a mobility hub, Tønsberg

3.2.2. Accessibility

The three hubs in Tønsberg are located on the premises of public transport, but they are different in terms of the number of services and shared mobility (see Table *1*) offered. Hence, the three of them are designed for different scales. The hub next to Tønsberg station; besides bike renting, e-scooters and car sharing, offers taxi services, bicycle repair, bike parking, pick-up points for parcels and information points with wayfinding. Sørbyen and Kaldnes hubs offer the same shared mobility services, with the difference that Kaldnes also features bike parking, pick-up points for deliveries and wayfinding. Sørbyen is a small-scale hub with only car and e-scooter shared services.

Regarding the geographical location, Kaldnes is near the river and a walking bridge in a mixed residential-working area. Similarly, Tønsberg station and Sørbyen are mixed land-use, with the difference that there

are more companies located on the premises of Sørbyen, but more people working around the Tønsberg station.

The number of total potential users is summarised in Table 9 following the same process as demonstrated in Leuven.

Table 9: Potential users per age brackets, Tønsberg

	300m						500m					
	Potential users per age brackets						Potential users per age brackets					
	20-24	25-34	35-44	45-59	60+	Total	20-24	25-34	35-44	45-59	60+	Total
Tønsberg station	34	71	50	69	73	297	114	233	168	238	292	1044
Kaldnes	32	78	32	59	77	278	79	196	88	155	197	714
Sørbyen (St Olavsgate 2)	65	132	78	120	161	555	160	340	203	312	384	1399

All service areas include several outdoor recreational spaces, reducing the housing density and residents living in the immediate vicinity. The visual representation of the service areas for all hubs is in Figure 88.

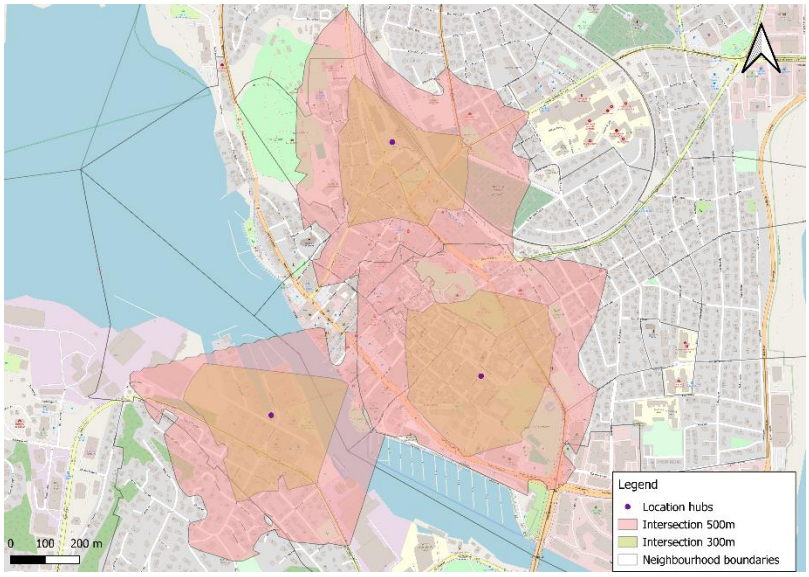


Figure 88: (From top to bottom) Catchment areas of mobility hubs Tønsberg station, Sørbyen (St Olavsgate 2) and Kaldnes in Tønsberg

3.2.3. Conclusions

A key takeaway from the survey is the strong reliance on private cars. The vast majority of respondents hold a driving license (92%), and car ownership is nearly universal. This aligns with the finding that 65% of all trips are taken by car, even for short distances. However, this also highlights an opportunity: many trips under 5 km are still made by car, suggesting potential for alternative transport modes such as bicycles or shared mobility solutions.

Shared mobility, including bike and car sharing, has not yet gained traction in Tønsberg. The survey revealed minimal use of shared mobility services, with only a small fraction of respondents indicating interest in increased usage. This highlights a challenge in encouraging modal shift through mobility hubs. However, respondents did express a strong willingness (over 70%) to engage with mobility hubs to some extent, particularly for non-shared services like bicycle parking, taxis, and parcel lockers.

The high willingness to use mobility hubs suggests that expanding practical services (e.g., secure bicycle parking, parcel lockers) could drive engagement. Hubs should be designed based on the specific needs of their surrounding communities.

3.3. City of Rotterdam

As explained in Section 1, the city of Rotterdam has established five pilots in two areas. The survey was conducted simultaneously, gathering information from the pilots' vicinity. In total, 563 answers were collected, from which 386 were considered valid. During the time the survey was active, the city, besides providing the questionnaire to the potential users through QR codes on flyers, sent workers into the area to perform face-to-face interviews. The city also hired a "mobility coach": someone standing on the hub grounds to raise awareness and teach people how to use the SM available at the location.

The number of answers differs in the areas, possibly due to communication barriers faced by some residents, for example, in the Oud-Mathenesse sector, where more people with immigration backgrounds possibly do not speak Dutch or English comfortably enough to participate in the survey. In any case, the collected sample is significant to the neighbourhoods to study, allowing us to make inferences about the preferences and behaviour of the inhabitants of these areas.

The follow-up survey for both areas was conducted during the month of June. However, the results of the survey are not shown in this report.

3.3.1. Sustainability

The division of the answers gathered per area is presented in Table 10. The sustainability theme results are presented separately per sector, i.e., results for Het Lage Land & Oosterflank and Oud-Mathenesse.

Table 10: Total answers Rotterdam survey

Hub name	Hub start and end date	Ex-ante survey	Ex-post survey
Het Lage Land & Oosterflank	03/02/2024-30/06/2024	301	-
Oud-Mathenesse	03/02/2024-30/06/2024	85	-

The following are the results of the baseline (ex-ante) survey per area. Some questions are omitted to leave more space for the most significant findings. It is worth noticing that some of the questions and answers are formulated differently compared to the survey of Leuven and Tønsberg, resulting in more options for answers in some sections. However, these changes do not affect the assessment of the survey.

Het Lage Land & Oosterflank

Socio-demographics

Our results show that approximately 22% of the respondents live with their partner and children, which is close to the 24% of respondents who mentioned living alone. A third of the respondents (33%) stated to live with their partner without children, and only 4% mentioned to live in a student house or residence. When looking at the age of the respondents, only 10% are younger than 25 years, which may explain the low percentage of people living in student housing. The distribution of responses across the remaining age groups, i.e., 26 to 35, 36 to 45, 46 to 60, and 60+, was fairly balanced, ranging from 19% to 24% each. The overall gender distribution is nearly equal, with slightly more women completing the questionnaire.

The most significant age-related gender difference appeared among seniors aged 60+, where there were 13% more male than female respondents.

At least 60% of the participants reported having an undergraduate or postgraduate degree. In contrast, 22% indicated that they had completed professional training, corresponding to "Middelbaar Beroepsonderwijs 2, 3, and 4" in the Dutch education system. Generally, the participants expressed a positive sentiment regarding their financial situation; only 7% said it is somewhat difficult or difficult to make ends meet. Finally, regarding the question related to the migration background, 68% responded they have no migration background, while 25% reported they did, meaning that at least one of their parents was born abroad.

Transport ownership and travel behaviour

The results of the vehicle ownership are not particularly surprising when considering the geographical context of the study area. The mode with the highest ownership is the bicycle, followed by private cars. The results contrast with those of Mannenstraat, Leuven and Tønsberg (see Figure *7* and Figure *69*), where car ownership is higher than bike ownership. Given the small sample of the Sint-Maartensdal in Leuven, it is difficult to make direct comparisons with vehicle ownership (Figure *28*). In all cases, these two modes seem to be dominant in all cities. Similarly, for all three cities so far, electric bicycles are owned by around a quarter of the surveyed population.

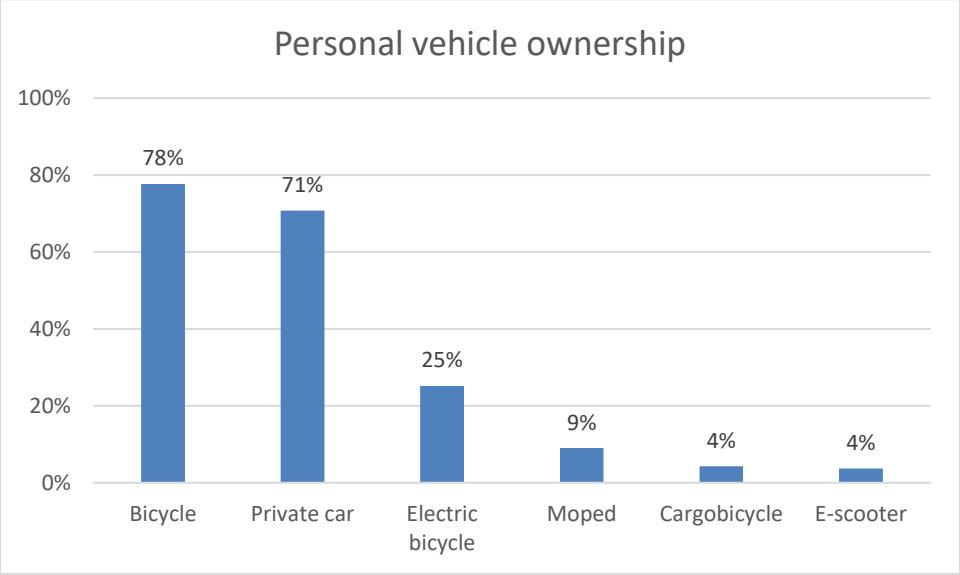


Figure 89 Personal vehicle ownership, Het Lage Land & Oosterflank, Rotterdam

Monthly/yearly subscriptions and passes with limited trips only constitute a third of the responses, which can indicate that 32% of the respondents are somehow regular PT users (Figure *90*). More than half of the pool indicated to pay per trip, which could suggest the respondents only use the system sporadically, thus, the flexibility and cost of paying per use is higher than having a pass with limited trips. Only 7% of users said not to use public transport at all.

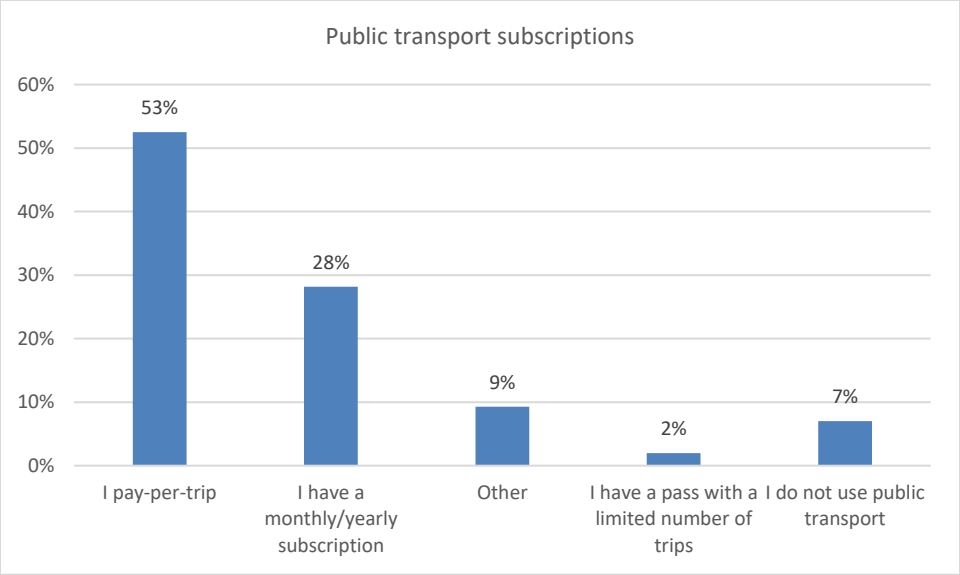


Figure 90 Public transport subscriptions, Het Lage Land & Oosterflank, Rotterdam

In the following section, respondents self-reported their travel behaviour, including travel distances, modal choices, and frequency across a range of common destinations. While cars and bicycles emerged as the most commonly owned modes of transport, cars are the most reported transportation mode in terms of usage, followed by public transport and cycling (Figure *91*). Approximately one in ten trips were made on foot, comparably a lower proportion to the findings from Leuven and Tønsberg (Figure *9* and Figure *71*). The predominance of car use and public transport may suggest that the respondents often cover relatively long distances for infrequent trip purposes.

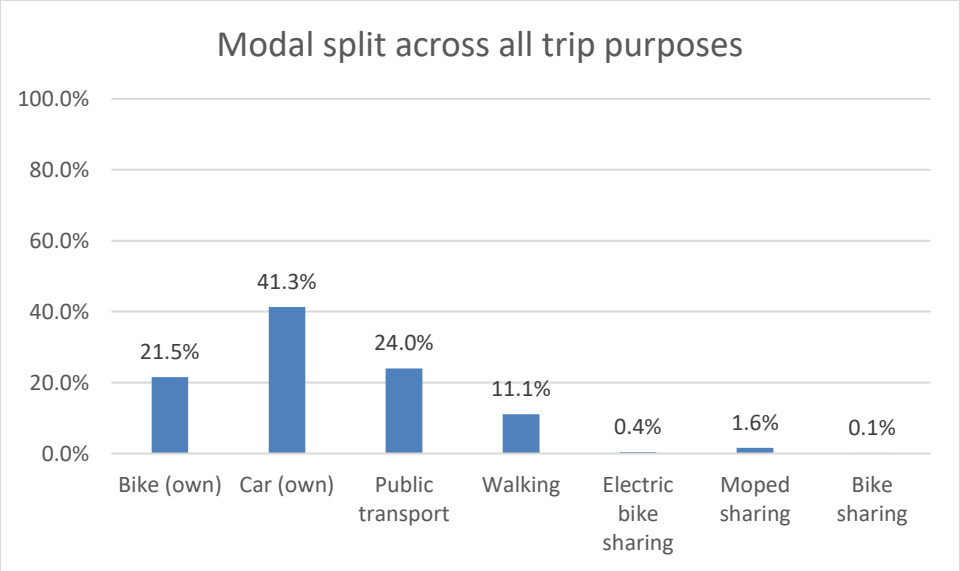


Figure 91 Modal split across all trips, Het Lage Land & Oosterflank, Rotterdam

With regard to trip frequency, commuting to work and going to the supermarket emerged as the most frequent travel purposes, with respondents indicating that they engage in these activities more than five times per week (Figure *92*). In contrast, the remaining supermarket trips tend to occur one to two times

per week, a pattern that is comparable to leisure activities, going out with friends or visiting family. However, these latter three purposes also tend to happen on a monthly basis. A relatively small proportion of respondents reported trips related to dropping children off at school, which aligns with the demographic data, where only 22% indicated that they live with children. Similarly, trips to university were not frequently indicated, reflecting the age profile of the respondents, most of whom are beyond the typical university age.

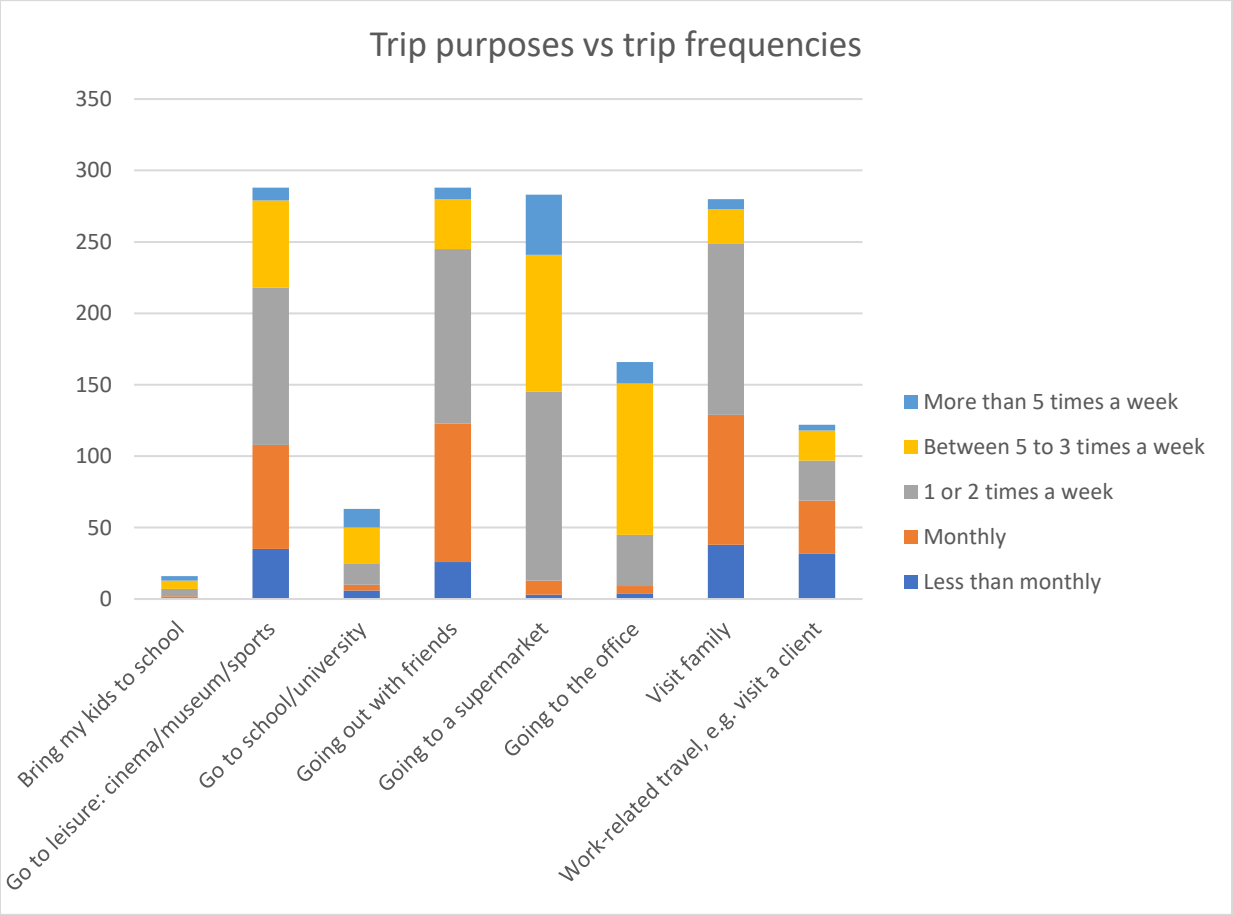


Figure 92 Trip purposes vs trip frequencies, Het Lage Land & Oosterflank, Rotterdam

The reported trip distances by mode of transport generally align with expected patterns (Figure *93*). Car usage is predominantly associated with longer trips, typically exceeding 10km. A similar trend is observed for public transport, although it also appears to be commonly used for medium- to long-distance travel (5 - 10km). Interestingly, contrary to common assumptions, a significant part of bike trips were reported to be over 5km. While this pattern differs from findings in Tønsberg and Leuven, it is consistent with the strong cycling culture in the Netherlands, which may account for the longer distances travelled by bike. The limited responses regarding moped sharing suggest that this mode is primarily used for trips in the 5 - 10km range. For short-distance travel, the most frequently chosen modes were cycling and walking.

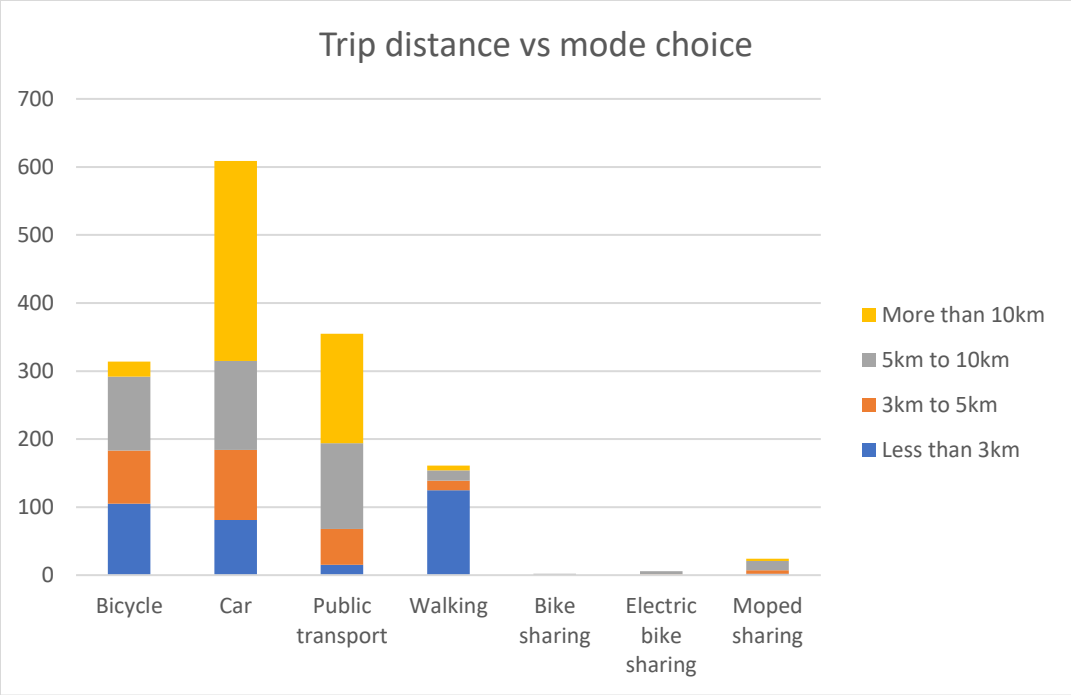


Figure 93 Trip distance vs mode choice, Het Lage Land & Oosterflank, Rotterdam

The next paragraph focuses on infrequent trips with potential for substitution by shared mobility options. Due to the limited number of responses for school-related travel, these trip purposes are excluded from further consideration. The analysis instead focuses on two moderately frequent trip types: leisure activities and visiting family, both of which received a relatively high number of responses on a monthly or less-than-monthly basis. Figure *94* shows that visiting family is mainly done by private car, for every distance category, with a significant portion of trips longer than 10 km. In contrast, Figure *95* indicates that trips towards a leisure activity are mainly done using public transport, with a high share of 5 to 10 km trips. Still, the car also has a considerable share, even for very short distances. As both trip purposes are discretionary in nature, they may be more susceptible to shift towards alternative or shared transport modes. For the percentage using cars, moped sharing may present an opportunity to replace shorter leisure trips. In contrast, family visits are often associated with longer distances and are primarily undertaken by car. In such cases, car-sharing may offer a viable alternative for reducing private vehicle use.

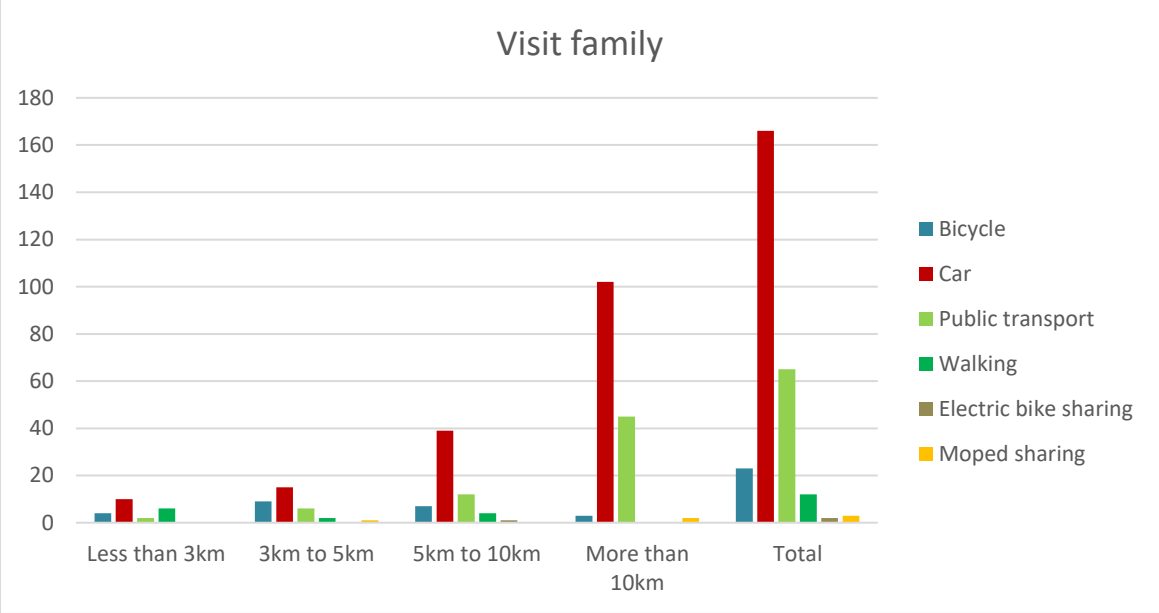


Figure 94: Trips to visit family, Het Lage Land & Oosterflank, Rotterdam

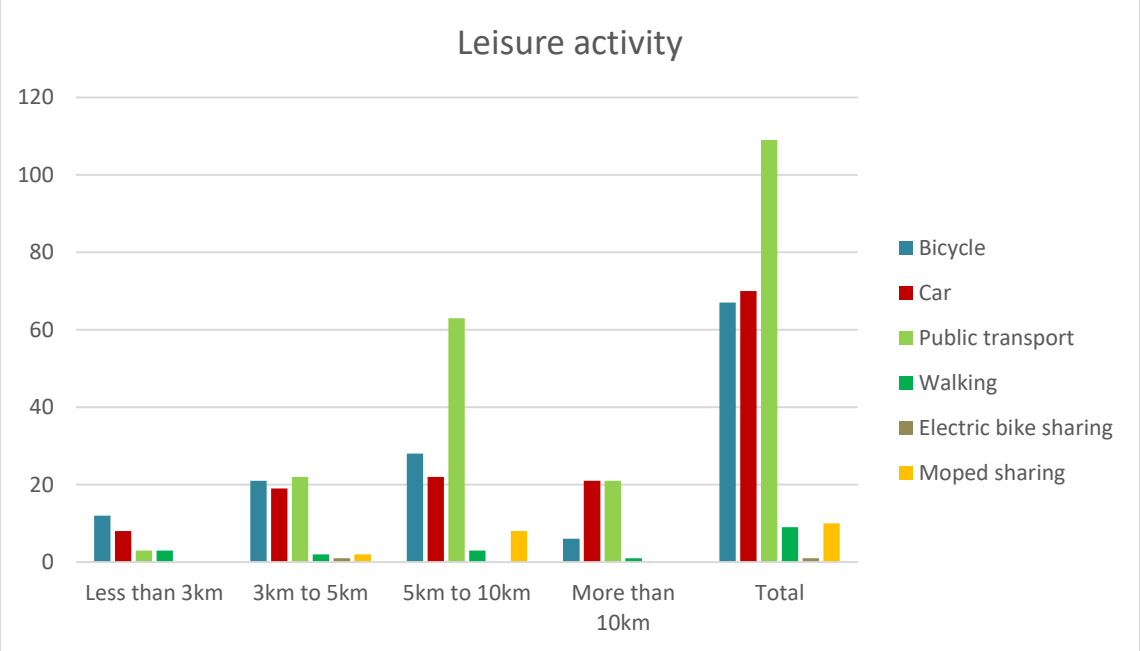


Figure 95: Trips to a leisure activity, Het Lage Land & Oosterflank, Rotterdam

Considering frequent trips with potential for modal shift, the data indicate that commuting and supermarket are among the most common or moderately frequent travel purposes. Trips to the supermarket are predominantly short-distance, with approximately 60% made using active modes of transport (e.g., walking or cycling) and around 30% by car. Figure *96* indicates that supermarket trips are primarily short, whereas the car still has a considerable share, even for those very short-distance trips. In those cases, a shared cargo bicycle could act as an ideal substitute.

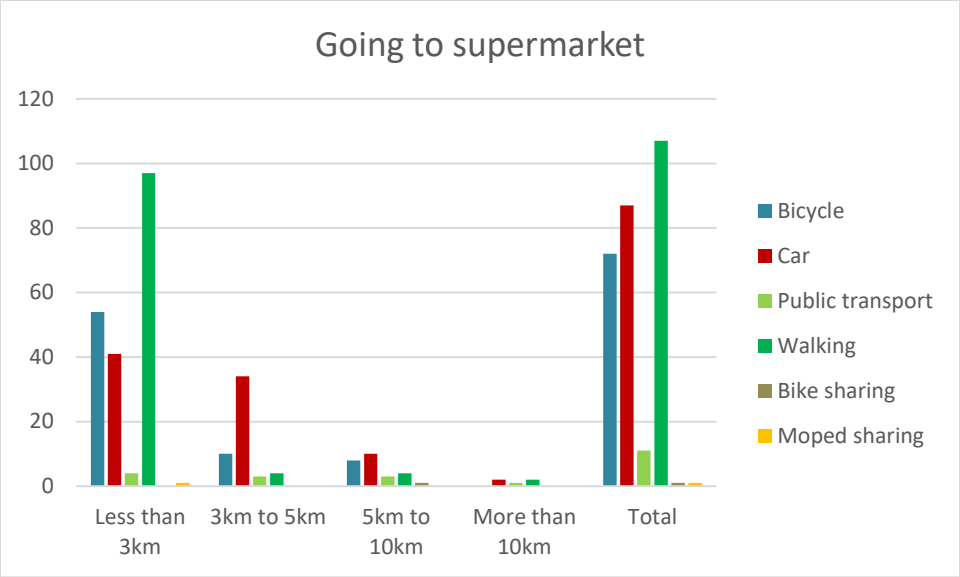


Figure 96: Trips to the supermarket, Het Lage Land & Oosterflank, Rotterdam

Similar to Leuven, Figure *97* indicates that the potential for substitution for commuting trips is low, as it mainly involves long and frequent trips being done by car, in which, for such situations, there is less of a use case for any type of shared transportation service.

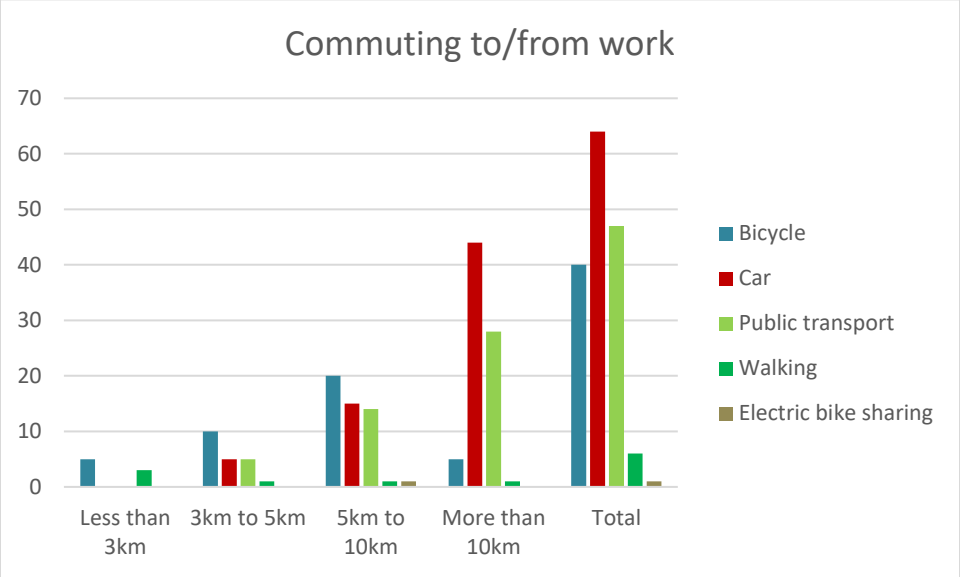


Figure 97: Commuting trips, Het Lage Land & Oosterflank, Rotterdam

Perception towards conventional and shared mobility

The following section presents the findings related to perceived obstacles and facilitators influencing the use of private vehicles, public transport and shared mobility. The first part focuses on perceptions surrounding private cars. As illustrated in Figure *98*, car owners do not seem to have problems with parking availability. There is only a small number that (partially) disagrees with the statement that they can park their car close enough to make all of their trips. This perception aligns with the overall negative

sentiment observed among respondents seeking alternatives to car use (Figure *99*). These findings are consistent with earlier results indicating that the private car was the dominant mode of transport across most trip purposes (Figure *91*) further reinforcing the established preference for car-based mobility. However, the respondents (partially) looking for alternatives, do also seem to be car users, as illustrated in Figure *100*.

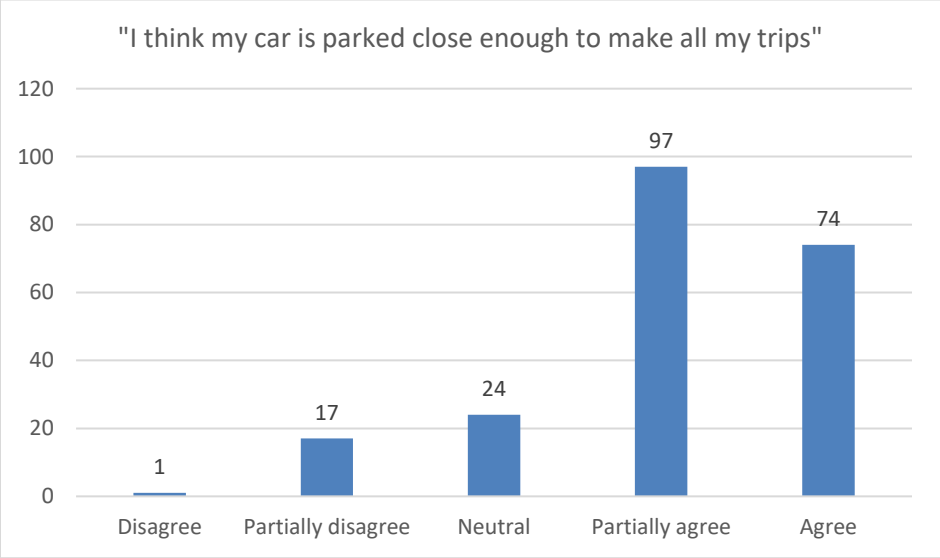


Figure 98: Perception parking availability, Het Lage Land & Oosterflank, Rotterdam

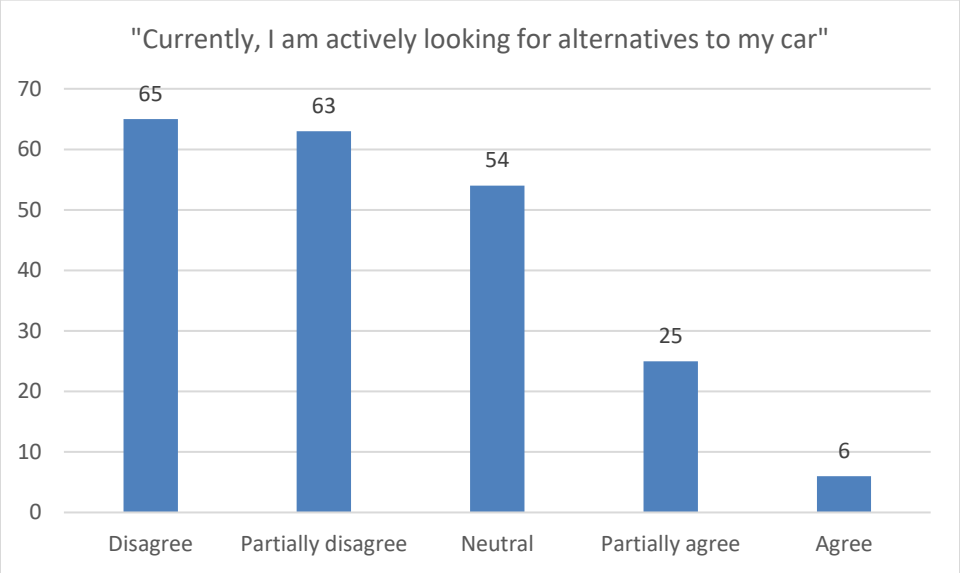


Figure 99: Likelihood to use alternatives to car, Het Lage Land & Oosterflank, Rotterdam

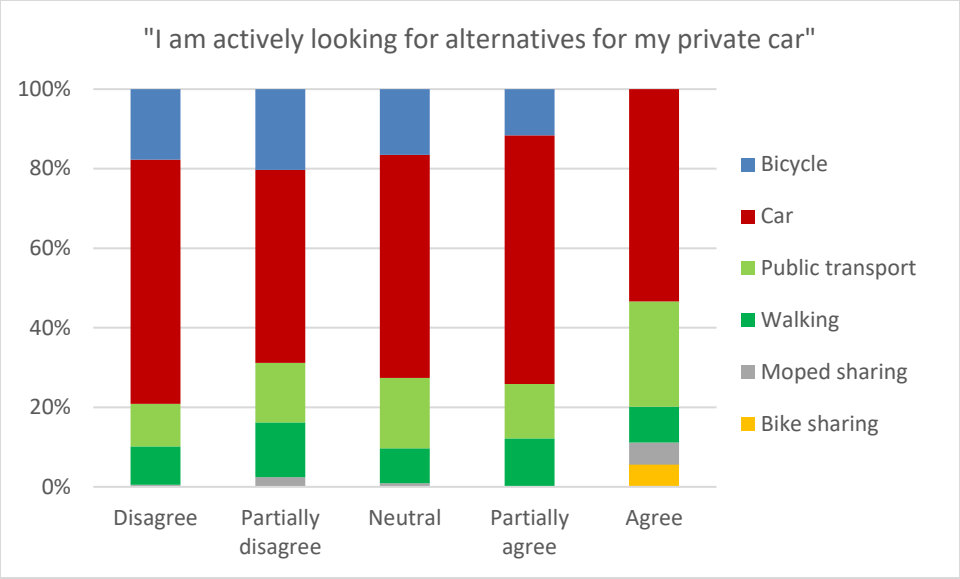


Figure 100: Likelihood to use alternatives to car, Het Lage Land & Oosterflank, Rotterdam

Public transport is perceived in a neutral to positive light (Figure *101*), as there is a significant group of respondents tending to use public transport more in the near future. Given its popularity for long-distance travel as well as for utilitarian purposes, such as commuting, it can be inferred that public transport is regarded as both financially viable and with a good level of service for daily mobility needs. This perception likely contributes to its widespread use across a variety of trip purposes, as previously discussed. To assess public transport's potential to attract car users, Figure *102* illustrates that it are mainly frequent car users who indicate they are not intending to use public transport (more often). However, there is potential as there is still a significant group of respondents making use of their car while (partially) intending to use public transport more often.

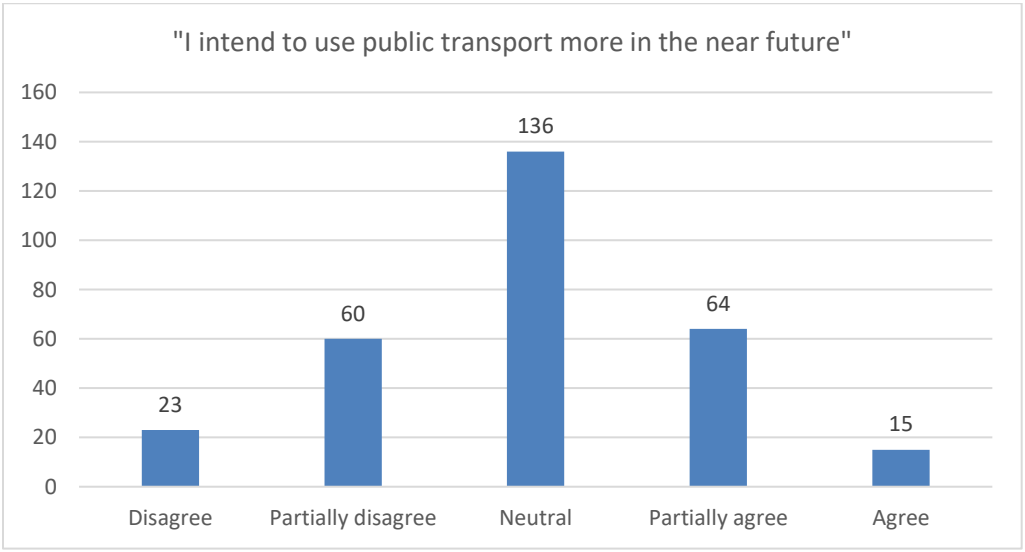


Figure 101: Intention to use public transport , Het Lage Land & Oosterflank, Rotterdam

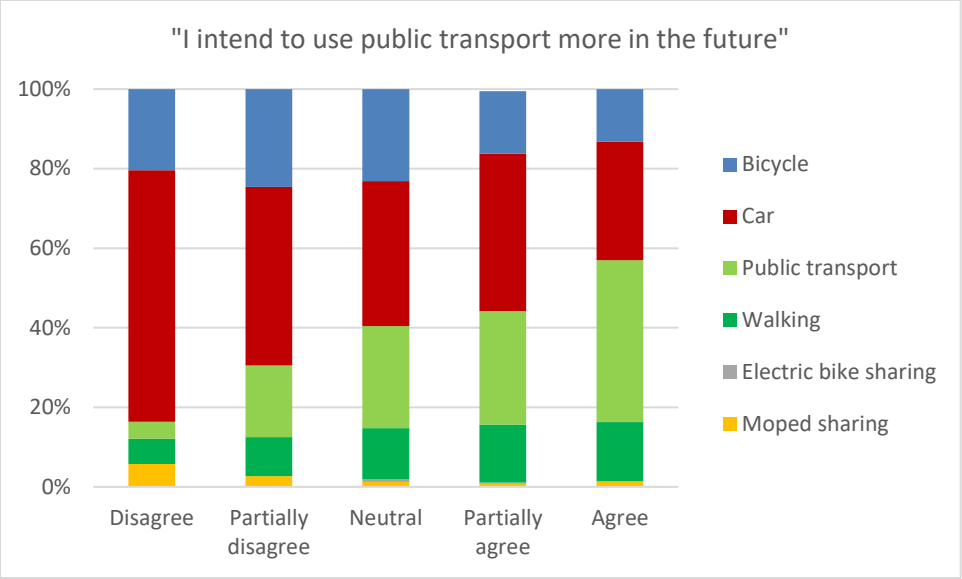


Figure 102: Intention to use public transport, Het Lage Land & Oosterflank, Rotterdam

Usage (intention) of shared mobility

The shared mobility available at hubs in Rotterdam consists of two-wheeled vehicles. While these modes are typically suited for short-distance travel, survey results indicate that respondents are generally willing to cycle distances of 5 km and occasionally more, depending on the trip purpose. Perceptions regarding the proximity of shared mobility options are largely neutral to positive (Figure *103*), suggesting that respondents are aware of these vehicles being present near their common destinations. However, this awareness does not translate into an intention to adopt shared mobility in the future, as indicated by the rather negative outlook on increased future use (Figure *104*). Furthermore, the respondents (partially) intending to make use of shared mobility are the ones already making use of some form of sustainable mobility (Figure *105*).

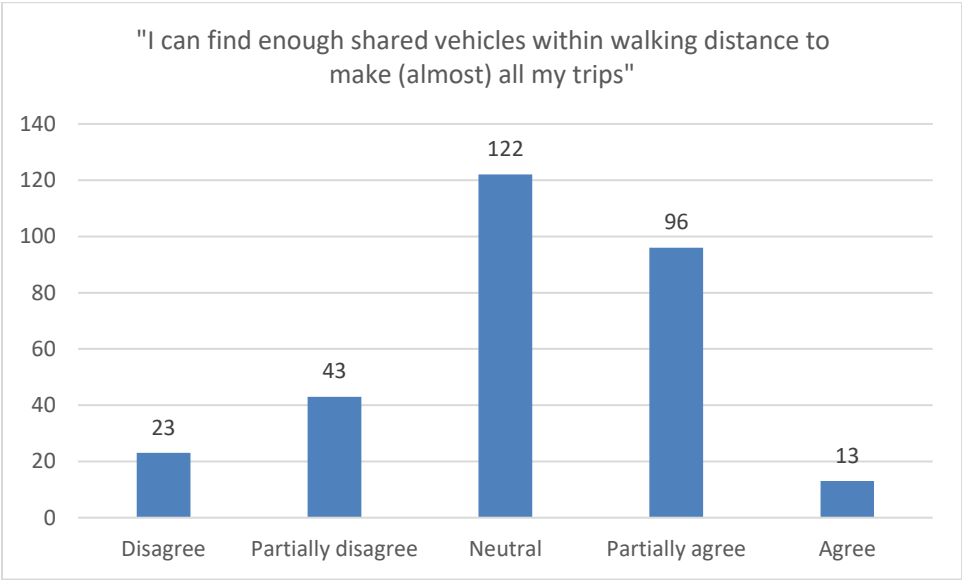


Figure 103: Shared mobility availability, Het Lage Land & Oosterflank, Rotterdam

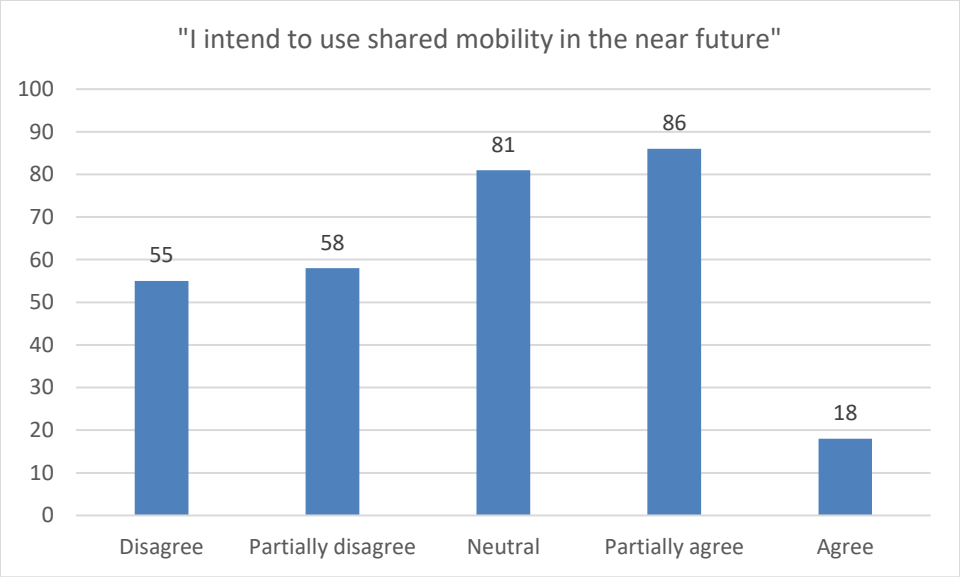


Figure 104: Intention to use shared mobility, Het Lage Land & Oosterflank, Rotterdam

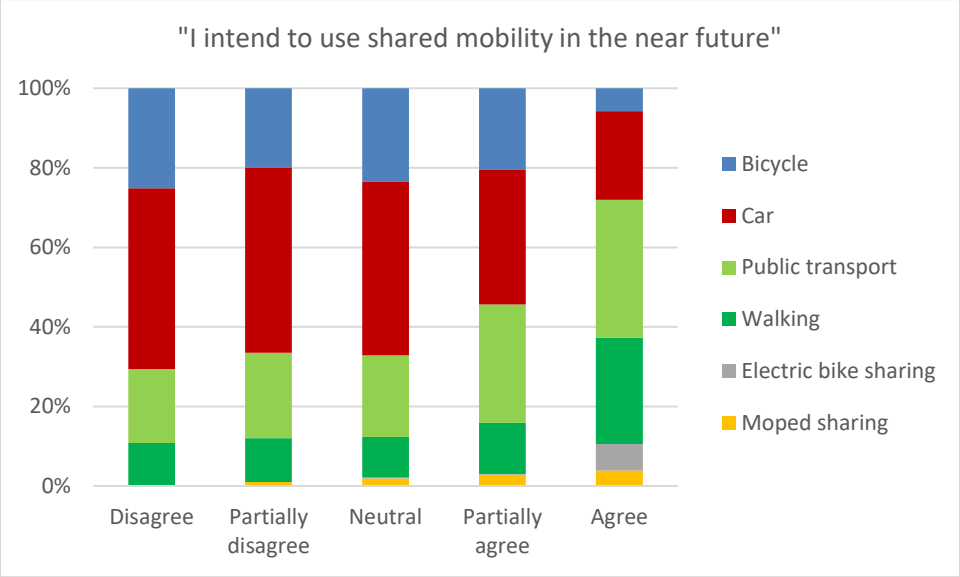


Figure 105: Intention to use shared mobility, Het Lage Land & Oosterflank, Rotterdam

Finally, the results from Rotterdam differ from those observed in Tønsberg and Leuven with respect to shared mobility subscriptions. Among the shared modes available in Rotterdam, mopeds appear to be the most used shared vehicle, as 75 respondents indicated they have used it while paying on a per-trip basis (Figure *106*). Around 10% of the sample also made use of (e-)bike sharing, which is significantly higher compared to the samples in Leuven and Tønsberg. However, the dominance of paying on a per-trip basis, gives an indication that the different shared transportation services are not that frequently used. The low number of cargo bike sharing users could be caused by the lower number of shared cargo bike vehicles compared to the much larger fleets of shared moped and (electric) bicycle operators.

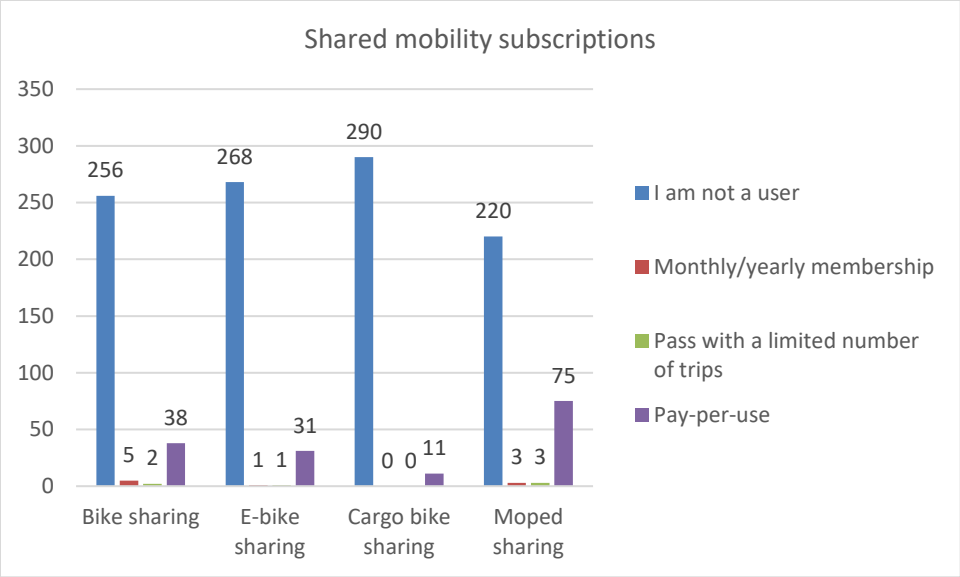


Figure 106: Shared mobility subscriptions, Het Lage Land & Oosterflank, Rotterdam

Knowledge of mobility hubs

The majority of respondents from the Lage Land & Oosterflank area were already familiar with the concept of a mobility hub. This can be attributed to previous awareness campaigns conducted by Rotterdam. In addition to these earlier efforts, the survey was carried out shortly after city-led activities in the neighbourhood aimed at promoting and encouraging residents to subscribe to the mobility budget.

Despite the high level of awareness, the majority of the respondents have not used one of the shared vehicles from a mobility hub (Figure *107*). Attitudes toward future use were mixed, with a slight majority of the participants indicating they do not foresee themselves using mobility hubs. However, as illustrated by Figure *108*, there is a significant portion of our sample having a mobility hub nearby their destinations, thus availability of an adjacent mobility hub does not seem to be a barrier. Preferences regarding shared mobility services aligned with the patterns shown in Figure *106*, where moped sharing emerged as the most used shared transportation option (Figure *109*).

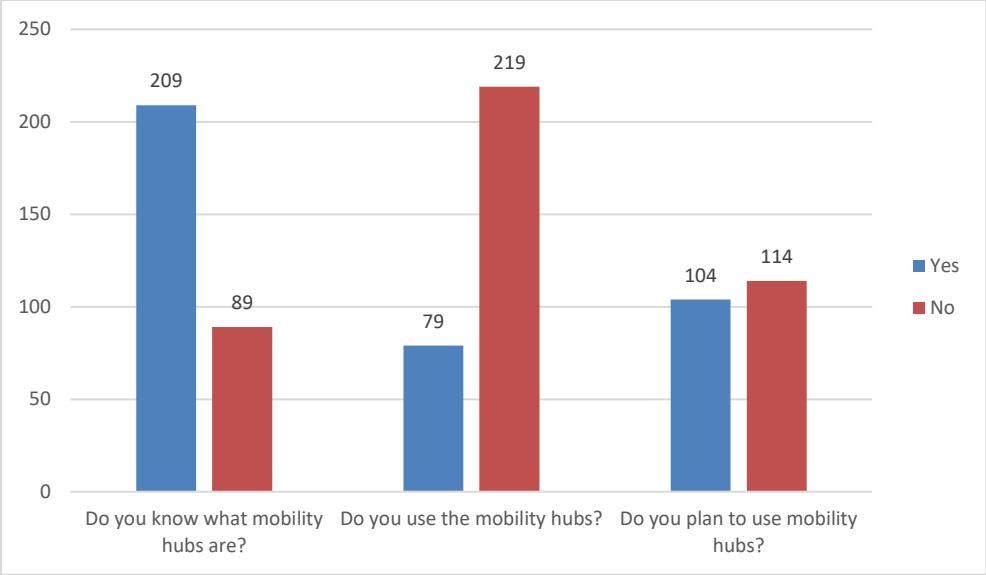


Figure 107: Knowledge and usage of mobility hubs, Het Lage Land & Oosterflank, Rotterdam

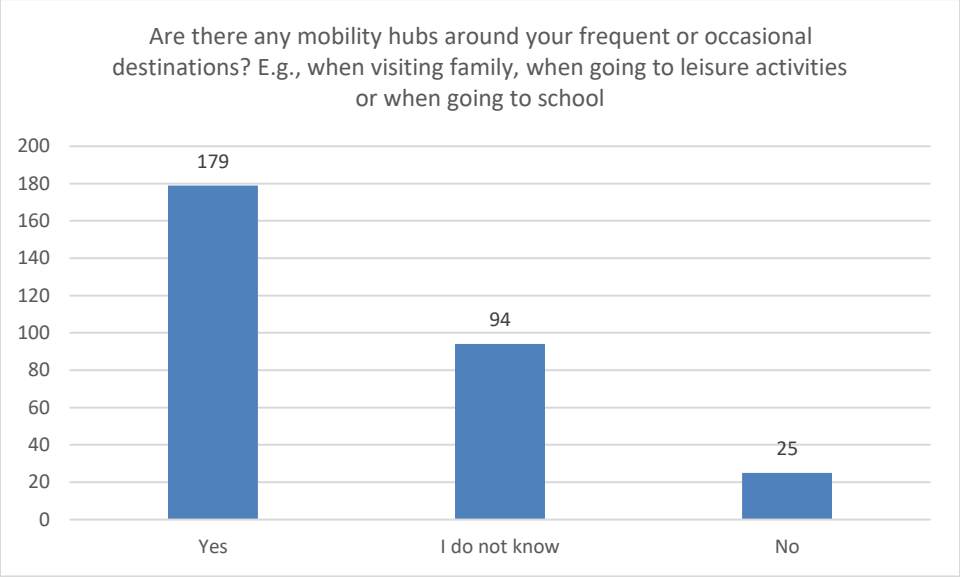


Figure 108: Availability of mobility hubs, Het Lage Land & Oosterflank, Rotterdam

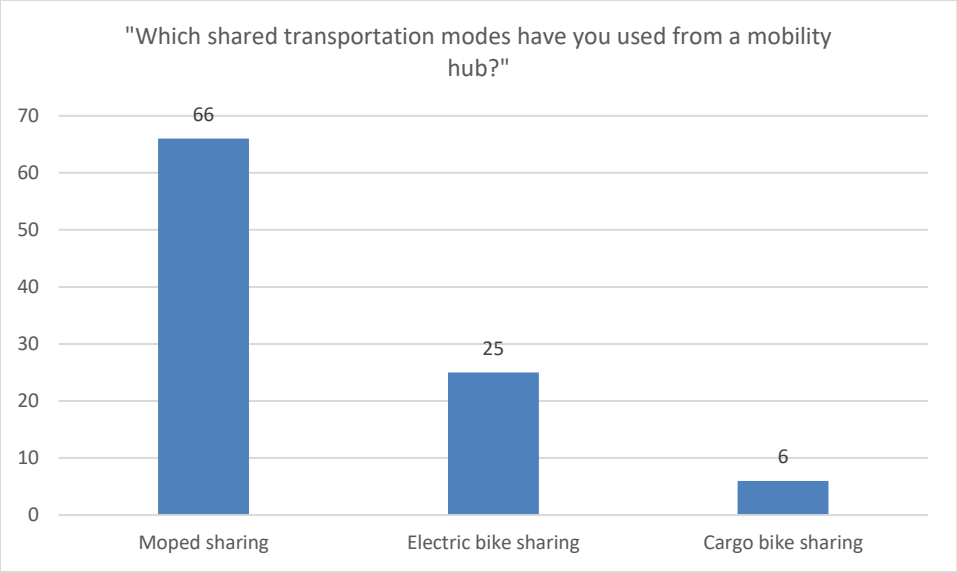


Figure 109: Usage sharing services at mobility hubs, Het Lage Land & Oosterflank, Rotterdam

Oud-Mathenesse

Socio-demographics

First, we have to point out that the sample of the Oud-Mathenesse survey is much smaller compared to the sample from Het Lage Land & Oosterflank. The number of valid responses is 85, while this is 301 for Het Lage Land & Oosterflank, and thus could affect the interpretation of the results.

Different from the Het Lage Land & Oosterflank area, the majority of the respondents of Oud-Mathenesse reported living alone (45%). The proportion of individuals living with both a partner and children is approximately 9%. Regarding the age distribution of respondents, approximately half were between 26 to 35 years old, for both genders. Women accounted for 51% of the sample, slightly more than men (41%). The subsequent age category, 36 to 45 years old, represented around 20% of respondents for both genders. The remaining age groups each accounted for approximately 10% of the respondents.

The proportion of respondents with primary or secondary education was less than 4%. More than 70% of the participants reported having an undergraduate or postgraduate degree, which reflects a sample of highly-educated respondents. Generally, the participants expressed a positive sentiment regarding their financial situation; only 8% said it is somewhat difficult to make ends meet, while no one indicated difficult. Finally, regarding the question related to the migration background, 51% responded they have no migration background, while 38% reported they did, reflecting a more diverse sample compared to the other Rotterdam pilot sample.

Transport ownership and travel behaviour

The results of the vehicle ownership from Oud-Mathenesse still are contrary to the ones presented in Leuven and Tønsberg (See Figure *7* and Figure *69*), however, they also differ slightly from Het Lage Land. Private cars are way less predominant in the area, where only 38% of the sample indicated they own at least one car, while more than 80% of the respondents indicated that they have at least one bicycle. Electric bicycle ownership is significantly less compared to het Lage Land, while the ownership rates of the other transportation modes are comparable.

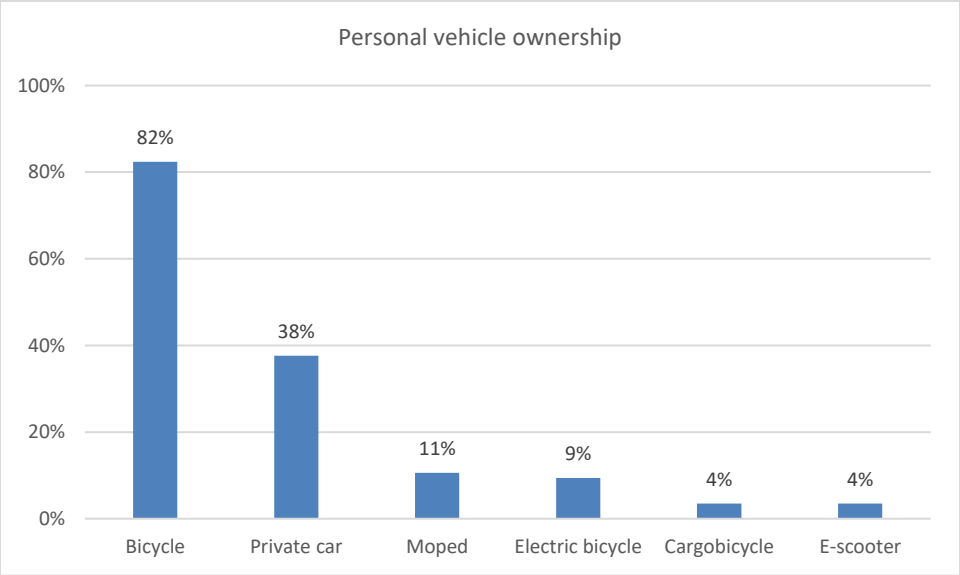


Figure 110: Personal vehicle ownership, Oud-Mathenesse, Rotterdam

The number of regular public transport users is relatively higher in this area, as 44% reported to have a monthly or yearly subscription (Figure *111*). Only 1% of the sample answered not to use public transport at all, which is 6% lower than Het Lage Land. The higher number of public transport users could reinforce the relatively lower number of people that reported owning a car.

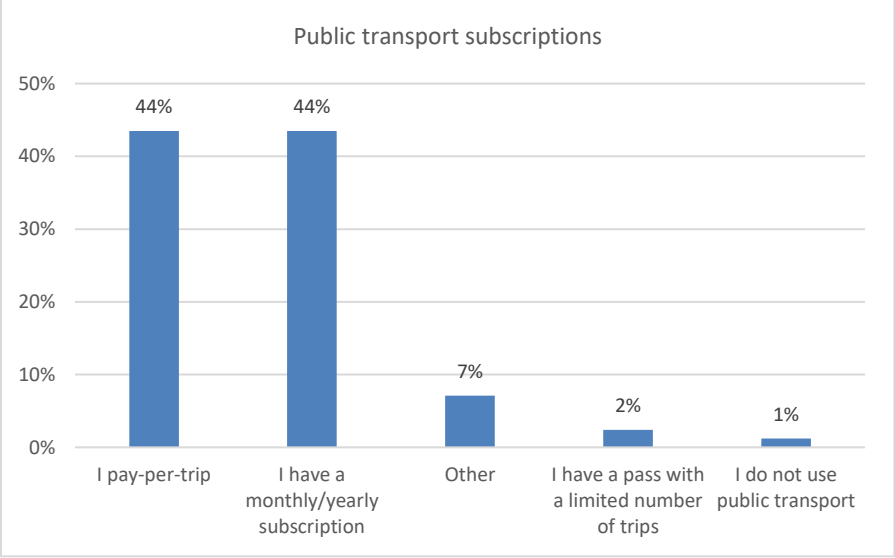


Figure 111: Public transport subscriptions, Oud-Mathenesse, Rotterdam

The results of the self-reported travel behaviour shows that people use public transport and the bicycle more frequently than car when considering all the modal split across all trip purposes (Figure *112*). This finding would support the results in Figure *111*, regarding PT subscriptions. Overall, inhabitants of Oud-Mathenesse use a sustainable mode of transport for almost 80% of their trips. It also seems that moped

sharing is the most popular shared vehicle type and has twice the percentage in the modal split compared to het Lage Land.

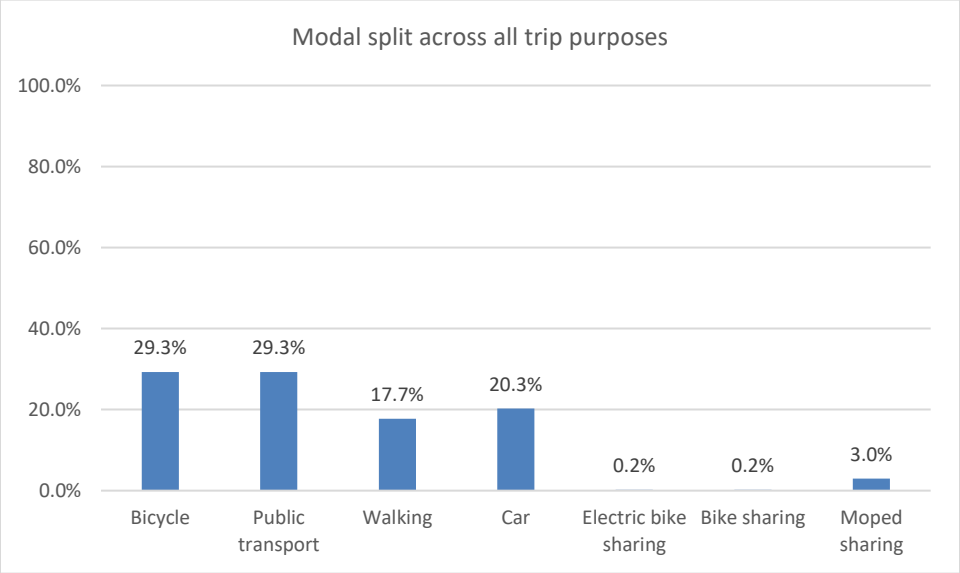


Figure 112: Modal split across all trip purposes, Oud-Mathenesse, Rotterdam

Regarding frequent trips, commuting and going to the supermarket are the two most frequent activities, as many respondents indicated they do this at least three times a week (Figure *113*). There were not many trips with the purpose of going to school or leaving children at school, so we did not include them in the analysis.

Among the infrequent trips, we have visiting family and going out with friends, which is comparable to het Lage Land. Going to a leisure activity shows a more varied distribution, as some respondents do this type of trip very frequently and other respondents more occasionally.

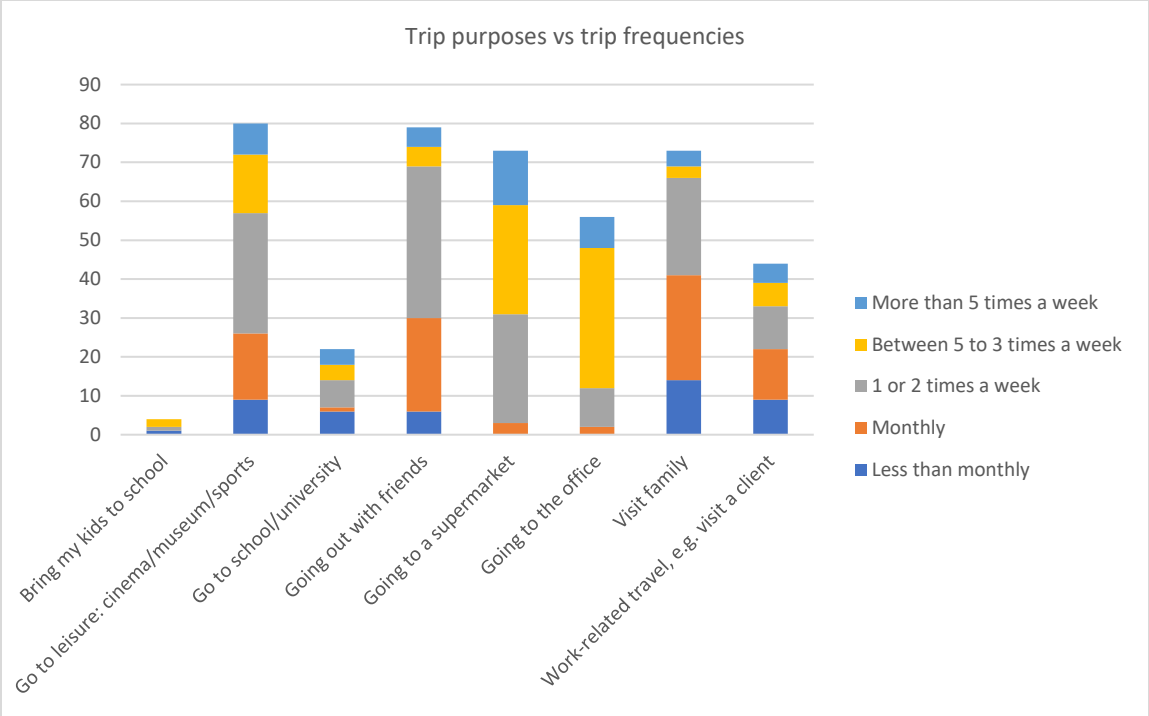


Figure 113: Trip purposes vs trip frequencies, Oud-Mathenesse, Rotterdam

When considering the trip distance per transportation mode across all trip purposes (Figure *114*), it aligns with certain expected patterns, such as public transport for medium to long distances and walking for short distances. However, it is remarkable that the car also seems to be mainly used for longer distances, which could reduce the potential for active shared mobility to act as a substitute for those trips. Furthermore, a considerable share of bicycle trips is also medium to long distance. Lastly, the moped sharing trips were mainly medium-distance trips.

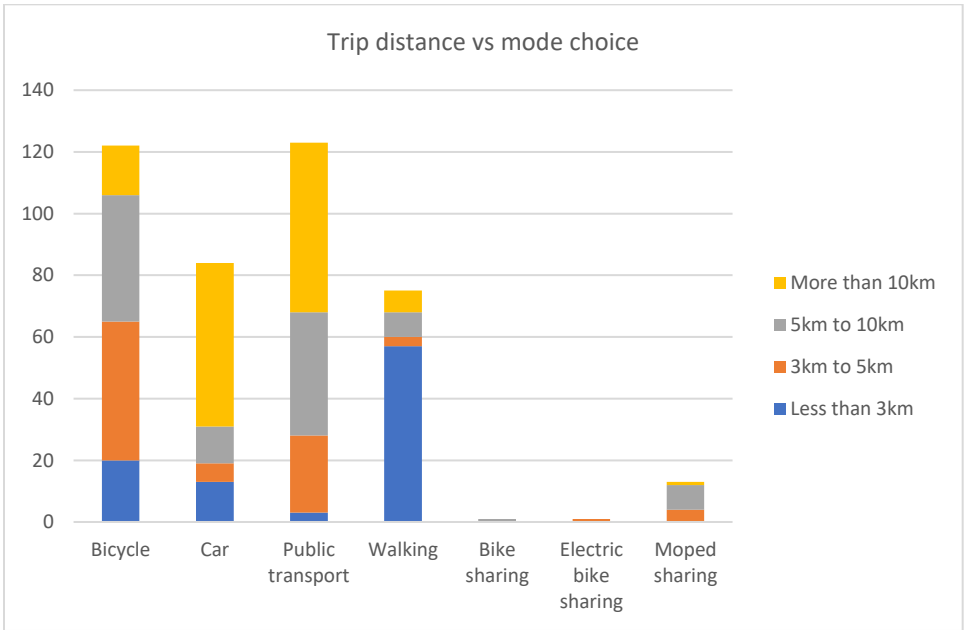


Figure 114: Trip distance vs mode choice, Oud-Mathenesse, Rotterdam

When we focus on the infrequent trips that could offer a use case for shared mobility services, Figure *115* and Figure *116* show that both for visiting family and going out with friends, the share of car trips is still considerable. It seems to be longer trips, which could make it more difficult to be fulfilled by active shared mobility. However, public transport and also cycling are well established in this sample, even for infrequent and longer trips.

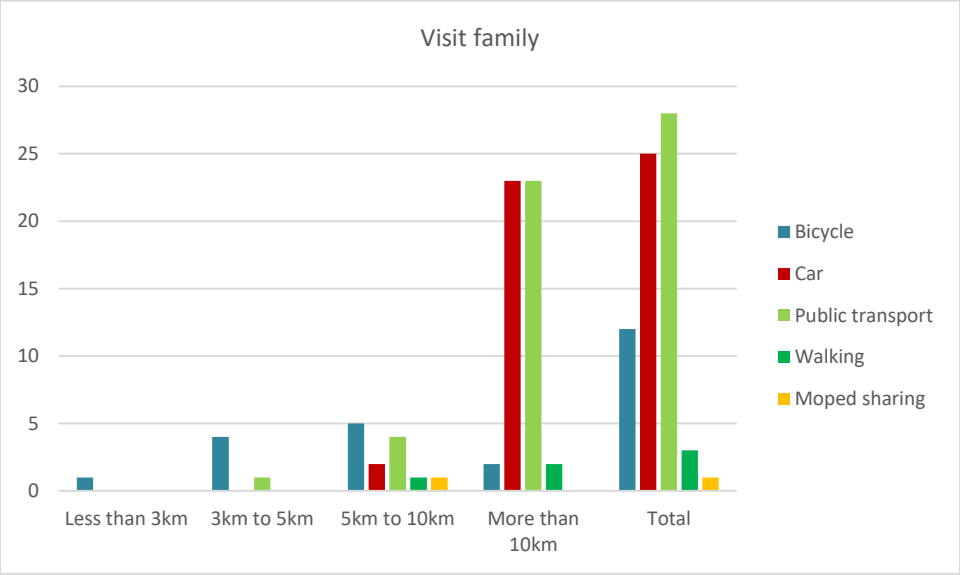


Figure 115: Trips to visit family, Oud-Mathenesse, Rotterdam

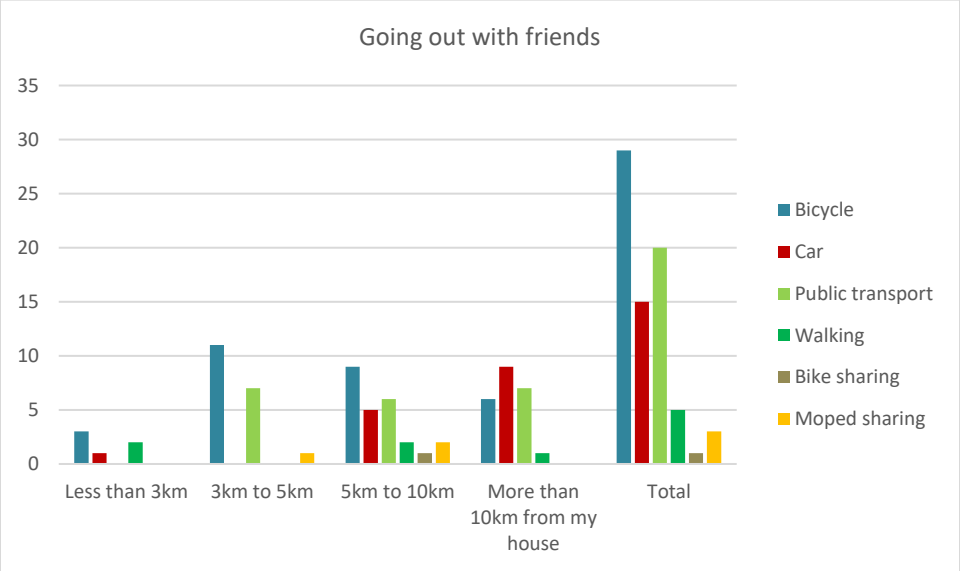


Figure 116: Trips to go out with friends, Oud-Mathenesse, Rotterdam

Among the trip purposes that are frequently completed, Figure *117* indicates that there is only a very limited potential for shared mobility, such as cargo bicycles, to further enhance sustainable mobility for trips going to the supermarket. Almost all trips are short and completed by foot. There is a small number

of car trips, but this is negligible. Considering commuting trips, Figure *118* illustrates that there is just a very small number of trips being completed by car, which are short. Still, also for longer commuting trips, this pool of respondents prefer cycling or taking public transport.

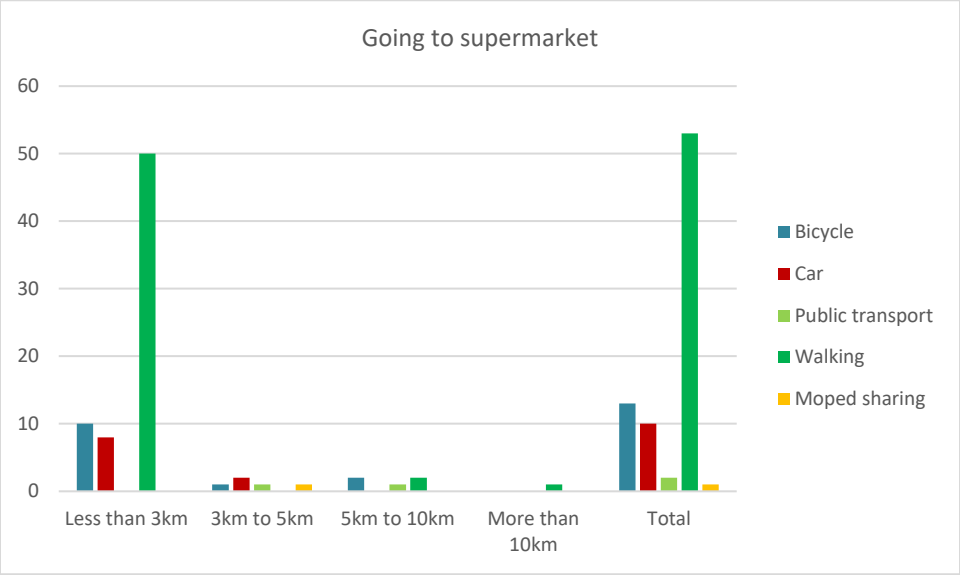


Figure 117: Trips to the supermarket, Oud-Mathenesse, Rotterdam

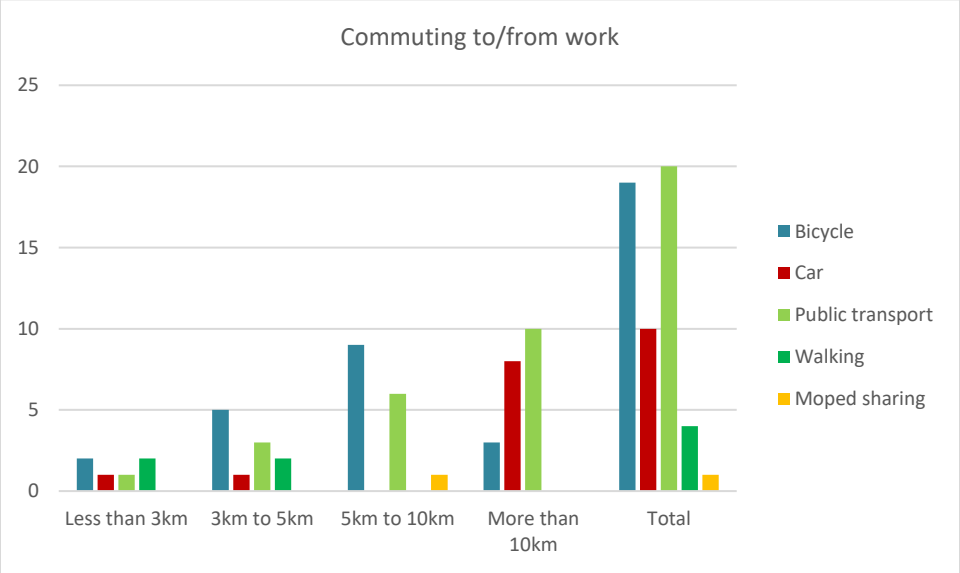


Figure 118: Commuting trips, Oud-Mathenesse, Rotterdam

Perception towards conventional and shared mobility

The first finding in Figure *119* focuses on perception about parking availability, showing that there is a more neutral perception towards parking availability compared to het Lage Land, where the large majority (partially) agreed with the statement. Figure *120* shows that from the 32 car owners, there is no one actively looking for an alternative to their car. However, there are still 8 respondents (a quarter) which are open for alternatives.

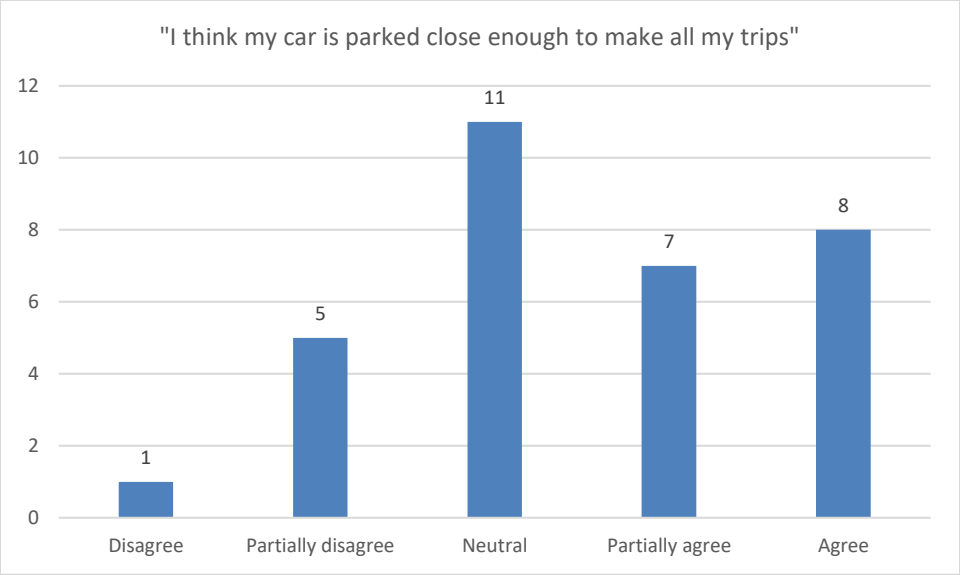


Figure 119: Perception parking availability, Oud-Mathenesse, Rotterdam

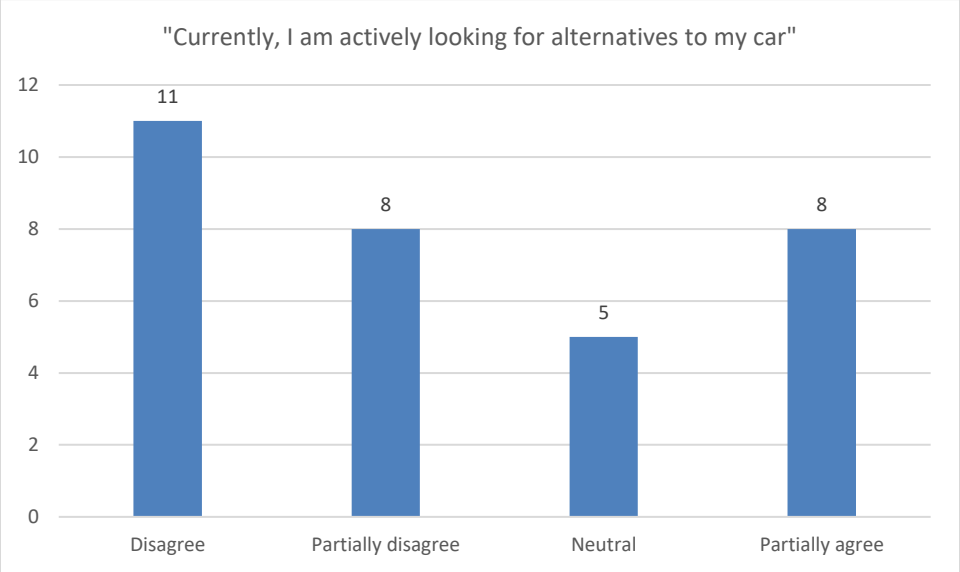


Figure 120: Likelihood to use alternatives to car, Oud-Mathenesse, Rotterdam

Even with already a high number of respondents using public transport, around 30% of respondents still indicate they intend to use public transport more in the near future (Figure *121*). However, Figure *122* illustrates that these respondents are already significant sustainable mobility users, while respondents with a relatively higher share of car usage in their modal split are the ones not intending to use more public transport.

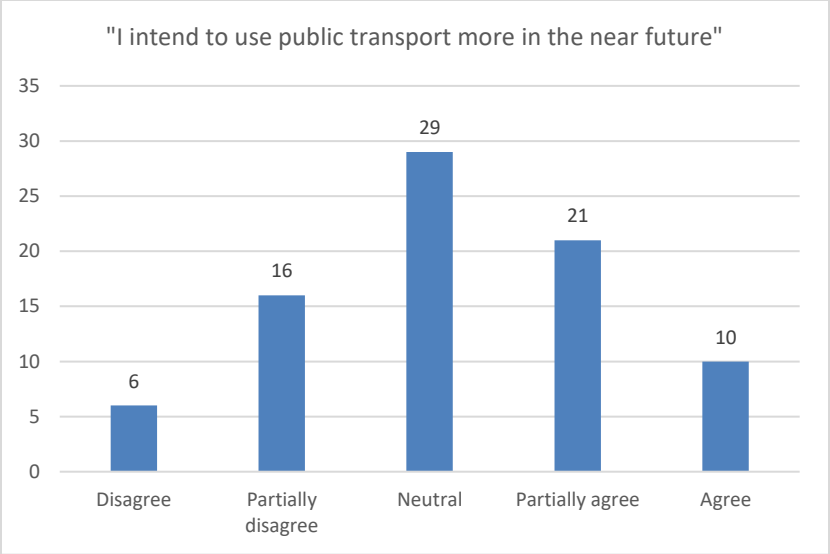


Figure 121: Intention to use public transport, Oud-Mathenesse, Rotterdam

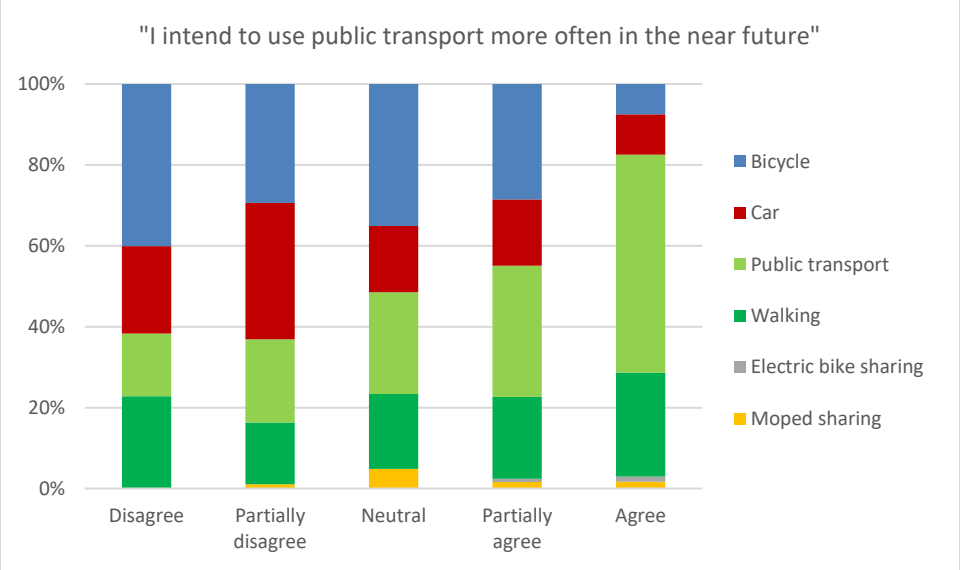


Figure 122: Intention to use public transport, Oud-Mathenesse, Rotterdam

Usage (intention) of shared mobility

Similar to Het Lage Land, this sample is neutral to positive regarding the availability of shared mobility in their vicinity (Figure *123*). This reflects their awareness regarding the available shared vehicles and could stimulate their intention to make use of them. Figure *124* gives an indication that there is quite a significant share of the respondents (around 38%) who show some intention to make use of shared mobility in the near future. Furthermore, Figure *125* shows that there are some car users who agree on the statement of using shared mobility in the near future. However, the sample that partially disagrees consists mainly of car users, so the potential is limited in that regard.

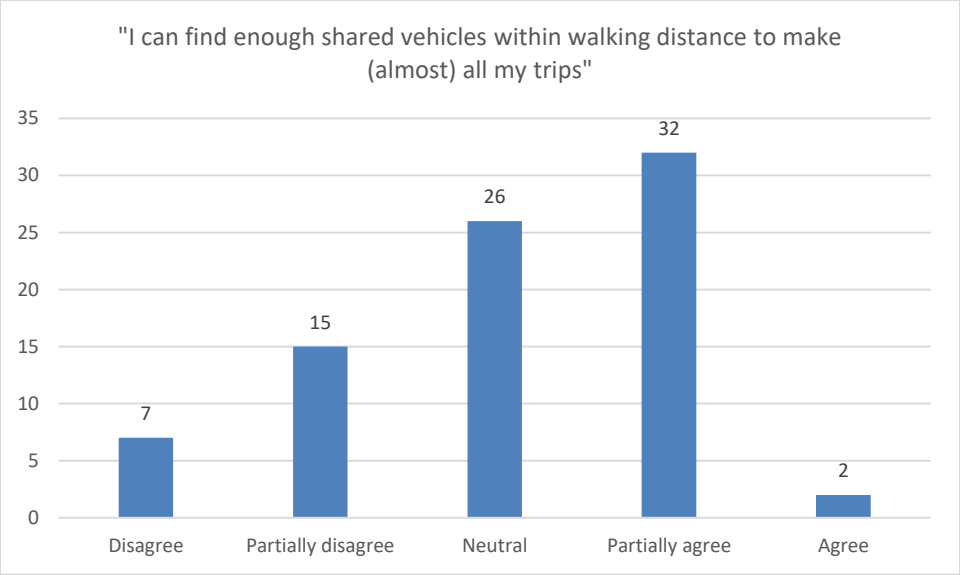


Figure 123: Shared mobility availability, Oud-Mathenesse, Rotterdam

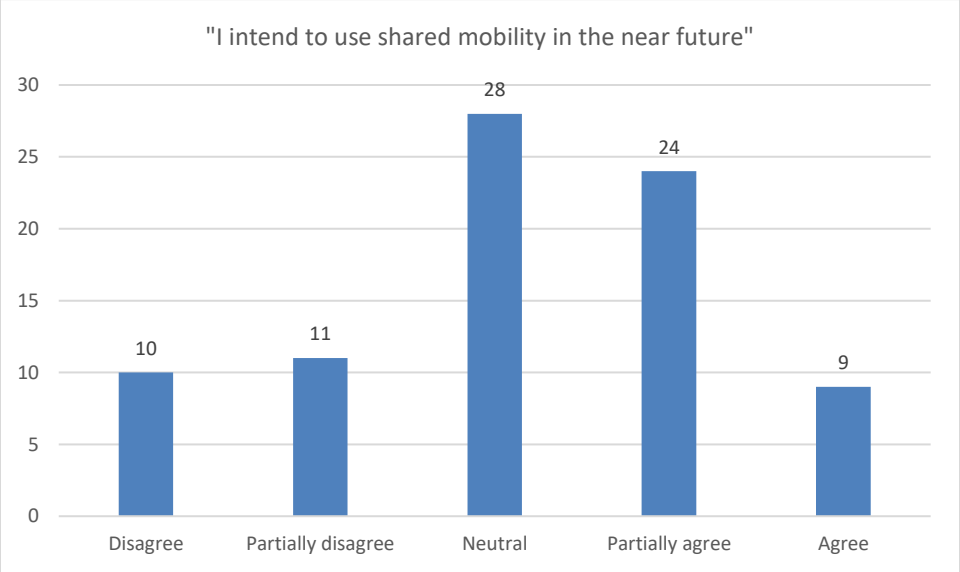


Figure 124: Intention to use shared mobility, Oud-Mathenesse, Rotterdam

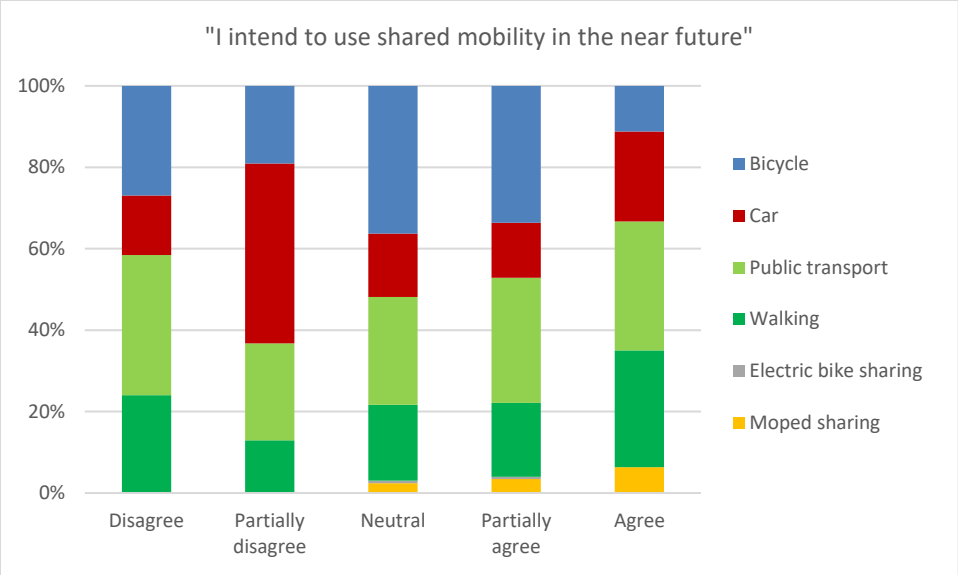


Figure 125: Intention to use shared mobility, Oud-Mathenesse, Rotterdam

Finally, the subscriptions to shared mobility services in Oud-Mathenesse do not differ significantly from those in Het Lage Land (Figure *126*), both in terms of popularity and preferred type of service. Most respondents stated that they do not use shared mobility. Among those who do, moped sharing is the most popular service, with a quarter of the respondents using it at least on a pay-per-use basis. Bike sharing is the second most popular option, followed by e-bike and cargo bike sharing. Only for bike sharing, there is a very small number of respondents who have a monthly/yearly subscription to it.

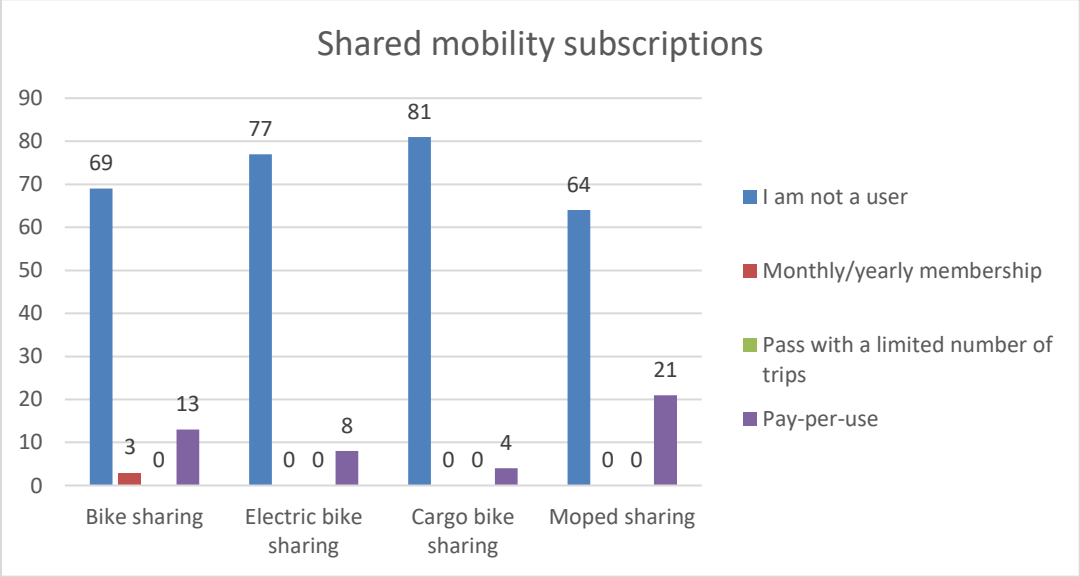


Figure 126: Shared mobility subscriptions, Oud-Mathenesse, Rotterdam

Knowledge of mobility hubs

As previously mentioned, the city of Rotterdam has actively implemented awareness campaigns to promote mobility hubs, and its citizens are generally familiar with the use and presence of shared mobility

services. Consequently, most respondents in Oud-Mathenesse reported being aware of mobility hubs prior to the survey, similar to the findings in Het Lage Land. Approximately a third of the respondents in Oud-Mathenesse indicated that they use mobility hubs, which is a bit higher compared to those in the other intervention area. Likewise, the intention to use mobility hubs in Oud-Mathenesse is greater. This may be attributed to the higher levels of public transport and bicycle use, suggesting a general willingness among residents to adopt active and shared mobility modes (Figure *127*).

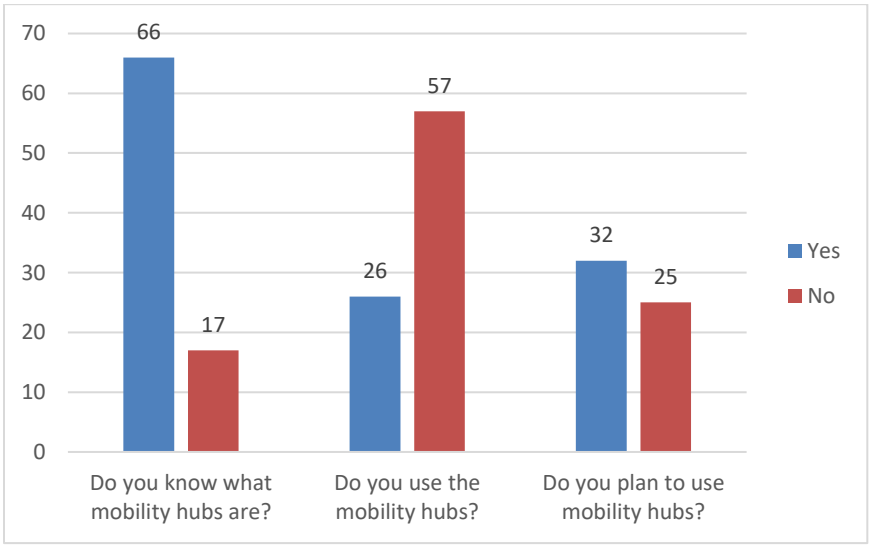


Figure 127: Summary questions about knowledge of mobility, Oud-Mathenesse, Rotterdam

The high awareness and intention to use mobility hubs could partly be attributed to the high perceived availability of mobility hubs (Figure *128*). A majority of the respondents indicates that there are mobility hubs located in the vicinity of their destinations. Lastly, when considering the modes that already have been used from a mobility hub, in line with the general usage of shared mobility in this area (Figure *126*), moped sharing is the most opted choice (Figure *129*).

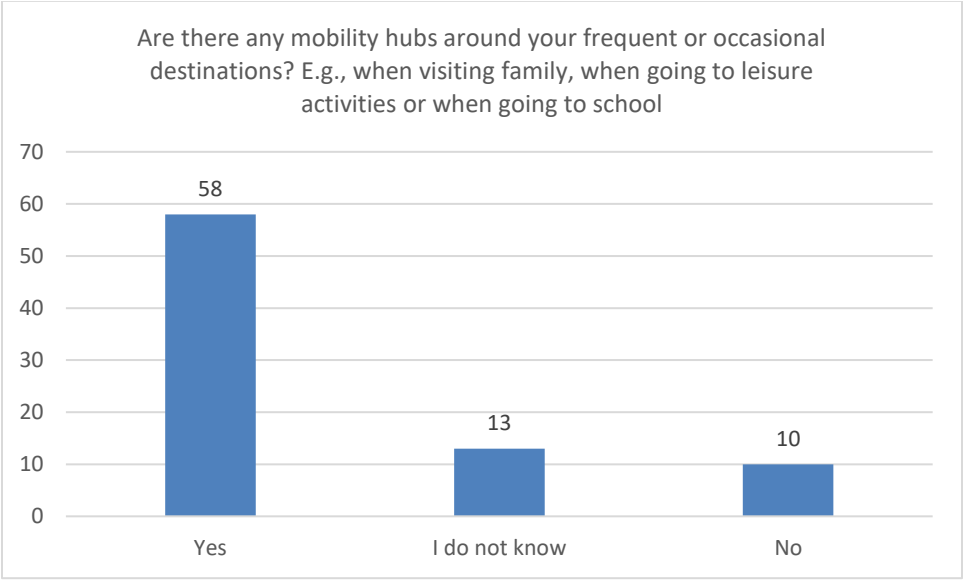


Figure 128: Availability of mobility hubs, Oud-Mathenesse, Rotterdam

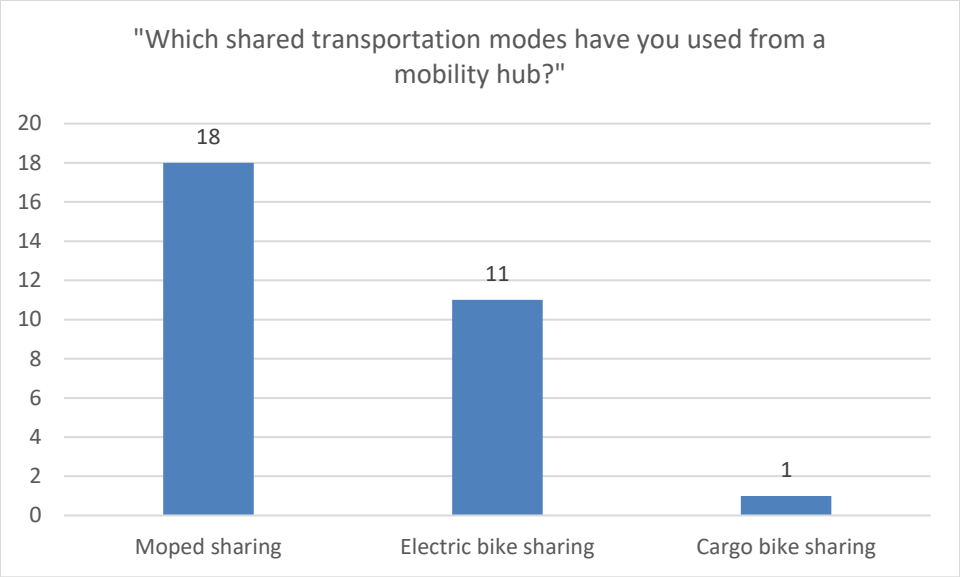


Figure 129: Usage sharing services at mobility hubs, Oud-Mathenesse, Rotterdam

3.3.2. Accessibility

The five hubs in Rotterdam have the same complexity in terms of facilities and services available. All pilots offer two-wheeler vehicles exclusively, and they target mainly two areas of the city, namely Oud-Mathenesse (Figure *130*) and Het Lage Land & Oosterflank (Figure *131*). The hubs of Franselaan and Kraaienstraat are designed to serve the area of$436{,}868\ m^2$ corresponding to Oud-Mathenesse. The service area of the hubs does not include all households in Oud-Mathenesse and extends to the municipality of Schiedam. An analysis of the service area distribution of the Fransenlaan hub shows that most of the potential users are concentrated on the eastern side. This pattern is influenced by the commercial spaces in front of the hub, limiting access to the residents living behind it. The distance from the Fransenlaan mobility hub to the southernmost part of the target area is approximately 700 meters, exceeding the typical walking threshold for accessing different SM options (see Table *4*). Additionally, 40% of the 500-meter service area around the Kraaienstraat hub extends into adjacent municipalities. The catchment area overlaps with the adjoining community garden with lower population density, thus potentially reducing the number of users from the adjoining municipality that could use the hub.

The sector of the Het Lage Land & Oosterflank stretches to $2'563{,}036\ m^2$ and contains three mobility hubs. The Jacob van Campenweg mobility hub primarily serves the eastern side of Het Lage Land, a predominantly residential area, with a small overlap into the adjacent linear park. The Oosterflank and Prinsenlaan mobility hubs cover the western Het Lage Land and eastern Oosterflank. The configuration of green spaces, commercial areas, and street layout influences the service area distribution, resulting in a diamond-shaped catchment with elongated vertices along the main avenue. The 500-meter service area of Prinsenlaan overlaps with Oosterflank, increasing the potential accessibility for residents near the Het Lage Land border, while those on Oosterflank's western side may have reduced access or find the hub less convenient.

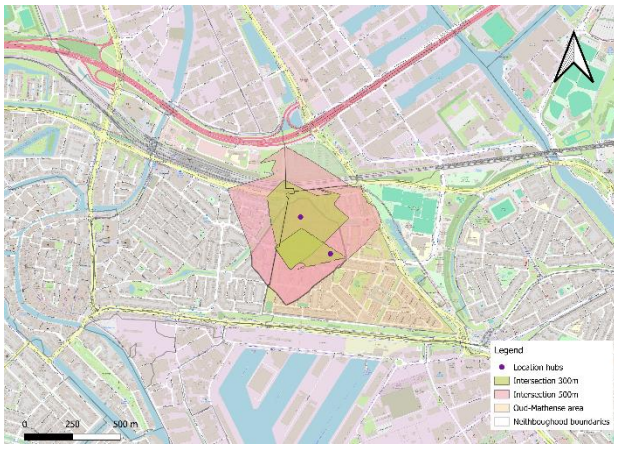


Figure 130: (From top to bottom) Catchment areas of mobility hubs Franselaan and Kraaienstraat in the Oud-Mathenesse, Rotterdam

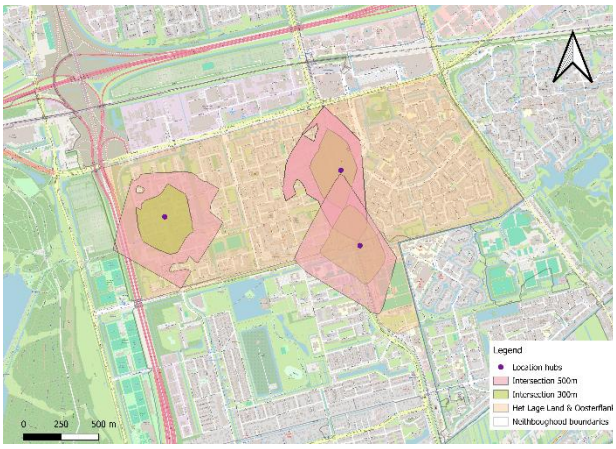


Figure 131: (From left to right) Catchment areas of mobility hub Jacob van Campenweg, Oosterflank and Prinsenlaan in the Het Lage Land & Oosterflank areas, Rotterdam

A summary of the potential users per age bracket in Rotterdam is presented in Table *11*. The number of potential users counts the inhabitants living outside the target areas of Oud-Mathenesse, Het Lage Land & Oosterflank that are covered by the catchment areas.

Table 11: Potential users per age brackets, Rotterdam

	300m						500m					
	Potential users per age brackets						Potential users per age brackets					
	<15	15 - 25	25 - 45	45 - 65	65 +	Total	<15	15 - 25	25 - 45	45 - 65	65 +	Total
Franselaan	50	57	152	90	46	395	231	243	665	403	198	1740
Jacob van Campenweg	105	98	219	194	176	793	321	301	671	595	541	2429
Kraaienstraat	157	164	449	273	133	1177	496	491	1364	843	403	3596
Oosterflank	91	85	191	169	154	690	254	238	531	471	428	1923
Prinsenlaan	102	83	193	211	187	775	262	212	495	543	482	1994

3.3.3. Usage patterns

To further assess the impact of the mobility hub intervention in Rotterdam, we begin by analysing the current usage patterns of shared mobility within the designated intervention areas. For this purpose, the City of Rotterdam provided a dataset comprising all recorded shared mobility trips from February 2024 to March 2025. The dataset includes information from 9 shared mobility providers, offering a range of vehicle types including mopeds, e-bikes, cars, and cargo bikes. For the analysis, the dataset was filtered

to retain only trips made with two-wheeled vehicles and further refined to include only trips that originated from within the mobility hub areas.

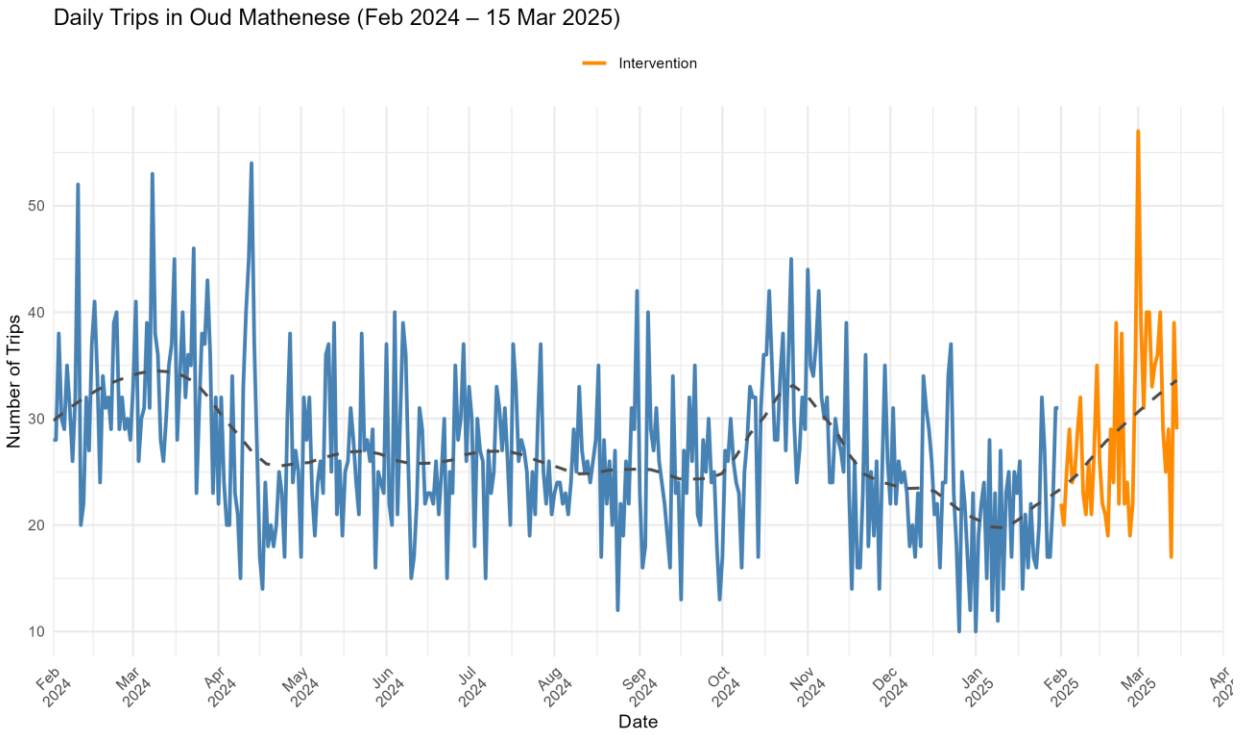


Figure 132 All trips done by all shared mobility in Oud Mathenesse from 2024 - 2025

Error! Reference source not found. depicts the evolution of trips originating in Oud Mathenesse. From February 2024 to February 2025, there was a slight decrease in the number of trips. During 2024, the average number of daily trips leaving the area was 30. A strong peak in usage was noted at the beginning of March 2025, which can be attributed to the communication surrounding the intervention. However, this increase was following a pattern emerging from the beginning of the year. In addition, trip usage was not significantly higher compared to the same months in 2024. Resultantly, no statistical proof could be found to support the impact of the intervention.

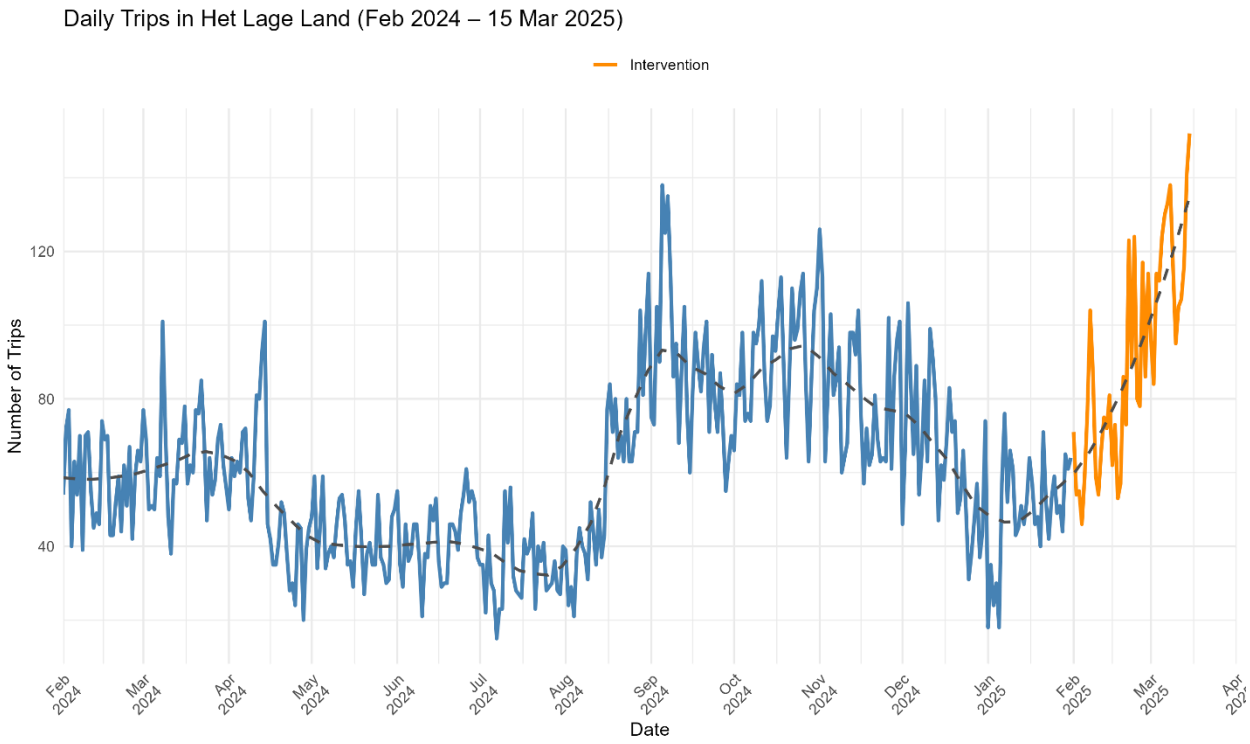


Figure 133 All trips done by all shared mobility in Het Lage Land from 2024 - 2025

Throughout the year the number of trips originating from Het Lage Land intervention area were significantly higher than Oud-Mathenesse (**Error! Reference source not found.**). However, it is worth noticing that the scale of intervention in the former is larger than in the latter, most likely leading to general higher use of shared mobility. As opposed to Oud-Mathenesse, Het Lage Land has a higher degree of mixed-used areas, and it is close to a metro station, both of which could impact the number of trips. Usage in the first month of 2025 is on the rise and higher than the same months in 2024. While the number of trips was also generally high in the fall of 2024, the intervention does seem to have a positive impact on trip usage. Again however, the differences are too small to draw statistically significant results.

Data on the trips per bike, moped and cargo-bike per area booked via the MaaS application used during the intervention, are presented in **Error! Reference source not found.** and **Error! Reference source not found.**. In the case of Oud-Mathenesse, shared bike bookings through the app are more significant during the month of March, although proportionally, these bookings make up only 5 to 10% of all trips leaving the study area, indicating the rather small effect of the intervention.

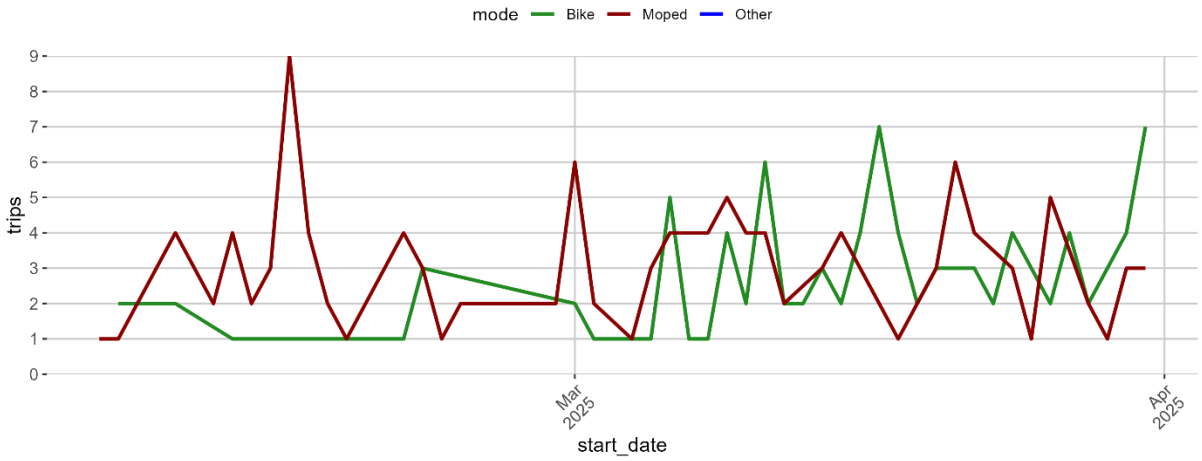


Figure 134 Trips using the umob app Oud-Mathenesse

In Het Lage Land, app usage was higher. Particularly, the use of shared bikes during the month of March mostly surpasses the use of mopeds, which is contrary to the initial preferences expressed in the survey results presented in Section 3.3.1. The use of shared bikes reaches up to 40 trips per day during mid-March, explaining the sharp increase observed in **Error! Reference source not found.**.

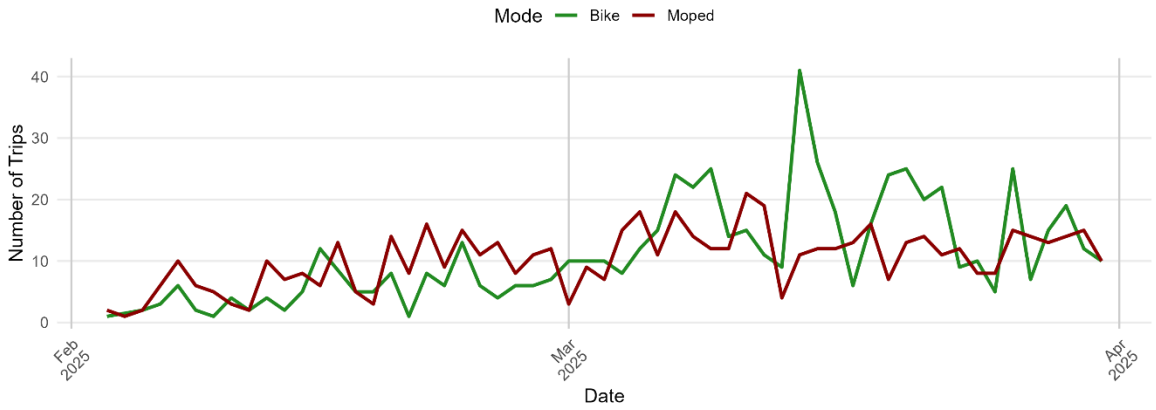


Figure 135 Het Lage Land usage through umob app

Both intervention areas exhibit a high frequency of short-distance travel, either within the same area or within a 1 km radius. Moreover, the majority of the destinations of the trips were in the central district, particularly around Rotterdam Central Station. In the case of Oud-Mathenesse, users frequently travelled to commercial zones in Nieuw-Mathenesse (**Error! Reference source not found.**), situated in the southeastern part of the intervention area. Additionally, trips extended to adjacent residential and commercial zones in Delfshaven.

The most common longer-distance trips take approximately 6 km, towards mixed-use residential and commercial areas in Feijenoord and Overschie, located to the southeast and northwest, respectively. The data indicate that shorter trips to nearby areas were predominantly completed using bikes, whereas longer trips toward the northern and southern sectors of the city were primarily undertaken using mopeds.

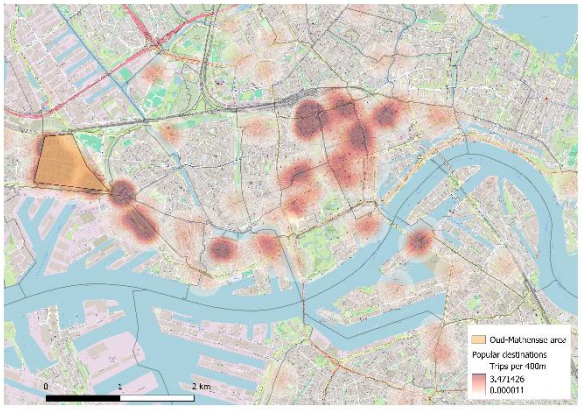
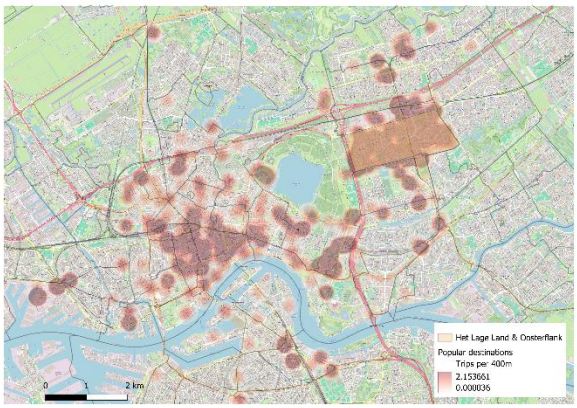


Figure 136: Destinations trips with budget Oud-Mathenesse

Figure 137: Destinations trips with budget Het Lage land & Oosterflank



The Het Lage Land area (Figure *137*) showed a greater variety of travel destinations compared to Oud-Mathenesse. Nearby destinations located within a 1 to 2 km radius to the north primarily consisted of residential zones, while trips to the west often led to green and recreational areas. Although located approximately 10 km away, the neighbourhoods of Nieuw-Mathenesse and Delfshaven were also frequent destinations for residents of Het Lage Land. Overall, the number of long-distance trips, as well as those completed by bike, was notably higher in Het Lage Land than in the other intervention area.

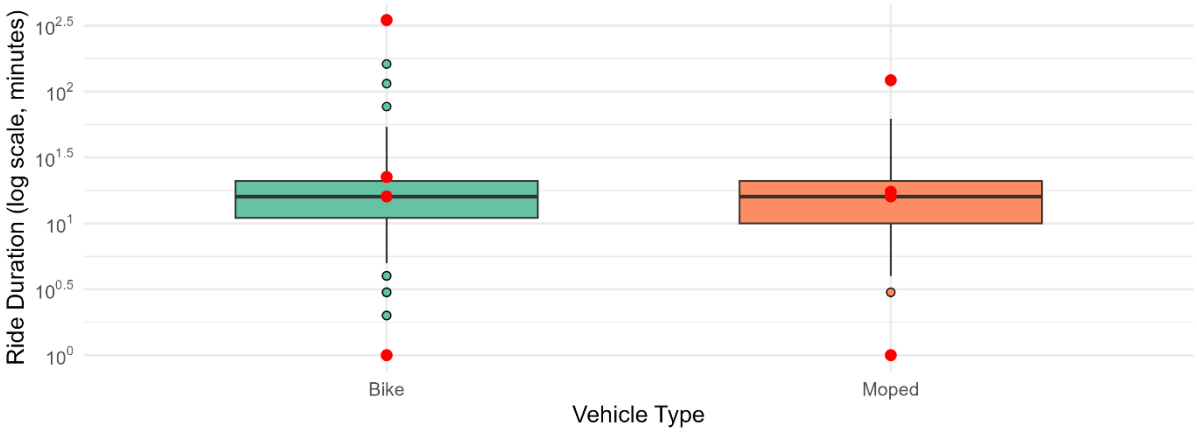


Figure 138: Distribution of ride duration in minutes, Oud-Mathenesse

The travel speed of e-bikes is assumed to be 12.04 km/h and of mopeds to be 18,72km/h (Arias-Molinares et al., 2021; Zhang et al., 2023). In Oud-Mathenesse (**Error! Reference source not found.**), the calculated average distance biked is approximately 4.5km whilst the mopeds reached 5.4km, however, for both transport services the results show that half of people travelled on average the same time, 16 minutes.

The result shows that there is a slightly greater variation of travel times and distance for bike users than for moped users.

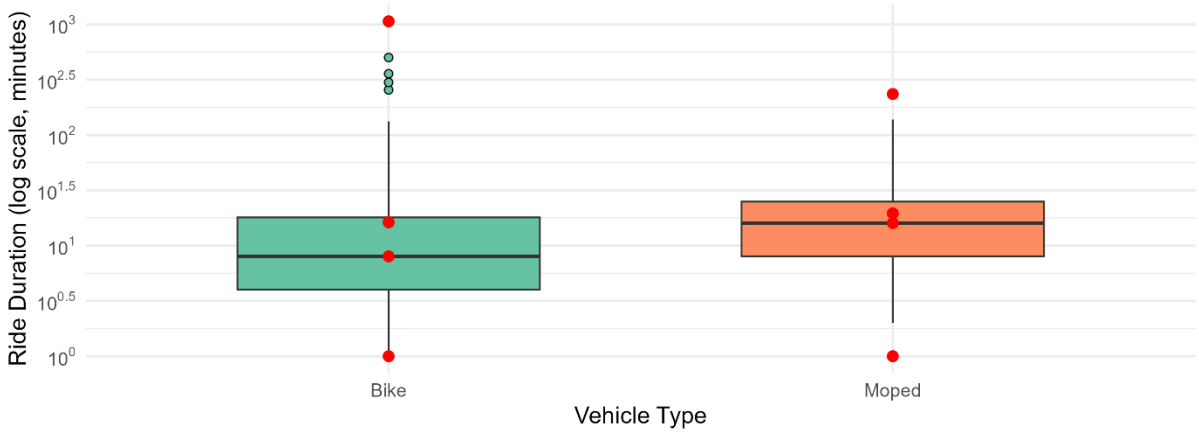


Figure 139: Distribution of ride duration in minutes, Het Lage Land & Oosterflank

The results of Het Lage Land & Oosterflank (**Error! Reference source not found.**) show that on average, people travelled approximately 3.2 from the intervention area by bike, and 6.1km using mopeds. At least half of the users travelled 1.6km by bike and 4.9km by moped. The variability on travelled distances between transport services is higher in this area compared to Oud-Mathenesse.

3.3.4. Conclusions

The inhabitants of Het Lage Land reported predominantly living with a partner without children, whereas nearly half of the respondents in Oud-Mathenesse indicated living alone. Additionally, there is a higher proportion of families and students residing in Het Lage Land, resulting in a more diverse demographic profile compared to Oud-Mathenesse. However, despite these differences, the survey reveals that the majority of respondents in both areas are familiar with the concept of mobility hubs. The findings further highlight that residents in both intervention areas generally hold a positive perception of shared mobility, with mopeds identified as the most preferred shared mobility service.

Public transport emerged as a popular mode for long-distance trips, followed by private car use in Het Lage Land and bicycle use in Oud-Mathenesse. Although most respondents hold a driving licence, the use of private vehicles is notably lower in Oud-Mathenesse. Despite this reduced use, respondents in both areas perceive the car as a cost-effective means of transport and do not typically rely on shared mobility services for short trips.

Increasing the likelihood of residents adopting shared mobility for short-distance trips would require interventions that extend beyond simple awareness campaigns. Moreover, commuting and leisure trips present the greatest potential for modal shift. However, the underlying motivations for modal choice differ between these purposes: commuting, as a routine activity, requires individuals to perceive shared mobility systems as reliable, whereas individuals tend to exhibit more flexibility when choosing transport modes for leisure activities.

The Kraaienstraat hub in Oud-Mathenesse appears to show greater potential for attracting users, as a higher number of people live within 300 metres of the hub and fall within the 25–45 age group (Table *11*), which is typically associated with higher shared mobility adoption. Nevertheless, although Oud-Mathenesse is a high-density area, it is important to consider additional factors such as income levels and land use, as both significantly influence transport choices. For example, the presence of shopping centres and a metro station in Het Lage Land could positively affect the uptake of shared mobility, generating more trips from this area. Similarly, the presence of residents with higher levels of education in Het Lage Land may also support greater use of shared mobility hubs, as higher education levels are often correlated with higher income and greater openness to new mobility options (Bosehans et al., 2021).

4. Economic theme

Analysis of the cost models

Through discussions and analysis of the TCO, it became evident that the organisation of the hub services, the types of facilities provided, and the state of affairs between the SM providers and stakeholders significantly impacted the costs deemed necessary to establish the pilots. In other words, the costs considered to make the hub operational varied considerably depending on the level of involvement of the stakeholders and the maturity of the relationship with providers.

Moreover, differences in cost models revealed that the overarching objectives of the hub, such as promoting inclusivity for low-income citizens, encouraging the adoption of shared mobility (SM), or advancing sustainable mobility, did not directly influence the operational costs of the hub.

The first step in conducting a cost comparison is to classify each pilot according to its typology. This categorisation is based on the pilot deployment reports (deliverable 5, WP1) drafted by Leuven, Tønsberg and Rotterdam, which provide detailed information on the transport modes and objectives of each pilot. Additionally, formal and informal discussions were conducted with key stakeholders to better understand the hubs' organisation.

As outlined in section 1, the three pilots in Leuven are primarily aimed at providing shared mobility solutions for low-income citizens. The hubs offer the same services and transport modes. Their implementation is carried out in close collaboration with the community centres in each neighbourhood. Table *12* summarises the characteristics of the three pilot hubs in Leuven.

Table 12: Summary characteristics and typologies of the hubs in Leuven

City	Hub name	Transport modes	Services	Scale	Complexity	Location	Typology
Leuven							
	Mannenstraat	Car-shared, cargo-bike, e-bikes, bikes	Parcel pick up, parking space, meeting point, community centre	Local	Medium: car sharing and non-mobility services	Neighbourhood	Neighbourhood
	Sint-Maartensdal	Car-shared, cargo-bike, e-bikes, bikes	Parcel pick up, parking space, meeting point, community centre	Local	Medium: car sharing and non-mobility services	Neighbourhood	Neighbourhood
	Casablanca	Car-shared, cargo-bike, e-bikes, bikes	Parcel pick up, parking space, meeting point, community centre	Local	Medium: car sharing and non-mobility services	Neighbourhood	Neighbourhood

The three hubs in Tønsberg offer different services and facilities. Additionally, one of the hubs is situated next to the main train station, providing interregional connectivity. As outlined in Section 1, the primary objective of the pilots is to reduce commuter trips made by private vehicles. A detailed description of the physical locations can be found in section 1.5. The design of the hubs also varies, as each pilot occupies more or less space depending on the services available. A summary of the hubs' characteristics is detailed in Table *13*.

Table 13: Summary characteristics and typologies of the hubs in Tønsberg

City	Hub name	Transport modes	Services	Scale	Complexity	Location	Typology
Tønsberg	Central station	Train, car-shared, e-scooter, taxi	Car parking, bike repair, bike hire, bike parking, parcel pick-up, information, meeting point, benches	Regional	High: regional trains	Rail network	City district
	Kaldnes	Car-shared, e-scooter	Bike parking, parcel pick-up, meeting point, benches	Local	Medium: car sharing and non-mobility services	Neighbourhood	Neighbourhood
	St Olavsgate	Car-shared, e-scooter	Meeting point	Local	Low: car sharing	Neighbourhood	Neighbourhood

Similar to the case of Leuven, the five pilot projects in Rotterdam incorporate the same transport modes. However, in this instance, all modes are two-wheelers (see Table *1*). The hubs are designed to raise awareness of shared mobility among local residents and potentially reduce car usage. Part of the pilot is experimenting with a mobility budget for residents in those neighbourhoods that can be used through a MaaS application. The hubs allow the shared mobility operators to provide their vehicles close to the residents. Table *14* describes the components of the local hubs in Rotterdam.

Table 14 Summary characteristics and typologies of the hubs in Rotterdam

City	Hub name	Transport modes	Services	Scale	Complexity	Location	Typology
Rotterdam	Franselaan	Two-wheelers: cargo-bikes, e-bikes, mopeds	Meeting point, Parking space for all SM	Local	Low: only shared micromobility services	Neighbourhood	Community
	Jacob van Campenweg	Two-wheelers: cargo-bikes, e-bikes, mopeds	Meeting point, Parking space for all SM	Local	Low: only shared micromobility services	Neighbourhood	Community
	Kraaienstraat	Two-wheelers: cargo-bikes, e-bikes, mopeds	Meeting point, Parking space for all SM	Local	Low: only shared micromobility services	Neighbourhood	Community
	Oosterflank	Two-wheelers: cargo-bikes, e-bikes, mopeds	Meeting point, Parking space for all SM	Local	Low: only shared micromobility services	Neighbourhood	Community
	Prinsenlaan	Two-wheelers: cargo-bikes, e-bikes, mopeds	Meeting point, Parking space for all SM	Local	Low: only shared micromobility services	Neighbourhood	Community

The hubs are classified as shown in Figure *140*. The five pilot projects in Rotterdam are categorised as **low-complexity community hubs**. Community hubs typically lack direct public transport connections or services such as pick-up points. However, as indicated in the accessibility analysis (Section 3.3.2), some of Rotterdam's hubs are relatively close to public transport, such as bus or metro stations, e.g., Oosterflank

hub. The short distance to public transport (often less than 300 metres) could create synergies between the hub and nearby stops.

The Tønsberg hub in St. Olavsgate is of a similar scale to those in Rotterdam. However, the presence of shared cars, a direct connection to public transport, and an information point extends its potential catchment area, classifying it as a **low-complexity neighbourhood hub**.

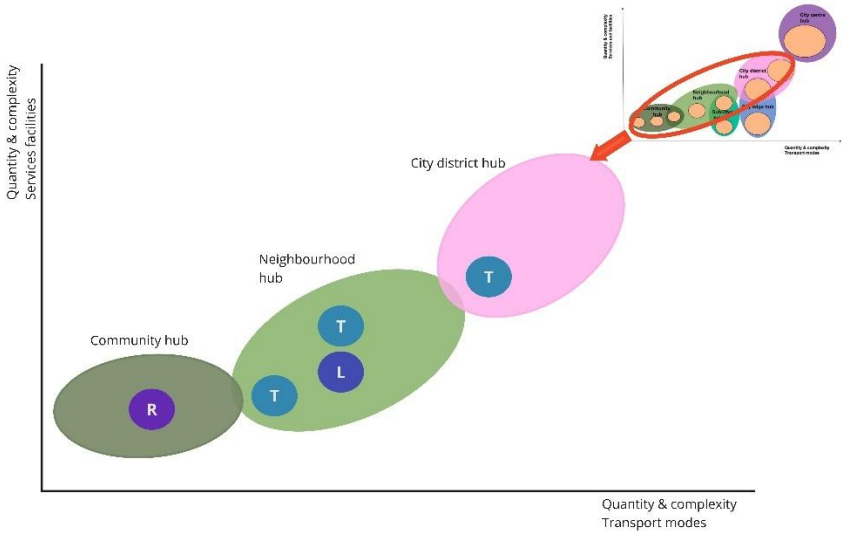


Figure 140: Classification of hubs (Weustenenk and Mingardo, 2023)

The three hubs in Leuven and the hub in Kaldnes (Tønsberg) are all classified as **medium-complexity neighbourhood hubs**. The distinction between **low- and medium-complexity neighbourhood hubs** is determined by the presence of non-mobility services, such as parcel pick-up points.

Both the Leuven and Kaldnes hubs occupy more space than community hubs and lower-tier neighbourhood hubs. However, the hub in Kaldnes includes additional facilities such as bike parking and benches, placing it at a slightly higher level of complexity compared to those in Leuven.

Finally, **the Central Station hub in Tønsberg** falls under the **city district** typology. City district hubs are typically situated in areas with a concentration of diverse functions, where parking availability is often limited.

The **Central Station hub** is located next to a car park and facilitates modal interchange between private vehicles, shared mobility, and public transport. The presence of information points and a bike repair shop enhances the hub's attractiveness and usability.

Its geographical location in a lower-density area adjacent to the city centre reinforces its role as an interregional node, enabling travellers to access the city via a range of alternative transport modes while leaving their cars in a convenient and accessible location.

Comparing cost components per typology

Based on interviews with the pilot cities' stakeholders, several cost components related to the implementation and management of the mobility hubs could be identified. These are related to i) the infrastructure required to accommodate the shared mobility services, ii) the infrastructure required to

accommodate non-mobility related services, iii) opportunity cost from loss of other income sources, iv) design and adaptation of public space required to accommodate shared and non-mobility related services, v) interaction and follow-up with shared mobility providers and vi) interaction and follow-up with providers of non-mobility service providers. These are elaborated in the below section for every pilot hub.

The hubs with the lowest complexity in terms of transport modes and services are the hubs in Rotterdam. The cost of managing the hub per month is relatively low compared to the rest of the pilots, given that the transport modes included, i.e., free-floating electric bicycles, mopeds, cargo bicycles, do not require infrastructure modifications for their deployment. The hubs include a sober wayfinding signage to indicate the location of the hub. Rotterdam designated shared mobility parking spaces using white tape, demonstrating that cities do not necessarily need a large budget to establish a hub. Instead, they require the ability to manoeuvre within the constraints of public space to allocate areas for shared mobility. Given that the expenses are limited to markers, wayfinding and a 5-year operational permit, this hub typology resulted in the most affordable among the pilots.

Increasing the complexity and quantity of transport modes to build a neighbourhood hub could lead to significant investments. Since neighbourhood hubs include a more complex set of transport modes, services and facilities, they require additional space. Comparing the cases of Rotterdam and St Olavsgate in Tønsberg, the increase in costs was primarily related to capital and administrative expenses incurred during the (re)design of public space and the infrastructure required to accommodate larger transport modes. The hubs in Tønsberg include dedicated parking spaces for car sharing, leading the city to repurpose the space and therefore, lose revenue from parking charges.

Beyond diversifying the transport modes, cities without availability of a standardised hub design – as in the Tønsberg case – might need to rely on third parties, i.e., consultancy services, to conduct research and provide designs that support the inclusion of the hub into the neighbourhood's built environment.

The type of agreement cities maintain with mobility providers, including expanding the number of vehicles available and developing software to operate the hub, can lead to extra costs. Expanding the vehicle fleet increases the complexity of the hub, and while operational software does not necessarily alter its typology, it does impact managerial costs. This was the case for St Olavsgate and for the pilots in Leuven. For the latter, the primary cost drivers were the inclusion of cargo bicycles and the expenses incurred from renting vehicles from providers to ensure their permanent availability for hub users.

Not every increase in the complexity of the transport modes, the services and facilities, changes the hub typology. Neighbourhood hubs share fundamental characteristics, such as offering services tailored to local needs. For example, both the Kaldnes hub in Tønsberg and the hubs in Leuven provide parcel pick-up services, however, Kaldnes also offers amenities such as benches and bicycle parking. Furthermore, the hub Kaldnes was designed by third parties, whereas the hubs in Leuven follow the Hoppinpunt guidelines[7]. Although these aspects do not directly influence the complexity of transport modes or services, they do increase the costs required to make the hubs operational.

Finally, the typology of City District hubs is typically located in areas where car parking is limited, thus they aim at offering options to residents in places with relatively constrained public space. The hub of Central

[7] The government of Flanders offer a series of guidelines for de design and governance of mobility hubs, or Hoppinpunten. For more information: www.vlaanderen.be/basisbereikbaarheid/combimobiliteit/hoppinpunten

Station in Tønsberg connects to an interregional train station, and offers a bicycle repair shop and a larger urban meeting area with benches, while also accommodating e-scooter and car sharing services. Establishing a higher-complexity hub in terms of both the quality and quantity of services required the city not only to develop a dedicated design but also to rearrange public space to accommodate the new amenities. Thus, the additional costs, compared to Kaldnes, were primarily related to the redevelopment of public space to accommodate shared mobility and bike-related services.

Governing the models of hubs

The costs associated with managing mobility hubs varied primarily based on three key factors:

- **The involvement of the city in the project:** includes the dynamics between public and private stakeholders, the city's role in management, funding, and operations.
- **The maturity of the concept**: such as the presence of pre-established design guidelines, collaboration between cities, citizen involvement, and the extent of shared mobility integration.
- **An established shared mobility network**: the relationships with mobility providers, parking and operational guidelines, and permit frameworks.

Each of these factors influenced the process of establishing mobility hubs in different cities, which, in turn, affected the final costs incurred for the pilots and the overall content of the TCO. Since the cities do not have the same level of involvement, maturity of concept and SM network, it is difficult to compare one-to-one the relationship between costs and complexity of hubs. Nonetheless, it is possible to create governance models based on the level of city involvement in the project.

The city as a manager

Cities incurred higher costs whenever they were responsible for overseeing the end-to-end implementation of a mobility hub. Before the hub becomes operational, cities may need to invest in concept design and procurement to prepare both the physical space and the political landscape.

Among the costs identified in this governance model is financial support for mobility providers to ensure their services are permanently available in the hub. Alternatively, cities may incur expenses by renting vehicles to place in the hub. The day-to-day operations of the hub include vehicle and public space maintenance, as well as status monitoring. When the city acts as manager, it is responsible for overseeing all tasks and allocating resources where possible. Ultimately, the responsibility for the success of the operation lies with the city.

In addition, cities with limited experience in managing and implementing shared mobility models (or mobility hubs), or those without established partnerships with experienced cities and regions, face additional costs. These often originate from the need to hire third parties for infrastructure and architectural design, as well as for large-scale marketing campaigns. Marketing campaigns, in particular, are important to ensure citizens engage with the hubs in their early stages. To make these campaigns effective, cities may need to collaborate with both traditional and online media channels. These can be considered initial dissemination costs that the city must take on.

Without an established network for shared mobility, including monitoring tools, the costs of creating mobility hubs can actually increase. For instance, the availability of traffic management tools and

performance monitoring systems for shared mobility, as well as operational guidelines for mobility providers, can contribute to higher upfront costs for pilot implementation.

The city as an intermediary

When a range of activities is managed jointly by the city and third parties, the costs incurred by the city to make hubs operational are somewhat reduced. This can be due to the presence of a pre-established set of guidelines for the operation of shared mobility vehicles, along with existing knowledge exchange systems with other regions and cities, which allow cities to benefit from shared expertise in implementing mobility hubs. With clear guidelines in place, cities can delegate responsibilities to the provider(s) involved in the hub, for example, managing vehicle operations, ensuring the correct use of public infrastructure.

Similarly, where there is an established relationship with shared mobility providers and a solid understanding of their services, cities can gain more leverage in negotiations. This can reduce the need for direct subsidies, particularly in cases where providers are able to incorporate the hub into their operations while maintaining a healthy business model.

If shared mobility is not entirely new to the region, there is a greater likelihood of higher adoption of the hub. A higher level of maturity in the concept also suggests that providers are more likely to be meeting financial targets, meaning that public funding may be less necessary.

When acting as an intermediary, the city shares responsibility with third parties for the day-to-day operation of the hub and can also draw on external sources of knowledge for its design, i.e. national blueprints for hubs. Marketing efforts in this case are more focused on encouraging the use of the hub itself, rather than shared mobility more broadly, which can reduce the costs associated with raising awareness.

The city as a facilitator

When there is an established relationship between public and private mobility stakeholders, along with clear operational permits and traffic regulations for shared vehicles, the city can reduce its level of involvement in mobility hubs. In such cases, the city's role is primarily to facilitate the conditions for providers to maintain their services within the hubs, for example, by creating regulatory frameworks that enable operability across the entire city.

The operation of the hub is largely the responsibility of the provider or a third party, depending on the complexity of the hub. In smaller, low-complexity hubs, e.g., community hubs, the vehicles on offer typically require minimal infrastructure, as is the case with free-floating shared bicycles, e-scooters or mopeds.

The city’s main responsibility is to define the areas where shared mobility services are permitted to operate. When pre-existing traffic regulations are in place, this does not result in significant additional costs for implementing the mobility hub. However, to ensure the correct use of vehicles, the city should have a mobility management tool in place to monitor the provider’s performance and, by extension, the hub’s effectiveness.

Collaborating with other cities that have a similar built environment, i.e., infrastructure, urban design, and transport modes, can also support the replication of best practices in hub layout, thus reducing implementation costs.

Conclusions

Cities with more experience in the management of shared mobility, traffic management tools, involved with other regions and cities with more advanced design guidelines of hubs would theoretically reduce the costs necessary to establish pilots, by delegating responsibilities to third parties without completely forgoing control over the operation of the hub. The city would have a higher managerial role that mainly focuses on guaranteeing that the steps to reach mobility goals are being taken.

As expected, the more complex a hub becomes in terms of services, facilities and transportation modes offered, together with the necessary adaptations to public space and infrastructure in order to accommodate all these facilities and mobility services, the higher the implementation and opportunity costs. However, if the city already has experience or has examples from other pilot areas in designing, developing and managing the procedure to install the hubs, the costs could be reduced.

5. Conclusions

This impact report aims to assess the effects of the ShareDiMobiHub pilots. The primary data sources are two surveys - ex-ante and ex-post - conducted at the pilot locations (only Leuven was able to conduct the ex-post survey). These surveys were designed to compare mobility behaviour before and after implementation and to derive insights into the pilots' impact. For Rotterdam and Leuven, the survey output was complemented with usage data from some of the shared mobility options. This allowed us to identify new generated trip patterns and additional trips being done by the shared mobility services provided at the pilots' locations.

The main conclusion is that while the pilots successfully raised awareness of mobility hubs (over 60% of respondents were familiar with the concept), their impact on increasing shared mobility uptake remained limited. Most users engaged with non-shared services such as bicycle parking, parcel lockers, and wayfinding information, rather than shared e-bikes, e-scooters, or car sharing options. This indicates that although mobility hubs provide value, the challenge lies in encouraging a shift from private vehicle use to shared mobility. However, we must note that changing people's travel behaviour is a long-term effort, and as such, it cannot be expected that a short-term pilot would induce a shift from traditional transportation options towards shared mobility alternatives. Therefore, the increased visibility and knowledge of mobility hubs due to the pilots can be seen as a first step towards inhabitants trying out these services and acknowledging their specific use cases. This is partly supported by the identified trip patterns from the Leuven pilots, where shared cargo bicycle trips primarily went to supermarkets as an ideal substitute for the carrying capacity for which a car is most often opted for (as the results from all pilots' surveys indicated).

Due to low adoption rates, the neighbourhood survey methodology was not ideal for capturing direct impacts on travel behaviour. While in some cases, sufficient respondents were reached to provide a representative sample of the neighbourhood, few were actual users of the shared mobility services. As a result, the surveys did not reflect significant shifts in mobility patterns, making it difficult to measure impacts on environmental pollution or accessibility. While actual usage data of shared mobility services could support such analysis, it lacks detailed insights into individual trips.

However, the surveys were valuable in identifying opportunities for shared mobility. Findings from all the pilots suggest that infrequent long-distance trips (e.g., visiting family) and short-distance shopping trips

could be replaced by shared mobility options such as car sharing and cargo bicycles. Yet, despite this potential, actual adoption of these services remained low. Additionally, existing infrastructure continues to reinforce car dependency, limiting the feasibility of shared mobility. Resultantly, for upscaling the use of shared mobility through mobility hubs, we emphasise the need for improved awareness, mobility hub integration, and allowing respondents to test out the offer. Concerning improved awareness, knowledge of the plans was rather low. Targeting users through community centres can work, however, we argue this should not be the only way, as only part of the population visits these locations. Rotterdam also allowed residents from the pilot areas to register and make free use of the shared mobility offer. This increased uptake of services during the pilot duration, but it is too soon to assess whether it will result in a long-term increase in uptake after the pilot ends. Concerning integration, the pilot in Tønsberg demonstrated the value of mixed services. In general, it seems vital to tailor hubs to local travel patterns and needs. Finally, merely providing an offer does not suffice to generate a mobility transition. In case cities want to improve the share of more sustainable transport modes, using a car for all kinds of trips should become less convenient, for example, by revisiting parking provision at origin and destinations. A variety of best practices and recommendations are formulated in the best practice report[8].

6. Reflections from pilot cities

As final part of the conclusion section, we have asked the pilot cities to reflect upon the results of their respective impact assessment, so that we could understand whether the results were (un)expected and how the insights would be used to further progress towards an increased awareness and uptake of shared mobility hubs.

Tønsberg

> "The findings align with our expectations. The analysis indicates a low number of users of the shared mobility services, which was expected given that our three pilot projects had only recently been launched at the time of the survey. The shared service offered was also limited, consisting solely of shared cars and electric scooters. Electric bicycles were introduced as part of the shared fleet in April 2025.
>
> The analysis highlights that in Tønsberg, there are several users of the bicycle parking, parcel lockers, and the furniture located near the mobility hubs. We incorporated this deliberately while developing the hubs, and this will be carried forward in the planning of additional hubs in Tønsberg and the region.
>
> Furthermore, the analysis points out that cars are widely used, even for short trips. This aligns with our previous transport analyses and is something Tønsberg Municipality and Vestfold County Council are actively working to change."

Rotterdam

> "The pilot in Rotterdam was fully completed in September 2025. We now have the main results, though some details are still being investigated. Nevertheless, we consider the pilot to have been a great success.

[8] WP 2, deliverable 13 – Best practices report

Across the city, there is an offer of shared bicycles, shared cargo bikes, and shared mopeds. In addition, a network of hubs has been rolled out to increase uptake and reduce nuisance. Shared mobility usage is highest in and around the city centre, while in certain outer neighbourhoods the use and supply are lower. In this pilot, we focused specifically on three outer neighbourhoods of Rotterdam: Oud-Mathenesse (including Witte Dorp), Oosterflank, and Het Lage Land. Before the pilot started, sufficient availability of shared bicycles, mopeds, and cargo bikes was ensured, and mobility hubs were placed in these neighbourhoods.

The pilot encouraged residents to try out shared mobility for the first time. Feedback from participants and other residents was largely positive. Awareness of shared mobility and mobility hubs also increased in the targeted neighbourhoods. Alongside awareness, actual usage went up as well. In these specific pilot neighbourhoods, more shared mobility trips were made during the pilot compared to the period before. Whether this effect will persist in the long term still needs to be seen from future usage data.

A pilot like this can be effectively carried out in collaboration with a MaaS provider, and such a partnership turned out to be very successful. Clear agreements made in advance ensured that we could access the data we needed and that all available shared two-wheelers in Rotterdam could be used via the app. It was also possible to send out surveys through the MaaS provider's app, in addition to the surveys we distributed in the neighbourhoods. Regarding communication, a letter to residents from the municipality proved to be the most effective approach, motivating the majority of participants to take part.

Some general findings that the municipality may want to act on: users often indicated that shared mobility is too expensive, and that better availability of vehicles could help increase use. Although we ensured more vehicles were available in the pilot areas, the supply did not match the supply levels seen in central Rotterdam.

In summary, the pilot helped to raise awareness of shared mobility. It also confirmed that neighbourhood mobility hubs are a valuable addition to the shared mobility offer. Users and residents were generally positive, although some reported experiencing nuisance related to shared mobility. Efforts are being made to address this issue, for example by implementing mobility hubs. Finally, the MaaS app proved to be an effective tool for providing free credits to residents to encourage shared mobility use."

Leuven

"In general, we would like to point out that generating survey responses is very difficult. Due to the small number of respondents, the conclusions drawn in this report should be treated with caution.

The socio-demographic results show that respondents tended to be residents of the wider neighbourhood. Although there were quite a few registrations from this group to participate in the project, the conversion rate to actual testing was low (1 in 4). The reasons for this low usage are unclear.

The core objective of this pilot was to gain insight into the barriers and motivators among vulnerable target groups. Based on the in-depth interviews conducted by Mobiel21 as part of this project, some interesting results have been obtained.

Regarding sustainability, however, there are a few surprises: the profile of the survey respondents does not correspond to that of visitors to the centres. In this sense, these findings complement the insights gained from interviews with first-line testers.

We had hoped that intentions to use shared mobility after the pilot would be greater than before, but this trend is not significant. However, this does correspond with the low usage figures: only a few people from the wider neighbourhood used the shared modes of transport.

It is good to read that there is a better understanding of what a mobility hub is, because that was one of the ambitions of this project.

Leuven will certainly continue to increase the number of mobility hubs and shared mobility options. The conclusions of this study will inform our decision-making and help shape our action plan. These are a few ideas for actions that support this:

- Following the bankruptcy of Cargoroo, Leuven will relaunch a cargo bike sharing system that will primarily focus on trips to the supermarket.
- Leuven will collaborate with the community work department to establish a suitable range of shared vehicles in close proximity to community centres.
- The focus on disseminating information and organising training sessions will continue so that more people become familiar with shared mobility and mobility hubs.”

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8. Appendix

(Ex-ante) Survey

Sustainability theme survey - Baseline

Start of Block: Introduction

Introduction
With this survey, we want to understand the use of shared mobility and public transport located in mobility hubs. Mobility hubs are locations where various transport means, such as public transport, shared bikes, e-bikes, scooters and shared cars, can be found.

Likewise, we want to find out if the presence of mobility hubs affects the modal choice of citizens. The modal choice is the process of choosing a transport mean to travel to any activity, for example work, go to the movies, or visit somebody.

End of Block: Introduction

Start of Block: Transport ownership

Ownership **In this section, we want to know which transport means you own, which ones you have memberships and which others you pay-as-needed**

1.1 Which of the following means of transport do you own? (mark all that correspond)

- ☐ **Bicycle**
- ☐ **Electric bicycle**
- ☐ **Electric scooter**
- ☐ **Moped**
- ☐ **Scooter**
- ☐ **Cargobicycle**
- ☐ **Private car**

1.1.1 How many cars does your household own or are available?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 3+

1.2 Which of the following shared transport services are you a member of and according to what formula? (tick everything that matches)

	Monthly/yearly subscription	Transport pass for a (limited) number of journeys	Pay per ride	I'm not a user
Shared bike	☐	☐	☐	☐
Electric shared bike	☐	☐	☐	☐
Shared cargo bike	☐	☐	☐	☐
Shared car	☐	☐	☐	☐

1.3 Do you have a public transport subscription (train/bus)?

- ☐ Yes, I have a monthly/yearly subscription
- ☐ Yes, I have a transport pass with a limited number of journeys
- ☐ No, I pay per ride
- ☐ No, I don't use public transport

End of Block: Ownership of means of transport

Start of Block: Knowledge of mobility hubs

Intro - knowledge **2. Knowledge of mobility hubs In this section, we want to know how familiar you are with the concept of mobility hubs and how to use them.**

2.1 Do you know what mobility hubs (hoppin points) are?

- ○ Yes
- ○ No

2.1.1 Mobility hubs are places where you can find, reserve and return various means of transport, e.g. public transport, shared cars and shared (cargo) bicycles

2.1.2 Are there mobility hubs (Hoppin points) around destinations you (occasionally) go to? For example, when you are going to visit family, when you do a leisure activity or when you go to school/work.

- ○ Yes
- ○ No

2.1.1.1 Do you use mobility hubs (Hoppin points)?

- ○ Yes
- ○ No

2.1.1.1.1 Are you planning to use mobility hubs?

- ○ Yes
- ○ No

2.1.1.1.2 Which means of transport do you use from the mobility hub (choose all the means of transport that match):

- ☐ Shared bike
- ☐ Electric shared bike
- ☐ Shared cargo bike
- ☐ Shared car
- ☐ Bus

2.2 Have you already used shared mobility in Leuven this year, whether or not from a mobility hub/Hoppin point?

- ○ Yes
- ○ No

2.2.1 Which shared vehicles have you already used in Leuven?

- ☐ Shared bike
- ☐ Shared cargo bike
- ☐ Shared car

2.2.2 How has the use of your own means of transport changed since the use of the shared bike

	I use this vehicle much less	I use this vehicle less	No change	I use this vehicle more	I use this vehicle a lot more
Bicycle	○	○	○	○	○
Electric bike	○	○	○	○	○
Electric scooter	○	○	○	○	○
Moped	○	○	○	○	○
Cargo bike	○	○	○	○	○
Private car	○	○	○	○	○
Public transport	○	○	○	○	○

2.2.3 How has the use of your own means of transport changed since the use of the shared cargo bike

	I use this vehicle much less	I use this vehicle less	No change	I use this vehicle more	I use this vehicle a lot more
Bicycle	○	○	○	○	○
Electric bike	○	○	○	○	○
Electric scooter	○	○	○	○	○
Moped	○	○	○	○	○
Cargo bike	○	○	○	○	○
Private car	○	○	○	○	○
Public transport	○	○	○	○	○

2.2.4 How has the use of your own means of transport changed since using the shared car

	I use this vehicle much less	I use this vehicle less	No change	I use this vehicle more	I use this vehicle a lot more
Bicycle	○	○	○	○	○
Electric bike	○	○	○	○	○
Electric scooter	○	○	○	○	○
Moped	○	○	○	○	○
Cargo bike	○	○	○	○	○
Private car	○	○	○	○	○
Public transport	○	○	○	○	○

End of Block: Knowledge of mobility hubs

Start of Block: Demographics - Part 1

3. Demographic data In this section, we ask you a number of questions about your current situation

3.1 Do you have a driver's license?

- ○ Yes
- ○ No

3.2 Which of the options following best describes your living situation, only one answer is possible

- ○ I live alone
- ○ I live with my parents
- ○ I live with my partner, and have no child(ren)
- ○ I live with my partner and child(ren)
- ○ I live with my children, but without a partner
- ○ I live with one or more people outside my family circle
- ○ I live in a student house
- ○ Other, namely _____

3.3 What is your professional category?

- ○ Student
- ○ Working (full-time)
- ○ Working (part-time)
- ○ Volunteer
- ○ Job seeker
- ○ Unemployed
- ○ Retired
- ○ Other, namely _____

3.3.1 Do you take into account transport to the place of application before applying?

- ○ Yes
- ○ No

3.3.2 Are you able to ride a bike?

- ○ Yes
- ○ No

End of Block: Demographics - Part 1

Start of Block: Trip length and choice of transport

4. Travel distance and choice of transport In the next section, we will ask you about travel distance, your preferred mode of transport and how often you go to certain activities.

4.1 How many times do you make a trip to do the following activities?

	More than five times a week	Three to five times a week	Once or twice a week	Monthly	Less than monthly	Never
Visiting family	○	○	○	○	○	○
Leisure - e.g.: cinema, bar, shopping, museum	○	○	○	○	○	○
To school/university	○	○	○	○	○	○
Taking my children to school	○	○	○	○	○	○
Going to the supermarket	○	○	○	○	○	○
Commuting from/to work	○	○	○	○	○	○
Visiting a client	○	○	○	○	○	○

4.2 What mode of transportation **did you use last time** you went to the activities below?

	On foot	car	Public transport	bike	scooter	moped	Shared bike	El. shared bike	Shared cargo bike	Shared car	Not applicable

Visiting family	c	○
Leisure - e.g.: cinema, bar, shopping	c	○
To school/university	c	○
Taking my children to school	c	○
Going to the supermarket	c	○
Commuting from/to work	c	○
Visiting a client	c	○

4.3 The **last time** I did this activity, I moved around:

	More than 10km from my starting point	5km to 10km	3km to 5km	Less than 3km	Not applicable
Visiting family	○	○	○	○	○
Leisure - e.g.: cinema, bar, shopping	○	○	○	○	○
To school/university	○	○	○	○	○
Taking my children to school	○	○	○	○	○
Going to the supermarket	○	○	○	○	○
Commuting from/to work	○	○	○	○	○
Visiting a client	○	○	○	○	○

End of Block: Trip length and choice of transport

Start of Block: Dependencies and barriers

5. Barriers to using shared mobility In the section below, we ask to rate statements (agree-disagree) about possible barriers for different mobility services and vehicles.

- **Questions for car owners** Which of the following descriptions best suits your current situation:

5.1 My car is the most cost-effective way to do all my trips

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.2 My car is the fastest way to make all my trips

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.3 I mainly use my car to cover short distances

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.4 I can park my car close enough to do all my trips with it.

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.5 Using my car is easier than registering for and using shared mobility and public transport

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.6 At the moment I am actively looking for alternatives for my car

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

Questions about public transport Which of the following descriptions best suits your current situation:

5.7 Public transport is the most cost-effective way to make all my journeys

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.8 Public transport is the fastest way to get around

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.9 I mainly use public transport to cover short distances

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.10 I am concerned about my safety near public transport stops.

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.11 I can reach almost all my destinations via the nearby public transport stops

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.12 I think that the current signage and digital information boards in stations and at stops are good enough to make it easy to understand and use the public transport network

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

5.13 I plan to use public transport more in the near future

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

- **Questions about shared mobility**

There is an option 'not applicable' if you have no (explicit) opinion/experience about a statement.

5.14 Shared mobility is the most cost-effective way to make all my journeys

	Totally agree	Agree	Neither agree nor disagree	Disagreeing	Strongly disagree	Not applicable
Shared bicycles	○	○	○	○	○	○
Electric shared bike	○	○	○	○	○	○
Shared cargo bikes	○	○	○	○	○	○
Shared car	○	○	○	○	○	○

5.15 Shared mobility is the fastest way to make most of my trips

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree
- Not applicable

5.16 I mainly use shared mobility to cover short distances

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree
- Not applicable

5.17 I don't feel comfortable in the places where I can lend or return the shared vehicle

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree
- Not applicable

5.18 The current road infrastructure is good enough to be able to drive safely with a shared vehicle

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree
- Not applicable

5.19 I can find enough shared vehicles nearby to make all my trips

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree
- Not applicable

5.20 I find it easy to find a shared vehicle, book it and then go there

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree
- Not applicable

5.21 I plan to increase the use of shared mobility in the near future

- Totally agree
- Agree
- Neither agree nor disagree
- Disagreeing
- Strongly disagree

End of Block: Dependencies and barriers

Start of Block: Demographics – part 2

6. Personal Information

6.1 What is your age?

- 18 to 25
- 26 to 35
- 36 to 45
- 46 to 60
- 60+

6.2 What gender do you identify with the most?

- Female
- Male
- Non-binary
- I'd rather not answer

6.3 What is your highest level of education?

- Primary education
- Secondary education
- Professional bachelor (college)
- Academic bachelor (university)
- Master and higher
- I'd rather not answer

6.4 How many times a week do you work from home?

- My current job does not allow me to work from home
- Never
- Less than once a week
- 1 to 2 times a week
- 3 to 4 times a week
- Daily

6.5 What is the financial situation of your family?

- Very comfortable
- Comfortable
- Rather comfortable
- Rather difficult
- Difficult
- I'd rather not answer

6.6 What is your postcode?

_____

6.7 Do you have a migration background? *You have a migration background if one or both of your parents were born abroad.*

- Yes
- No
- I'd rather not answer

The ShareDiMobiHub Consortium

The consortium of ShareDiMobiHub consists of 13 partners and 4 subpartners with multidisciplinary and complementary competencies. This includes European cities and regions, universities, network partners and transport operators.

For further information please visit https://www.interregnorthsea.eu/sharedimobihub