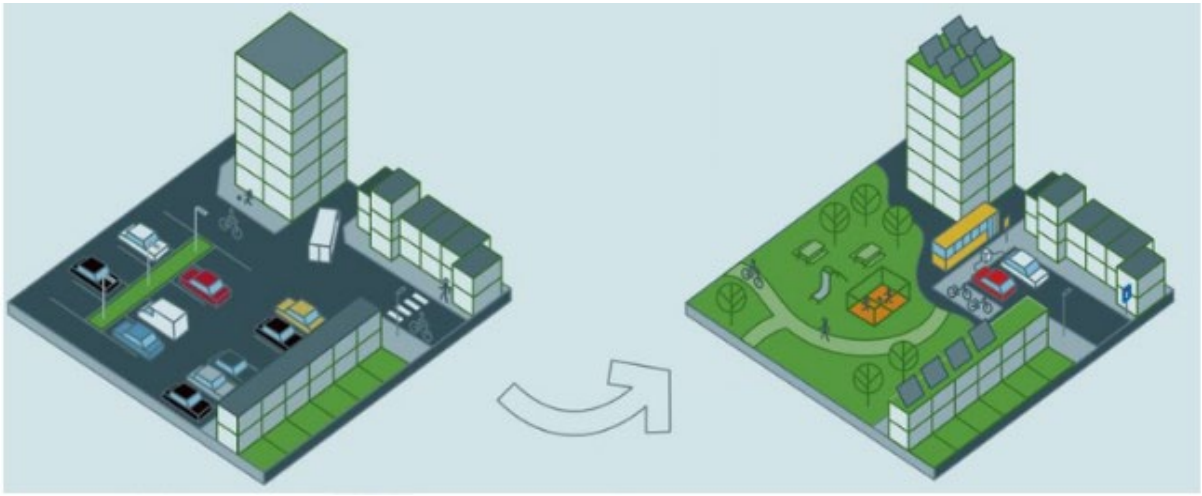
Combining Shared Mobility & Housing for more space, greenery and playgrounds: feasible or utopia?

A qualitative study into the integration of shared mobility in housing projects



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Preface

In front of you you see the final result of my master thesis to finalise the master Urban and Regional Mobility at Radboud University Nijmegen. In this thesis, research has been conducted into the extent to which the integration of shared mobility in housing projects can stimulate the use of shared mobility. The entire process from idea to end result was an instructive period. Due to personal interests in mobility, I have worked on the research with great pleasure and satisfaction. During this research, interviews were conducted with various organisations and authorities. The conclusions I have drawn in this research are based on the knowledge, learning and experience of experts in the field of mobility and spatial planning. I would like to take this opportunity to thank them for their cooperation in this research and the knowledge they have shared with me. Without them this research would not have been possible. I would also like to thank my thesis supervisor Sander Lenferink for his guidance during the research process. I could contact him at any time and expect clear and constructive feedback.

I would like to wish you a good time reading my master thesis, thank you.

Teun Sturkenboom,

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Summary

Car ownership and car use in its current form has many negative consequences for our quality of life. Shared mobility can potentially contribute to a solution to these problems. To date, however, shared mobility has been used too little. In this study, an attempt was made to investigate to what extent integrating shared mobility in housing projects can stimulate shared mobility. The provision of shared mobility in combination with adjusted parking standards is central to this research. Several theories related to behavioural change, two-sided markets, institutions and public & private goods have been used to support this study. The research was conducted through a single case study into the Hogekwartier district in the city of Amersfoort. The data was collected by conducting semi-structured interviews with housing corporations, project developers, policy makers, mobility advisors and others active and playing a role in this sector. The data was analysed by coding the interviews and on this basis the results chapters have been written.

The case study shows that the integration of shared mobility in the Hogekwartier has not been successful so far. The low usage figures can be partly attributed to Covid-19. In addition, it appears that the absence of public transport and a good parking regime play a major role in the low usage rate. In addition, the Hogekwartier area is located next to a highway, and the resident groups are focused on long commutes, which causes them to use their own car. In the future, there is still a lot to gain in terms of publicity, scaling up shared mobility and applying a parking regime, which offers some perspective for the Hogekwartier district.

In addition to the Hogekwartier case study, the factors that generally influence the integration of shared mobility in housing projects were also examined. This research shows that in many cases developers think too supply-oriented about shared mobility and that they see shared mobility more as a means to complete their housing assignment and to develop a better business case. Other preconditions for the correct integration of shared mobility in housing projects focus on taking the target groups into account, offering a mobility-mix and a corresponding active and steering mobility policy. In addition, it has been established that the integration of shared mobility in area development requires an enormous change in behaviour. In order to steer this behavioural change, it is important to integrate shared mobility at an early stage, to price shared mobility correctly and to give residents time to get used to this change. Finally, it was investigated to what extent the integration of shared mobility in housing projects contributes to an improvement in quality of life. This shows that residents, municipalities and developers are not sufficiently concerned with the benefits that

this concept can have for the quality of life. It can help to let residents participate in the process and for example start a neighbourhood foundation.

In conclusion, this research shows that the integration of shared mobility in housing projects could potentially be a good way to stimulate the use of shared mobility. To date, it has proved difficult to get residents to use shared mobility. To incentivize the use of shared mobility, it is extremely important that municipalities and developers create the right preconditions and that the most important factors are taken into account at all times. That is why the practical recommendations focus on improving mobility policy and on cooperation between municipalities and developers. In the scientific field, it has been recommended to carry out follow-up research into the consumer side of integrating shared mobility in housing projects and to see which means of transport replace each other.

Key words: Shared Mobility Housing Parking Behaviour Policy

Contents

1. Introduction

1.1 Problem statement

The use of shared mobility as part of a solution for spatial and environmental problems of densely populated cities has gained more interest over the past 20 years. Shared mobility can potentially make a positive contribution in the field of mobility, quality of life and sustainability. This research will examine whether the integration of shared mobility in housing projects can stimulate the use of shared mobility.

Cities have grown rapidly over the past 50 years. In 1950, only 30% of the world's population lived in cities. More than half a century later, in 2007 a point was reached where more than half of the world's population lives in a city (Ritchie, 2018). This trend has also continued in Europe where 72% of the population now lives in urban areas and urban regions (European Union & United Nations Human Settlements Programme, 2016). This increase of citizens can be explained by on one side the natural growth of the population and on the other side an increasing number of young adults and immigrants settling in the cities (CBS, n.d.). Cities in the Netherlands have also become popular in the past 50 years and this trend will only continue as a result of domestic and international migration (van Binsbergen & Hoogendoorn, 2016). According to the CBS, the population of the Netherlands will increase in the coming years to a population of 18.3 million in 2035 (2019). This growth will mainly take place in large and medium-sized cities. This demographic growth of cities naturally has consequences for the city itself and presents social and spatial challenges for policy makers.

One of the biggest challenges for Dutch cities is the limited amount of space. The Netherlands is one of the most densely populated countries in Europe with 487 inhabitants per square kilometre (CBS, 2011). As a result, policymakers in the Netherlands have to use the physical space in a smart and efficient way. In the Netherlands you generally do not have to travel far to get to your destination. This is partly due to a good network of public transport and the major role of the bicycle in the Dutch traffic system. Despite the good public transport system and the role of bicycles, car use and car ownership in the Netherlands continues to increase. According to figures from the CBS, there were almost 8.7 million passenger cars in the Netherlands in 2020 (2020). This is an increase of 1.7 percent compared to the previous year. This means that the number of cars is increasing faster than the population of the Netherlands. The car takes up a lot of space and has always played a

prominent role in the design of cities in the Netherlands since there must be sufficient space on the road to prevent congestion and also sufficient parking space.

In densely populated cities, shared mobility can potentially have many advantages in terms of urban mobility and sustainability. The greatest advantage of using shared mobility for consumers is that they are not tied to the fixed costs of buying –and owning- for example a car (Wielinski, Trépanier, & Morency, 2016). Many of these shared cars are electric. One of the biggest barriers for people to buy an electric car is the price: an electric car is simply more expensive than a regular petrol car (Wappelhorst et al., 2014). One of the advantages of shared mobility is that these costs are distributed evenly among all users, making it financially advantageous and thus more accessible to use this service.

In addition to the consumer side, shared mobility can also have positive effects on the city itself. For example, shared mobility leads to a decrease in congestion in the cities. Research has shown that people will drive less if they use forms of shared mobility than if they own a car (Wappelhorst et al., 2014). Today, many of the shared mobility options offered in cities are electric. Using electric shared mobility compared to regular petrol cars and scooters leads to a reduction in CO2 emissions in a city (Rycerski et al., 2016). This has several positive consequences in the field of heat stress and climate change.

The private car is parked on average 23 out of 24 hours a day (Firnkorn & Müller, 2011). This means that a lot of parking space is required for all stationary cars. The use of different forms of shared mobility can contribute to solving this parking problem: a reduction in the total number of stationary cars in a city. The result is that less space is needed for parking spaces and more space is available for public space. Despite all the advantages, a recent report by the KiM (Knowledge Institute for Mobility Policy) showed that shared mobility is still little used in the Netherlands (Ministry of Infrastructure and Water Management, 2021). While at the same time, according to the CROW, the number of, for example, shared cars has grown enormously in recent years (CROW, 2021a). So the supply is increasing but the demand remains arguably the same. It has been found that shared mobility users are responsible for only 0.02% of the total number of trips in the Netherlands and this has not grown since 2014 (Ministry of Infrastructure and Water Management, 2021).

Relatively speaking, the use of shared mobility has not increased very much in recent years. There are several possible reasons for this. Such as the price, inconvenience or limited availability. In addition, owning a car is interwoven in our culture and society and this is something that is difficult to get rid of. There are various ways for municipalities and provinces to promote and stimulate shared mobility. Parking standards have recently been

regularly seen as an important instrument to ensure that people get rid of their own car and use shared mobility. One of the most interesting developments that is currently becoming popular is the integration of shared mobility in housing projects. This led to the City Deal for Electric Shared Mobility in Area Development, which was signed in 2018. In this deal, innovative housing projects with a major role for shared mobility started in seven cities in the Netherlands (Agenda Stad, 2019). In these projects, different parking standards are used than those that people are used to from the theory. Instead of adhering to a standard of 1.5 to 2 parking spaces for each home, shared cars and cargo bikes are integrated for several houses. This potentially leads to fewer emissions, cheaper homes and more space for greenery, parks and playgrounds.

To conclude, the core of the problem lies in densely populated cities that suffer from various spatial and environmental problems of which car use is a major cause. Shared mobility can offer an efficient solution in this respect, but in many cases the user figures are still very low. Can the integration of shared mobility in housing projects stimulate the use of shared mobility? To find out it’s important to take a look at how developers view shared mobility. Which factors are important here when integrating shared mobility into housing projects and to see whether this aligns with public shared mobility goals? This research will make an attempt to provide a clear answer to these questions.

1.2 Research aim

The above problem statement has shown that the integration of shared mobility in housing projects is central to this research. The aim of this research is to gain insight into the extent to which the integration of shared mobility in housing projects can stimulate the use of shared mobility in the city. It is also important to see what lessons can be learned from the treated case, namely the neighbourhood 'Hogekwartier' in the city Amersfoort. The reasoning behind this case will follow in chapter 3. With the results of this research, an attempt is also made to make statements about other cases and to generalise the results to other cities.

An attempt will be made to get a clear picture of the various factors that play a role in the integration of shared mobility in housing projects. By examining which factors are important here, it is easier to establish the relationship between the integration of shared mobility in housing projects and the use of shared mobility. The research also aims to gain knowledge about both the private and public side of the story. Shared mobility is integrated by private

organisations or housing corporations in their housing projects, but must be in line with public shared mobility policy. To get a better understanding of the factors that play a role in the integration of shared mobility in housing projects, this research contributes to the aim of acquiring more knowledge to improve urban development and land use, of which mobility is a big part.

1.3 Research questions

In order to achieve the aim of this research, the following main question was formulated:

To what extent does the integration of shared mobility in housing projects stimulate the use of shared mobility?

The main question requires some explanation. In this study, the integration of shared mobility in housing projects refers to the provision of various forms of shared mobility in the development of new-built housing projects. The aim is to examine to what extent the integration of shared mobility stimulates the use of the shared mobility by residents in those neighbourhoods.

The following sub-questions have been formulated in order to provide a clear answer to the main question:

1. How do developers view the value of shared mobility?
2. Which aspects must be taken into account when integrating shared mobility in housing projects?
3. What is the role of behavioural change when integrating shared mobility in housing projects?
4. To what extent is the integration of shared mobility in housing projects in line with public shared mobility goals?

1.4 Scientific relevance

Looking at the scientific literature, little has been written about the integration of shared mobility in housing projects. Nevertheless, according to various Dutch sources, this appears to be a promising way to stimulate behavioural change with regard to mobility. For example,

an article by Jelle Postma (2020) argues in favour of making shared mobility mandatory through the VvE (Association of Owners). By implementing shared mobility in housing projects and no longer adhering to the current parking standards, you may be able to steer people to get rid of their own car and where necessary to use, for example, a shared car, bicycle or cargo bike.

The concept of housing with different parking standards is not completely new. In practice, there were various so-called 'car-free housing' or 'low-car housing' projects in the late 1990s and the early 2000s where there were no or a limited number of parking spaces for private cars. In the scientific literature, different types of research have been done on different car-free housing projects. For example, a study was done on the city of Vienna and the differences in environmental effects between two housing projects were examined: one car-free project and the other with cars allowed (Ornetzeder et al., 2008). A study by Nobin (2003) did not look at the environmental effects of car-free housing, but instead examined the change in mobility behaviour of residents who move to a low-car housing project. This was carried out through a case study in Freiburg, Germany. Another article looked at how car-free housing developments can contribute to sustainable smart growth and urban regeneration (Kushner, 2005). The article also discusses the possibility of implementing shared mobility in car-free housing projects. Kushner argues that shared cars should be a municipal service to be successful in these projects, because it is not financially profitable enough for the companies providing shared mobility (Kushner, 2005). In this study, several cases were included in Austria, Germany, the Netherlands and Scotland. These studies raise the question of why people would choose the option to live in this way. A study by Paijmans and Pojani (2021) looked at the motivations for city residents to live car-free. The survey found that these people generally consider car ownership unnecessary if you make certain practical changes in your life. This choice is often made under the core argument for ‘going green’.

As can be read above, research has been done from different perspectives into housing with lower parking standards. In addition, several cases have already been investigated in the scientific literature. What is striking is that there are still very few studies that specifically focus on the integration of shared mobility in so-called low-car housing projects. In particular, little research has been conducted into the public and private policy side of shared mobility. The few studies that have been done are outdated, partly because shared mobility has changed in recent years due to technological innovations. The aim of this research is to close this scientific knowledge gap with regard to the integration of shared mobility in housing projects. In addition, this study may offer new possibilities for further research

1.5 Societal relevance

This research can also make a contribution at a societal level. As mentioned earlier, Dutch cities experience many problems as a result of a growing population together with limited space. This leads to challenges in the field of mobility and sustainability. The pressure on public space is great, and efforts are being made to use it more efficiently by reducing the number of cars on the street and reducing parking pressure (Ministry of Infrastructure and Water Management, 2021). Shared mobility has developed in recent years into a concept that could potentially make a major contribution to tackling these challenges in an efficient way (CROW, 2021b). Shared mobility offers a sustainable solution to spatial and mobility problems faced by densely populated cities. The positive consequences in terms of mobility, space and sustainability that shared mobility can have on our society is central to the social relevance of this research.

As we have seen in scientific relevance, attempts have been made in several European cities for car-free development, with in some cases the incorporation of shared mobility. Many of these projects were carried out in the early 2000s but were not successful at the time. In the meantime, shared mobility and the entire infrastructure and charging systems behind it have become smarter and more intelligent. This research focuses on the question to what extent the integration of shared mobility in housing projects can stimulate the use of shared mobility in the city. By better understanding how organisations implement shared mobility, how this is in line with public shared mobility goals and which aspects are important here, you make a direct social contribution to those organisations, municipalities and provinces to find out whether this concept can be of value to society.

Dutch cities want to invest heavily in shared mobility in the future (Agenda Stad, 2018). In addition to public incentives, it is then important to seek private ways to incentivize people to make use of shared mobility. This research provides insight into the extent to which this can have a positive effect. In addition, the results of this study are important for municipalities to see how they can align their parking policy, as part of their mobility policy, to this new concept. After all, it makes no sense to develop a housing project with only shared mobility when there is sufficient public parking space a street away. Municipal or provincial policy must be aligned with private development. In conclusion, the results of the research make a social contribution to various actors.

2. Theoretical framework

In the theoretical framework the most relevant theories, models and concepts with regard to the subject will be defined and elaborated. In addition, the most important concepts from the problem statement and research questions will be delineated. This is done to frame the research as optimally as possible.

2.1 Shared mobility

Looking at the scientific literature over the past two decades, much has been written about shared mobility in general. Shared mobility received more attention and became more popular from 1990 (Illgen & Höck, 2018). The concept of shared mobility has grown enormously over the past 20 years and has gone through various developments and transitions. Shared mobility can be defined as follows: *''...trip alternatives that aim to maximise the utilisation of the mobility resources that a society can pragmatically afford, disconnecting their usage from ownership''* (Machado, de Salles Hue, Berssaneti, & Quintanilha, 2018).

2.1.1 Shared economy

The concept of shared mobility is part of a broader concept that has been on the rise in the last 20 years, namely the shared economy. Shared economy can be defined as follows: *"...a new economic model based on the peer-to-peer activity of obtaining, giving, or sharing access to goods and services, coordinated through community-based online services"* (Hamari , Sjoklint, & Ukkonen, 2015). Often reference is also made to 'access-based consumption' and 'platform economy'. This concerns goods that can be used more efficiently by sharing. In this case, the *use* of a good conflicts with the *possession* of a good. The sharing economy is applied in many different industries, with platforms such as Uber (ride sharing) and Airbnb (accommodation sharing) as the best-known examples. Yet many of these sharing industries have certain similarities. For example, the various platforms contain features such as ratings-based marketplaces and in-app payments (Narasimhan et al., 2017).

A more comprehensive definition is used in a publication by Schlagwein, Schoder, and Spindeldreher (2019). According to them, the sharing economy refers to *“…a set of organisational and business models based on ‘sharing’, ‘collaborative’, ‘gig’ or ‘access’ approaches to the use of resources”* (Schlagwein et al., 2019). This definition is broader in nature and deliberately does not include the term ‘peer-to-peer’, as opposed to the definition

by Hamari et al. (2015). In this article the definition is therefore not limited to consumers who offer a good or service to each other, but companies that offer shared goods are also incorporated. This is an important difference, especially when looking at shared mobility as part of the shared economy. Shared mobility is therefore not limited to peer-to-peer sharing, but also involves business-to-consumer sharing. When implementing shared mobility in housing projects, in almost all of the cases, business-to-consumer sharing is used.

2.1.2 Carsharing

Carsharing is a concept that is central to this research. Carsharing can be defined as follows: a system in which people can use cars in the vicinity, at any time and indefinitely (Münzel et al., 2017). This definition is very broad. The definition of carsharing depends on the form and type of carsharing system. Carsharing has developed rapidly over the past 20 years, resulting in various carsharing systems. Much has been written about the different forms of carsharing. This is therefore a topic that often returns in the literature. For example, Münzel et al. (2019) make the difference between B2C (business-to-consumer) and P2P (peer-to-peer) clear. With B2C carsharing, an organisation owns a fleet of vehicles that customers can use. This organisation can be set up for profit or as a non-profit service. The cars are spread over a city or area and the users can pick up the car themselves and pay per minute, hour or day - depending on the organisation. Fixed costs such as maintenance and insurance are paid by the organisation. In another article by Jorge, Correia, & Barnhart (2012) they involve different forms of B2C carsharing. The first and most classic form of carsharing is 'station-based'. Here, a user can reserve the car, pick it up at a station and return it at the same station. This is also referred to as 'round trip' sharing (Jorge et al., 2012). The second form of carsharing is also station-based, but with this form it is not necessary to make a 'round trip'. The user of the shared car picks up the car at a station, but does not have to deliver it to the same station: 'one-way' carsharing is used (Jorge et al., 2012). Firnkorn (2012) adds one of the new forms of carsharing in his article: a form of carsharing that eliminates stations and makes a step towards 'free-floating' carsharing. This allows the user to trace an available car on a map, use it and then return it to a location of their choice within a certain area.

The opposite of B2C is P2P carsharing. Here, the car-sharing organisation offers a platform where private car owners and users are linked. P2P carsharing is provided with a platform in which private individuals serve as both provider and user. The advantage of this is that P2P is easy to apply in less populated areas, because the market for companies there is too small (Münzel et al., 2019). The differences and the advantages and disadvantages of P2P

compared to B2C is an important topic in carsharing and much has been written about it. According to Bardhi and Eckhardt (2012), it is important to address these differences as both forms act from different motives. According to them, B2C has more to do with a consumer society than with a sharing economy. Here, making a profit is the opposite of the sustainability motive of saving (Hartl et al., 2018).

Today, a large part of the shared cars available in cities are electric cars. Electric cars can be used for both P2P and B2C shared driving. To date, electric cars have mainly been part of station-based carsharing systems. Electric cars must be charged at a charging station. These charging stations are location-specific, making it difficult to integrate electric cars into a 'free-floating system'. As mentioned before, the user can park the car anywhere within a certain region with a free-floating system. The user does not have to park the car at a charging station. Until now, this has made it difficult to include electric vehicles in a free-floating system. Electric vehicles are part of carsharing systems because electric vehicles make a major contribution to sustainability and climate change. Electric cars have lower CO2 emissions than regular petrol or diesel cars (Wappelhorst et al., 2014). Reducing CO2 emissions is one of the European climate goals. Mobility plays a major role in this and the electrification of shared cars can make a major contribution to this. In this research, the focus will be on B2C electric shared mobility, as this is the form that is discussed in the relevant case.

2.1.3 Shared Micro-Mobility

In addition to carsharing, there are other forms of shared mobility on the market. These other modes of shared mobility include (electric) shared bicycles, shared scooters and cargo bikes. These forms of shared mobility refer to shared micro-mobility. Shared micro-mobility can be defined as follows: *"...the use of small, lightweight vehicles that enables users to have short-term access to transportation modes on an 'as-needed' basis"* (Shaheen et al., 2020). The different types of micro-mobility have a few commonalities. For example, these modes of transport are often offered electrically. In a definition by McKenzie (2019), this is seen as a precondition for the concept to be of added value for cities. According to him, shared micro-mobility can be defined as follows: *"...those services that provide short term electric rental vehicles to the general public for a fee"* (McKenzie, 2019). In addition, the different types of vehicles are generally used for shorter trips than traditional modes of transport.

As discussed earlier, in carsharing a distinction is made in business models between P2P (peer-to-peer) and B2C (business-to-consumer). This is rarely the case with shared micro-mobility. The majority of shared micro-mobility vehicles on offer are business-to-consumer services (Vitkauskaitė & Vaičiukynaitė, 2020). This applies to both shared scooters and shared bicycles. However, as with carsharing, a distinction is made between the forms of B2C sharing systems. There are also differences between round trip, one-way and free-floating sharing for shared scooters and shared bicycles. For example, there are permanent station-based places in cities where (electric) shared bicycles or shared scooters are offered. This can also be seen in free-floating systems, which until now have mainly been applied to electric shared scooters.

2.2 Institutions & Organisations

Various organisations and actors play an important role in this research. These groups are part of the institutional setting of this study. In order to describe these, it is important to first take a good look at what institutions entail and what the role of organisations is in this. After this has been operationalized, the various organisations that are applicable in this study are explained. Institutions can be defined as: *''…systems of established and prevalent social rules that structure social interactions. Language, money, law, systems of weights and measures, table manners, and firms (and other organisations) are all institutions''* (Hodgson, 2006). In general, institutions provide certain expectations and actions by imposing form and consistency on the activities of humans. They depend on individuals and their activities, but are not reducible to them. In the context of this research, organisations are the most relevant form of institutions. Organisations can be defined as: *''...special institutions that involve (a) criteria to establish their boundaries and to distinguish their members from nonmembers, (b) principles of sovereignty concerning who is in charge, and (c) chains of command delineating responsibilities within the organisation''* (Hodgson, 2006). In this study, a distinction is made between different organisations that can be categorised into the public, private and public-private partnership sectors.

2.2.1 Public sector

With regard to the public sector, it is first of all good to look at what constitutes a public good. A public good can be defined as: *''...one which is not subject to exclusion and is subject to jointness in its consumption values''* (Ostrom, 1972). It can therefore be said that it is the responsibility of the public sector to ensure that public goods remain accessible to all people and that they are not being misused. The public sector can be seen as a sector organised

solely through government agencies, where services are performed and delivered through a system of public administration (Savas, 2019). The principles of public administration traditionally provide for the organisation of services through an integrated command structure where personnel are subordinated to a single chief executive. Coordination in the public sector is achieved through a bureaucratic system where superiors direct their subordinates and where each public employee is accountable to each other and to their chief executive, the elective public official. Within the context of this research, the role of Dutch municipalities is mainly examined in the public sector. By making mobility policies, municipalities focus on various public goals that they want to be achieved. This therefore also applies to policy on shared mobility, which falls under the responsibility of municipalities. When making mobility policy, it is important to always bear in mind that municipal policy may never lead to exclusion and that it can, in principle, be consumed by everyone.

2.2.2 Private sector

As opposed to the public sector and public goods, you have private goods as part of the private sector. A private good can be defined as: *''...one which is subject to exclusion and can be consumed by only a single person''* (Ostrom, 1972). In addition, a private good can also be characterised by the fact that people have a choice to consume the good and the choice in type and quality of the good. The private sector can be seen as a sector organised through market transactions and market mechanisms. Coordination in the private sector is obtained through the market system that governs economic relations. This is done through supply and demand and competitive selling and buying (Savas, 2019). Within the context of this study, the role of project developers and shared mobility providers in the private sector is the main focus. These are the actors that act on the market and depend on supply and demand. Project developers play a role in this because they could benefit from developing homes with a combination of low parking standards and shared mobility, because the development of parking spaces costs a lot of money. Shared mobility providers are the companies that provide the neighbourhoods with shared mobility. These often work on behalf of the public sector, namely the municipality. The market mechanism plays an enormous role for both project developers and shared mobility providers.

2.2.3 Public-Private partnership

Public and private are not kept separate at all times. Nowadays, public-private partnerships (PPPs) are increasingly used. Public-private partnerships are defined as: *"… long-term contracts between a private party and government entity, for providing a public asset or service, in which the private party bears management responsibility"* (United Nations

Publications, Kamiya, & Zhang, 2016). In the context of this research, the role of housing corporations as a public-private partnership has been examined. Housing corporations is an important notion in this research. Housing corporations are in a unique position between the public and private sector. In order to define and operationalize the concept of housing corporations, it is extremely important not to view the concepts of public and private in isolation. What can be seen as public sector or public good is not necessarily expressed and defined by the state alone (Ostrom, 2008). Other forms of cooperatives, civil society and local institutions are also included. In this way, the public economy can be seen as ‘a mixed economy with substantial private participation in the delivery of public services’ and is not exclusively a government monopoly (Ostrom, 1972). The same applies to the private sector, where public influences can also play a role. Looking at the relevance of this for this research, it can be stated that simply put, housing corporations are private institutions with public interest. In principle, Dutch housing corporations are authorised institutions that act solely in the interest of housing for the public, and therefore do not aim to make a profit (Koebel, 1998). This gives a good reflection of its unique position between public and private.

2.3 Theory of two-sided markets

As mentioned earlier, the concept of shared mobility is central to this research. Shared mobility is an example of a shared economy in which business models play an essential role. A common business model that is often cited in the literature with regard to shared mobility is the theory of two-sided markets. A two-sided market can be defined as a market: *"... in which two sets of agents interact through an intermediary or platform, and the decisions of each set of agents affects the outcomes of the other set of agents, typically through an externality"* (Rysman, 2009). Two-sided markets have become increasingly important in recent years. This is due to the multi-sided nature of markets that depend on technology and the internet, such as payment systems and social media that act as an intermediary or platform between businesses and consumers.

Shared mobility and the context in which shared mobility is treated in this study is a good reflection of a two-sided market. As mentioned earlier, the form of shared mobility discussed in this study is a business-to-consumer concept. In the case of shared mobility, there are two sets of agents that interact with each other, which can differ from time to time. On the one hand for example, potential users of the shared mobility service can interact with the providers of the shared mobility service through a platform or intermediary, namely that of a

mobile app where users can reserve the car and make their payments (Tirachini et al., 2020). When focussing on the context of this research, the functioning of the two-sided market also depends on the public and private sector interacting with each other. In this case, the private sector develops homes in which they integrate shared mobility. They depend on the public sector, which gives out the discount on parking standards and is able to create preconditional mobility policies.

A key feature of a two-sided market is that the decisions of one set of agents can influence the outcomes of another, often as a result of an externality (Rysman, 2009). This is also reflected in shared mobility in housing projects. For example, a subsidy on electric cars could ensure that electric shared cars become cheaper, so that consumers make more use of them, which in turn has a positive effect on the outcomes of the companies that offer electric shared cars. Models and theories remain a simplification of reality, but the two-sided market model nevertheless helps to gain a better understanding of shared mobility in housing projects.

2.4 Behavioural change

Behavioural change plays a major role in this research. Changing mobility behaviour, namely stimulating shared mobility, is one of the main goals of integrating shared mobility in housing projects. This should then lead to more space for greenery, parks and playgrounds. The theories of consumer choice behaviour and nudging are used to explain behavioural change within mobility.

2.4.1 Theory of consumer choice behaviour

One of the most relevant theories in the context of behavioural change is the theory of consumer choice behaviour. Using shared mobility services or choosing to use a private car is not an obligation and is therefore purely dependent on the choices and behaviour of the consumer. Although this research does not directly focus on consumers, it is extremely relevant for policymakers to understand why consumers make the choices they do. When creating and implementing a new policy, you want to shape a certain change. If this change concerns the consumer, which is the case in shared mobility, it is important to understand the behaviour of a potential user. The theory of consumer choice behaviour has been developed to explain the choice behaviour of consumers. Consumer choice behaviour focuses on consumption values and can be defined as: *"... a theory developed to explain why consumers make the choices they do"* (Sheth, Newman, & Gross, 1991). A consumer

choice is influenced by one or more consumption values. This is shown schematically in figure 1.

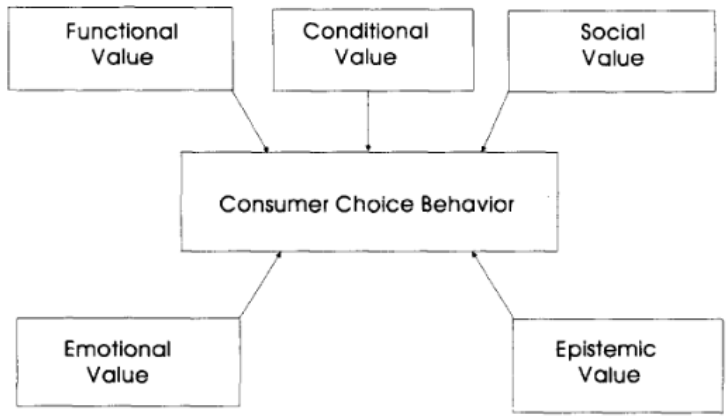

Figure 1: The five values influencing consumer choice behaviour (Sheth, Newman, & Gross, 1991)

Functional value is the main driver of consumer choice behaviour. Here, the perceived utility with the highest functional and utilitarian performance is central. In the case of social value, the choice is based on the association with one or more demographic, cultural-ethnic or socioeconomic groups. In addition, emotional values can influence the choice of consumers. Consumers will choose a product or service that arouses certain feelings for them. Epistemic value concerns the alternative that arouses curiosity because, for example, something is new and unknown to the consumer and the consumer longs for knowledge about it. Finally, the choice behaviour of consumers can be determined by conditional values. Conditional values opt for the alternative that arises as a result of a specific situation or due to certain circumstances that befall the consumer (Sheth et al., 1991).

Within the framework of this research into shared mobility in housing projects, functional value plays the most prominent role. A study by Hartl et al. (2018), in which users of a shared-mobility system were interviewed, shows that consumers use shared mobility because it is financially beneficial for them and that other considerations, for example sustainability, play a minor role. The price of a good or service is typically a characteristic of a functional value. Conditional values also play a role in the choice for shared mobility. As mentioned earlier, with conditional values a choice is made that is influenced by certain circumstances. Within the context of this research, consumers can, for example, start using shared mobility because parking standards are becoming stricter, making it more difficult to own one or more private cars. Here, certain circumstances, namely adjusted parking standards, influence the consumer's mobility choice. In addition, it can be argued that the epistemic value also applies to a certain extent when choosing shared mobility. Consumers

can make use of shared mobility because they are curious whether the concept can be of value to them, or because they have never driven an electric car before and want to know what this is like. Here the consumer longs for knowledge about the concept.

2.4.2 Nudge theory

Owning one or more passenger cars is something that is intertwined in Dutch and Western culture. People know that owning and using regular petrol cars has many negative consequences for our quality of life. Despite this, car use and car ownership continues to increase. Behavioural change is necessary to ensure that people make use of mobility options that have a lesser impact on our living environment, such as shared mobility. This can be done through 'hard' measures such as regulation, but also in a 'soft' way, such as nudging. Nudging can be defined as a concept where: *"... public policy-makers arrange decision-making contexts in ways to promote behaviour change in the interest of individual citizens as well as that of society"* (Thaler & Sunstein, 2015) . A key aspect of nudging is that you try to stimulate desired behaviour without forbidding other alternatives, which is different in contrast to regulating. It is of utmost importance to steer people towards a certain choice, without limiting the choice set in a significant way (Hansen & Jespersen, 2013).

When applying the nudge theory in this research, it is important to look at how residents are nudged to make use of shared mobility. As mentioned earlier, the combination of adapted parking standards and the provision of shared mobility in a neighbourhood plays a central role in this study. By integrating shared mobility into housing projects and adjusting parking standards accordingly, you nudge residents to make use of shared mobility. What is important here is that owning your own car is not prohibited. The parking standards are hereby reduced, but not brought to zero. Parking in the neighbourhood will be made more difficult, but there is still a possibility to park, possibly even in an adjacent neighbourhood. You still give the residents a mobility choice, but you try to steer them towards the desired behaviour, namely the use of shared mobility.

2.5 Conceptual framework

In the theoretical framework, the most relevant theories, models and concepts of this research have been defined and elaborated. Based on this, the conceptual model, as seen in figure 2, has been formed. The conceptual framework functions as a guideline for this research and can be seen as a starting point for the next chapter, namely the research methodology.

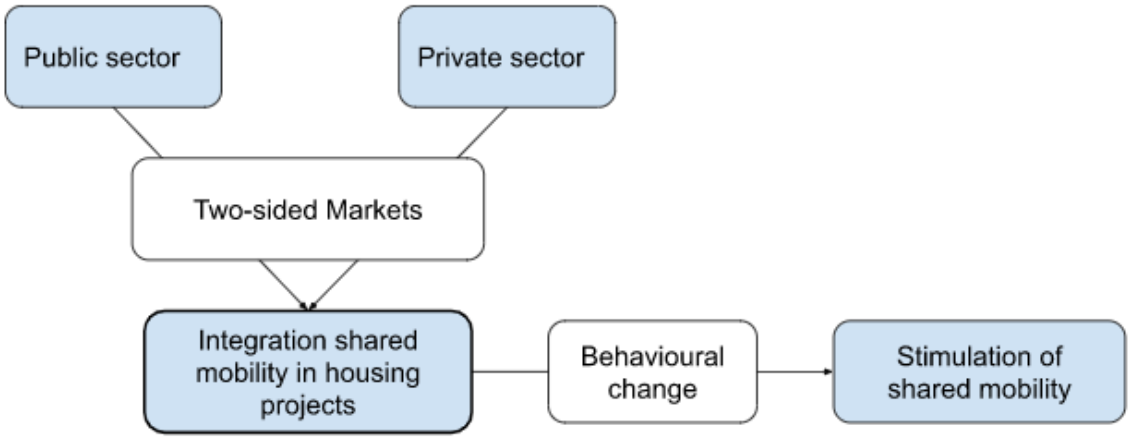

Figure 2: Conceptual model

The integration of shared mobility in housing projects is central to this research. The variable 'integration shared mobility in housing projects' is influenced by the independent variables ‘public sector’ and ‘private sector’. As mentioned earlier, the private sector influences the integration of shared mobility by provisioning shared mobility in their housing projects. The public sector influences the integration of shared mobility in housing projects by giving out a discount on the parking standard and creating other preconditional mobility policies. The public sector and the private sector are interdependent and interact through two-sided markets, as schematically depicted in the conceptual model. The hypothesis of this study is that there is a causal relationship between the independent variable 'integration shared mobility in housing projects' and the dependent variable 'stimulation of shared mobility', which focuses on the stimulation of usage of shared mobility. The variable 'behavioural change' also plays a role in this. In theory, the integration of shared mobility in housing projects leads to the stimulation of shared mobility through behavioural change. The variable behavioural change relates to mobility behaviour, which is determined by the choice behaviour of residents and which is influenced by concepts such as nudging.

3. Research methodology

In this chapter the methodology of this research will be discussed. Here the strategy of the research, the data collection, the justification for the case study, the methods of analysis and the validity and reliability will be elaborated on.

3.1 Research strategy

This research is an empirical in-depth study that will be conducted by means of qualitative research methods. This choice was made on the basis of the three research characteristics detailed in the book by Verschuren & Doorewaard (2015). It is important that you make a well-considered choice based on your research goal. According to Verschuren & Doorewaard, it is key to first make a choice between a broad or in-depth research (2015). Subsequently, a choice must be made whether the research should be empirical or theoretical and finally whether the research will be conducted qualitatively or quantitatively. An in-depth study was chosen because as much specific knowledge as possible must be gathered in order to answer the research question. In-depth interviews will be used to gain as much detail as possible about the problem. In addition, the choice was made for an empirical study because direct observations will be used. Finally, the research will be conducted in a qualitative manner. Qualitative research is about studying and providing insight into a specific issue. In qualitative research, the description and interpretation of problems of situations, events or people is paramount (Reulink & Lindeman, 2005). In the case of this research, this means providing insight into and studying the integration of shared mobility in housing projects. In addition, the research is phenomenological in nature. The phenomenon, the integration of shared mobility in housing projects, will be recorded in a descriptive way. The research will be conducted by means of a single case study. In a single case study, research is conducted in an empirical way into one phenomenon (Vennix, 2016). One of the main advantages of a case study is that this way of doing research gives you a detailed and in-depth picture of the specific case (Verschuren & Doorewaard, 2015). This is therefore necessary to answer the main research question.

3.2 Data collection

In this research, both primary and secondary data will be used. Here, the insights obtained from the primary data will be combined with the scientific literature. Field studies will be conducted to collect the primary data. The primary data will consist of information extracted from semi-structured interviews with housing corporations, project developers, policy makers, mobility advisors, project managers and others active and playing a role in this sector. This will be done to create a clear picture of the situation from multiple angles and to answer the research-questions as completely as possible. What is striking about the scientific literature is that many studies are written from a user or policy perspective. In this study, this literature will be supplemented by the perspective of the public sector, private sector and housing corporations. By looking at the problem from multiple angles, you create a clear picture of the different groups of stakeholders. This is necessary to find out whether the integration of shared mobility in housing projects can stimulate shared mobility.

In addition to scientific literature, grey literature will also be used. Reports and policy documents from municipalities and other authorities are of essential value in this regard. These are important in order to draw up an interview guide in a structural way and to extract as much information as possible from the interviews. In addition, these were used as a source for secondary data in order to answer the sub-questions of this research as completely as possible. Most of these documents are publicly available online.

Interview overview

Name	**Organisation**	**Date**	**Role**
Hans Buijtelaar	Municipality of Wijk bij Duurstede	28-4-2022	Former alderman Mobility of the Municipality of Amersfoort
Roald van der Linde	Municipality of Amersfoort	28-4-2022	Alderman Mobility
Martien Das	Rijkswaterstaat WVL	11-5-2022	Senior advisor sustainability and climate policy
Peter Rossewij	Axxel / Mobiliteitsfabriek	11-5-2022	Projectmanager mobility (operator shared mobility

			Hogekwartier)
Dieuwke Leveling	Housing corporation Alliantie Amersfoort	16-5-2022	Senior Area Development
Jelle Postma	VINU	18-5-2022	Senior Project Manager Mobility
Douwe Offringa	Municipality of Amersfoort	23-5-2022	Sustainable mobility program manager: development of MaaS policy and shared mobility
Bob Braak	Municipality of Amersfoort	25-5-2022	Senior project manager inner-city area developments
Wouter Slob	Province of Utrecht	30-5-2022	Trainee Smart Mobility
Hannah Habekotté	Over Morgen	13-10-2022	Advisor Sustainable Mobility
Han-Paul van Westing	Deesy	13-10-2022	Founder of Shared Mobility Netherlands
Nick Knoester	Municipality of Utrecht	13-10-2022	Advisor MaaS, behavioural change & shared mobility
Kay van der Kraan	Empaction	14-10-2022	Advisor / Project Manager Parking & Mobility
Anouk Schouten	Over Morgen	17-10-2022	Former advisor Sustainable Mobility
Marlou Boerbooms	Groene Huisvesters	15-12-2022	Project manager
Coen van Rooyen	WoningBouwersNL	25-01-2023	Manager Director

3.3 Case study

As mentioned earlier, this research will be conducted by means of a single case study. In the context of this research, the case study will be conducted on a project chosen from one of the projects covered by the 2018 City Deal for Electric Shared Mobility in Area Development because within the City Deal active plans have been made to allow shared mobility to play a

prominent role in the development of new housing projects. These projects are spread over seven different cities and are all in different stages. Some projects are still under development while others have already been fully realised. This research will be carried out on the *Hogekwartier* project in Amersfoort. This housing project is a joint venture between the Municipality of Amersfoort and housing corporation De Alliantie. De Alliantie is a private institution with social capital. Construction on the project started in 2006 and delivered the first homes in 2016 (Kovi, 2021). A partly finalised project was deliberately considered because this makes it suitable to evaluate a project and the way of integrating the shared mobility.

A lot has changed since the plans were established in 2006, which led to the decision in 2017 to make certain plan adjustments to allow the project to adapt to these changes (Municipality of Amersfoort & De Alliantie, 2017). One of these changes is adjusted parking standards in certain parts of the Hogekwartier. High parking standards put pressure on the quality of life in public areas. To prevent this, measures have been taken that can have an effect on car ownership, such as shared mobility. This makes it possible to reduce parking spaces. Due to the provision of shared cars, a total of 50 less parking spaces have been created. Instead, a total of ten shared cars have been installed. In addition, the plan is to offer other shared concepts as well, such as electric (cargo) bicycles. The choice for the Hogekwartier was made because this project has already been completed for a few years. As a result, the way in which shared mobility has been integrated in the neighbourhood and the consequences it has had can be properly investigated. This makes the case suitable for investigating whether the integration of shared mobility in housing projects can stimulate the use of shared mobility.

3.4 Data analysis

The data necessary to answer the main question will be collected through semi-structured interviews with different actors. Interview guides will be drawn up to provide guidance on the interviews. After collecting the data, all interviews will be transcribed. This will be done partly manually and partly with the Amber Transcript program. The information obtained will then have to be ordered and analysed. This will be done by coding the interviews. The interviews will be coded with the Atlas.ti program. Open, axial and selective coding will be used to make this process run as structurally as possible. With open coding, the created codes are linked to text fragments. In axial coding, the codes are compared and connected with each other. Finally, an analysis of the codes takes place. This process is called selective coding.

Subsequently, common concepts and specific connections will be sought. The coding will provide a clear picture of which concepts, issues and aspects are considered most valuable by the respondents. The results of the research will be further explained and connected to the previous used theory. Conclusions will be drawn on this basis.

3.5 Validity & Reliability

In order to determine the quality of a research, it is important to check whether the research is reliable and valid. For this it is important that the researcher keeps enough distance to remain objective in the research, but at the same time is still involved enough (Boeije & Bleijenbergh, 2019). In order to determine the validity of the research, it is investigated whether the relevant methods have measured what should be measured. In validity, a distinction is made between internal validity and external validity. The research results are internally valid if the correct conclusions are drawn from the chosen research methods (Vennix, 2016). The design of the research is of great importance in this regard. The internal validity of this study will be increased by means of triangulation. In case of triangulation, methods of data collection and analysis will be combined (Vennix, 2016). Different forms of triangulation can be distinguished. In this research, methodical triangulation is used since the use of interviews is combined with a literature study. In addition, secondary literature was used for the research. By adding secondary literature you make a contribution to data and source triangulation. This is because both scientific articles and policy documents were used. By using different forms of triangulation, namely methodical- and source triangulation, the internal validity of this study is ensured.

In addition to internal validity, external validity is important when conducting a study. External validity refers to the extent to which the research results can be generalised to an entire population or to other groups. External validity is less important in qualitative research than in quantitative research (Vennix, 2016). This is because the data is collected based on a small group of participants, which makes it difficult to generalise the results. In this study, research will be done on one project, namely that of the Hogekwartier. Every project is different and has different characteristics, so the results can never be completely generalised. Despite this, the results of this study can be generalised to other projects to a certain extent. Many of the City Deal projects have common goals that they try to achieve in similar or different ways. Through this research, one project can learn from the mistakes of the development of another project. On the other hand, certain positive developments can be taken into account as well. The Hogekwartier district was chosen because this project

has been realised for some time, which makes it suitable for evaluating the project. In addition, parking standards have been lowered on a certain scale. When generalising the results of this study, it may therefore be useful to compare the results with neighbourhoods with the same characteristics on the same scale. In this way, despite the qualitative nature of the research, the results can be generalised to a certain extent to other projects.

In addition to validity, it is also important that a study is reliable. Reliability involves checking whether the same results would be achieved if the research was conducted in the same way (Boeije & Bleijenbergh, 2019). This is also known as the replicability of the research. For this it is important that the research is influenced as little as possible by systematic errors. The reliability of this research is guaranteed by standardising the research process. For example, by providing all participants with the same information, you can contribute to preventing systematic errors and guaranteeing reliability. In addition, the reliability of the research is guaranteed through transparency. The research is provided with all used interview guides, transcripts and coding schemes.

4. Hogekwartier Case Study

As described earlier, this research was conducted through a single case study of the Hogekwartier district in the city of Amersfoort. In this chapter the results of the case study will be analysed. Based on the interviews conducted, the most important concepts, aspects and issues are presented and elaborated on. First of all, an in-depth look will be taken in the background of shared mobility in the Hogekwartier district in Amersfoort. It was investigated why shared mobility has been integrated in the Hogekwartier, how to evaluate which things have gone well and which lessons can be learned. The results are based on data generated from interviews with different actors directly involved in the Hogekwartier project.

4.1 Shared mobility in the Hogekwartier

For the elaboration of the case study it is essential to outline the background of the situation in the Hogekwartier. The Hogekwartier is an area that was designated in 2006 as an urban renewal district, which belongs to the Amersfoort Vernieuwt program. Old dilapidated houses had to make way for new construction. One of the main problems during the development was that the Alliantie housing corporation had to deal with the fact that parking spaces had to be realised in accordance with the parking standards at the start of the development, but there was no longer space for parking spots outside (H. Buijtelaar, personal communication, 2022). In addition, at that time there was a plan 'Geen Blik op Straat' to aim for as few cars as possible parked in public space (D. Leveling, personal communication, 2022). However, with only parking facilities built indoors, the homes would become too expensive, as the housing corporation can mainly build social housing. So alternatives had to be devised. This in combination with the fact that in 2012 there was still no construction due to the economic crisis, and realisation occurred from the housing corporation that a parking standard of 1.7 is extremely high for social housing. In addition, a new Housing Act was also introduced at the time, which could lead to certain changes. The Alliantie entered into talks with the municipality to indicate that the high amount of parking spaces are both unnecessary and unrealistic (D. Leveling, personal communication, 2022). This is how shared mobility came into the picture. By offering shared mobility, the Alliantie received a 'discount' on the current parking standard (H. Buijtelaar, personal communication, 2022). A calculation rule was applied whereby ten shared cars would replace 50 parking spaces, as a result of which the development could, on paper, be finalised. In this way, shared mobility was used as a means of completing the housing assignment in the Hogekwartier and finalising the business case (B. Braak, D. Leveling, H. Buijtelaar, P. Rossewij & R. van der Linde, personal

communication, 2022).

In 2018, the municipality and De Alliantie wrote out a tender for this shared mobility solution. This contract was won by the company the Mobiliteitsfabriek, which has received a concession to offer shared mobility in the period from 2018 to the end of 2023. The Mobiliteitsfabriek operates this service and is therefore responsible for providing the service from A to Z. Due to a delayed delivery and implementation of the charging systems, shared mobility in the Hogekwartier only started in February 2020. The shared mobility in the Hogekwartier district operates under the name Axxel, as being the shared mobility provider. (P. Rossewij , personal communication, 2022). The Mobiliteitsfabriek and Axxel are responsible for a minimum supply of shared cars. They are obliged to have at least two cars available during the week and four at the weekend. This to ensure that the shared mobility is available in the vicinity at all times.

4.2 Usage rate

The results of a study by the Mobiliteitsfabriek show that the usage figures for shared mobility in the Hogekwartier are very low. Demand in the district is lagging behind initial expectations (P. Rossewij, personal communication, 2022). In this study investigates the various reasons for the low usage figures and these have been elaborated in this chapter.

4.2.1 Covid-19

First of all, it is essential to mention that shared mobility started in February 2020 and a month later, in March 2020, Covid-19 broke out. This meant that a lot of people had to work from home, participate less in social and recreational activities, which generally resulted in fewer movements in the country. The movements that did take place are short-distance movements, such as to the supermarket and school. The car is not often used for these types of movement. In addition, in these times people felt hesitated to sit in a car that someone else had been in. With the current corona measures, this created uncertainty about hygiene and safety when using shared mobility because people are afraid to expose to Covid (B. Braak, personal communication, 2022). The current low usage figures cannot be fully attributed to Covid-19, but the shared mobility project in the Hogekwartier has therefore had a difficult start-up phase, which consequently ends in low user numbers in the first two years (D. Leveling & P. Rossewij, personal communication, 2022). This can be linked back to the theory of consumer choice behaviour. In particular, the conditional value applies here. As mentioned earlier, with conditional value the consumer makes a choice because of

certain contingencies. Covid-19 is a fitting example of this. Shortly after integrating the shared mobility in the Hogekwartier, Covid broke out. As a result, residents did not feel safe to use the shared mobility in the Hogekwartier. In this case, the contingency, namely Covid, influences the consumer's choice not to use shared mobility in this case.

4.2.2 Location

Secondly, it can be concluded that when integrating shared mobility, the location of the Hogekwartier was not properly considered. The district is located along the A28 highway and adjacent to the Hoevelaken traffic node. On the one hand, this can be seen as an advantage for carsharing because your accessibility is good. However, shared cars appear to be more focused on short trips, which causes on the contrary a negative effect on shared mobility in the Hogekwartier. The district consists mainly of commuters with a relatively large commuting distance, which is around 25 kilometres on average. Residents are very oriented to trafficking outside of Amersfoort in this regard (P. Rossewij, personal communication, 2022). A residential area next to a highway attracts a specific target group, namely that of young working people, where both partners need their own (lease) car for work, which is highly the case for the Hogekwartier (B. Braak, personal communication, 2022). Roald van der Linde, alderman for mobility of the Municipality of Amersfoort, sees this as an important learning point for the Hogekwartier: "*We have learned to think much more in terms of target groups, you have to adjust the programming of your housing development to this. There is a big difference if you are going to make apartments next to a station, compared to apartments next to a highway, and you should adjust your parking policy to that as well"* (personal communication, 2022). This does not mean that shared mobility in a residential area next to a highway per definition does not work, but that complementary factors must be carefully considered. Think of the type of housing, this also affects the type of people who come to live there, and also their choice of mobility.

4.2.3 Public transport

Another important argument to point out here is that there is no good public transport hub on site in the Hogekwartier. One of the factors of which it is known that works well for shared mobility is the presence of a train station, metro or other forms of public transport nearby (R. van der Linde; H. Habekotté & D. Offringa, personal communication, 2022). This mix of mobility stimulates both shared mobility and public transport because they complement each other perfectly. The availability of shared mobility, together with a good public transport network and good cycling infrastructure help to reduce car ownership in new housing developments (M. Das, personal communication, 2022). The Hogekwartier has one bus stop

and the nearest station is ten minutes by bike. This makes it unattractive to use public transport. Especially in combination with the A28 highway along the district, ensures that people will not easily get rid of their own car and will use shared mobility (D. Leveling, personal communication, 2022). In this respect it is very important to always keep the target groups in mind. What is now being seen in Amersfoort is that people from Utrecht and Amsterdam are moving to Amersfoort so they have space to be able to park their car again (R. van der Linde, personal communication, 2022). If a good public transport hub is initially provided in an early stage in these districts, and parking the car is made more difficult by different measures, this target group will have to think about a mobility alternative when moving to a different city. Transit Oriented Development plays a major role in this (H. Habekotté, personal communication, 2022). Transit Oriented Development is a concept that focuses on public transport, in which infrastructure and spatial planning are approached in an integrated manner in terms of planning and implementation. Public transport is seen as the main driver of urban development. Habekotté points out the big difference between the Amersfoort Schothorst district, where a station is located, and the Hogekwartier, which is located next to a highway: *"It is important that when integrating and building in additional mobility services, you do not just use shared cars or shared two-wheelers only, but also public transport, that it is very important that you immediately think about additional mobility options when designing or renovating a neighbourhood"* (personal communication, 2022). According to Habekotté, this goes beyond simply a bus connection. A bus connection alone is rarely enough to really offer people an alternative to their car. This must be an integrated total mobility solution.

4.2.4 Parking regime

What can perhaps be seen as the most important factor for the low usage figures for shared mobility in the Hogekwartier turns out to be the absence of a good parking regime (B. Braak; D. Leveling; H. Buijtelaar; P. Rossewij & D. Offringa, personal communication, 2022). Parking regulation plays an enormous role in this. Senior project manager of the Municipality of Amersfoort Bob Braak sees this as a precondition for the success of shared mobility in the Hogekwartier: *"What you also notice, which I think is also a very important condition for the success of shared mobility, is that Amersfoort is still busy with adjusting its parking regulations. Compared to similar cities such as Leiden or Haarlem, Amersfoort still has a limited regulatory area, the inner city and the surrounding shell. So that also simply means that large parts of the city, including Hogekwartier, have no parking regulations"* (personal communication, 2022).

Without an active parking regime in the form of paid or licensed parking, the current parking pressure in and around the Hogekwartier is not incentivizing enough for people to use the shared mobility available (P. Rossewij, personal communication, 2022). This is because residents have the opportunity to park their cars in the adjacent neighbourhoods.

The possibility of parking regulation was discussed in the Hogekwartier at the time, but there was too much political opposition to do so. The opposition was caused by a form of political fear of getting residents against you, especially in times of local elections (B. Braak, personal communication, 2022). Ultimately, this has ensured that parking is still free in public, which means that it remains very attractive for residents to keep their own car or even buy a new one (D. Leveling, personal communication, 2022). What also plays a role in the Hogekwartier is the presence of the Amarena swimming pool. There is a large swimming pool in the neighbourhood with a large parking garage underneath. This is a swimming pool with a lot of national allure, where sporting events regularly take place (D. Leveling, personal communication, 2022). The parking garage of the Amarena can be used at low costs of 70 cents per day. Because there is no paid parking in the district, the municipality notices that visitors of the swimming pool park their cars for free in public, and not in the parking garage intended for this purpose, especially in times of events (B. Braak, personal communication, 2022). This creates additional parking pressure in the district where there is already a reduced parking standard, which causes frustration of the residents of the Hogekwartier.

4.3 Future perspective

The previous sub-chapter shows several important reasons that explain the low usage figures for shared mobility in the Hogekwartier. Of course, some factors play a more restrictive role than others. For example, Covid-19 no longer has such a dominant hold on people's lives than it had two years ago. Nevertheless, certain reasons will still play a role in the choice for shared mobility. It is important for this study to see whether shared mobility still offers perspective for the Hogekwartier. Or that the Hogekwartier still offers perspective for shared mobility? In this context, it was investigated what has been done in recent years and what can be done to increase the usage of shared mobility.

4.3.1 Publicity

One of the points where there is still a lot to be gained is the awareness of the existing shared mobility. Covid-19, among other things, has made it difficult to advertise and convince people of the importance of shared mobility (B. Braak, personal communication,

2022). Various marketing and promotion methods are used to promote awareness of the existing shared mobility. This is done by various stakeholders. For example, housing corporation De Alliantie sends out a monthly newsletter. This newsletter always contains a message about shared mobility, Axxel and the Mobilitsfabriek. In terms of awareness, residents should therefore be able to know that shared mobility is available (D. Leveling, personal communication, 2022). Naturally this raises the question how many people read the newsletter, and whether residents actually do anything with it.

The Mobilitsfabriek is currently setting up a major campaign before the summer holidays. They want to change the way of pricing. They are also thinking about placing an extra car to take a step towards the residents, instead of waiting for residents to come to them (B. Braak, personal communication, 2022). With the latest completions of the building fields, residents also receive a mobility pass as standard with a new home. That way you have the option to already use the shared mobility since you only have to activate your account. Peter Rossewij of shared mobility provider Axxel also indicates that quite a few steps have been taken in recent years to increase the success of shared mobility in the Hogekwartier, particularly in the field of communication. For example, a communication calendar and campaigns have been set up in collaboration with the Alliantie and the Municipality of Amersfoort. It states that all new residents receive a starter package from the municipality, which also includes a notification about Axxel (P. Rossewij, personal communication, 2022). There are also residents' meetings and people from Axxel are present at the completion of new housing blocks and they are given the opportunity to explain the shared mobility available. In addition, test drives are offered, there has been door-to-door advertising, flyers through the doors, billboards placed and even more forms of advertising done.

Research by Axxel itself showed that the visibility of shared mobility was actually insufficient. At the start of setting up shared mobility, a conscious choice was made in order not to make the shared cars stand out too much, which turned out to be the wrong choice: *"The funny thing was when we started Axxel, we said: the shared car often has a kind of stigma, we as opposed to Greenwheels do not want a red car with a large white circle on it so that everyone knows that you are driving a shared car, but we want to be representative, no different from other residents. So we said: okay, then we'll keep it a simple car. The cars are not provided with all kinds of stickers and the like. Those street interviews, on the other hand, showed that a number of people in that street also said: yes, but that car over there belongs to a neighbour, right? So then we decided, the visibility must be increased, so we are now going to work on that too"* (P. Rossewij, personal communication, 2022).

4.3.2 Economies of Scale

In addition to publicity, there is also a lot to be gained in the Hogekwartier in terms of economies of scale. For shared mobility to succeed in the Hogekwartier, it is important that the existing shared mobility can be used at all times if a resident wishes to do so (H. Buijtelaar, personal communication, 2022). Alternatives to the car must be available if residents do not take their own car or have disposed of it. Especially at so-called peak times when demand is high, for example during rain. For this it is very important that the shared mobility supply in the Hogekwartier is scaled up, Offringa states: *“You have to start with a solid amount. You shouldn't park one car and then wait for the needs of the second. You have to park ten cars and then residents will see that the shared mobility is there with a reason"* (personal communication, 2022). In this way you guarantee a form of availability for residents who want to use shared mobility. In the case of the Hogekwartier district, it’s therefore necessary to add more than two shared cars.

Nevertheless, this turns out to be easier said than done. It was agreed in the planning with the shared mobility operator that ten shared cars would be installed in the Hogekwartier. This number has been agreed based on the amount of parking spaces that the shared cars would replace, in combination with an expected demand for the shared mobility. In the current situation, however, it is already unprofitable for the shared mobility operator with three cars. As a result, the operator waits before installing the remaining seven. For them it should ultimately become a profitable business case. This is seen as a kind of chicken-egg situation that sustains each other (D. Leveling, personal communication, 2022). Shared mobility operators will not offer more cars if the demand is not there, but the demand will not increase if there is not an ample supply. The theory of two sided markets plays a major role here. In a two-sided market, there are two sets of agents interacting with each other, with the decision of one affecting the outcome of the other. With regard to shared mobility in the Hogekwartier, you have two actors, namely the shared mobility operator Axxel and the residents. The decisions of both actors influence each other's outcomes. If residents do not use the shared mobility, Axxel cannot run a profitable business. The same applies the other way around, if Axxel does not offer enough shared cars, residents will not use them to a large extent. In this case, the theory of two-sided markets causes a situation that perpetuates each other.

4.3.3 Parking policy

As mentioned earlier, the parking regime or parking policy plays an enormous role. Its absence is therefore seen as an important reason for the low usage figures for shared

mobility in the Hogekwartier. A parking policy is perhaps the most important precondition for shared mobility to succeed in the neighbourhood. Hans Buijtelaar indicates that it is a precondition to take major steps in parking policy in Amersfoort. The municipality of Amersfoort is looking for a total solution and therefore wants to prevent the city from consisting of separate islands that do and do not have parking regulations (H, Buijtelaar, personal communication, 2022). To make shared mobility succeed in a city like Amersfoort, it is of great value to introduce a city-wide parking policy of paid or licensed parking, and not project-oriented (B. Braak & D. Leveling, personal communication, 2022). With project-oriented thinking you run the risk that the policy of one project will have negative consequences for another project. In a situation like this a government keeps investing in solutions per project, and you naturally want to prevent this. It is essential to regulate the parking supply at least up to and including the ring of the city, regardless of whether this applies to Amersfoort or to other cities. Licensed parking should be implemented, so that people can only have one car per household within the ring road. According to Hannah Habekotté, this should be feasible, because in every city public transport within the ring is within walking or cycling distance and work facilities are often located within or close to the ring (personal communication, 2022). A city-wide policy is therefore of enormous value in this regard.

5. General findings

In addition to the Hogekwartier case study, data was collected to make statements about the integration of shared mobility in housing projects in general. Although this data is not or partly based on the Hogekwartier project, comparable topics or factors may be discussed. This data on this subject has been collected in order to be able to make statements and draw conclusions about which factors generally influence the integration of shared mobility in housing projects. The data used in this chapter, as well as the results of the case study, are based on information obtained from interviews. In addition, the data will be linked to the previously discussed theory.

5.1 Developers view

One of the goals of this research is to see how developing parties view shared mobility, and in particular its integration in housing projects. The perspective of developers is important for this study. After all, developers, often in collaboration with municipalities, can create the right preconditions for good use of shared mobility. It is therefore useful to see how developers value shared mobility and how they use this concept to their advantage.

5.1.1 Finalising housing development

As discussed earlier in this study, integrating shared mobility in housing projects can function for various goals. For municipalities, the provision of shared mobility can be of value to allow people to use electric means of transport for the benefit of the environment, or to ensure that people get rid of their second car in order to have less cars on the street. In addition to municipalities, this study also looks into the extent to which developing parties are concerned with the value that shared mobility can have. It can be stated that the integration of shared mobility in housing projects is used by most developers as an instrument to complete their housing assignment and/or to develop a better business case (B. Braak, H. Buijtelaar, J. Postma, P. Rossewij, H. Habekotté, A. Schouten, K. van der Kraan, H. van Westing & N. Knoester, personal communication, 2022).

Developers must develop their housing in accordance with the parking standards of the municipality or the province. Developing parking facilities costs developers a lot of money. Developers prefer to spend the space and money they initially had to use for parking spaces, on additional houses or apartments. After all, the profit margins are on houses and the construction of fewer parking spaces creates a better business case in this regard. Providers

of shared mobility services notice that in a lot of cases, developers are starting a housing project and would like to develop more floors or houses than are permitted under the parking standards. Developers submit a request to providers of shared mobility to offer shared mobility for the project in question, in order to obtain a 'discount' from the parking standard from municipalities (P. Rossewij, personal communication, 2022). Municipalities are likely to give this discount because shared mobility is seen as a sustainable alternative to owning a car, but they are not sufficiently concerned with creating demand for such a concept. Shared mobility is often seen among developers as a 'magic word' to get their area development completed in terms of financing (K. van der Kraan, personal communication, 2022).

This is not a problem at itself and could potentially be a win-win for municipalities and developers. Practice however shows that in many cases this is not the case. When developers have finished building, they no longer feel connected to the further course and development of the shared mobility that has been installed. In this way there is no long-term commitment and therefore no incentive to guarantee the success and proper use of the shared mobility (P. Rossewij, personal communication, 2022). Situations like this mainly occur in municipalities where the parking policy is not extensively developed (H. Habekotté, personal communication, 2022). It is therefore essential for municipalities to be aware of this and to make clear agreements with developers and providers. To solve this, it could be an idea to have a parking facility operated by a manager. The exploiter can give out parking permits and integrate shared mobility in this. In this way you create a market in order to increase use (P. Rossewij, personal communication, 2022).

5.1.2 Supply thinking

Another important aspect to touch on in this study focuses on supply-oriented thinking. It can be stated that developing parties are thinking in a too supply-oriented manner when it comes to shared mobility (P. Rossewij; K. van der Kraan; H. van Westing & N. Knoester, personal communication, 2022). This applies to shared mobility in general in the Netherlands, but also specifically to the integration of shared mobility in housing projects. This problem can lie with both the developing party and the municipalities. For example, various respondents see that municipalities and developers often have the idea that simply placing shared cars and other shared mobility should be sufficient for success and a high number of users. For example, when placing shared mobility, often only a sign is placed with the name of the provider, and no additional information. This is a common problem, especially in the case of shared cars.

In particular for shared mobility in area development, the cars are placed, a sign is put up, and residents receive a letter at home with, for example, the price card. This is simply not enough to incentivize residents to use shared mobility. People have all kinds of questions about reservations, functioning of the app, the privacy of their driver's licence, fines, insurance and electric driving (H van Westing, personal communication, 2022). This all regards information that you can find on a website. However, it has become apparent that residents will not put in the effort to find out for themselves, and that a larger trigger is needed to allow people to actually use the shared mobility. For example, it appears that a live meeting where people can ask questions and mention their uncertainties and concerns can be very helpful (H. van Westing, personal communication, 2022).

The quantity of shared mobility often plays a major role in this so-called supply-oriented thinking. Developing parties have the idea that increasing the quantity of shared mobility guarantees an increase in the use of shared mobility. The same accounts for the public side of the story, if a concept works on a certain scale, government agencies often have the reflex to double numbers, which does not guarantee success (N. Knoester, personal communication, 2022). It takes more than simply increasing the quantities. Information provision and other incentives play a major role in this. It is important that municipalities and developing parties realise that they have to invest a lot of time and energy into this. Han-Paul van Westing sees that many parties are not prepared to invest the time and money that is necessary: *"Many municipalities, developing parties and providers often think: we have the cars and are ready now, while the process then only begins"* (personal communication, 2022). It can therefore be concluded that more measures must be taken on the demand side of offering shared mobility in housing projects.

5.2 Key aspects

Supplying shared mobility in housing projects does not guarantee actual use of shared mobility. There are a number of important aspects to consider when integrating shared mobility in housing projects. These aspects are seen as preconditions for all projects where governments want shared mobility to have an important role in.

5.2.1 Target Groups

The case study of the Hogekwartier in Amersfoort shows that taking the target groups in a neighbourhood into account plays an enormous role when integrating shared mobility in housing projects. Placing shared mobility without considering the target groups can therefore

have negative consequences for a neighbourhood. In the case of the Hogekwartier, this led to low use of shared mobility and parking pressure. Taking the resident groups into account does not only play a role in the Hogekwartier, but is relevant for every neighbourhood in the Netherlands where shared mobility is integrated into housing projects.

It is important to get a picture of the housing-work situation of the target group of a particular neighbourhood at an early stage. Before the development of a new housing estate, developers and municipalities should look at which resident groups the houses are intended for, and based on this estimate whether shared mobility is a realistic option (H. Habekotté, H. van Westing, personal communication, 2022). If the target group consists of parents who both have a long commute to work, it is an extremely difficult task to get them to use shared mobility. The same applies to target groups in the social rental sector that work in healthcare for example, because they simply need a car five days per week (M. Boerbooms, personal communication, 2022).

With regard to target groups, it has been found that different user profiles are important. Shared mobility can therefore only be made profitable for providers when different user profiles live in a neighbourhood and can use the available shared mobility (N. Knoester, personal communication, 2022). This is something that still regularly goes wrong, argues Nick Knoester: *"I regularly see proposals for neighbourhoods where only young families would come to live and it was expected that they would get rid of their second car in order to make use of shared mobility. But when do they need that second car? All on Wednesday afternoons and Saturdays, that doesn't work"* (personal communication, 2022). Peak demand plays a limiting factor here. If users all need the shared mobility at the same time, the supply of shared cars must be high, which means that the shared cars are idle for the other parts of the day. This is also a recurring problem with shared cargo bikes these days. This is a difficult business case because they have a high peak demand at certain times. If this peak demand cannot be met, users will drop out. It is of the utmost importance that shared mobility must be available to users at all times (K. van der Kraan, personal communication, 2022). Housing projects with different complementing user profiles, and therefore different times of use, offer the greatest potential in this area for making shared mobility a success in this respect.

In addition to different user profiles of residents, differences in user profiles at home-work locations can also be examined. For example, there are practical examples of neighbourhoods where residential areas are being developed around business locations. Take the Beurskwartier, for example, a neighbourhood that is being developed around the

Jaarbeurs. The companies in this location own shared cars that are used during the day on weekdays. In the development of this district, it is now being examined whether residents can use the present shared mobility during the weekend and in the evening. The moments of demand for shared mobility complement each other and are in good harmony in this case (N. Knoester, personal communication, 2022).

5.2.2 Mobility-Mix

The term shared mobility includes various forms of shared mobility. Much has been written so far about carsharing. This is not surprising since shared mobility is often seen as the alternative to the private car, and a shared car is the closest alternative to this. The shared car cannot and will not replace the regular private car one-to-one (H. Habekotté, personal communication, 2022). The regular car in its current form is simply too flexible and convenient for this. In order to still have this tailor-made journey with shared mobility and to guarantee that flexibility, it is important to also use other means of transport and thus create a so-called mobility mix (B. Braak, J. Postma, M Das, P. Rossewij, R. van der Linde, W. Slob, H. Habekotté, D. Offringa, K. van der Kraan & N. Knoester, personal communication, 2022).

For shared mobility to succeed, it is a precondition that the shared car is complemented with alternatives such as the bicycle, public transport, the pedestrian network, and forms of shared micro-mobility (M. Das, personal communication, 2022). There must be a total solution existing out of various mobility combinations that can be made. This could include, for example, expanding stations and station areas with forms of shared mobility. So that travellers arriving at a station can immediately take a shared bicycle to their destination. Public transport plays a major role here. Public transport is sufficiently flexible and shared cars offer the solution to meet the needs of the user in addition to public transport (J. Postma, personal communication, 2022). As mentioned earlier, a public transport hub in or close to a district is a precondition for this.

In addition to public transport, (shared) micro-mobility also plays a major role when integrating shared mobility in new housing estates (D. Offringa, personal communication, 2022). If residents decide not to take their own car, or to get rid of it, the shared mobility available in that neighbourhood must meet every need that a private car offers. For this it is essential that products such as shared cargo bikes are also offered. This to ensure that these types of trips that were previously done with a car can also be replaced by a shared alternative. It is also important for this that the cycling infrastructure in a neighbourhood and

city is safe and in order (H. Habekotté, personal communication, 2022). This is done so that neighbourhoods are and remain accessible to cyclists. It can therefore be concluded that a varied offer is extremely important. Careful consideration must be given in advance to the composition of the supply and its quality requirements (K. van der Kraan, personal communication, 2022). The pitfall here can be to think in a too supply-oriented manner and not to take into account the different user profiles of a neighbourhood. These play a role in the choice of which forms of mobility should be available in the area.

5.2.3 Mobility policy

The case study of the Hogekwartier district provides a good representation of the importance of a good mobility policy. Mobility policy is something that every municipality has to deal with on different scales. Parking policy and shared mobility in particular are two subjects that go hand in hand and are dependent on each other. This chapter looks at the extent to which parking standards and parking regimes influence shared mobility in housing projects. In addition, the extent to which local politics is involved in this and whether the possibility of a shared mobility concession can be considered as a realistic solution.

Parking standards

Parking standards are seen as a promising means of influencing shared mobility. By developing neighbourhoods with a reduced parking standard in combination with shared mobility, this could potentially lead to fewer cars in a neighbourhood, and thus more space for greenery, homes or other facilities. Parking standards can therefore be lowered on different scales. Current parking standards are often advised by organisations such as CROW and are set by municipalities and provinces in their policies. Municipalities can give a discount on these parking standards, depending on how much shared mobility will be offered. In the Hogekwartier we have seen that a reduced standard does not guarantee actual use of shared mobility. Projects such as the Hogekwartier have shown that simply lowering the standards and then installing shared mobility is not sufficient for such a project to succeed. Although it is not a holy grail in itself, it is extremely important that it happens (H. Buijtelaar, personal communication, 2022). If parking standards remain high and it is made accessible for people to own one or two cars, they will do so (W. Slob, personal communication, 2022). That is why it is important that behaviour is stimulated in some way, for example through adjusted parking standards. So lowering parking standards does play an important role in the bigger picture to make shared mobility in area development a success.

In addition to using shared mobility, municipalities can also give discounts on the parking standard in other ways. According to Van der Kraan, there are two ways for municipalities to decide on the amount of discount. First of all, whether paid parking is present in the neighbourhood. If paid parking is active, municipalities have more freedom to release the parking requirement, or the number of spaces recommended, because then you have the certainty that no nuisance will arise in the public space (K. van der Kraan, personal communication, 2022). The other factor that determines how much discount you get on the parking standard is the accessibility of public transport. This is used because public transport offers a good alternative to the car. It is important to look at the user profile of the residents. If you need the car for work every day, despite good public transport, people will not easily make the switch to shared mobility (K. van der Kraan, personal communication, 2022). The success rate of shared mobility in new housing estates is therefore significantly greater if parking regulations are in place and the accessibility of public transport is good, because then the discount on the parking requirement is also greater.

An issue that policymakers have come up against a lot recently is that parking standards are often set based on current standards. The parking standard and the amount of discount that an area development receives is based on current circumstances, while the development may not be completed for another four years (H. van Westing, personal communication, 2022). So, based on certain assumptions for the future, the number of parking spaces is calculated. This is often not very realistic because you do not know what the future will look like. The development of shared mobility and electric cars is going very fast and this must be taken into account, says Han-paul van Westing: *“If you install an X number of charging stations now, you know that you will not have enough in five years. So you actually have to build some form of flexibility into an area, and that is extremely difficult"* (personal communication, 2022). This also applies to parking standards. Van Westing argues for a kind of environmental management or area management, an organisation in which the parties involved (users, municipality and developers) remain involved in the area after the homes have been completed. In this way you incorporate a form of guarantee for the success and use of shared mobility in an area development.

Parking regime

The Hogekwartier project is the perfect example to show that shared mobility in area development does not only depend on adjusted parking standards, but that the parking regime plays an equally important role. It is a precondition for shared mobility in housing projects to have a parking regime consisting of paid or licensed parking in the

neighbourhood itself and the area around it (P. Rossewij, H. Habekotté, D. Offringa, K. van der Kraan, H. van Westing, N. Knoester, M. Boerbooms & C. van Rooyen, personal communication, 2022). This does not only apply to the Hogekwartier, but to all neighbourhoods in the Netherlands where shared mobility must play a role in the future. In these types of scenarios, an area is often developed in which agreements have been made about reduced parking standards and deliberately not giving out parking permits. The municipality however decides not to apply paid or licensed parking in the surrounding neighbourhoods. As a result, people park their cars in the surrounding neighbourhoods and the parking pressure shifts. This is called the waterbed effect and occurs in areas where a city-wide parking regime is absent (B. Braak, D. Leveling, H. Buijtelaar, J. Postma, M. Das, R. van der Linde, H. Habekotté, D. Offringa, K. van der crane, H. van Westing, M. Boerbooms, C. van Rooyen, personal communication, 2022).

This can lead to frustration among residents of the surrounding neighbourhoods because they are now facing parking pressure. After a while, municipalities often decide to still introduce paid parking in both the neighbourhood itself and the surrounding neighbourhoods because they notice the usage rate of the shared mobility is low, or the complaints of residents about parking pressure. In many cases, this leads to a feeling of injustice because these residents are the victims of an area development in the neighbourhood next door (H. van Westing & C. van Rooyen, personal communication, 2022). These residents suddenly have to pay money for a parking spot that was previously free for them. For this, it is essential to have paid parking or licensed parking in the surrounding neighbourhoods arranged in advance before residents move into their homes (H. Habekotté, personal communication, 2022). Otherwise, you give people the opportunity to park their car and then take it away. It is important to think about the parking policy at an early stage and what consequences this may have for the district itself and the surrounding districts.

Local politics

Topics such as parking standards and parking regime are inseparable from local politics. Owning a car in the Netherlands is woven into our culture and renouncing it is seen as a huge behavioural change. Policies from local authorities regarding cars and parking can therefore be a sensitive subject to residents. Especially when it comes to developments that aim to reduce car ownership. The fear within local politics of resistance from residents can therefore hold back and delay the development and progress of shared mobility in a housing project (D. Leveling, R. van der Linde, H. Habekotté, K. van der Kraan, N. Knoester & C van Rooyen, personal communication, 2022).

As discussed, an area development in which shared mobility and adapted parking standards are integrated can lead to a waterbed effect in which residents park their cars in a surrounding neighbourhood. To prevent this, it is essential that a municipality applies licensed or paid parking in the surrounding neighbourhoods at an early stage. This can be very politically delicate. Aldermen in local politics are afraid of resistance from residents. This resistance could lead to these residents not voting for them in the next municipal elections. For that reason, no city council likes to implement a low-car policy. Car-restricted policies can therefore be perceived by residents as 'car bullying'. This fear of not being re-elected often means that residents still receive their much wanted parking permit, or that no parking regime will be implemented in the surrounding neighbourhoods (H. Habekotté, personal communication, 2022). In this case, the importance of implementing a low-traffic policy clashes with the interest of keeping residents satisfied (K. van der Kraan, personal communication, 2022). As a result, the preconditions for allowing residents to use shared mobility are not in order and, as in the Hogekwartier, the usage figures for shared mobility will therefore be low.

The same goes for lowering parking standards. The development of a new residential area is the ideal time to build with a reduced parking standard because there are no residents yet. However, it appears that lowering parking standards and reducing parking spaces in an already built area is something that municipalities do not like to participate in (D. Leveling, personal communication, 2022). When developing a new housing project and having implemented shared mobility in advance, you can always point out to residents the conditions they were aware of before they came to live there. To take measures to lower parking standards or introduce permitted parking in an already existing residential area is therefore seen as 'political suicide' (N. Knoester, personal communication, 2022).

Shared mobility concession

Because shared mobility is still under development and usage figures are not yet high everywhere, it is regularly not (yet) profitable for companies that offer shared mobility to continue to do so. Companies often depend on subsidies or investors for this. To ensure that many of these providers can continue to exist, the idea of a shared mobility concession is regularly put forward by municipalities and provinces (A. Schouten & W. Slob, personal communication, 2022). The question here is whether the province could add shared mobility to the public transport concession. With a shared mobility concession, the government buys in shared mobility, and in this way it partly becomes a public good (K. van der Kraan, personal communication, 2022). The same is done in the Netherlands with public transport, because otherwise it is not profitable enough for providers to continue to offer their service.

At the province of Utrecht, a conscious decision was made during the last concession formation not to integrate shared mobility in the public transport concession. The reason for this is because concessions are always bound to certain terms that are fixed for a long time (W. Slob, personal communication, 2022). Shared mobility is still very much in development. If you anchor shared mobility in a concession, there is less room for innovation in the short term and it is immediately fixed for the long term. By giving different market parties the space to innovate, develop and implement ideas, you can also better adjust shared mobility to the needs of residents. Not much is known about the needs of residents for shared mobility at the moment, and it differs greatly per location (A. Schouten, personal communication, 2022). This makes it difficult to establish shared mobility in the form of a concession. Financially supporting market parties through subsidies would be a better solution in the short term (K. van der Kraan, personal communication, 2022).

5.3 Behavioural change

As mentioned earlier, owning one or more cars is intertwined in our western culture. A country like the Netherlands is prosperous enough that owning several cars has become a 'normal' for many people. The same applies to parking where people sometimes see it as a 'right' to be able to park their car on the street in front of their house. Not taking a car or getting rid of their own car and making the switch to shared mobility is therefore seen as an enormous change in behaviour (B. Braak, H. Buijtelaar, J. Postma, M. Das, R. van der Linde, W. Slob, H. Habekotté, A. Schouten, H. van Westing, N. Knoester & C. van Rooyen, personal communication, 2022). Developing a new housing area and new residents moving in is seen as a life-changing event for people and an ideal moment to stimulate a change in behaviour (H. van Westing, personal communication, 2022). When developing a new area you have a so-called 'point-zero' where there is a moment of change and people will have to make their mobility choices. In this phase, various factors of behavioural change are important when integrating shared mobility in housing projects.

5.3.1 First experience

For many people, moving from car ownership to shared mobility is a big step. To make this step at all, it is very important that the sharing concept works as it should. Many people therefore first try different shared mobility services before they decide to make the switch. The first experience with shared mobility is therefore very decisive for its future use (J. Postma, R. van der Linde, A. Schouten, H. van Westing & N. Knoester, personal communication, 2022). People can quickly have prejudices about new unfamiliar concepts, including shared mobility. If some prejudices are confirmed in a first experience, people will

not easily use the concept again in the future. That is why, according to Jelle Postma, it is important that new residents get the help they need when trying out the concept: *“I think it helps enormously if you have something like a demonstration. People move in and someone from the shared mobility provider takes people by the hand and shows them it's easy, how the app works and how you start the car and then you know how it works. Then they have a positive experience, making it more accessible to continue using it. It only has to go wrong once or twice and then people think, you see, it doesn't work"* (personal communication, 2022). That is why it is important as a shared mobility provider to also invest in test drives, communication and promotion.

It is very difficult to give people a good first experience when a concept is still in a development phase. The concept of shared mobility has been around for a few years now. Nevertheless, there is still plenty of innovation taking place, which means that changes and improvements are still taking place. This makes it difficult to directly bind users to shared mobility. If someone has a negative first experience with shared mobility due to a specific problem, it is unlikely that they will use shared mobility again. Even though this specific problem will probably be solved a year later through innovation (A. Schouten, personal communication, 2022). It is therefore difficult to get people to get used to a still developing concept and as a result it can be difficult to steer this behavioural change.

5.3.2 Early stage adaptation

In the Hogekwartier, we have seen that due to a delay in the delivery of the charging stations for the shared cars, shared mobility could only start a few years later than desired. As a result, residents had been living there for a number of years, before shared mobility was integrated on site. Residents of the Hogekwartier therefore made their mobility choice some time ago when they came to live there, and were unable to include shared mobility in their choice at the time. This has ensured that shared mobility in the Hogekwartier had a difficult start-up phase (P. Rossewij, personal communication, 2022).

Integrating shared mobility at an early stage of an area development is therefore seen as one of the most important factors for the success of shared mobility in housing projects (J. Postma, M. Das, P. Rossewij, R. van der Linde, W Slob, H. Habekotté, A. Schouten, K. van der Kraan, H. van Westing, N. Knoester & M. Boerbooms, personal communication, 2022). Getting people to use shared mobility and getting rid of their own car is seen as an enormous change in behaviour. It is therefore complicated to change the behaviour of people who already have their own car at their doorstep by simply adding shared mobility.

That is why it is important to make an impact before people move in so that you can change these ingrained patterns. (J. Postma, personal communication, 2022).

This so-called early stage adaptation consists of two essential factors. The first of these is that shared transport must already be present in the neighbourhood before the new residents come to live. The residents must be able to use the shared mobility immediately when they move into their home. A good supply from the start is essential as well. It is important to show residents from the start that shared mobility is always available when they want to use it. Residents already make their choice of mobility before they move into the new homes. By offering shared mobility at an early stage, they can see the benefits and base their mobility choice on this (J. Postma, personal communication, 2022).

Secondly, timely information provision plays an enormous role in early stage adaptation. When people register for a new-build home, they start thinking about their future at an early stage. Mobility is also part of this, since people's housing-work situation strongly depends on mobility. Future residents must be aware of all information about the neighbourhood before they come to live there. This means that if a neighbourhood is developed as a 'car-restricted' neighbourhood with low parking standards, residents will know exactly what this means and what consequences it will have for them. It is important that there must be a clear picture of the flexibility of the mobility system. This means that residents must be aware of the forms of shared mobility that are offered, the quantity, the alternatives in public transport and bicycle and pedestrian networks. This so that they already get an idea of what the neighbourhood will look like (J. Postma, personal communication, 2022). In this way you ensure that behaviour has already been adjusted when people come to live there.

It is important that the establishment of shared mobility is completely sealed at an early stage. A buyer or tenant must receive complete information on the project website or that of the estate agent and know in advance how mobility is arranged, that they cannot obtain a parking permit and what the parking costs are. This is where things regularly go wrong, according to Martien Das: *“Poor information provision often results in bad publicity afterwards. People then complain that parking is too expensive or that they cannot park their car. While this should have been clear in advance"* (personal communication, 2022). By responding to this at an early stage, you can prevent bad publicity.

The responsibility of early stage adaptation lies with various actors. Both the municipality, developers and providers of shared mobility. It is important for a municipality to communicate clearly during the area development that the neighbourhood will become a car-restricted

neighbourhood in which the role of car ownership will decrease, in order to stimulate a mobility transition (J. Postma, personal communication, 2022). Municipalities can therefore set important preconditions for this through parking policy. The developing parties also have a share in this. As mentioned earlier, it is often noticed that shared mobility is seen as a solution for developers to complete their housing construction. Developers often lack some form of responsibility for the use of shared mobility. Much progress can still be made in the field of information provision. The websites of new-build projects where it is known that agreements have been made about shared mobility, often contain very little information about carsharing, shared bicycles and parking standards. In many cases the information on websites only contain some general terms about the neighbourhood becoming sustainable and green. It is important that these websites provide extensive information in the field of shared mobility. These websites serve as a form of 'sales website', where people receive information about the neighbourhood where they'll potentially live. If people buy or rent a house based on this incomplete information, or on the basis of information from a broker, this can lead to unexpected problems for residents in the future. In addition, developing parties and brokers often lack the knowledge to properly answer questions in this context (M. Das, personal communication, 2022).

5.3.3 Time aspect

Shared mobility is a relatively new concept and is therefore still under development. Because shared mobility, and in particular the shared car, is an alternative to a product that has been worn into our system for decades, namely the car, this switch is seen as a huge behavioural change. In addition to all the aforementioned incentives, the matter of time and patience is seen as an important factor for the success of shared mobility (B. Braak, H. Buijtelaar, M. Das, H. Habekotté, K. van der Kraan & H. van Westing, personal communication, 2022). Any major change in behaviour requires getting used to and that takes time. This also applies to shared mobility. For this reason, it is extremely important that new housing projects in which shared mobility is integrated are given time. Providers of shared mobility in housing projects often incur start-up losses in the first few years because people already have their own mobility arranged in the majority of cases. It is therefore important that the public sector, namely municipalities, provide the shared mobility operator with financial support to ensure that they can continue to offer the shared mobility service for the first few years (P. Rossewij, personal communication, 2022). Residents must be given time to make the transition from car ownership to car sharing. Time is of course an important aspect, but always complemented by other measures and incentives.

One of the aspects that has an important share with regard to the time aspect is the generation difference. The younger generation is involved in mobility in a completely different way than older generations, which is also reflected in the use of shared mobility (B. Braak, R. van der Linde, W. Slob, N. Knoester, M. Boerbooms & C. van Rooyen, personal communication, 2022). While the older generation is reasonably attached to the car, the younger generation views mobility in a more sustainable way (R. van der Linde, personal communication, 2022). Nick Knoester also sees this happening in practice: *"You see that companies and employers are increasingly realising that their new employees don't actually want a company lease car. They live in Amsterdam or Utrecht. They want to be facilitated in their mobility in a different way, for example by means of an NS Business Card or an option for shared mobility"* (personal communication, 2022). What also plays a role in this is that people are increasingly working from home (H. van Westing, personal communication, 2022). As a result, people are less dependent on their car because they simply need it less. Public transport is increasingly used for the few journeys that require on-site travel. This therefore once again emphasises the important role that a good public transport connection has when integrating shared mobility in housing projects.

5.3.4 Price effect

There are several ways to change behaviour. One of the most common ways to steer behaviour is through financial incentives, especially in a country like the Netherlands. In shared mobility in general and in particular when integrating shared mobility in housing projects, price, and the way of pricing in particular, plays an enormous role. In practice, different pricing methods are used when integrating shared mobility in housing projects. For example, subscription costs, price per kilometre, price per hour and sometimes the costs of shared mobility are integrated into the rental or purchase price of the house. At the moment, it is often seen in practice that people get a wrong picture of the actual costs of shared mobility (B. Braak, H. Buijtelaar, J. Postma, M. Das, P. Rossewij, W. Slob, A. Schouten , H. van Westing & N. Knoester, personal communication, 2022). People often underestimate the costs of car ownership and overestimate the costs of shared mobility. Often a skewed comparison is made in which the price per kilometre of a shared car is compared with the petrol costs per kilometre of a private car. People underestimate the cost per kilometre of their own car. Costs such as insurance, depreciation, road tax, maintenance and even the purchase costs of a car are often forgotten (H. van Westing, personal communication, 2022). All these costs are already included in the price of a shared car, which means that the price can be perceived as high to users, while in reality and compared to car ownership, shared mobility is cheaper in the majority of the cases. It is important to note that this mainly applies

to shared cars as an alternative to the second car (B. Braak, personal communication, 2022). If a resident has to drive long distances every day for work, a private first car will usually pay off (H. van Westing, personal communication, 2022).

According to Hans Buijtelaar, pricing is therefore the most important factor in getting people to use shared mobility: *“The question is, how do you get that large middle group on board? If you can do that, you will achieve something. You can only do that by setting a good price, showing what a car really costs. If a shared car costs less, the majority of the Netherlands will start to consider whether they should make the switch"* (personal communication, 2022). In many cases, the price of shared mobility is not the problem in itself, but rather how people perceive this price, and the way of pricing plays a major role in this. In addition to the pricing of shared mobility, there are also other financial means to steer behavioural change with regard to shared mobility. For example, municipalities are increasingly working with paid parking or with paid parking permits for residents. If residents have to pay a lot of money for, for example, a second permit for their car, they may be more inclined to consider shared mobility (C. van Rooyen, personal communication, 2023). The influences of prices on parking or shared mobility can also be linked back to the theory of consumer choice behaviour. In particular, the functional value plays a major role here. Pricing is an example of a functional value, namely the perceived utility with the highest functional and utilitarian performance. The price of a service or good, in this case a parking permit, influences the choice behaviour whether to opt for shared mobility.

What is nowadays also seen as a promising way of integrating shared mobility in area development is integrating the costs of shared mobility into the purchase or rental price of a house (K. van der Kraan & H. van Westing, personal communication, 2022). You can, for example, charge this to the VvE (Association for Owners) or include it in the service costs. In this way you allow residents to contribute to shared mobility, which lowers the threshold for buying their own car because you already incur certain costs for your mobility (K. van der Kraan, personal communication, 2022). In addition, this ensures that the risk for the shared mobility provider is also lower because they generate income from the very first moment (H. van Westing, personal communication, 2022). This way of guiding behaviour is a good example of nudging. An important aspect of nudging is to direct behaviour without prohibiting alternatives or greatly limiting the choice of alternatives. By incorporating the costs of shared mobility into the rental price, you still give residents the choice to have their own mobility, but you also nudge the choice of an alternative that is of interest to society.

5.4 Public goals

According to the City Deal electric shared mobility in area development, the integration of shared mobility in housing projects would have various advantages. Some of these benefits focus on an increase in quality of life because these types of projects free up more space for trees, parks and playgrounds. This is therefore seen as one of the main reasons for municipalities to integrate shared mobility in housing projects. Nevertheless, it appears that many of the actors studied, namely residents, municipalities and developers, are often too little concerned with the positive consequences that the integration of shared mobility can have for the quality of life in those residential areas (H. Buijtelaar, M. Das, R. van der Linde, H. Habekotté, K. van der Kraan, H. van Westing, N. Knoester & C. van Rooyen, personal communication, 2022).

As mentioned earlier, the private sector, namely developers, often use shared mobility as a means to complete their housing development and thus business case. What often happens in practice is that the space that is freed up by lowering parking standards and offering shared mobility is used to develop more houses. This is because more houses were calculated in the housing plans than could be developed with the current parking standard. As a result, this freed up space is not being used for more greenery, playgrounds and other investments that can improve the quality of life in a neighbourhood (H. Buijtelaar, personal communication, 2022). This while, according to the City Deal, these housing projects should lead to an increase of quality of life.

Having the space to park your own car in front of your house is still seen as invaluable in the Netherlands. Despite this, Hans Buijtelaar and Martien Das have also recently seen a slight shift in which people increasingly value more living space and more greenery (personal communication, 2022). This new housing need can partly be attributed to the consequences of Covid-19 (D. Leveling, personal communication, 2022). Due to corona, more people are working from home and are therefore more present in the area around their house. As a result, residents have a greater need for more space and greenery in their living environment. Despite this shift, the willingness of residents to get rid of their cars and use shared mobility is still very low.

According to Han-Paul van Westing, there is still a lot to be gained in terms of raising awareness among residents that more use of shared mobility and fewer parking spaces can lead to more greenery and a better living environment: *"You can make it very attractive for residents to use shared cars and shared mobility. This has benefits for your neighbourhood*

that you can promote as a developing party. The quality of life is of course an element that is increasing. People don't think about this at first, but when your children can play nicely and it's safer on the street or the cycling routes are good. Then it becomes very attractive to use shared vehicles. So there are also qualitative aspects that you can and must emphasise" (personal communication, 2022). The quality of life and other benefits for the user must be visible. If these benefits are only for the developing party or for the municipality to build more houses, residents will never take the step to shared mobility.

In order to make residents and potential users more aware of the positive consequences that shared mobility can have on their living environment, it can be useful to let residents participate in the process (H. van Westing, personal communication, 2022). In new housing projects and also in the case of existing residential areas, resistance can arise from many residents when parking standards are lowered because this means that parking their cars becomes more difficult. This resistance or frustration can be prevented by including residents in the process and by allowing them to think about what exactly the space that will be released by applying fewer parking spaces can be used for. This gives residents more empathy for so-called car-restricted developments. In addition, the opportunity can also be offered to (future) residents to have their say about the type of shared vehicles, the quantity and where they will be located.

To allow residents to participate in the process, it can be of value to start a neighbourhood foundation (J. Postma & H. Habekotté, personal communication, 2022). If developers receive a discount on the parking standard, this means that the developer has to construct fewer parking spaces and therefore spend less on this, which leads to larger profit margins. The goal of a neighbourhood foundation is that (part of the) money saved by constructing fewer parking spaces ends up in a fund for facilities in the district. With this, developers indirectly pay for good pedestrian facilities, public transport hubs, more greenery and playgrounds. In this way you make sure that not only developers and municipalities benefit from the development, but also the residents for whom it is ultimately intended. In this way, a neighbourhood foundation also stimulates the participation process when residents are allowed to co-decide about what the money from the fund is used for (H. Habekotté, personal communication, 2022).

5.5 Synthesis

In the synthesis of this research, we look back at the previously used theories and models from chapter 2 and the extent to which they are reflected in the results of this research. The synthesis is a form of analysis based on comparison and contrast. Various theories and operationalizations have been used in the theoretical framework. The results show that the concepts that are part of the shared economy, namely carsharing and shared micro-mobility, naturally recurs a lot in the results, given that these forms of shared mobility can be seen as the main concept of this study. In a broad sense, the use of the theories about the institutions and organisations has been used less as a basis for the results than expected. However, many results are based on the opinions of both the municipality (public sector) and those of housing developers (private sector) and these reoccur more often. It was expected that the public-private partnership would also play a major role in the analysis of the results. The role of this was ultimately limited and is only expressed in Chapter 4, in which the results of the case study are based, among other things, on the data obtained from the relevant housing corporation (public-private partnership). In addition, the theory of two-sided markets applies. This has been used as a support point in Chapter 4 for the argument of economies of scale. Finally, several theories related to behaviour change have been used to further elaborate on the results. For example, the theory of nudging was used to substantiate the argument of price effect in Chapter 5. The theory of consumer choice behaviour, on the other hand, was used to a limited extent to substantiate the results. Of the five consumption values used, only the conditional value is applicable to the results used in Chapter 4 and the functional value was used to substantiate the argument of price effect in Chapter 5. The other consumption values subsequently appear to be less applicable to the results of this study.

6. Conclusions & Recommendations

The research results were analysed in the previous chapter. Conclusions will now be drawn on the basis of these analyses. This will be done by answering the main and sub-questions in this chapter. The main question states: *"To what extent does the integration of shared mobility in housing projects stimulate the use of shared mobility?"*. In addition to answering the main and sub-questions, practical and theoretical recommendations will be made and the critical reflection on the research will also be discussed.

6.1 Conclusions

First of all, it was investigated how developing parties view shared mobility. It can be stated that project developers generally use shared mobility as a means to complete their housing assignment. In many cases this is done due to a lack of space or to obtain a better business case. Municipalities will be inclined to cooperate by means of a discount on the parking standard, because shared mobility is seen as a green solution. Despite this, it can be concluded that in many cases the role of responsibility for the further development of shared mobility in a neighbourhood is unclear. As in the case study in Hogekwartier, a company has been designated as a shared mobility operator, but developers feel too little responsibility to contribute to essential preconditions to promote the use of that shared mobility. In cases where the developing party is involved, it is seen that shared mobility is often thought of in a too supply-oriented manner. Developers and municipalities are not sufficiently concerned with measures to create the right amount of demand for the shared mobility.

The second sub-question concerns the most important factors that must be taken into account when integrating shared mobility in housing projects. It can be concluded that it is essential to keep the target groups in mind during the entire development process and to adjust your mobility policy accordingly. It can be concluded that a combination of user profiles works best. In addition, it is important that shared mobility is complemented by other means of transport. A mobility mix of shared cars, shared micro-mobility, public transport and bicycle and pedestrian networks are of utmost importance. This combination of means of transport, in particular the addition of public transport, was absent in the Hogekwartier study which caused residents to not have a total offer of mobility options. Finally, it is a precondition to adjust your mobility and parking policy to your spatial development. An active parking regime in particular is essential to sufficiently incentivize residents to make use of shared mobility. It should be emphasised that the total combination of these factors is

important. If one of these preconditions is not present, the chance of success is significantly reduced.

Thirdly, the role of behavioural change in integrating shared mobility in housing projects has been investigated. It can be concluded that it is an enormous change in behaviour to make sure that people actually use shared mobility and that various factors are important in this regard. First of all, it can be concluded that the first experience with shared mobility can be decisive for its future use. It is important to respond to this first experience at an early stage of a development, through early provision of information and early implementation of shared mobility. In this way you change behaviour before residents move into their new homes. In line with this, it is important that the process of getting people used to this behavioural change is given time and, where necessary, supported by financial resources. Finally, the way of pricing shared mobility also plays a major role here. To date, it can be concluded that people underestimate the costs of their own car and overestimate the costs of shared mobility. In this case, behaviour must be consciously controlled by educating residents or integrating costs into the rent or purchase price of a house.

In the last sub-question, it was investigated how the integration of shared mobility is in line with public shared mobility goals. The main focus was on how shared mobility can lead to an improvement in the quality of life through more greenery, playgrounds and pedestrian facilities. It can be concluded that residents are too little aware of the positive consequences that shared mobility can have for the living environment, resulting in high car ownership. Developing parties also have a share in this because they invest too little in public space, while they do reap the benefits of a development with a low parking standard. This is also the case in the Hogekwartier, where shared mobility is used as a means to complete the housing assignment. To solve this problem, a neighbourhood foundation could be used, in which you let residents participate and think along about the use of the public space, in order to improve the quality of life in the neighbourhood. As a result, residents will be more inclined to make the switch from car ownership to shared mobility.

Finally, the main question: *To what extent does the integration of shared mobility in housing projects stimulate the use of shared mobility?* It can be concluded that the integration of shared mobility in housing projects could potentially be a good way to stimulate shared mobility. However, this research shows that it has so far proved difficult to get residents of residential areas to use shared mobility because the switch from car ownership to shared mobility requires an enormous change in behaviour. To incentivize the use of shared mobility, it is extremely important that municipalities and developers create the right

preconditions. This remains a difficult task because every housing development has different characteristics and therefore requires a tailor-made solution. For this reason, it is essential that careful consideration is given to the target groups, mobility options, prices and mobility policy at an early stage. It is important to look further than just the neighbourhood itself, so that the development does not lead to negative consequences for surrounding areas. There are therefore many factors that need to be taken into account when integrating shared mobility into housing projects. As soon as municipalities and developers make the right investments to create key preconditions, and residents are given time to get used to this change, the integration of shared mobility in housing projects can already function in the short term as a means of stimulating the use of shared mobility.

6.2 Critical reflection

An important part of a thorough research is reflection. This section critically reflects on the research process and the final results of the research. A first point of criticism of this research focuses on the case study selection. The case study choice was based, among other things, on the fact that the Hogekwartier has built 50 fewer parking spaces and would install ten shared cars in return. Unfortunately, it was only during the data collection process that it was realised that not ten, but two shared cars had been installed. As a result, the scale was less representative of the study than initially thought. In addition, the study initially assumed that other forms of shared mobility would be present, such as shared cargo bikes and other forms of shared micro-mobility. In the later part of the process, research showed that these had not yet been placed, which caused that this part could not be included in the case study.

Another point of criticism of this research focuses on the perspective of the developing parties. An attempt was made, among other things, to investigate how developers see shared mobility and in particular how they view the integration of shared mobility in housing projects. Ultimately, the case study was carried out on the Hogekwartier district, which was developed by a housing corporation. The results of this study with regard to this sub-question have been generalised to the group of developing parties, which includes both private developers and housing corporations. As a result, these two actors were sometimes lumped together during the research and perceived and regarded as one actor, while their views on shared mobility can differ much. It turned out to be difficult to make statements about the perspective of developers and housing corporations because those two actors were sometimes perceived as one actor, instead of two separate acting agencies.

A final point of criticism focuses on the consumer side of this study. The role of residents and consumers and how they make their choices play an enormous role in integrating shared mobility in housing projects. However, this study deliberately focuses on the policy side of this subject because less has been written about it in scientific literature. Despite this, the consumer side has been included in this study to a certain extent because it is of value to policymakers to know why consumers make certain choices. In retrospect, it would have been valuable to fully include the consumer side in the research, because this is essential to paint a complete picture of the integration of shared mobility in housing projects and to board up the research as much as possible.

6.3 Recommendations

This study investigated the extent to which the integration of shared mobility in housing projects can stimulate shared mobility. Based on the results and the critical reflection of this study, some recommendations can be made. In this research practical and scientific recommendations are distinguished.

6.3.1 Practical recommendations

With regard to the practical recommendations, recommendations for two different actors were considered, namely those of municipalities and the developing parties. With regard to municipalities, recommendations can mainly be made in the field of mobility policy. The case study in the Hogekwartier proves that a passive role of municipalities can have negative consequences for the use of shared mobility in a neighbourhood. The most important recommendation for municipalities is to introduce a city-wide parking regime when a neighbourhood is constructed with adapted parking standards and shared mobility. This is to prevent residents from parking their cars in the surrounding neighbourhoods and creating a waterbed-effect. An active parking regime through licensed or paid parking is seen as a precondition for the use of shared mobility. A second recommendation for municipalities focuses on giving out discounts on parking standards. Municipalities must make more efforts to ensure that developers invest part of the money, caused by a development with lower parking standards, in neighbourhood facilities to improve the quality of life. Municipalities should make agreements with developers about starting up a neighbourhood foundation, for example, so that residents can see that using shared mobility has benefits for their neighbourhood.

It is advisable for developing parties to look ahead to the future when developing a neighbourhood. As a developer, it is important to think about the integration of shared mobility at an early stage and to build your infrastructure on this basis. This includes the timely installation of the charging network for shared electric vehicles. This way you ensure that shared mobility is already present when people start living in the neighbourhood. As a developer you have a large share in this to ensure that this happens on time. Secondly, it is recommended for developers to create neighbourhoods where different user profiles will live. This research shows that shared mobility works best when a neighbourhood consists of different target groups, so that the shared mobility can be used optimally. In general, it is advisable to keep the target groups and location of your development in mind at all times during the development process of housing projects.

6.3.2 Scientific recommendations

The scientific recommendations include consideration of the possibilities for further research. First of all, it can be recommended to continue research into shared driving in general. Because the concept of shared driving is still developing rapidly, the current state regarding shared mobility says little about the future. Due to technological developments and policy changes, shared driving may look very different in a few years. For example, it would be possible to look specifically at shared mobility as part of a concession and what consequences this has for the use of shared mobility.

Secondly, it can be recommended to carry out quantitative research into the integration of shared mobility in housing projects in the future. This research was qualitative in nature and investigated, through various perspectives of the actors involved, to what extent the integration of shared mobility can lead to a stimulation of shared mobility. It is recommended that in the future, research should also be carried out into the actual usage figures of shared mobility neighbourhoods. It is valuable to find out to what extent people switch to shared mobility as a result of reduced parking standards, or whether this will make them more likely to use other means of transport, such as public transport. In line with this, it is also interesting to investigate from which means of transport residents make the switch to shared mobility. For example, if residents make the switch from public transport or cycling to shared mobility, is that really desirable? This research shows that there is still little insight into which means of transport replace each other, and on what scale this happens.

Finally, it is recommended to conduct further research on the side of the residents. This research mainly focused on the perspectives of the actors, policymakers and developing

parties. Due to the scale of this study, the perspective of residents has been included to a limited extent. Much has been written in the scientific literature about the consumer side of shared mobility in general, but not yet specifically about shared mobility in housing projects. For follow-up research, it may be interesting to look at the considerations of residents who live in neighbourhoods where shared mobility is integrated and to conduct a quantitative study of this. In this way you ensure that the research results on shared mobility in housing projects can be generalised in a better way.

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Appendix A: Codes

Code	Grounded	Code Groups
Availability Shared Mobility	23	
Behavioural change	43	Behavioural change
City Deal	10	
City-wide	8	
Commuting	8	
Covid	6	
Early Stage Information Provision	33	Key aspects
Finalizing housing development	27	Developers view
First experience	6	Behavioural change
Generational difference	8	Behavioural change
Highway location	7	
Housing developers	23	Developers view
Hygiene	3	
Knowledge exchange	14	
MaaS	29	
Marketing	30	
Mobility Policy	14	Key aspects
Mobility-Mix	27	Key aspects
Neigbourhood Foundation	3	Public goals
Parking pressure	10	
Parking regime	59	Key aspects
Parking standards	62	Key aspects
Participation	6	Public goals
Politics	13	Key aspects
Price effect	43	Behavioural change
Public Transport	49	Key aspects
Quality of life	36	Public goals
Shared Micro-Mobility	26	Key aspects
Shared mobility calculation	15	
Shared Mobility concession	7	Key aspects
Shared Mobility operator	9	
Shared mobility providers	11	
Substitute second car	13	
Supply thinking	7	Developers view
Sustainability	31	
Swimmingpool location	6	
Target groups	39	
Time aspect	21	Behavioural change
Underground parking	17	
Upscaling	8	
Visibility	11	
Waterbed effect	19	Key aspects

Figure 1: Codes

Figure 2: Code Groups

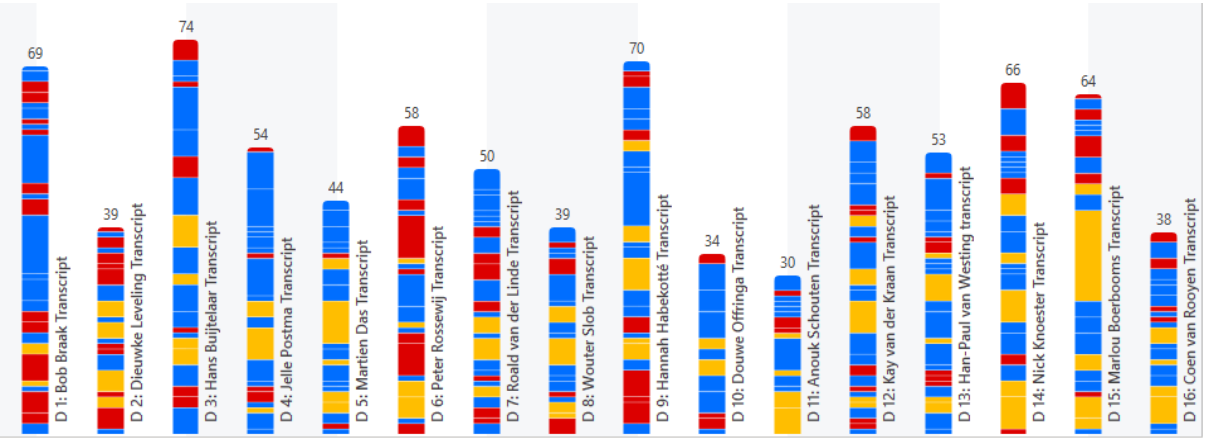

Figure 3: Code Distribution by Document