Mobility transition in The Hague

Exploring mobility hubs as a solution for the mobility challenges

CTB3000 – Bachelor End Project

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by

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Preface

This report presents the results of my Bachelor of Science thesis project in Civil Engineering, in the track Transport and Planning. The scope of this project was on mobility hubs and their potential role in supporting The Hague's ambition to reduce car movements. I chose this topic because of my growing interest in shared mobility systems and their place in sustainable urban development.

In this thesis, I conducted a policy analysis, a study on mobility hubs with a case study on the Shell Mobility Hub Q-Park in particular, and a survey among residents of The Hague to better understand how mobility hubs are planned and how they are perceived by the public. This thesis combines both theoretical frameworks and real-world data to explore how such hubs can be effectively implemented and used.
I would like to thank my supervisors, Srinath Mahesh and Yufei Yuan, for their valuable guidance and feedback throughout the project. I also want to thank Theo Thuis and Diede Labots from Q-Park and the municipality of The Hague for their kind cooperation and for providing the data and insights that were essential to this research.

Lars Keser
Delft, June 2025

Summary

This research explores the extent to which mobility centers can contribute to the reduction of car movements in The Hague, according to the city's Mobility Transition Strategy 2022–2040 and the Network Strategy 2040. To create a sustainable and space-efficient city, the municipality considers mobility hubs a key instrument. These are locations that support modal shifts by offering various transport options, often including shared mobility. The goal of this study is to assess both the policy framework and public perception of mobility hubs in The Hague and to evaluate whether they can effectively support the mobility transition of the city.

The methodology of this research consists of three main components: (1) a review of the literature on municipal mobility policies, (2) a study on mobility centers with a particular case study of the Shell Mobility Hub Q-Park located in the city center, and (3) a survey conducted among 120 residents and workers in The Hague, assessing their awareness of, willingness to use, and preferences regarding mobility centers. The survey focused on four key travel-related factors: travel cost, travel time, walking distance, and transfer time. In addition, participants were asked to rank the most important features for a successful hub.

The results reveal that only 35% of the respondents were familiar with the concept of a mobility hub. Walking distance (37.8%) and travel time (37.4%) emerged as the most common barriers to usage, while travel cost (31.0%) and transfer time (23.8%) were less decisive. Respondents rated accessibility, vehicle availability, and ease of use as the most important features of a hub. Age differences were evident: younger participants prioritized affordability and convenience, while older participants valued comfort and safety more. Spatial variation also played a role: districts such as Haagse Hout showed relatively low levels of resistance, making them promising locations for pilot implementations.

In conclusion, mobility hubs align well with The Hague's policy goals, but their success depends on public awareness and user-centered design. To increase acceptance and implementation of mobility hubs, the study recommends targeted communication efforts, design hubs based on user preferences, and prioritizing implementation in districts where survey results show lower resistance and higher willingness to use hubs. If these conditions come together, mobility hubs can serve as a scalable and inclusive mobility solution that supports The Hague's transition toward a more sustainable and livable urban future.

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1
Introduction

The Hague is growing. In 15 years, it is expected that the city's number of residents will rise with 100,000 [2]. Next to this, the municipality expects a city rise of 50,000 houses and 48,000 jobs in 2040. This means that the number of travelers into or from the city will rise as well. Without any action from the municipality's side, the number of movements will increase with 21%. Mainly, the car movements will increase. Namely, with 80,000 extra daily car movements [3]. While it may seem logical that the roads are becoming busier, this actually conflicts with the municipality's Mobility Transition Strategy 2022 - 2040 [4], which they have published. These concrete plans include, among other things, a less car movement policy. The Hague is on the verge of facing a major challenge: balancing its increasing number of travelers in the city with its ambitions to create this less car movement policy.

One possible solution that helps achieving these goals is the development of mobility hubs. A mobility hub is a location where various forms of transport, such as public transport, shared bikes, scooters, and cars, are brought together to facilitate easy transfers. These hubs are designed to encourage multimodal travel and reduce the need for private car use in and around the city [5]. In The Hague, Q-Park has become a key player in the development of mobility hubs. The company, in collaboration with Shell, has already a city mobility hub opened in 2023 in the city center and this hub is called Shell Mobility Hub Q-Park The Hague. This hub represents one of the first practical implementations of the city's car movement-reduction ambitions [6].

1.1 Research goal

In cities like The Hague, where policies increasingly aim to reduce car usage and promote alternative transportation while dealing with major urban growth, mobility hubs are becoming a key part of urban planning. These hubs bring together different transport options, such as public transport, shared bikes, scooters, and cars, and these hubs function as a location for people to switch between them [5]. Because of this, mobility hubs are seen as one of the most promising tools to reduce car dependency in a practical and scalable way. However, the success of mobility hubs does not only depend on their design or location, but also on how residents and commuters experience and accept these changes. This research aims to explore both the policy context and the public perception of mobility hubs in The Hague, to understand whether they can truly contribute to the city's ambition to reduce car movements and support a sustainable mobility transition.

1.2 Research questions

What is the current and future role of mobility hubs within the decreasing car movement policy that The Hague aims to implement, and how are mobility hubs perceived by residents?

This main research question explores two sides of the story. First, the ruling party: mainly the municipality of The Hague. They are facing a huge challenge, solving increasing city traffic, while implementing for a less car movement policy. What is this policy exactly and why is this implementation necessary? On the other hand, this research will investigate whether a mobility hub can be a potential problem-solver or not. Which requirements do key investors have for placing mobility hubs and more important: to what extent will passengers make use of these mobility hubs and the associated shared mobility?

To investigate how these two sides influence this mobility challenge in practice, the research is guided by a few sub-questions.

1. How is the ambition to decrease car movement reflected in current urban policies and developments in The Hague?
2. What role does the Shell Mobility Hub Q-Park The Hague currently play in the city's mobility strategy?
3. What do residents know about mobility hubs, and how do they perceive their potential or relevance in daily life?
4. To what extent can mobility hubs play a greater role in addressing future mobility challenges in The Hague, considering public support, space, and policy ambitions?

1.3 Research approach

To formulate a complete answer to the main research question, a well-structured strategy has been developed. Each subquestion is designed to address a specific aspect of the overarching research. Therefore the main research question will be separated in three pieces to be answered:

What is the current and future role of mobility hubs within the decreasing car movement policy that The Hague aims to implement, and how are mobility hubs perceived by residents?

1. The decreasing car movement policy of The Hague;
2. The current and future role of mobility hubs;
3. Resident perception of mobility hubs.

The three components are each linked to one or more subquestions, and each is approached using an appropriate research method. The structure is as follows:

1. The decreasing car movement policy of The Hague
This part of the research is covered by subquestion 1, which is answered through a literature review of municipal strategies and planning frameworks. It examines how the ambition to reduce car usage is reflected in existing urban mobility policy, and how mobility hubs are incorporated in these plans.

2. The current and future role of mobility hubs
This component is addressed through subquestion 2, which investigates the Shell Mobility Hub Q-Park in the city center of The Hague as main reference for sketching the current role of mobility hubs. A study is conducted based on relevant literature, obtained data from the municipality, supplemented where possible by stakeholder interviews (e.g. with Q-Park). Additionally, subquestion 4 helps assess the broader potential of mobility hubs in future mobility planning.

3. Resident perception of mobility hubs
This topic is explored in subquestions 3 and 4. A survey among residents and workers in The Hague examines awareness, willingness to use shared mobility, and preferences regarding conditions such as cost, walking distance and transfer time. These groups were chosen because their travel choices have a big impact on daily traffic in the city, and their support is important for the success of new mobility solutions. These insights are complemented by findings from the case study to evaluate whether public support is sufficient for future expansion of mobility hubs.

To provide a clear overview, Table 1.1 summarizes the relation between the research components, subquestions, and the methods applied.

Table 1.1: Overview of main research components, subquestions and methods

Research Component	**SQ**	**Method**
Decreasing car movement policy	SQ1	Literature review of municipal policies and planning documents
Current and future role of mobility hubs	SQ2, SQ4	Case study of Shell Mobility Hub, stakeholder interviews, combined analysis
Resident perception of mobility hubs	SQ3, SQ4	Survey on awareness and willingness, integrated with policy and spatial considerations

1.4 Stakeholders

In such large challenges as this mobility challenge in a major city as The Hague, lot of different stakeholders are involved. Below, the main stakeholders are named and its power and interest is described and illustrated in a PowerInterest-grid.

1. The municipality of The Hague has a major role in this mobility transition. They are policy-maker, ultimate responsible and implementer of the car movement reduction and mobility transition strategy.

- ☐ **Power:** High. Directing policies and arranging funding and strategies.
- ☐ **Interest:** High. Directly responsible for sustainable urban mobility goals.

2. Q-Park (Shell and other investors in mobility hubs) are operators in mobility hubs. They are designing the mobility hubs.

- ☐ **Power:** Medium - High. Key-player in implementation and innovation of mobility hubs.
- ☐ **Interest:** High. Financial interest in success of hubs as they function as commercial parties.

3. Residents are end-users of shared mobility services, which use is affected by accessibility and infrastructure changes.

- ☐ **Power:** Low - Medium. Might influence political decisions by support or resistance.
- ☐ **Interest:** High. They are the users of daily mobility, parking and traveling.

4. Extern workers or visitors use hubs for multimodal travel to/from The Hague.

- ☐ **Power:** Low. Not directly involved in decision-making.
- ☐ **Interest:** Medium. They will benefit from improved access and services.

5. Shared mobility providers (e.g. Felyx, Check, Greenwheels) are providing shared bikes, scooters and cars available at hubs.

- ☐ **Power:** Medium. Their influence is growing but still partnership dependent.
- ☐ **Interest:** High. These companies are eager on integration in hubs.

6. Public transport operators are operating buses, trams and trains which might connect to mobility hubs.

- ☐ **Power:** Medium. They control a important part of the transport.
- ☐ **Interest:** Medium - High. The increasing use of mobility hubs can improve or make worse the number of travelers of public transport, depending of public transport is connecting well to mobility hubs.

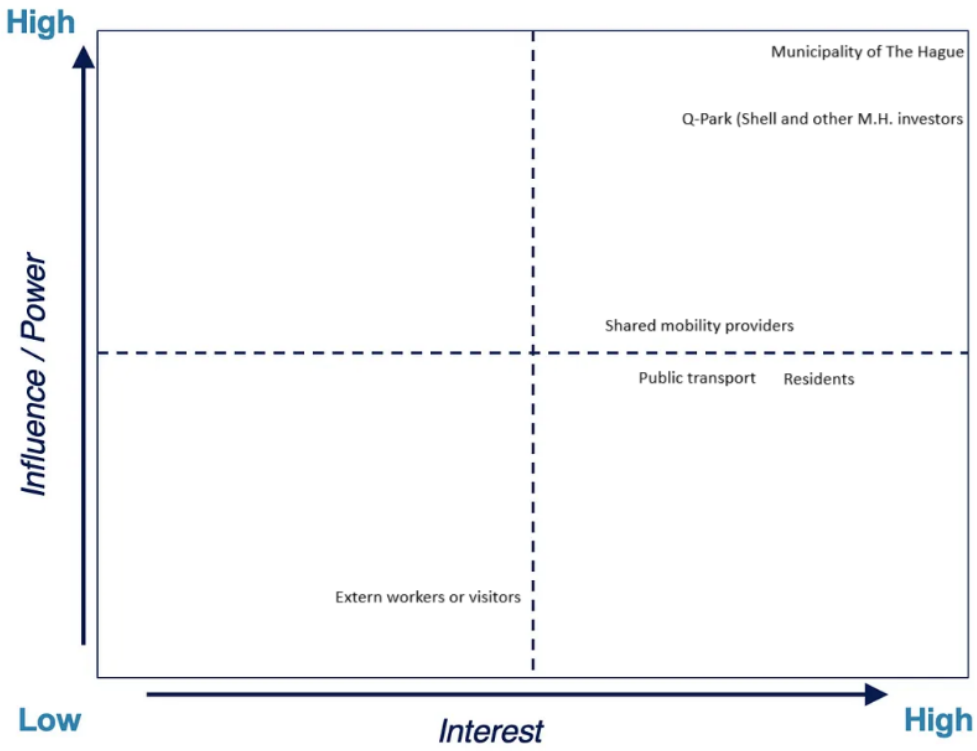


Figure 1.1: PI-grid (own design, framework from [7]).

1.5 Relevance

1.5.1 Social relevance

The Hague facing this rapid growth creates pressure on the city's transport infrastructure and the sustainable ambition of the municipality of The Hague. Mobility hubs, strategically located points integration multi-transport modes such as shared bikes, scooters and car, are key plans in the city's Strategy for Mobility Transition 2022 - 2040 to face this huge challenge. By facilitating multi-modal travel and reducing dependency on private vehicle, these hubs are created to increase the city's livability. This research is socially relevant as it examines how mobility hubs can support The Hague's goals of maintaining accessibility and quality of life, despite major urban growth.

1.5.2 Scientific relevance

Although the concept of mobility hubs has been explored in multiple international studies, much of the existing research focuses on technical design, operational performance, or large metropolitan areas. There remains a lack of context-specific research that investigates how mobility hubs are perceived and used by residents, particularly in medium-sized Dutch cities such as The Hague. Little is known about how local policy frameworks and user behavior interact in such settings.

This study contributes to that gap by focusing on The Hague's implementation of mobility hubs within its mobility transition strategy. By integrating policy analysis, a case study, and a user survey, the research provides insights into both institutional intentions and public response, offering a more complete understanding of the effectiveness and acceptance of mobility hubs in a real-world context.

1.6 Thesis outline

This thesis is structured as follows. Chapter 2 presents a literature review of The Hague's mobility policies and introduces the concept of mobility hubs, including reference projects from other cities. Chapter 3 outlines the methodology, including the design of the survey and an explanation of the analysis which will be done. Chapter 4 presents the results of the survey and analysis will be performed. Chapter 5 discusses these findings in order to answer the research questions. Finally, Chapter 6 provides conclusions and recommendations for future mobility hub development in The Hague.

2
Literature study

In this chapter, the first two sub-questions will be answered through a literature study. This is done by providing background information on The Hague's mobility policies and strategies, which directly relates to sub-question one. To answer the second sub-question, relevant literature and documents are reviewed concerning the concept of mobility hubs and the role of Q-Park, with a specific focus on the Shell Mobility Hub located in the city center.

2.1 The Hague's current mobility strategy

Due to the increasing number of people living, working, and visiting The Hague, there is a growth in road traffic within the city and this is negatively affecting people's mobility [8]. To face this challenge, the municipality has developed long-term strategies such as the *Mobility Transition Strategy 2022–2040* [4] and the *Networkstrategy 2040* [3]. These plans are made to handle the city's growth and to encourage people to travel in ways that use less space and are better for the environment.

2.1.1 Mobility Transition Strategy 2022–2040

While it may seem logical that the roads are becoming busier due to city growth, this actually conflicts with the municipality's Mobility Transition Strategy 2022–2040, which they have recently published. The city of The Hague has the following policy frameworks and preconditions which it wants to work out in the next years [9].

- ☐ The city center's car movement is decreasing;
- ☐ Visitors should park as much as possible in parking garages;
- ☐ Supply of shared vehicles is shifting from free-floating to 'back to many';
- ☐ Free-floating shared cars are not allowed to leave on the street in the city center;
- ☐ The Hague welcomes the realization of charging facilities on private property;
- ☐ Through the development of logistics hubs, the number of delivery and freight trips in The Hague can be significantly reduced.

These bullet points support the municipality's goals described in The Mobility Transition Strategy and emphasize that a new approach to mobility is necessary to keep passenger travel fluent. The municipality's ambition is to become a compact city that prioritizes walking and cycling. Conclusion of this all is the city's goal of decreasing car movement in the city. Mentioning these ambitions is one thing, but achieving them is not easy. That is why the municipality set up the Networkstrategy 2040, to concretize these ambitions.

2.1.2 Networkstrategy 2040

To respond to the city's rapid growth, a concrete and integrated mobility plan is required. That is why the municipality of The Hague published the *Networkstrategy 2040* [3]. This strategy outlines how the city plans to improve mobility while avoiding a proportional increase in the space used for traffic.

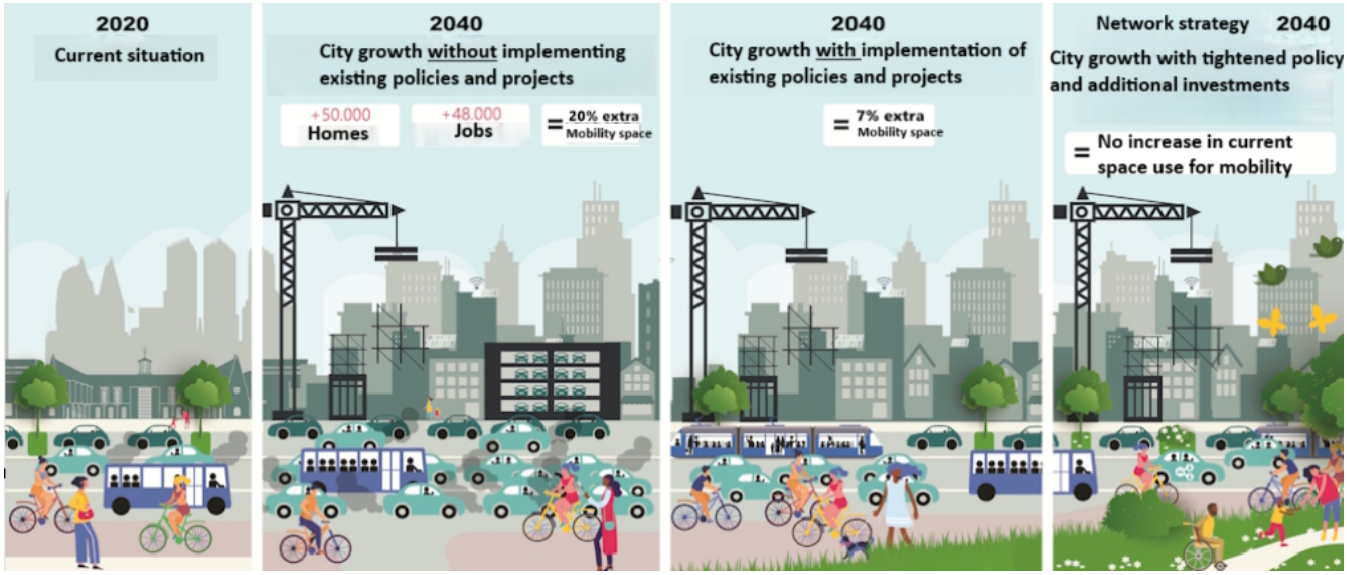


Figure 2.1: Development of mobility in different scenarios [2].

Figure 2.1 illustrates four future mobility scenarios for The Hague between 2020 and 2040. The first panel shows the current situation in 2020. The second panel projects the consequences of urban growth without implementing existing policies, resulting in 50,000 extra homes, 48,000 additional jobs, and 20% more space required for mobility. The third panel shows the same urban growth but assumes implementation of existing mobility policies, reducing the required increase in mobility space to just 7%. The final panel reflects the full implementation of the Networkstrategy 2040, where proactive policies and targeted investments make it possible to accommodate growth without any increase in mobility space. This progression clearly demonstrates the importance of strategic planning to avoid rising congestion and inefficient land use.

The most relevant choices and solutions from the Networkstrategy 2040 are:

- ☐ **More space for walking:** Expansion of 30 km/h zones and walking areas will increase the accessibility for walking travelers. The walking areas will contain improved walking routes to important spots in the city.
- ☐ **More space for cyclists:** Implementation of the *Ruim baan voor de fiets** program, development of fast and comfortable cycling routes, and expanded bike parking near stations.
- ☐ **Public transport improvements:** Strengthening of the core network and regional connections, including new corridors (e.g., Koningscorridor) and enhancements to tram line 9.
- ☐ **Mobility hubs:** Development of hubs to encourage modal shifts and reduce traffic, supported by clustered and indoor parking, P+R facilities, and bike parking at major stops.

- **Lower speeds, fewer accidents:** Ambition to convert half of all 50 km/h roads to 30 km/h by 2040 to improve traffic safety.
- **Robust road network:** Maintenance of an efficient car network for long-distance travel, with potential tunnel projects and a focus on emergency access.
- **Supplementary policies:** Measures such as tighter parking regulations and incentives for walking, cycling, public transport, and shared mobility to improve urban growth sustainably.

**Ruim baan voor de fiets* [10] is a program implemented by the municipality of The Hague, which states that by 2040 cycling will be the main mode of transport in the city, as part of the broader Network Strategy 2040. This ambition is based on the fact that cycling is healthy, accessible, and sustainable. The municipality is focusing on creating a network of fast, comfortable, and safe cycling routes both within the city and in the wider region, designing high-quality bicycle parking facilities at important locations such as stations, city centers, and residential neighborhoods. Safety is a key priority, and an important aspect is recognizing that traffic safety is a shared responsibility. Additionally, The Hague develops policies to encourage more people to cycle, especially targeting groups for whom cycling is currently less obvious as a transport choice.

The Networkstrategy 2040 is built around six main policy goals, which reflect how the strategy will contribute to a future-proof urban mobility system:

- **Safety:** The city currently has around 500 kilometers of 50 km/h roads. The ambition is to transform about half of them to 30 km/h zones. Lower travel speeds, together with broader and improved cycling and walking paths, will enhance traffic safety.
- **Space efficiency and health:** Without intervention, car traffic is expected to grow by 3% by 2040. The strategy focuses on reallocating space to walking and cycling, which are more space-efficient and healthier alternatives.
- **Sustainability:** With all proposed measures, car kilometers are expected to decrease by 7% compared to 2020. Moreover, a growing share of cars is electric, contributing to a more sustainable city.
- **Connection:** Redesigned walking and cycling routes will make key locations in the city more accessible. These locations were already accessible by car, but now become easier to reach in more sustainable ways.
- **Appropriate mobility system:** More options for license-free and affordable travel will help reduce transport poverty, making mobility more inclusive.
- **Robustness:** Car traffic will be concentrated on main S-routes to free up space for other modes. At the same time, public transport and cycling networks will be expanded. Some roads and intersections will need to be upgraded to maintain flow, particularly where congestion is expected to rise.

2.1.3 Looking forward to 2050

While the Networkstrategy focuses on the year 2040, The Hague also has a long-term environmental vision for 2050. According to external research, mobility movements will grow by 30% compared to the current situation—an increase of another 9% from 2040. To manage this, continued development and adaptation of the Networkstrategy will be

necessary to ensure the city remains livable, sustainable, and accessible in the decades ahead.

2.2 Mobility hub

One way to potentially solve this mobility challenges is by making use of a mobility hub, which already has the support of the municipality. A mobility hub is a place where different forms of transportation come together. It is mainly used as a location where passengers switch from one mode of transport to another [5]. Nowadays, mobility hubs connect public transport with shared mobility options such as bicycles, scooters, and car-sharing services. They encourage people to use sustainable transport by offering smooth, convenient transfers. As mobility hubs offer a solution to replace parking spaces, which are being reduced in future construction plans to support car-free areas, the demand for them is growing. In The Hague there is currently one key-player in the mobility hub market: Q-Park [6]. According to the interview with Q-Park (Summary of the interview attached in Appendix E), a location is considered a mobility hub when it includes the following essential components:

- **Shared mobility options**. A range of vehicles such as bicycles, scooters, and shared cars are available for use, allowing travelers to switch between modes of transport easily.
- **Reservation system**. Vehicles can be booked in advance, which reduces the amount of "search traffic". "Search traffic" means traffic generated by drivers who are searching aimlessly for transportation or parking without a fixed plan.
- **Charging facilities**. Electric vehicles can recharge on this place, supporting sustainable mobility and encouraging the use of electric transportation.
- **Parking spaces**. The hub provides designated parking spots, which are crucial for making the transition between private transport and shared mobility efficient.

Q-Park divides three different forms of mobility hubs. This is sketched in the figure below:

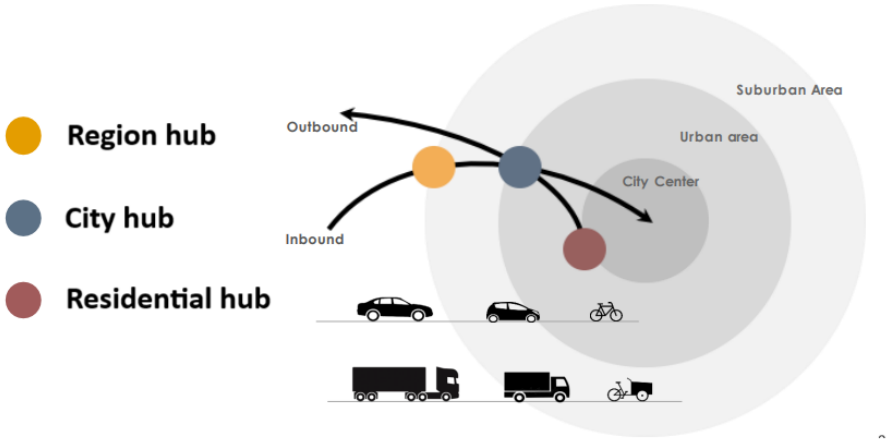


Figure 2.2: Different mobility hubs [6].

- **Region hub:** Also known as a P+R (Park and Ride) hub in the Netherlands. These hubs are located at the edge of cities or near highways or train stations and are designed for long-distance travel. Travelers can park their car and continue their journey using public or shared transport.
- **City hub:** Located within the urban area, this type of hub serves traffic within the city. Municipalities often face challenges here, as they aim to reduce car usage while there is still a huge demand for car access. City hubs help to balance accessibility with sustainability goals.
- **Residential hub:** These hubs are mainly intended for short-distance transport. They are often found in neighborhoods and consist of marked parking spaces for shared bicycles, scooters, and sometimes cars. Their goal is to make shared mobility easily accessible close to home.

2.2.1 Current role of mobility hubs in The Hague

To better understand the current operational role of mobility hubs in The Hague, the municipality provided detailed rental data on shared mobility use. This dataset was received directly via e-mail from Diede Labots, an official at the municipality of The Hague specialized in mobility hubs [11]. It includes both aggregated usage figures for all hubs over the city and specific statistics for the Shell Mobility Hub Q-Park in the city center.

From this data, some insights has been created:

- **Shell Mobility Hub Q-Park** (Amsterdamse Veerkade) shows a usage pattern that stabilized throughout 2024, with daily usage occasionally exceeding 40 rentals. This demonstrates initial adoption and seasonal fluctuations (Figure D.1).
- **Citywide hub usage** indicates increasing adoption of shared mobility in The Hague. On peak days, the number of rentals exceeds 1000, showing hubs are actively used in practice (Figure D.2).
- **Scooters dominate usage**, followed by shared bicycles. For instance, at the Shell Mobility Hub Q-Park, scooters account for 6,243 rentals compared to only 291 for bikes and 69 each for cars and cargo bikes. Across all hubs in The Hague, scooters similarly lead with 118,274 rentals, followed by 11,990 bike rentals, while cars and cargo bikes remain limited at 219 and 730 rentals respectively (Figures D.4 and D.5). This highlights a consistent preference for fast and flexible micromobility options across both individual and citywide hub locations.
- **Hourly and monthly distribution** of activity shows consistent usage throughout the day, with peaks in morning and afternoon hours (Figure D.3).

These patterns confirm that mobility hubs are not just a theoretical element in The Hague's planning policy, but are actively used by residents and visitors. The figures referenced here are presented in full in Appendix D.

2.3 Reference projects

In order to understand the potential impact and success conditions of mobility hubs, this section discusses two reference projects from European cities that have implemented mobility hubs as part of their strategy to transition away from private car dependency.

2.3.1 Bergen (Norway)

The city of Bergen has developed a network of 14 mobility hubs, of which six are operational and eight are under construction. These hubs combine car-sharing, public transport access, cycling infrastructure, pedestrian facilities, and real-time travel information. The city aims to reduce private car usage and improve air quality, targeting an emission-free city center by 2030. Each hub is designed to match the needs of its local neighborhood, and the city uses smart monitoring software to ensure shared mobility providers follow the rules in real time. Notably, one shared car is estimated to replace up to ten private cars [12].

2.3.2 Leuven (Belgium)

Leuven has implemented multiple electric mobility hubs (eHUBS), which include shared e-cars, e-bikes, and public charging stations. These hubs are strategically placed in residential neighborhoods and at transfer points. Their development involved active collaboration with local residents and knowledge institutions, resulting in greater public support and usage. By focusing on electric and shared mobility, the city contributes to climate targets while addressing local transport needs.
The city has developed a structured implementation approach for mobility hubs, which includes four main phases: location determination, services determination, deployment, and implementation. Each phase outlines specific tasks such as selecting locations, consulting stakeholders, planning infrastructure, and installing services. Additionally, overarching elements like branding, communication, and stakeholder management are emphasized throughout the process. A visual representation of this implementation framework is included in Appendix G.

Relevance for this study
These examples show that mobility hubs can really help cities become more sustainable. They do this by reducing the number of private cars and giving space back to people. In Bergen, one shared car can replace up to ten private cars, which shows how much space and pollution can be saved. Both Bergen and Leuven also show that it is important to match the mobility hub with the local area, and to involve the people who live there. This is also important for The Hague. Because the city is growing fast and wants fewer car trips, these lessons are useful. The example of Leuven (see Figure G.1) also shows that building a mobility hub is not always easy. It needs good planning, community support, and cooperation between the city and other partners.

Summary

This literature study addressed the first two sub-questions of this research. The first sub-question concerns how the ambition to decrease car movement is reflected in The Hague's current urban policies and planning. It was found that both the Mobility Transition Strategy 2022–2040 and the Networkstrategy 2040 strongly focus on reducing private car usage, re-locating road space to walkers and cyclists, and encouraging shared mobility through well-integrated hubs. These strategies aim to support a more compact, safe, and sustainable city.

The second sub-question explored the current role of mobility hubs and how Q-Park fits into this development. A mobility hub is defined as a location that facilitates modal shifts between public transport, shared vehicles, and active travel. Q-Park, the key actor in The Hague, separates hubs into regional, city, and residential hubs. The Shell Mobility Hub Q-Park, located at Amsterdamse Veerkade, functions as a concrete example of a city hub within The Hague's center. Data received directly from the municipality confirms that mobility hubs are actively used. At the Shell hub, scooters dominate with 6,243 rentals over a two-year period, while bicycles, cars, and cargo bikes are used significantly less. Across the entire city, over 100,000 scooter rentals were recorded, reaffirming a strong user preference for fast, flexible micromobility.

Finally, reference projects in Bergen and Leuven demonstrate how mobility hubs can help cities reduce car dependency and achieve sustainability goals. These are planned with local needs and public support in mind. These examples highlights the importance of thoughtful implementation, something that The Hague aims to implement in its own urban mobility strategy.

3
Methodology

This chapter outlines the methodology used to investigate how residents and workers in The Hague perceive mobility hubs, and under what conditions they would consider using them. The research focuses on three key components:

1. **Awareness**: whether people are familiar with the concept of mobility hubs and its functions or not.
2. **Willingness to use a hub under different conditions**: how specific travel-related factors such as cost, travel time, walking distance, and transfer time influence people's willingness to adopt hub-based transport.
3. **User priorities**: which features users consider most important for a successful mobility hub, based on a ranking exercise.

Each component contributes to a deeper understanding of the behavioral potential use for mobility hubs in the city. In particular, the willingness analysis is done with a comparative sensitivity assessment across the four factors, to identify which elements have the strongest impact on user decision-making. This comparative analysis is therefore considered an integral part of the second component.

The choice for these four specific factors is grounded in both expert insight and academic research. During the interview with Q-Park [6], it was emphasized that travel time, transfer time, and travel cost are decisive elements in whether people choose for a certain mobility option. Scientific literature supports this as well: He et al. (2021) found that travel time, travel cost, transfer burdens, and walking distance significantly influence people's commuting mode choice [13]. Although walking distance was not explicitly mentioned in the interview, it is expected to play a relevant role in the decision-making process and is therefore included in the analysis.

The full survey structure is available in Appendix A. According to established guidelines, a minimum of 100 responses is generally required to obtain meaningful statistical insights. For larger populations, the number of responses should ideally not exceed 10% of the total group and should remain under 1,000 to ensure manageable data handling [14]. With a population of over 550,000 residents, The Hague qualifies for the upper bound of this recommendation. The sample for this study is therefore capped at 1,000 responses. Ultimately, 120 relevant responses were collected.

The survey was distributed online using a convenience sampling approach. Distribution took place through the researcher's personal network, as well as through the professional networks of family members and acquaintances. The target group consisted of individuals who either live or work in The Hague, with early survey questions used to filter for geographic relevance. The survey was designed and distributed using Qualtrics, a platform

suitable for structured and conditional questioning. After data collection, responses were exported and analyzed using IBM SPSS Statistics, which allowed for descriptive statistics, cross-tabulations, and significance testing related to the formulated hypotheses.

This complements the earlier chapters that addressed subquestions 1 and 2 from a policy and infrastructure perspective. The behavioral analysis presented here directly addresses subquestions 3 and 4. By exploring how residents and workers perceive mobility hubs, their level of awareness, and their conditional preferences, the study provides valuable insights into the demand side of a potential mobility transition.

3.1 Respondent classification: district and age

District segmentation
Geographic segmentation is based on Questions 3, 4, and 5. Question 4 asked respondents to provide their neighborhood of residence, which was manually assigned to one of The Hague's eight official administrative districts, as shown in Table 3.1. Respondents who neither live nor work in The Hague were excluded. If a respondent listed a neighborhood outside The Hague (e.g., Voorburg), they were only retained if they indicated they work in The Hague, in which case they were placed in the category *Work only*. The districts are shown in Appendix C.

Table 3.1: Neighborhoods grouped by district

District	**Neighborhoods included**
Center	Center, Zeeheldenkwartier, Archipel, Duinoord, Valkenboskwartier
Haagse Hout	Benoordenhout, Bezuidenhout, Mariahoeve, Uilennest
Scheveningen	Scheveningen, Statenkwartier, Van Stolkpark, Westbroekpark
Segbroek	Segbroek, Vogelwijk
Loosduinen	Loosduinen, Bohemen en Meer en Bos, Houtwijk
Escamp	Moerwijk, Leyenburg, Morgenstond, Wateringse Veld
Leidschenveen-Ypenburg	Ypenburg, Leidschenveen
Laak	Binckhorst, Laakkwartier
Work only	Respondents who only work in The Hague

Age segmentation
Age is obtained from Question 1 and grouped into "Under 18", "18–24", "25–34", "34–44", "45–54", "55–64" and "65+". This age segmentation is applied to test for demographic differences in willingness and preferences.

3.2 (1) Awareness of mobility hubs

To determine whether unfamiliarity might be a barrier, the survey asked respondents (Question 7) whether they had heard of mobility hubs. Responses are analyzed descriptively and visualized in a bar chart. Segmentation by district and age is included to reveal spatial or generational patterns in awareness. Gender is included if any meaningful difference appears.

3.3 (2) Willingness to use a hub under different conditions

This part of the analysis explores how four travel-related factors affect willingness to use a mobility hub: travel cost (Q9), walking distance (Q10a), travel time (Q10b), transfer time (Q11). Each of the four travel-related factors is analyzed using the same logic. Respondents who provided a numeric input (e.g., percentage or minutes) were grouped into low, medium, or high sensitivity categories. In addition, two special categories were defined:

- ☐ **Not important** – for respondents who indicated that a specific factor does not affect their decision.
- ☐ **Refusal** – for respondents who explicitly stated they would not use a hub regardless of that factor.

Travel cost

Table 3.2: Overview of responses to Q9 – Travel cost

Q9 – Under what price condition would you consider using a city hub?	
Original survey response	**Grouped category**
I would use a city hub if it is at least ___% cheaper than private travel cost.	☐ $< 20\%$ = Low sensitivity ☐ 20–50% = Medium sensitivity ☐ $> 50\%$ = High sensitivity
Price doesn't matter much to me. I value other factors more.	Not important
I would not use a city hub, regardless of the price.	Refusal

Walking distance

Table 3.3: Overview of responses to Q10a – Walking distance

Q10a – What is the maximum time you are willing to walk to reach a city hub?	
Original survey response	**Grouped category**
Willing to walk up to: ___ minutes	☐ 0–5 minutes = Short ☐ 6–10 minutes = Medium ☐ > 10 minutes = Long
I would not use a city hub, regardless of the travel time.	Refusal

Travel time

Table 3.4: Overview of responses to Q10b – Travel time

Q10b – What is the maximum additional travel time you would accept when using a city hub, compared to your usual transport?	
Original survey response	**Grouped category**
Acceptable if it takes up to: ___% longer	☐ $< 10\%$ = Low tolerance ☐ 10–25% = Medium tolerance ☐ $> 25\%$ = High tolerance
Travel time is not the most important factor. Other benefits matter more.	Not important
The trip must be at least as fast as usual. No extra time is acceptable.	Strict

Transfer time

Table 3.5: Overview of responses to Q11 – Transfer time

Q11 – What is an acceptable transfer time?	
Original survey response	**Grouped category**
Acceptable transfer time: ___ minutes	☐ 0–3 minutes = Short ☐ 4–7 minutes = Medium ☐ > 7 minutes = Long
A bit of extra time is fine if the process is smooth.	Flexible
No additional time is acceptable. Switching should be immediate.	Strict

Comparing the influence of the four factors

To identify which factors most strongly discourage the use of a mobility hub, a comparative bottleneck analysis is conducted. Each respondent was given the opportunity to indicate, for each of the four factors (travel cost, walking distance, travel time, and transfer time), under which conditions they would consider using a hub. Crucially, all scenarios included a categorical "Refusal" option: respondents could explicitly state they would not use a mobility hub for that factor. In the case of travel time and transfer time, this categorical refusal was phrased as "Strict", reflecting an absolute unwillingness to accept any additional delay or transfer. This makes it possible to see "Refusal" or "Strict"-answers as a behavioral bottleneck where a specific factor becomes a decisive barrier to adoption. By comparing the proportion of respondents who selected "Refusal" for each factor, the analysis reveals which mobility hub attributes are most frequently experienced as unacceptable.

The comparative analysis includes:

- ☐ The share of respondents per factor who categorically refuse to use a hub;
- ☐ A ranking of factors based on bottleneck prevalence;
- ☐ A combined bar chart visualizing refusal percentages side by side per district.

This approach avoids direct numerical comparisons across qualitatively different attributes (e.g., price vs. walking time), and instead focuses on the behavioral impact of each. If, for instance, transfer time yields the highest refusal rate, it can be considered the most critical barrier. And a low refusal rate suggests that a factor is not a major obstacle for most users. The results inform prioritization in urban mobility policy: improvements should focus first on reducing the impact of those factors that most frequently lead to categorical refusal.

3.4 (3) User priorities for a successful mobility hub

To understand which features of a hub are most important to potential users, respondents were asked to rank seven aspects (Question 12):

(a) Travel cost
(b) Accessibility (reachable by foot or bike)
(c) Availability of vehicles
(d) Safety (especially at night)
(e) Ease of use (e.g., one app)
(f) Comfort and facilities (shelter, shops, benches)
(g) Environmental impact

The average rank for each item is calculated across all respondents. Lower scores indicate higher perceived importance. Results are presented in a bar chart. Segmentation by age is included as well. To examine differences between age groups, respondents were grouped into three categories (≤ 24, 25–44, ≥ 45), and the average ranking of each feature was compared between these groups.

3.5 Hypotheses

The study explores the following hypotheses:

- ☐ H1: Awareness of mobility hubs is lower among older age groups and in districts close to the border of the city.
- ☐ H2: The most common bottlenecks to using a mobility hub are walking distance and travel time.
- ☐ H3: Priorities for mobility hubs differ between age groups, with younger respondents placing more emphasis on availability and ease-of-use, while older respondents prioritize safety and comfort.

Note on the use of AI tools

During the writing of this thesis, the language model ChatGPT was used to assist with rephrasing sentences, grammar checking, assisting with Latex-coding and visualizing data outputs. Prompts included requests such as “Can you rewrite this sentence more clearly?” with the specific sentence provided. In some cases, multiple suggestions were requested to better suit the intended meaning. Final edits and interpretations were made independently by the author. (ChatGPT, 2025)

Summary

This study investigates how residents and workers in The Hague perceive mobility hubs and under what conditions they would use them. The analysis focuses on three components: (1) awareness of mobility hubs, (2) willingness to use a hub under varying travel-related conditions (cost, time, walking distance, transfer), and (3) user priorities based on a ranking of hub features. Survey responses (n = 120) were collected through convenience sampling and analyzed using SPSS.

For willingness, responses were grouped into sensitivity categories and refusal options to identify behavioral bottlenecks. A comparative analysis assessed which factors most commonly lead to hub rejection. User priorities were derived from average rank scores. The methodology supports hypothesis testing related to age, geography, and hub preferences, and provides insights into potential barriers and success conditions for future mobility hub implementation.

4
Results

This chapter presents the results of the survey, which explored public awareness, willingness, and preferences regarding mobility hubs in The Hague. Most of the figures, graphs and tables are designed in SPSS. Some are designed in Python and their code is attached in Appendix F. The analyses are structured around the three key components defined in the methodology:

1. Awareness of mobility hubs
2. Willingness to use a hub under different conditions
3. User priorities for a successful mobility hub

4.1 Respondent characteristics

The survey included respondents from all official districts of The Hague, as well as individuals who do not live in the city but work there. For district-level analysis, only districts with more than 10 respondents were considered to ensure a meaningful interpretation of the results. These include Center (n=10), Haagse Hout (n=34), Scheveningen (n=16), and Work only (n=38).

Table 4.1: Respondent distribution by district, gender and age group (in %)

District	**Gender**			**Age group**						**n**
	Male	**Female**	**Other**	**18–24**	**25–34**	**35–44**	**45–54**	**55–64**	**65+**	
Center	30.0	60.0	10.0	10.0	20.0	0.0	20.0	50.0	0.0	10
Escamp	25.0	75.0	0.0	0.0	25.0	0.0	50.0	25.0	0.0	4
Haagse Hout	58.8	38.2	2.9	5.9	23.5	8.8	26.5	17.6	17.6	34
Laak	60.0	40.0	0.0	40.0	20.0	0.0	0.0	40.0	0.0	5
Leidsch.-Ypenburg	75.0	25.0	0.0	25.0	0.0	25.0	25.0	25.0	0.0	4
Loosduinen	0.0	100.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	3
Scheveningen	62.5	37.5	0.0	25.0	0.0	0.0	25.0	50.0	0.0	16
Segbroek	50.0	50.0	0.0	33.3	0.0	0.0	33.3	33.3	0.0	6
Work only	39.5	57.9	2.6	13.2	10.5	7.9	36.8	26.3	5.3	38
Total	**48.3**	**49.2**	**2.5**	**14.2**	**14.2**	**12.5**	**28.3**	**30.0**	**0.8**	**120**

4.2 (1) Awareness of mobility hubs

The first part of the analysis investigates public awareness of the mobility hub concept and its functions. Three sub-analyses were conducted to examine overall awareness and its variation across age groups and districts.

Figure B.1 in Appendix B presents the overall awareness among respondents. Out of 120 participants, 42 (35%) indicated they had heard of the concept of mobility hubs, while 54 (45%) had not. Additionally, 23 respondents (19%) were unsure, stating they thought they had heard of it but did not know what it meant. This highlights that more than half of the respondents either lack awareness or do not fully understand the concept.

Figure B.2 explores awareness across age groups. The 45–54 and 55–64 age brackets show the highest engagement, with both groups reporting relatively high awareness levels. In the 45–54 category, approximately 50% of respondents indicated familiarity with the concept, while this was around 46% in the 55–64 group. In contrast, awareness among younger participants is lower: in the 18–24 group, around 35% reported knowing about mobility hubs, and in the 25–34 group this share was slightly above 30%. These percentages were calculated by dividing the number of "Yes" responses by the total number of respondents within each age group, based on Figure B.2 and Table 4.1. This suggests that awareness is a bit higher among middle-aged adults, although the differences between groups are not extreme.

Figure B.3 illustrates awareness levels by district, limited to the four groups with sufficient sample size. In Haagse Hout and Scheveningen, more than half of respondents had not heard of mobility hubs. In contrast, the Center district shows relatively higher awareness (around 50%), while the "Work only" group also displays relatively balanced awareness and non-awareness levels. This indicates that geographic context plays a role, though not a decisive one.

These findings suggest that although the term "mobility hub" is gaining some recognition, there remains a substantial portion of the population in The Hague that is either unaware of it or confused about its meaning. With regard to Hypothesis H1, that awareness is lower among older age groups and in peripheral districts, the results offer only partial support. Awareness does not appear significantly lower among older respondents; in fact, the 45–64 age groups show relatively high awareness levels. However, when focusing solely on residential districts with sufficient sample size, we observe that awareness is indeed lower in more peripheral areas such as Haagse Hout and Scheveningen, compared to the more central district of the Center. The hypothesis is therefore partially supported: while geographic variation aligns with expectations, the anticipated age-related decline in awareness is not clearly observed. One reason could be that older people are more interested in local plans or follow city news more closely, so they know more about mobility hubs. Younger people might not notice these hubs yet or don't find them important for their daily travel, which could explain why they are less familiar with them.

4.3 (2) Willingness to use a hub under different conditions

To assess user willingness to adopt a mobility hub under various conditions, four key influencing factors are analyzed: price, walking distance, travel time, and transfer time. The results provide insights into how sensitive travelers are to each factor, based on stated preferences from the survey. Detailed figures per factor are provided in Appendix B.

4.3.1 Factor-specific findings

Price sensitivity. As shown in figure B.4, pricing is not a dominant factor for most respondents. A majority of 44% indicate that price is *not important*, while 31% explicitly state they *refuse* to use a hub regardless of price. Only 8% of respondents fall into the *Low sensitivity* group, those likely to switch if the hub is cheaper. This suggests that price incentives alone may not be sufficient to attract a broad user base.
Walking distance. Figure B.5 reveals that walking distance is a somewhat more impactful factor. 37.76% of respondents again fall into the *Refusal* group, yet nearly half (48%) are willing to accept walking times of various lengths. Specifically, 30.61% tolerate *medium* walking distances, and 17.35% accept *short* walks. The share of *long distance* acceptors (14.29%) is modest, indicating distance remains a relevant constraint.
Travel time tolerance. The results in figure B.6 suggest that users are quite sensitive to total travel time. 37.38% report being *strict*, not accepting any added travel time. Meanwhile, 26.17% think travel time *not important*, and 28.04% show a *medium tolerance* for longer trips. Only a small fraction (0.93%) accept *high increases* in travel time. These results imply that any additional travel time should be minimized to encourage acceptance.
Transfer time sensitivity. Finally, figure B.7 shows that users are generally more forgiving with transfer times. A majority (52.38%) fall into the *flexible* category, accepting some delay if the transition is smooth. However, 23.81% still demand *strict* and immediate switching. Only 3.81% accept *long transfer delays*, suggesting smooth transitions are critical, though not necessarily instantaneous.

4.3.2 Bottleneck comparison across mobility hub factors

Table 4.2 presents the share of respondents who categorically refused to use a mobility hub under specific conditions related to each factor. These responses represent behavioral bottlenecks, situations where the factor in question completely inhibits usage.

Table 4.2: Proportion of respondents selecting categorical refusal per factor

Factor	Refusal category	Refusal rate (%)
Travel cost	Refusal	31.0
Walking distance	Refusal	37.8
Travel time	Strict	37.4
Transfer time	Strict	23.8

Walking distance and travel time were the two most frequently cited bottlenecks, with

37.8% and 37.4% of valid respondents, respectively, refusing to use a hub under the defined conditions. Travel cost was also a considerable barrier (31.0%), while transfer time scored lower (23.8%), suggesting greater flexibility among respondents when it comes to making a transfer.

Bottleneck differences across districts

While the overall bottleneck comparison highlights which factors discourage hub usage most frequently, it does not account for spatial variation across the city. To explore whether specific areas are more or less sensitive to certain mobility hub barriers, a district-level analysis was conducted.

For each valid district (only the districts with at least ten respondents: Center, Haagse Hout, Scheveningen, and the "Work only" group), the same bottleneck analysis was performed: the percentage of respondents who selected a categorical refusal (or "Strict") per factor. This makes it possible to compare where potential resistance to mobility hub usage is highest and to identify districts with relatively low bottleneck scores.

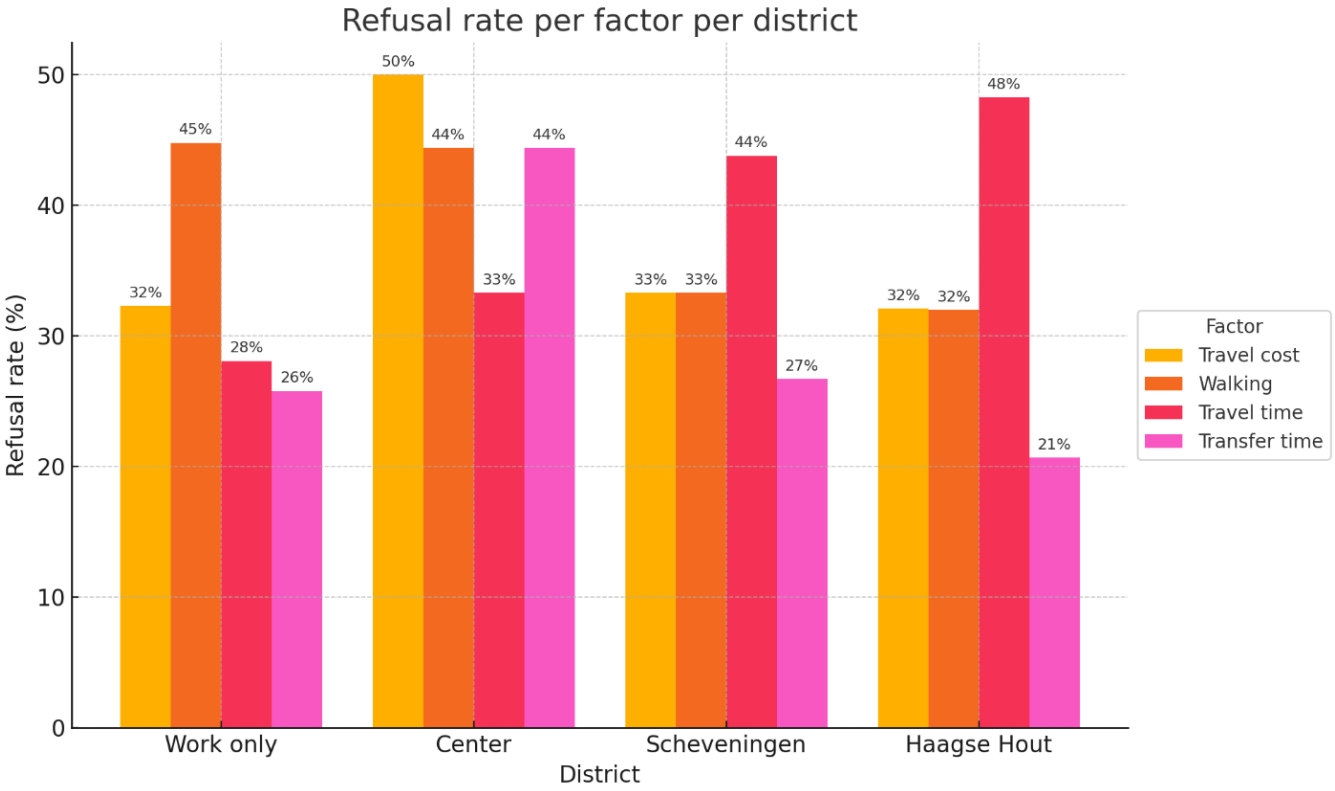


Figure 4.1: Refusal rate per factor for using a mobility hub, by district [F.3]

Figure 4.1 displays refusal rates across four key factors per district. (Table is visible in Appendix B.1.) These refusal rates represent the share of respondents who indicated they would categorically not use a mobility hub under specific conditions, highlighting the most critical barriers in each area.

Work only. Respondents who commute to The Hague but do not live there ("Work only") show relatively high refusal related to walking distance (44.8%), suggesting that ease of access is essential for them. However, refusal for travel time (28.1%) and transfer time (25.8%) remains moderate, indicating that minor delays or transfers may be acceptable as long as the location is convenient. A hub near major employment zones with minimal walking distance could therefore be viable.

Center. Respondents in the city center display the *highest overall refusal levels*, with 50% unwilling to consider hubs unless costs are significantly reduced and 44.4% refusal on both walking and transfer time. This suggests a highly demanding user group. Implementation of a hub here would likely require substantial incentives (e.g., financial discounts, direct locations), and may face resistance regardless.

Scheveningen. Refusal rates are moderate across all factors. Travel time (43.8%) is the most prominent bottleneck, but walking, cost, and transfer time refusals remain around one-third. These figures suggest Scheveningen users are willing to accept hubs provided there is no significant time penalty. A strategically located hub with efficient routing could work here, especially for leisure and seasonal use.

Haagse Hout. This district shows the *lowest overall refusal levels*, especially for transfer time (20.7%) and walking (32.0%). Although travel time refusal is somewhat high (48.3%), users appear more open than in other districts. The relatively low barriers on three out of four factors indicate Haagse Hout may be a promising area to pilot a hub, especially near rail or metro access points with minimal additional travel burden.

Based on refusal patterns, Haagse Hout emerges as the most suitable candidate for further investigation. It combines moderate cost and walking tolerance with relatively low transfer-time resistance. In contrast, the Center district shows high resistance on all fronts, making it a less feasible starting point for hub development. These spatial patterns are consistent with the broader findings across the full sample: walking distance (37.8%) and travel time (37.4%) are the most common barriers to mobility hub adoption. Travel cost also plays a role (31.0%), while transfer time is less frequently cited (23.8%). These results support Hypothesis 2: *"The most common bottlenecks to using a mobility hub are walking distance and travel time."* Walking distance is especially restrictive among "Work only" respondents, while travel time proves to be a limiting factor across multiple districts. Prioritizing measures that reduce both may therefore be most effective in encouraging adoption.

4.4 (3) User priorities for a successful mobility hub

In order to identify which hub-properties are considered most important by potential users of a mobility hub, survey participants were asked to rank seven aspects from most important (1) to least important (7). These aspects included: travel cost, accessibility, availability, safety, ease of use, comfort, and environmental impact.

Figure B.8 (see Appendix B) shows the average ranking for each aspect across all respondents. A lower average score indicates a higher perceived importance. The results show that accessibility (mean: 2.39) and availability of transport modes (mean: 2.74) are

the most valued features in a mobility hub. Travel cost is also important (mean: 3.16), but less so than the physical and functional access to the hub. Ease of use and safety fall in the mid-range, while environmental impact (5.56) and especially comfort (6.04) are considered least important.

To explore potential demographic differences, the same features were analyzed by age group. Respondents were grouped into three categories: *young* (≤24), *middle-aged* (25–44), and *older adults* (≥45). Figure 4.2 shows the average ranking per feature within each group.

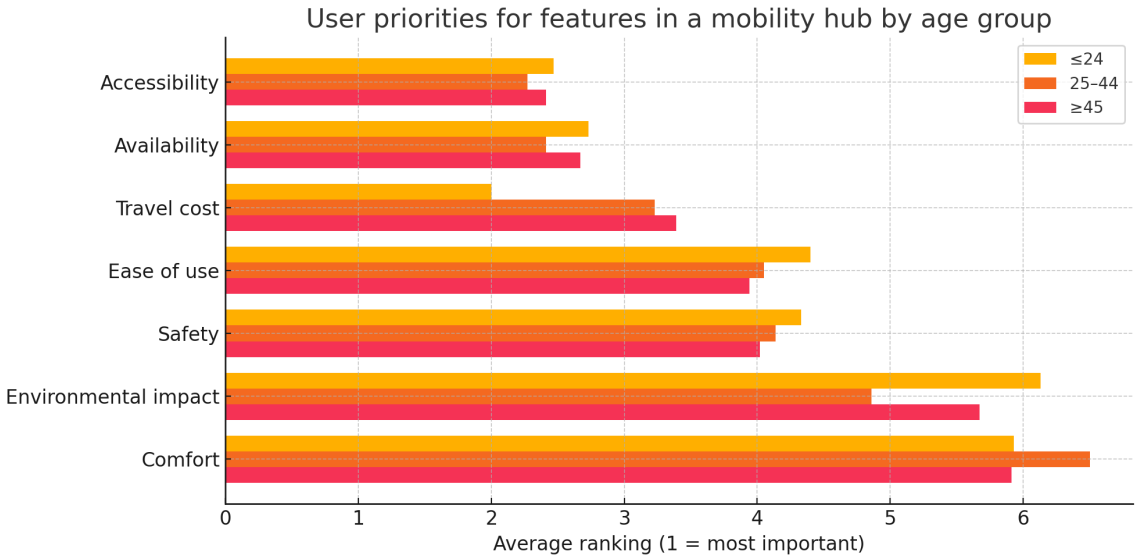


Figure 4.2: Average ranking of mobility hub features by age group (lower = more important) [F.4]

The results show notable differences in user priorities across age groups. Young respondents (≤24) place high importance on **travel cost** (mean: 2.00) and show relatively low concern for environmental impact and comfort. The middle-aged group (25–44) prioritizes **accessibility** (mean: 2.27) and **availability** (2.41), but considers **comfort** least important (6.50). In contrast, older respondents (≥45) give more balanced scores across all categories, but value **comfort** and **environmental impact** more than the younger groups.

These findings suggest that while accessibility and availability are important across all groups, additional design considerations may be needed to tailor mobility hubs to specific age demographics. For example, affordability and ease of use may help increase adoption among younger users, whereas safety and comfort could be more effective drivers for older populations.

The results show clear differences in mobility hub priorities across age groups. Younger respondents (≤24) assign greater importance to travel cost, availability, and ease of use, while placing less emphasis on comfort and environmental impact. Middle-aged users (25–44) prioritize accessibility and availability, whereas older adults (≥45) value comfort, safety, and environmental considerations more strongly.

These findings support Hypothesis 3: *"Priorities for mobility hubs differ between age groups, with younger respondents placing more emphasis on availability and ease-of-use, while older respondents prioritize safety and comfort."* The variation in average rankings across all seven features confirms that mobility hub design should be responsive to age-specific user needs.

Summary

This chapter addressed the third and fourth subquestions of the research:
(3) What do residents know about mobility hubs, and how do they perceive their potential or relevance in daily life?
(4) To what extent can mobility hubs play a greater role in addressing future mobility challenges in The Hague, considering public support, space, and policy ambitions?

Regarding subquestion 3, the results show that awareness of mobility hubs is still limited. Only 35% of respondents indicated familiarity with the concept, and 19% were unsure. Awareness is slightly higher among middle-aged adults (45–64), but lower in peripheral districts such as Haagse Hout and Scheveningen. While general knowledge is lacking, responses to willingness and priority questions suggest that many residents recognize the potential benefits of mobility hubs, especially when convenience and accessibility are ensured.

Subquestion 4 was explored through analyses of behavioral bottlenecks and user priorities. The most common barriers to hub usage are walking distance and travel time, with refusal rates of 37.8% and 37.4% respectively. Travel cost also poses a constraint (31.0%), though transfer time is less critical (23.8%). District-level differences further illustrate that some areas, Haagse Hout for example, show lower resistance to hub usage and could serve as suitable locations for future pilots. Additionally, the ranking exercise revealed strong support for core features such as accessibility, availability, and ease of use, especially among younger users. Older users, by contrast, prioritized comfort and safety. These differences indicate that public support for mobility hubs exists, but effective implementation depends on tailored design that accounts for spatial and demographic variation.

In summary, while awareness of mobility hubs remains modest, there is clear potential for broader acceptance. This chapter provided insights that design and location choices align with user needs and expectations across different groups and areas in The Hague.

5
Discussion

This research aimed to assess awareness, willingness, and user priorities related to mobility hubs in The Hague. The results show that only 35% of respondents said they know what a mobility hub is. Most people either had never heard of it or were not sure what it means. This is a problem, because the city wants to use hubs as a key part of its mobility strategy. Without enough awareness, people may not use them.

The results also show that travel cost and walking distance are the most important factors that influence willingness. If these improve, more people are willing to use a hub. This finding aligns with other research on mobility hubs: He et al. found that "walking distance had the largest negative impact on hub attractiveness among all tested factors" [13]. Similarly, Krueger et al. showed that both travel cost and first/last mile distance significantly reduce the willingness to use shared mobility options [15]. Transfer time had less influence. Maybe people accept a short transfer if the price and distance are good.

But the research also has clear limitations. First, many districts in The Hague had too few respondents. That made it hard to compare results across the city. These districts were excluded from the segmentation analysis because of the small sample sizes. This means that the results cannot be used to describe the whole city in a representative way. Also, this research used stated preferences, which means people answered what they think they would do. In real life, people sometimes behave differently. So the actual use of hubs may not match the answers from the survey. Public transport is of course also an alternative for many trips in The Hague. However, this study focused only on shared mobility services within hubs. Public transport was not included, mainly to keep the analysis clear and focused. Including it would have added complexity that was beyond the scope of this research.

Future research should:

- ☐ Use a larger sample with more equal responses from each district.
- ☐ Compare stated preferences with real usage data from mobility providers.
- ☐ Do interviews or focus groups to better understand reasons for low awareness or refusal.
- ☐ Study how better communication about hubs could improve public understanding and usage.

Even with these limits, this study gives useful first insights into what people expect from a mobility hub and what factors hold them back.

6

Conclusion and recommendations

This final chapter answers the main research question by combining insights from literature, a Shell mobility hub Q-park-case study and a survey among residents of The Hague. The study aimed to understand both the strategic intentions behind mobility hubs in urban policy and the extent to which residents are open to using them. These two perspectives, policy and public perception, must be aligned in order for mobility hubs to succeed as a tool in reducing car movements across the city. The central research question that guided this study is restated below:

What is the current and future role of mobility hubs within the decreasing car movement policy that The Hague aims to implement, and how are mobility hubs perceived by residents?

Subquestion 1: How is the ambition to decrease car movement reflected in current urban policies and developments in The Hague?
The Hague has formalised its car reduction goals through the *Mobility Transition Strategy 2022–2040* and the *Network Strategy 2040*. These strategies promote shared mobility and active travel, and define mobility hubs as key infrastructure to support this shift. The Shell Mobility Hub Q-Park represents an early example of this approach in practice, with strong scooter usage data supporting the hub's relevance.

Subquestion 2: What role does the Shell Mobility Hub Q-Park The Hague currently play in the city's mobility strategy?
The Shell Mobility Hub Q-Park, located in the city centre, is a concrete example of how the municipality's strategy is being translated into action. It offers shared scooters, bikes, cars, and cargo bikes. Data show high usage of shared scooters, with over 6,000 rentals at this hub and more than 100,000 citywide. Q-Park applies a tiered system (regional, city, residential hubs) and sees potential for growth as there is increasing demand from municipalities to implement mobility hubs as a structural response to mobility challenges.

Subquestion 3: What do residents know about mobility hubs, and how do they perceive their potential or relevance in daily life?
Survey results indicate that only 35% of respondents knew what a mobility hub is, while 19% were unsure. Awareness was slightly higher in middle-aged groups, but lower in districts like Haagse Hout and Scheveningen. Despite this, many respondents were willing to use a hub if it met their needs. Key factors influencing willingness were cost, walking distance, and service availability. This shows that the public is not resistant to hubs, but that clear information and practical design are essential.

Subquestion 4: To what extent can mobility hubs play a greater role in ad-

dressing future mobility challenges in The Hague, considering public support, space, and policy ambitions?
Behavioural bottlenecks such as walking distance (37.8% refusal) and travel time (37.4%) currently limit hub usage. Travel cost is another concern (31.0%), while transfer time is less critical (23.8%). District-level data suggest areas like Haagse Hout may be more receptive to hubs. Priority rankings show that availability, accessibility, and ease of use are most valued, especially among younger users. Older respondents favoured comfort and safety. These patterns confirm that mobility hubs can support the city's policy goals if designed with users in mind.

Recommendations
Based on the findings above, the following recommendations are proposed to help the municipality and stakeholders improve the design, communication, and implementation of mobility hubs across the city:

- **Raise awareness through clear communication.** Awareness is limited. Targeted campaigns can help residents understand what mobility hubs offer and how to use them.
- **Design hubs based on key user preferences.** Focus on reducing walking distance and cost, and ensure high availability of preferred modes like shared scooters.
- **Use district-level data to plan pilot hubs.** Start in areas like Haagse Hout, where resistance is lower. Design hubs to local demographics and needs.
- **Ensure better geographic representation in future studies.** Some districts had too few respondents. A broader and more representative sample would improve planning accuracy.
- **Explore public transport integration in follow-up research.** While excluded here for focus reasons, public transport is essential in a complete multimodal system. Public transport can increase demand for mobility hubs, when a well-designed cooperation is created.

Conclusion

This research concludes that mobility hubs have significant potential to support The Hague's decreasing car movement policy. The city has a clear strategy, and private actors like Q-Park are already taking initiative. From the public's perspective, acceptance is possible, but only under the right conditions. Cost, walking distance, and accessibility are key. If these factors are addressed, mobility hubs can become a scalable and inclusive mobility solution, helping The Hague transition to a more sustainable urban future.

References

[1] E. Schaafsma. *Deelmobiliteit in nieuw parkeernormenbeleid Den Haag - Agendastad*. Accessed: 2025-05-08. 2021. URL: https://agendastad.nl/deelmobiliteit-in-nieuw-parkeernormenbeleid-den-haag/.

[2] Gemeente Den Haag. *Netwerkstrategie 2040: voor een leefbaar en bereikbaar Den Haag*. Geraadpleegd op 15 mei 2025. 2025. URL: https://www.denhaag.nl/nl/verkeer-en-vervoer/netwerkstrategie-2040/.

[3] Gemeente Den Haag. *Vrijgave voor inspraak van het concept Netwerkstrategie 2040: Voor een leefbaar en bereikbaar Den Haag. PDF-publicatie, Gemeente Den Haag.* Documentnummer RIS321330. 2025. URL: https://www.denhaag.nl/netwerkstrategie.

[4] Gemeente Den Haag. *Voorstel van het college inzake Strategie mobiliteitstransitie Den Haag 2022–2040*. 2021.

[5] Thomas Arnold et al. "Mobility Hubs: review and future research direction". In: *Transportation Research Record Journal of the Transportation Research Board* 2677.2 (July 2022), pp. 858–868. DOI: 10.1177/03611981221108977. URL: https://doi.org/10.1177/03611981221108977.

[6] Theo Thuis. "Interview with Theo Thuis, Managing Director Innovation at Q-Park". Personal interview conducted by Lars Keser on 9 May 2025, see Appendix E. 2025.

[7] Philip Rogers. *Identifying and Engaging Stakeholders*. Geraadpleegd op 20 mei 2025. Apr. 2023. URL: https://medium.com/agile-outside-the-box/identifying-and-engaging-stakeholders-c16c6557317d.

[8] Gemeente Den Haag. *Den Haag leefbaar, verkeersveilig en bereikbaar houden*. Accessed: 2025-05-08. 2025. URL: https://www.denhaag.nl/nl/verkeer-en-vervoer/den-haag-leefbaar-verkeersveilig-en-bereikbaar-houden/.

[9] Diede Labots (Gemeente Den Haag), Theo Thuis (Q-Park), and Frank Leerdam (Shell). *Mobility hubs in grote steden*.

[10] Gemeente Den Haag. *Ruim baan voor de fiets*. https://www.denhaag.nl/nl/verkeer-en-vervoer/fietsen/ruim-baan-voor-de-fiets/. Geraadpleegd op 16 mei 2025. 2020. URL: https://www.denhaag.nl/nl/verkeer-en-vervoer/fietsen/ruim-baan-voor-de-fiets/.

[11] Diede Labots. *Mobility hub usage data for The Hague*. Internal dataset shared via email, Municipality of The Hague. 2025.

[12] Wassim Hached and Alain L'Hostis. *Mobility Hubs: A Lever for More Sustainable Mobility?* https://hal.science/hal-03795005v1. Accessed: 2025-05-21. 2022.

[13] Shanshan He et al. "Unraveling the impact of travel time, cost, and transit burdens on commuting mode choice". In: *Transportation Research Part A: Policy and Practice* 144 (2021), pp. 1–17. DOI: 10.1016/j.tra.2020.12.005. URL: https://www.sciencedirect.com/science/article/pii/S0965856420306741.

[14] Survicate. *Survey Sample Size: How Many Survey Participants Do I Need?* Accessed: 2025-05-22. 2023. URL: https://survicate.com/blog/survey-sample-size/.

[15] Reinhold Krueger, Taha H. Rashidi, and John M. Rose. "Preferences for shared autonomous vehicles". In: *Transportation Research Part C: Emerging Technologies* 69 (2016), pp. 343–355. DOI: 10.1016/j.trc.2016.06.015.

[16] Shell Nederland. *Shell en Q-Park openen samen Mobility Hub in Den Haag*. Geraadpleegd op 27 mei 2025. 2023. URL: https://www.shell.nl/over-ons/nieuws/nieuwsberichten-2023/shell-en-qpark-openen-samen-mobility-hub-den-haag.html (visited on 05/27/2025).

[17] Gemeente Den Haag. *Den Haag op Kaart*. https://www.denhaag.nl/nl/den-haag-op-kaart/. Toegankelijk op 2 juni 2025. 2025. URL: https://www.denhaag.nl/nl/den-haag-op-kaart/.

[18] H. Evenepoel. "Planning Process in Leuven". Internal document. 2021.

A

Survey set up

Survey Introduction

Thank you for taking part in this survey. This research is part of a Bachelor thesis at TU Delft and aims to understand how people in and around The Hague travel, and whether mobility hubs (places with shared cars, bikes, scooters, etc.) can help reduce car usage in the city. The city of The Hague is currently implementing changes to reduce car traffic, including increasing parking costs and promoting shared transport. Your opinion helps shape the future of mobility in the region.

This survey takes about 5–7 minutes and contains five parts.

No personal identifying information will be collected. Data will be used solely for academic research purposes and stored securely in accordance with TU Delft's research ethics guidelines. Participation is voluntary, and you may stop at any time without consequences.

Contact me (mail and phone number attached) or e-mail one of my supervisor in case you have any questions: Yufei Yuan: `y.yuan@tudelft.nl`

Survey Questions

1. What is your age group?
    - Under 18
    - 18–24
    - 25–34
    - 35–44
    - 45–54
    - 55–64
    - 65+
2. What is your gender?
    - Male
    - Female
    - Non-binary / third gender
    - Prefer not to say
3. Do you live in The Hague?

- Yes
- No

4. (If yes) Which neighborhood do you live in?
   Open text field

5. Do you work (fully or partly) in The Hague?

   - Yes
   - No

6. How often do you currently use the following modes of transport?

Mode	**Rarely/never** (0–1x/week)	**Occasionally** (2–4x/week)	**Frequently** (5+ / week)
Private car Private (e-)bike Private scooter Public transport (OV) Shared car Shared bike/scooter Walking			

7. Have you ever heard from the mobility hub concept and its functions?

   - Yes
   - No
   - I think so, but I was not sure what it meant

8. Have you heard of the Shell Mobility Hub Q-Park in The Hague's city center (Amsterdamse Veerkade 30), and have you ever used it?

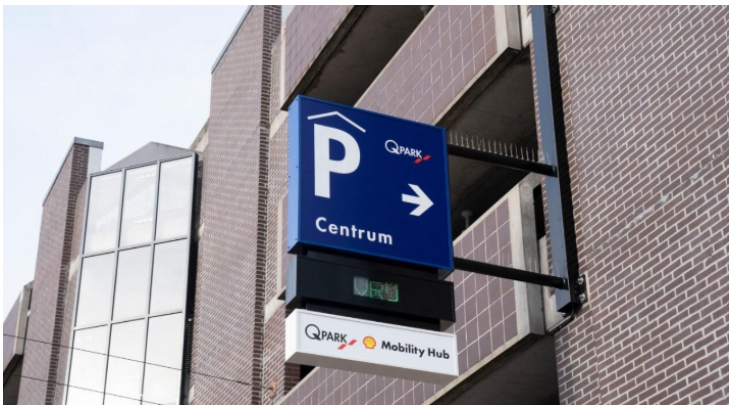


Figure A.1: Shell Mobility Hub Q-Park at Amsterdamse Veerkade 30, The Hague [16]

   - Yes, I know it and I have used it
   - Yes, I know it but have not used it

- No, I did not know about it
- Not sure

9. Travel cost — Under what price condition would you consider using a city hub?
   - If it is cheaper than other transport. I would use a city hub if it's at least: _____% cheaper than private travel cost
   - Price doesn't matter much to me. I value other factors more (e.g. comfort, parking, flexibility)
   - I would not use a city hub, regardless of the price
10. Travel time
    (a) What is the maximum time you are willing to walk or cycle to reach a city hub?
    - Willing to walk up to: _____ minutes
    - Willing to cycle up to: _____ minutes
    - I would not use a city hub, regardless of the travel time

    (b) What is the maximum additional travel time you would accept when using a city hub, compared to your usual transport?
    - Acceptable if it takes up to: _____% longer
    - Travel time is not the most important factor. Other benefits matter more
    - The trip must be at least as fast as usual. No extra time is acceptable
11. Transfer time — What is an acceptable transfer time?
    - Acceptable transfer time: _____ minutes
    - A bit of extra time is fine if the process is smooth
    - No additional time is acceptable. Switching should be immediate
12. A city hub can offer many features — Rank the following from most important (1) to least important (7):
    (a) Travel cost
    (b) Accessibility (reachable by foot or bike)
    (c) Availability (vehicles available when needed)
    (d) Safety (especially at night)
    (e) Ease of use (e.g. one app)
    (f) Comfort/facilities (shelter, shops, benches)
    (g) Environmental impact
13. What would convince you to let go of your private vehicle? (Select all that apply)
    - Shared vehicles are significantly cheaper per month than owning a private car
    - I no longer need to worry about parking, permits, or maintenance
    - I can try it out for a few months without risk or penalty

- Shared vehicles are always available when I need them
- A mobility hub with multiple transport options is within 5 minutes walking distance from my home
- I get access to reserved spots and better infrastructure for shared transport
- I can easily transport groceries, luggage, or children using shared vehicles
- I only use my car a few times per week anyway
- I cannot park my private car in front of my home anymore
- I would not give up my private car under any circumstances

14. Carpooling vs. private use — When using a shared car from a mobility hub, what would you prefer?

    - I prefer to use the car privately (no carpooling)
    - I am open to carpooling with others, as long as it is well organized
    - I don't mind either way
    - I would not use a shared car at all

B
Results data

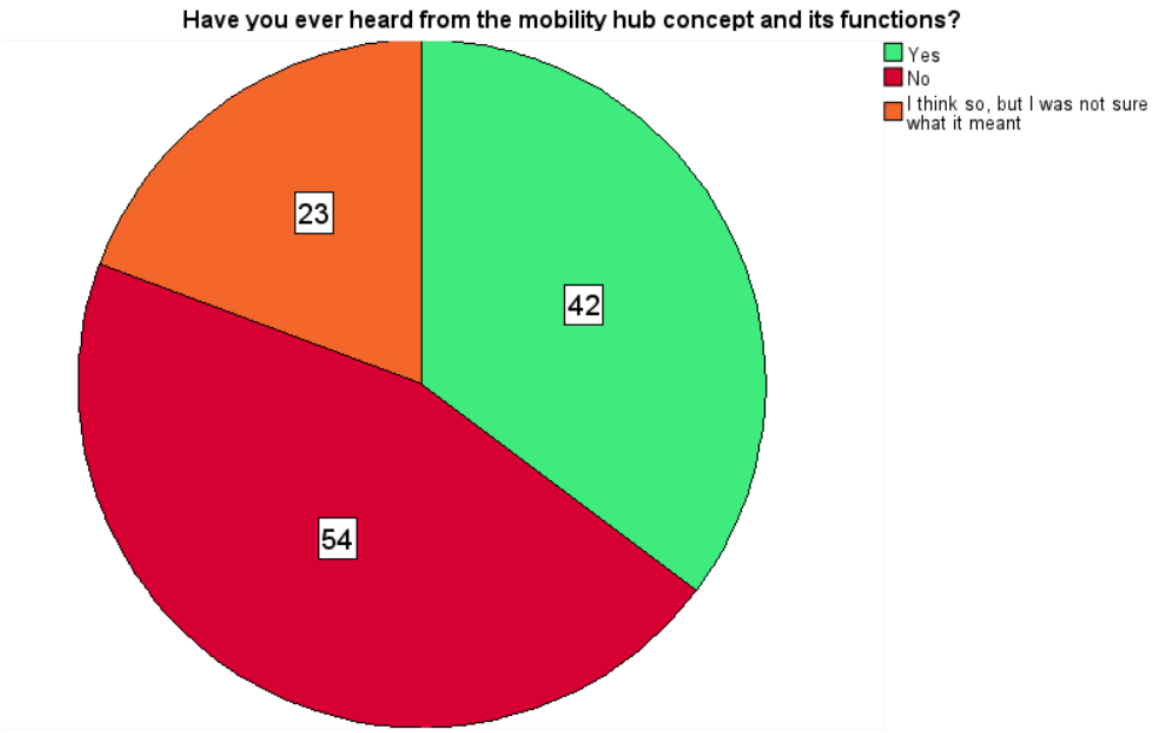


Figure B.1: Overall awareness of mobility hubs among respondents

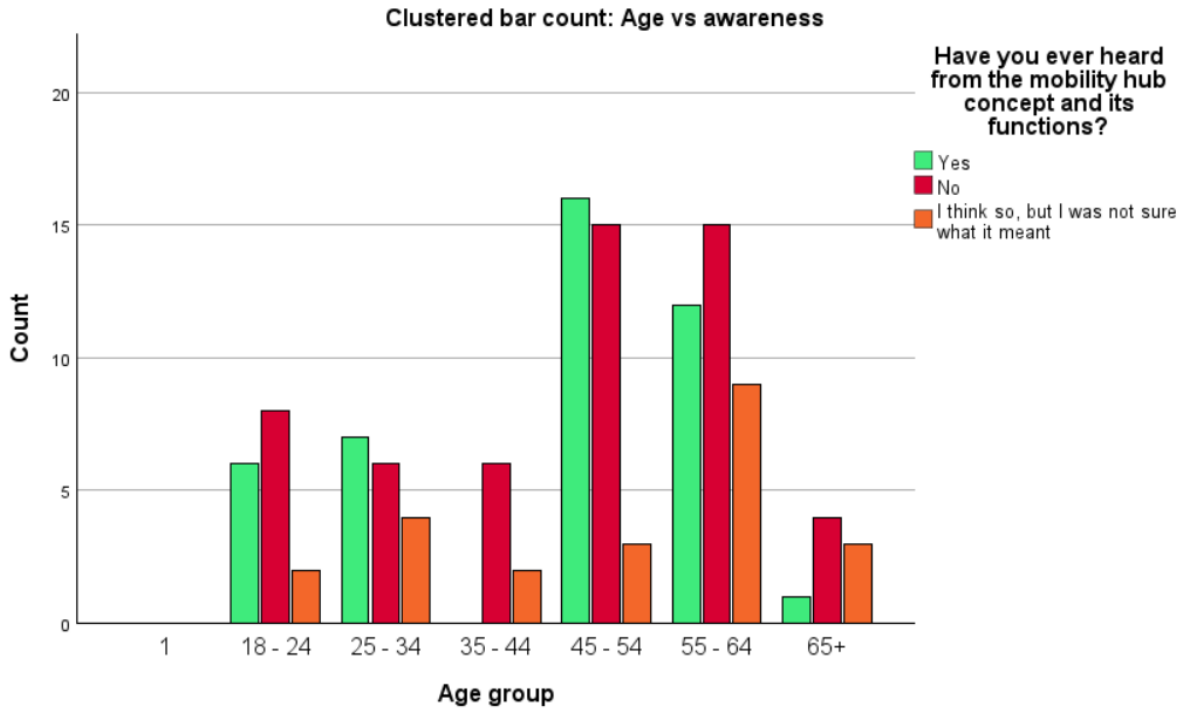


Figure B.2: Awareness of mobility hubs versus respondent's age groups

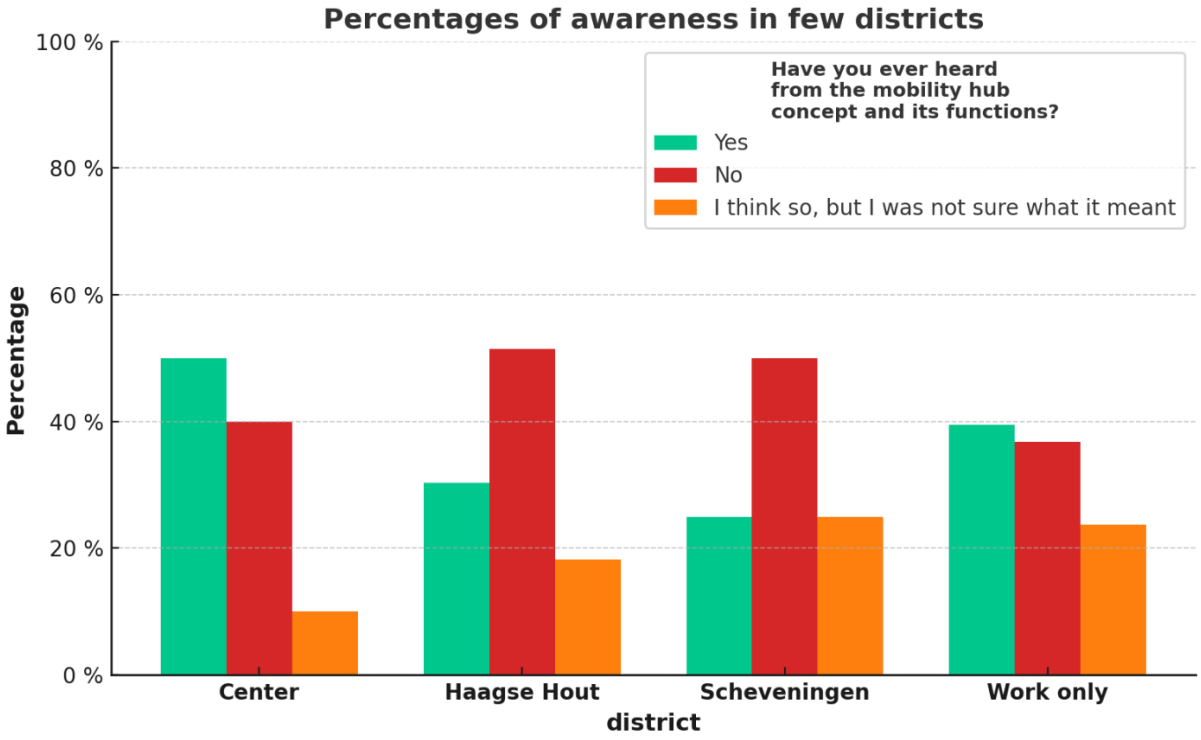


Figure B.3: Awareness of mobility hubs versus respondent's districts [F.2]

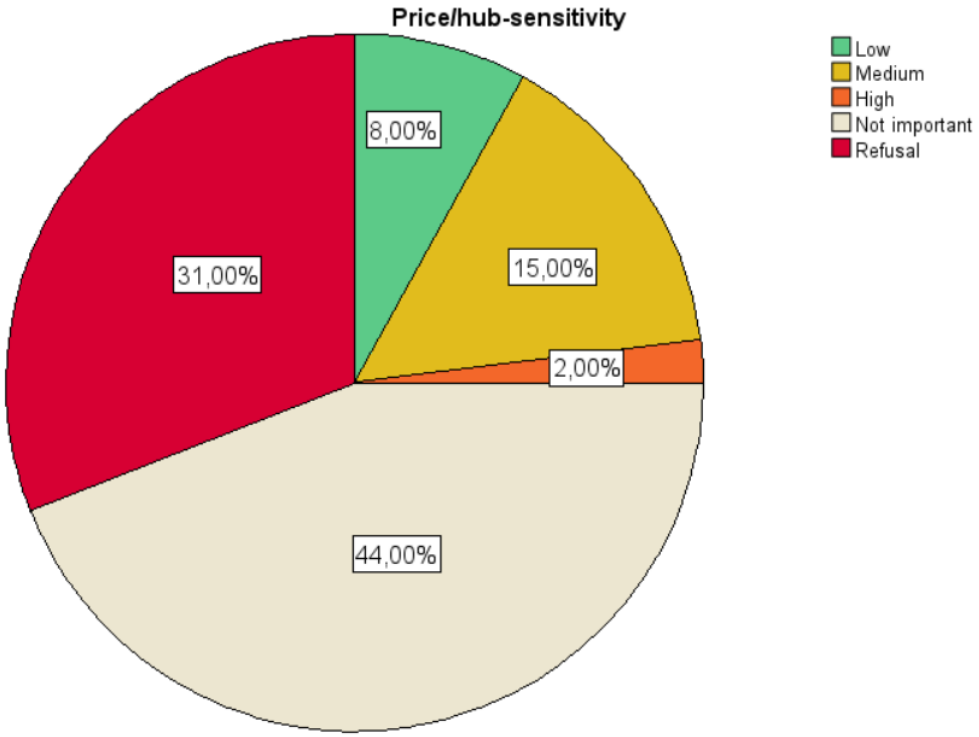


Figure B.4: Price/hub-sensitivity

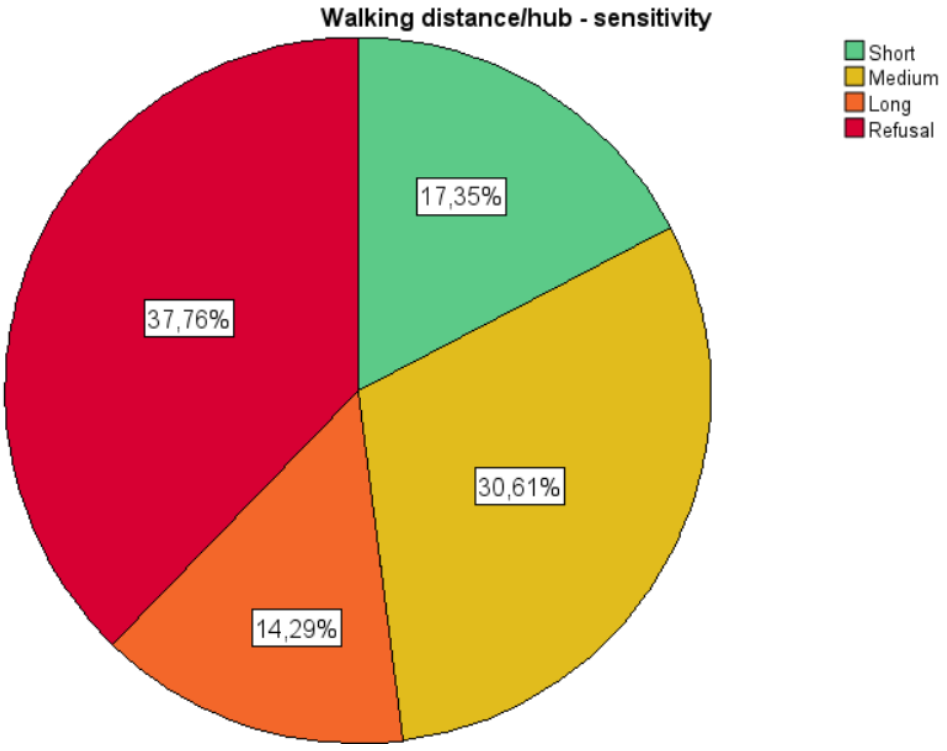


Figure B.5: Walking distance/hub-sensitivity

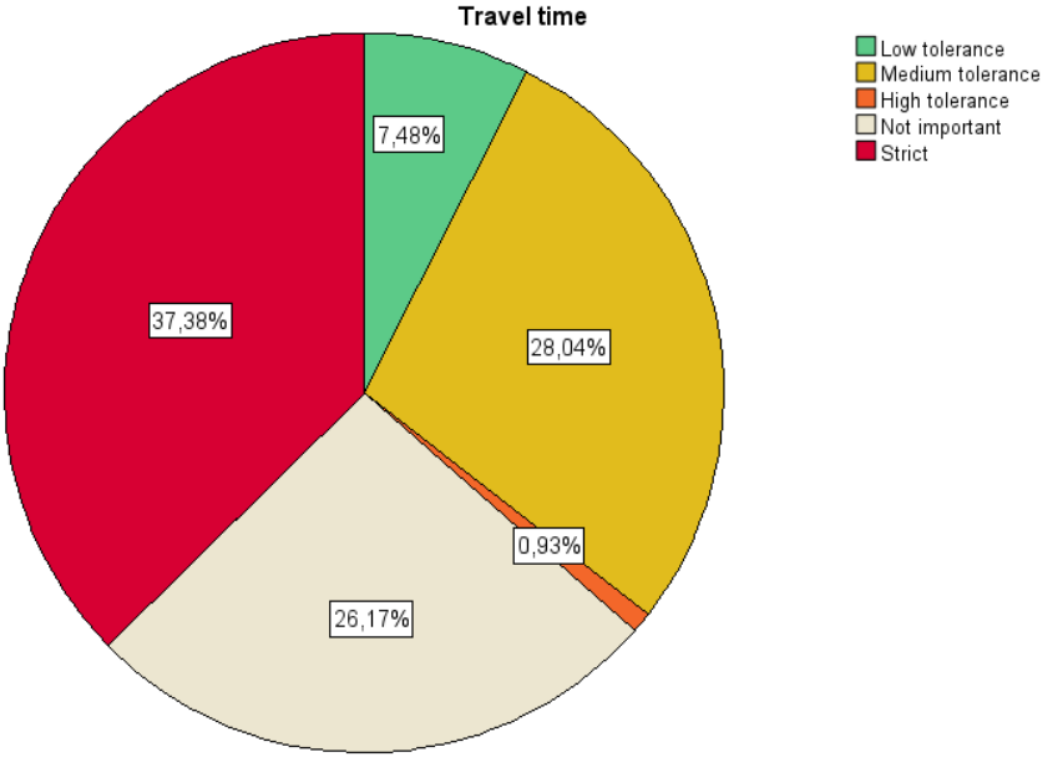


Figure B.6: Travel time tolerance

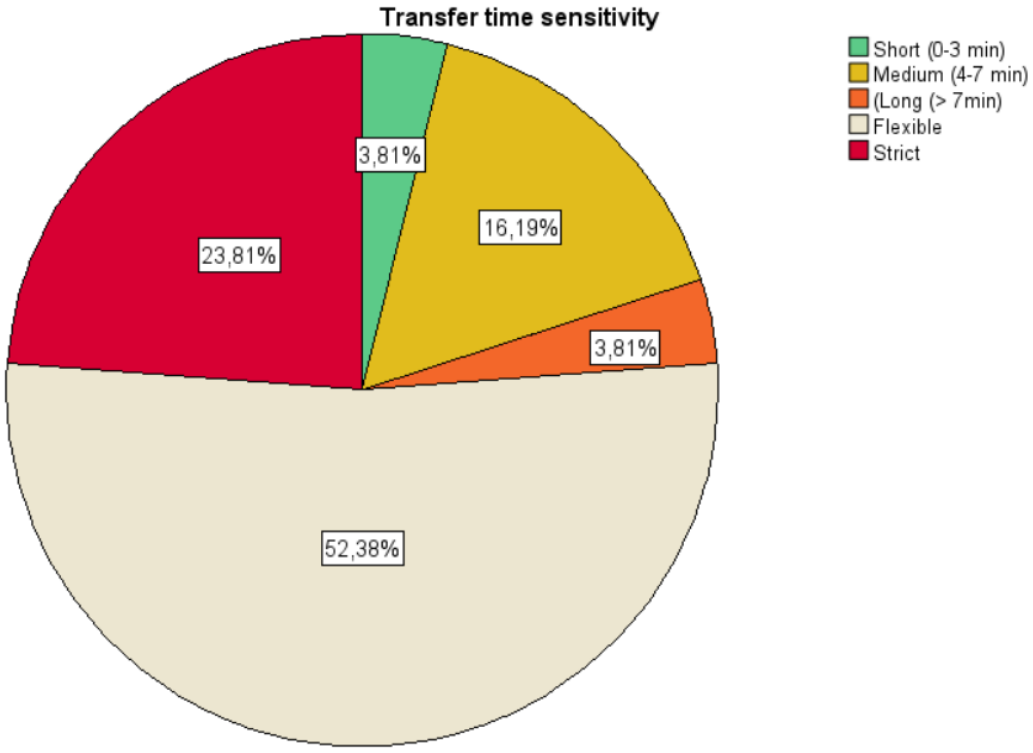


Figure B.7: Transfer time sensitivity

Table B.1: Refusal rates per factor and district

District	Travel cost	Walking distance	Travel time	Transfer time
Work only	32.3%	44.8%	28.1%	25.8%
Center	50.0%	44.4%	33.3%	44.4%
Scheveningen	33.3%	33.3%	43.8%	26.7%
Haagse Hout	32.1%	32.0%	48.3%	20.7%

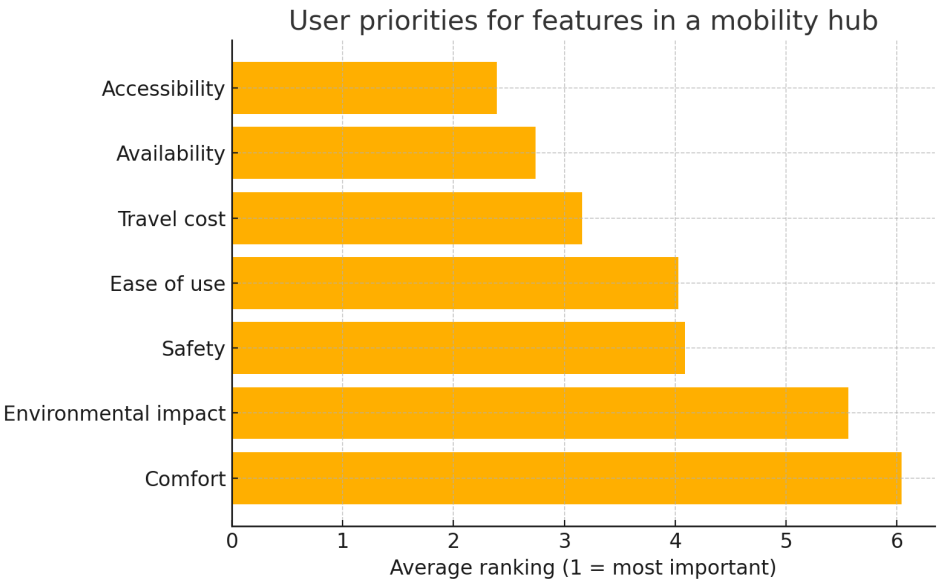


Figure B.8: Average ranking of features in a mobility hub (lower = more important) [F.1]

C
Districts

Figure C.1: District division of The Hague used for respondent grouping [17].

D

Current role mobility hub-data

This appendix contains official visual data on shared mobility use in The Hague, received from Diede Labots (Municipality of The Hague).

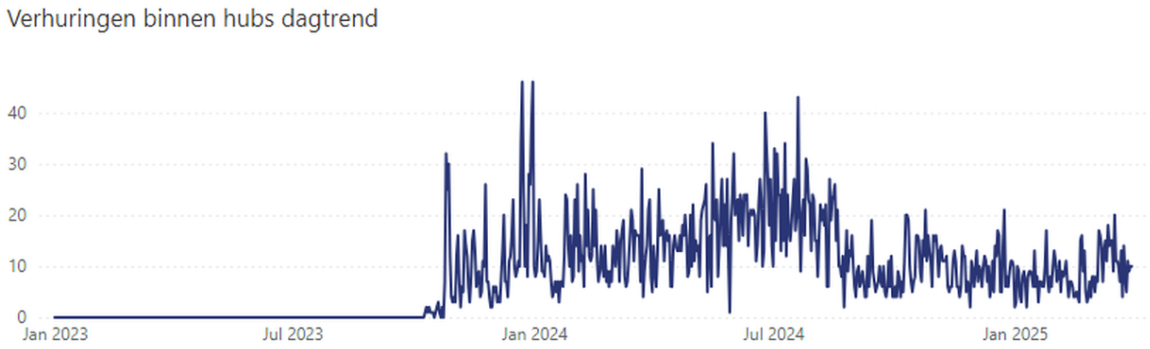


Figure D.1: Daily usage at Shell Mobility Hub Q-Park (2023–2025)

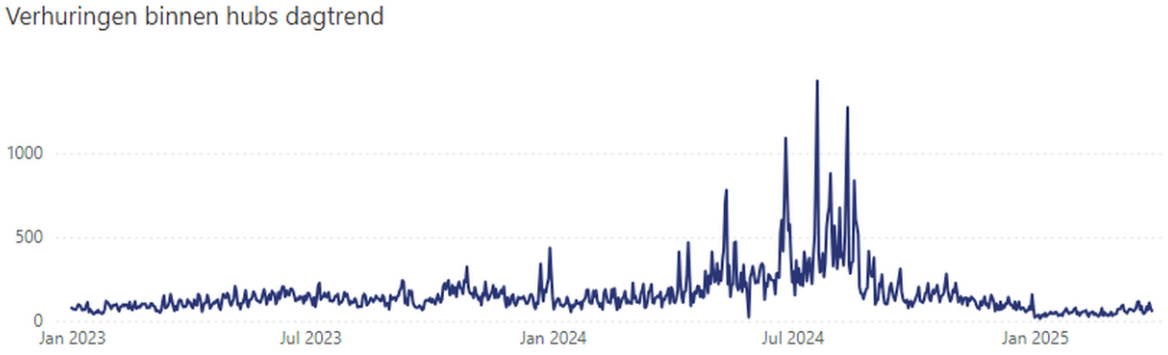


Figure D.2: Total daily rentals across all mobility hubs

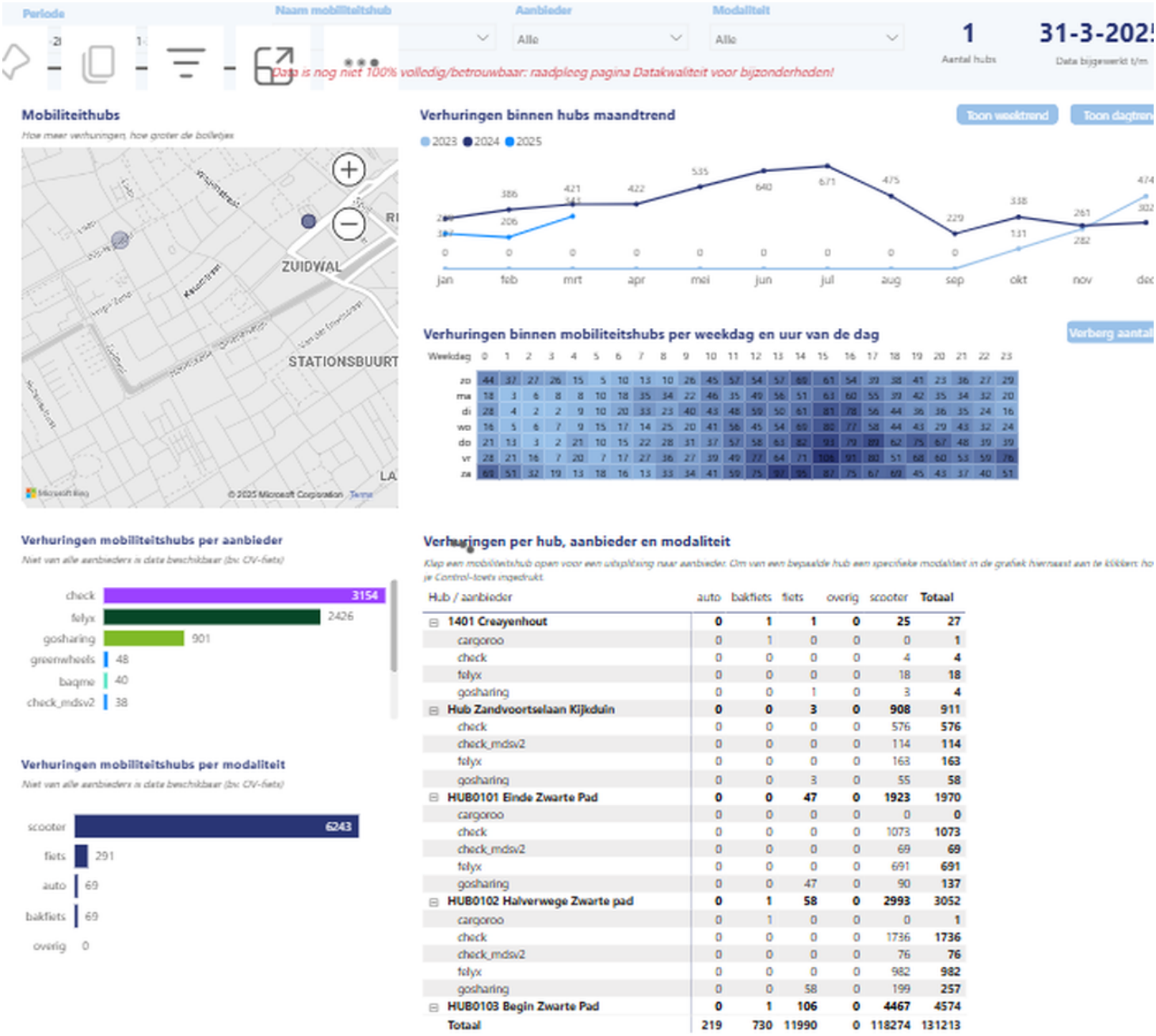
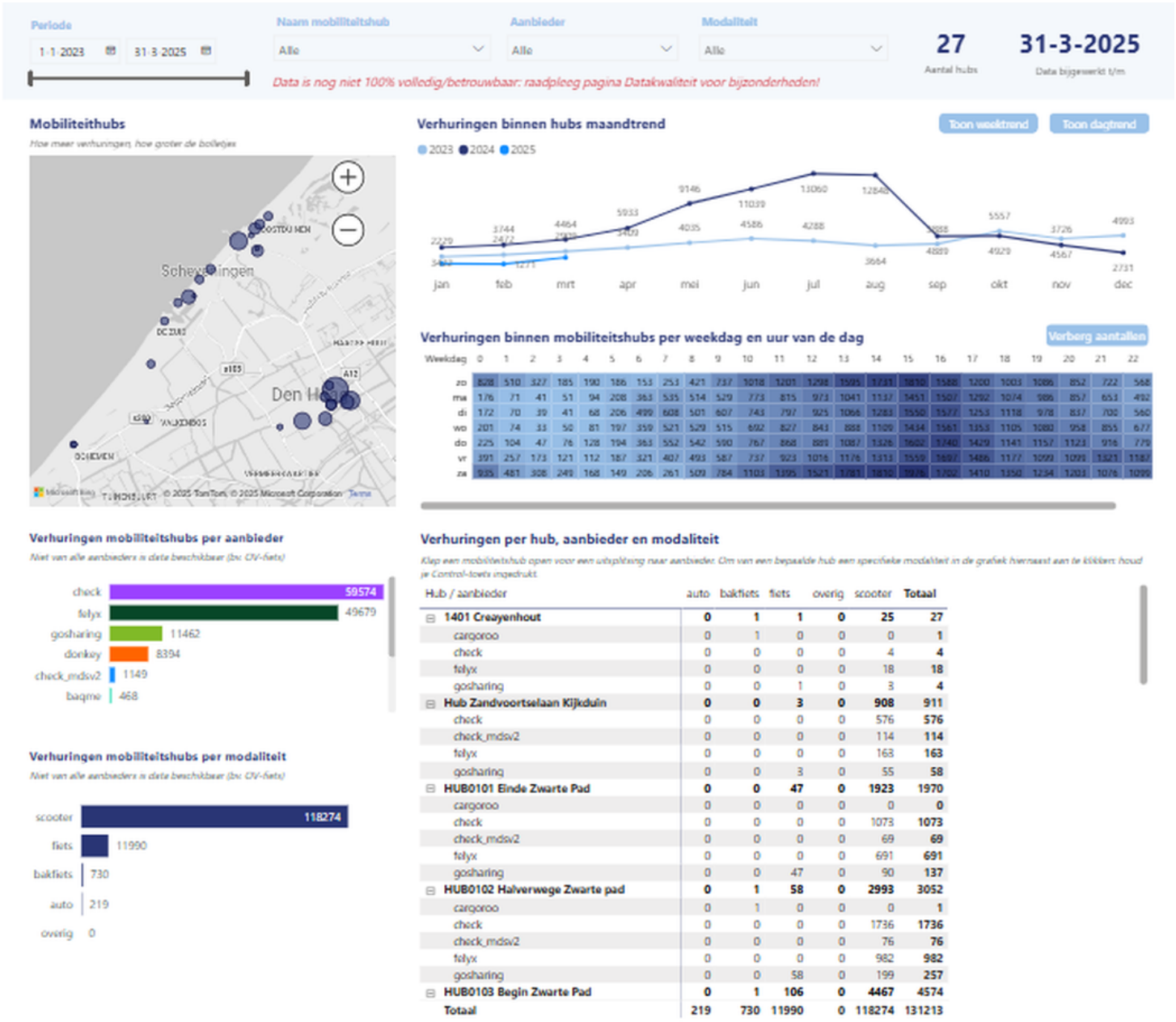
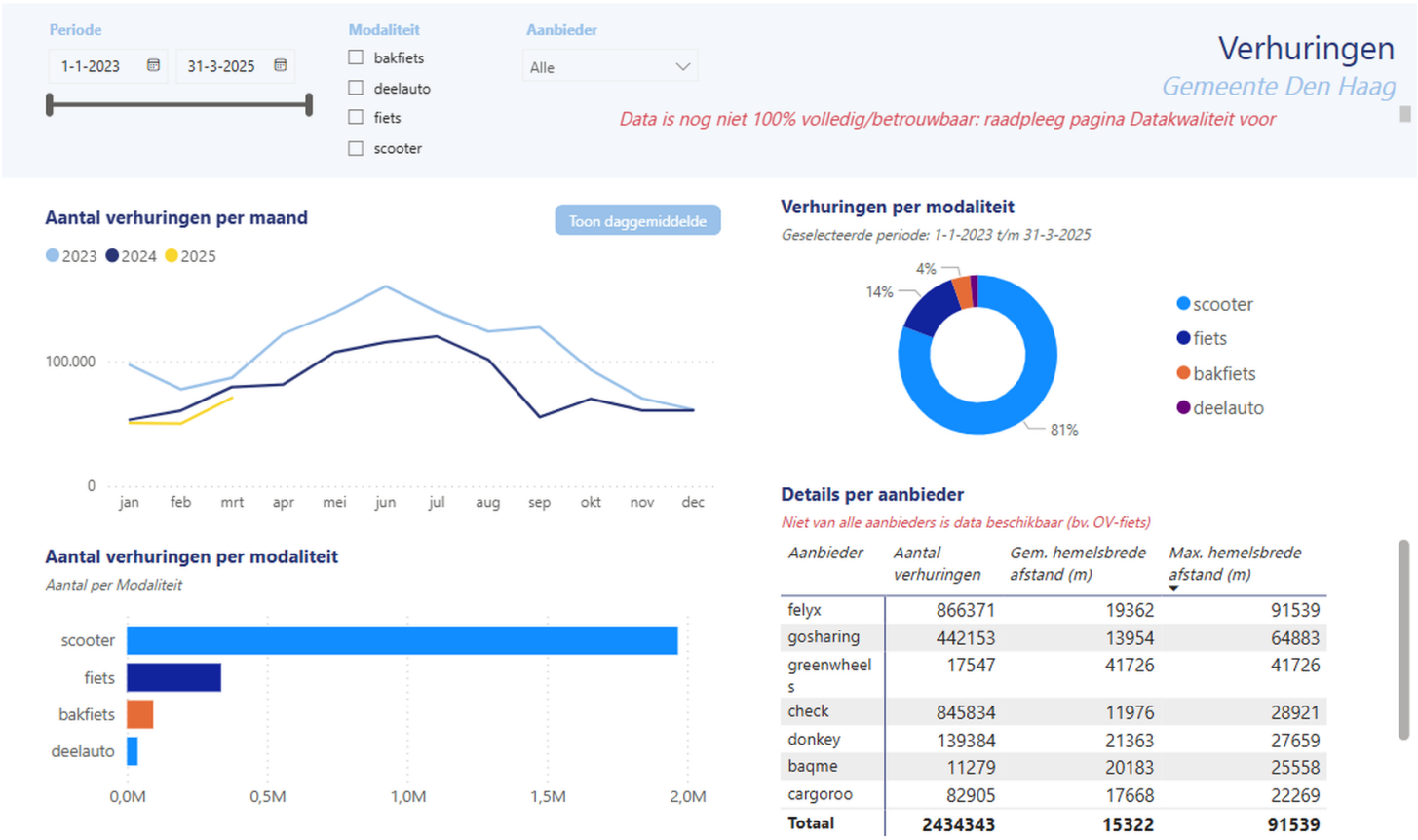


Figure D.3: Shell hub: hourly and monthly rental distribution



Hub / aanbieder	auto	bakfiets	fiets	overig	scooter	Totaal
1401 Creayenhout	**0**	**1**	**1**	**0**	**25**	**27**
cargoroo	0	1	0	0	0	**1**
check	0	0	0	0	4	**4**
felyx	0	0	0	0	18	**18**
gosharing	0	0	1	0	3	**4**
Hub Zandvoortselaan Kijkduin	**0**	**0**	**3**	**0**	**908**	**911**
check	0	0	0	0	576	**576**
check_mdsv2	0	0	0	0	114	**114**
felyx	0	0	0	0	163	**163**
gosharing	0	0	3	0	55	**58**
HUB0101 Einde Zwarte Pad	**0**	**0**	**47**	**0**	**1923**	**1970**
cargoroo	0	0	0	0	0	**0**
check	0	0	0	0	1073	**1073**
check_mdsv2	0	0	0	0	69	**69**
felyx	0	0	0	0	691	**691**
gosharing	0	0	47	0	90	**137**
HUB0102 Halverwege Zwarte pad	**0**	**1**	**58**	**0**	**2993**	**3052**
cargoroo	0	1	0	0	0	**1**
check	0	0	0	0	1736	**1736**
check_mdsv2	0	0	0	0	76	**76**
felyx	0	0	0	0	982	**982**
gosharing	0	0	58	0	199	**257**
HUB0103 Begin Zwarte Pad	**0**	**1**	**106**	**0**	**4467**	**4574**
Totaal	**219**	**730**	**11990**	**0**	**118274**	**131213**

Figure D.4: Mobility mode usage across all hubs (bikes, scooters, cars)



Aanbieder	Aantal verhuringen	Gem. hemelsbrede afstand (m)	Max. hemelsbrede afstand (m)
felyx	866371	19362	91539
gosharing	442153	13954	64883
greenwheels	17547	41726	41726
check	845834	11976	28921
donkey	139384	21363	27659
baqme	11279	20183	25558
cargoroo	82905	17668	22269
Totaal	**2434343**	**15322**	**91539**

Figure D.5: Rental share per provider and vehicle type

E

Interview Theo Thuis Q-Park

In an interview with Theo, a representative of Q-Park, the following key points were discussed regarding mobility hubs:

- Q-Park views mobility hubs as an essential component of future urban mobility strategies and is currently the only key player in mobility hubs in The Hague.
- According to Q-Park, a mobility hub should include at least the following elements:
  - **Shared mobility**: Availability of shared vehicles such as bicycles, scooters, and cars.
  - **Reservation system**: Vehicles can be booked in advance, reducing unnecessary traffic caused by drivers searching for transport or parking.
  - **Charging infrastructure**: Charging points for electric vehicles support sustainable transportation.
  - **Parking spaces**: These facilitate the transition from private to shared mobility.
- Theo emphasized that mobility hubs offer a solution to the ongoing reduction of parking spaces in urban centers, which aligns with policies promoting car-free zones.
- It is stated that travel time, transfer time, and travel cost are the three main factors influencing a person's choice to use for a certain mobility option.
- There is increasing demand from municipalities to implement mobility hubs as a structural response to mobility challenges.
- Q-Park distinguishes between three types of mobility hubs:
  - **Regional hubs (P+R)**: Located at the border of cities, supporting long-distance travel by enabling a switch to public or shared transport.
  - **City hubs**: Positioned within the urban area, balancing accessibility and sustainability goals.
  - **Residential hubs**: Small-scale hubs in neighborhoods providing access to short-distance shared transport options.

F
Python codes

This appendix contains the Python scripts used to generate the key visualizations in this thesis. Each listing corresponds to a figure referenced elsewhere in the report.

User priorities for a mobility hub

The figure showing user priorities for mobility hub features (Figure B.8) was generated using the Python code in Listing F.1.

```
import matplotlib.pyplot as plt

aspects = ["Accessibility", "Availability", "Travel cost", "Ease of use",
           "Safety", "Environmental impact", "Comfort"]
mean_scores = [2.39, 2.74, 3.16, 4.03, 4.09, 5.56, 6.04]

sorted_data = sorted(zip(mean_scores, aspects))
sorted_scores, sorted_aspects = zip(*sorted_data)

plt.figure(figsize=(8, 4))
plt.barh(sorted_aspects, sorted_scores, color="orange")
plt.xlabel("Average ranking (1 = most important)")
plt.title("User priorities for features in a mobility hub")
plt.gca().invert_yaxis()
plt.tight_layout()
plt.savefig("user_priorities_for_appendix.png")
```

Listing F.1: Bar chart of user priorities based on average rankings

Awareness of hubs by district

The awareness chart (Figure B.3) was created using the grouped bar chart script in Listing F.2.

```
import numpy as np
import matplotlib.pyplot as plt

districts = ["Center", "Haagse␣Hout", "Scheveningen", "Work␣only"]
yes = [50, 30, 26, 39]
no = [40, 52, 50, 37]
unsure = [10, 18, 24, 24]

x = np.arange(len(districts))
width = 0.25

plt.figure(figsize=(8, 5))
plt.bar(x - width, yes, width, label="Yes", color="mediumseagreen")
plt.bar(x, no, width, label="No", color="tomato")
plt.bar(x + width, unsure, width, label="I␣think␣so,\nbut␣not␣sure", color=
    "orange")

plt.ylabel("Percentage")
plt.xlabel("district")
plt.title("Percentages␣of␣awareness␣in␣few␣districts")
plt.xticks(ticks=x, labels=districts)
plt.legend(title="Have␣you␣ever␣heard\nfrom␣the␣mobility␣hub\nconcept␣and␣
    its␣functions?")
plt.ylim(0, 100)
plt.tight_layout()
plt.savefig("awareness_per_district_for_appendix.png")
```

Listing F.2: Grouped bar chart for awareness across districts

Refusal rate per factor per district

The refusal rate analysis shown in Figure 4.1 was generated using the code in Listing F.3.

```
import matplotlib.pyplot as plt
import numpy as np

labels = ["Work␣only", "Center", "Scheveningen", "Haagse␣Hout"]
travel_cost = [32, 50, 33, 32]
walking = [45, 44, 33, 32]
travel_time = [28, 33, 27, 21]
transfer_time = [26, 44, 33, 48]

x = np.arange(len(labels))
bar_width = 0.2

plt.figure(figsize=(10, 6))
plt.bar(x - 1.5*bar_width, travel_cost, width=bar_width, label="Travel␣cost
    ", color="orange")
plt.bar(x - 0.5*bar_width, walking, width=bar_width, label="Walking", color
    ="orangered")
plt.bar(x + 0.5*bar_width, travel_time, width=bar_width, label="Travel␣time
    ", color="hotpink")
plt.bar(x + 1.5*bar_width, transfer_time, width=bar_width, label="Transfer␣
    time", color="violet")

plt.ylabel("Refusal␣rate␣(%)")
plt.xlabel("District")
plt.title("Refusal␣rate␣per␣factor␣per␣district")
plt.xticks(x, labels)
plt.legend(title="Factor")
plt.ylim(0, 60)

for i in range(len(labels)):
    plt.text(x[i] - 1.5*bar_width, travel_cost[i] + 1, f"{travel_cost[i]}%"
    , ha='center')
    plt.text(x[i] - 0.5*bar_width, walking[i] + 1, f"{walking[i]}%", ha='
    center')
    plt.text(x[i] + 0.5*bar_width, travel_time[i] + 1, f"{travel_time[i]}%"
    , ha='center')
    plt.text(x[i] + 1.5*bar_width, transfer_time[i] + 1, f"{transfer_time[i
    ]}%", ha='center')

plt.tight_layout()
plt.savefig("refusal_rate_per_district_for_appendix.png")
```

Listing F.3: Bar chart showing refusal rates per factor per district

User priorities per age group

The figure showing user priorities for mobility hub features by age group (Figure 4.2) was generated using the Python code in Listing F.4.

```
import matplotlib.pyplot as plt
import numpy as np

aspects = ["Accessibility", "Availability", "Travel␣cost",
           "Ease␣of␣use", "Safety", "Environmental␣impact", "Comfort"]

# Gemiddelde scores per leeftijdsgroep
scores_young = [2.47, 2.73, 2.00, 4.40, 4.33, 6.13, 5.93]
scores_middle = [2.27, 2.41, 3.23, 4.05, 4.14, 4.86, 6.50]
scores_old = [2.41, 2.67, 3.39, 3.94, 4.02, 5.67, 5.91]

x = np.arange(len(aspects))
bar_width = 0.25

plt.figure(figsize=(10, 5))
plt.barh(x - bar_width, scores_young, height=bar_width, label="24")
plt.barh(x, scores_middle, height=bar_width, label="25-44")
plt.barh(x + bar_width, scores_old, height=bar_width, label="45")

plt.yticks(x, aspects)
plt.xlabel("Average␣ranking␣(1␣=␣most␣important)")
plt.title("User␣priorities␣for␣features␣in␣a␣mobility␣hub␣by␣age␣group")
plt.gca().invert_yaxis()
plt.legend()
plt.tight_layout()
plt.savefig("user_priorities_age_groups.png")
```

Listing F.4: User priorities per age group

G

Implementation process Leuven

Figure G.1 shows the full implementation framework used by the city of Leuven to deploy electric mobility hubs (eHUBS). The diagram outlines the various steps taken throughout each phase of the process, from strategic planning to practical implementation.

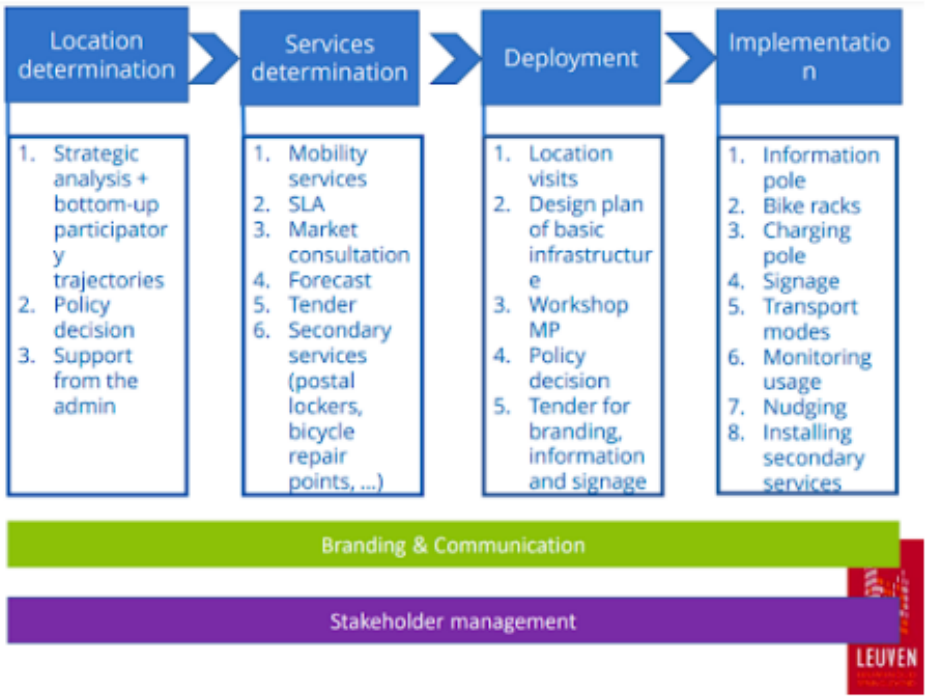


Figure G.1: Steps taken throughout mobility hub implementation process [18].

H
Planning

Week	Initial Planning	Actual Work Done
Week 1: 22–28 April	Finalize work plan, start literature review (mobility, carsharing), draft survey, collect policies (e.g., Utrecht)	Finalized work plan, started literature, drafted survey
Week 2: 29 April – 5 May	Develop methodology, continue literature, analyze Belgian cases (Gent, Leuven), contact experts	Expanded methodology, analyzed Leuven/Gent, started reaching out to Diede Labots and Theo Thuis, first feedback and edits to methodology
Week 3: 6–12 May	Start GIS analysis, explore OmniformGroup data, finalize/test survey	Interviewed Theo Thuis (9 May), finalized methodology, completed and tested survey, received data from Q-Park and municipality
Week 4: 13–19 May	Midterm presentation, distribute survey, analyze CBS & SnappCar data, complete Belgian case	Midterm presentation (15 May), launched survey distribution
Week 5: 20–26 May	Analyze preliminary results, survey data analysis, develop conceptual hub model (GIS)	Analyzed survey results in SPSS, started drafting results chapter (factor analysis, bottlenecks)
Week 6: 27 May – 2 June	Finalize and evaluate results, create user scenario model, draft methodology and results chapters	Wrote methodology and results chapter, including district comparison and user priority ranking
Week 7: 3–9 June	Prepare elevator pitch, start drafting conclusion, begin final presentation	Prepared elevator pitch, drafted conclusion, designed first slides for final presentation
Weeks 8 & 9: 10–24 June	Complete thesis, refine and prepare final presentation (24 June)	Finalized thesis (conclusion, recommendations), completed slides and submitted full report (16 June)

I

Presentation slide Q-Park

Figure I.1: Slides presented from Q-Park [9].