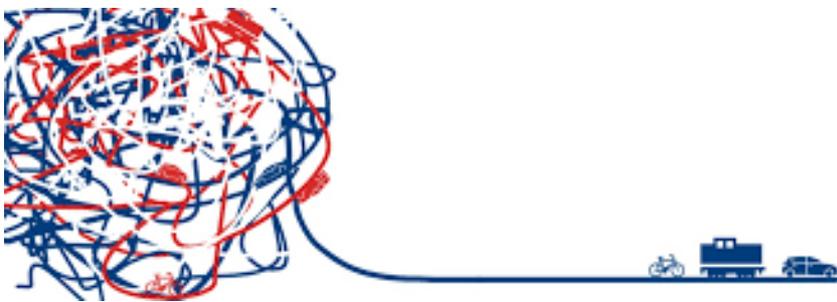


HOW TO OVERCOME OBSTACLES IN THE IMPLEMENTATION OF SUSTAINABLE MOBILITY IN FUTURE URBAN DISTRICTS?

GETTING FROM A TO B IN A COMPLEX MOBILITY IMPLEMENTATION PROCESS: A RESEARCH ON THE INSTITUTIONAL AND FINANCIAL OBSTACLES AND APPROACHES IN THE PLANNING PROCESS OF SUSTAINABLE MOBILITY IN CASES OF MERWEDE AND SLUISBUURT.



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Preface

Hereby I present my thesis, written for my Master Spatial planning at the Utrecht University. The reason I chose this research's topic is that I am supporting sustainable development of cities. My interests were confirmed during my academic years in Utrecht in which many courses highlighted the importance of sustainable development, especially the master's courses 'Planning for Sustainable Cities', 'Smart Urban Governance' and 'Urban Infrastructures'. These courses made me aware of the urgency to guide cities to have a healthy and liveable environment. However, they also made me aware of the extreme complexity of solving urban problems, sometimes even referred to as '*wicked problems*'. When I combined this with my interest in urban mobility, I hope this research and its outcomes contribute to debate about how to develop cities sustainably despite all difficulties we have to face.

I have been working on this thesis since the beginning of February 2021, combining it with a very instructive internship at the municipality of Apeldoorn. This thesis would not have been possible without the advice and help of the various people. Special thanks to my Utrecht University supervisor Martijn van den Hurk for guiding and assisting me during the period of writing my thesis. His expertise on the subject and his substantive feedback really helped me to improve my thesis. Also, thanks to my internship supervisor Annelies Beek from the municipality of Apeldoorn for inspiring and supporting me during the process. Both my supervisors were really experienced with doing and writing research. Also, I want to thank all respondents and participants in my research for their input and time. Because without their input, this research would not have been possible. Finally, I want to thank my fellow students, my family, and friends for supporting me during the time I wrote my thesis.

Now I finished my master thesis and with it a very interesting period in which I developed myself both academically -during my thesis and master courses- as practically -during my interesting internship- my period as a student has come to an end. The most important thing I learned is that being a planner is my passion and at the same time a real privilege. I am looking forward to put everything I learned into practice to contribute to a beautiful, functional and healthy living environment.

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Abstract

The growing demand for urban living has a lot of consequences for cities. As cities attract more people, more houses have to be added while available space is becoming increasingly scarce. Building dense is an often-mentioned approach to satisfy housing demands. However, cities that already suffered from a decreasing liveability, congestion and lack of green space will continue to decrease in those aspects. Private cars within cities do have a very bad influence on urban living. As the population rises, the demand for travel grows with it. In many cities however, a capacity limited is reached. In order to improve the urban quality of life and keep cities accessible, alternatives to motorised private cars are needed. Sustainable urban mobility entails a shift from car-oriented neighbourhoods towards compactly built neighbourhoods dominated by active modes, such as walking and cycling. Other alternatives to the car, are shared mobility modes, which are gaining popularity rapidly.

Many cities are starting to rethink their mobility strategy and starting to experiment with new mobilities by providing services and adapting the urban design. Also in the Netherlands, cities are starting to practise the shift as congestion problems, space scarcity and a decreasing quality of urban life are emerging. In the bigger Dutch cities, former brownfields are planned to be transformed into high-density and compact urban neighbourhoods. The neighbourhoods have a pioneer position due to their size and their ambitions on sustainable mobility as becoming almost car-free, setting up a shared mobility system following the concept of MaaS (mobility as a Service). However, the implementation of these plans is expected to be complex and full of obstacles. This research focused on the institutional and financial obstacles and the way of counteracting them in the implementation process of sustainable urban mobility in two future urban neighbourhoods: Merwede Utrecht and Sluisbuurt Amsterdam.

The research concludes that several obstacles are found in the cases of Sluisbuurt and Merwede. Although the cases did differ a lot, mostly institutional, the approach to major obstacles was comparable. The city of Amsterdam and Utrecht both took a large interest in the facilitation of mobility as a service by becoming owner of parking spaces and subsidise the still struggling private mobility providers for as long as necessary. Although a large responsibility lies with the market, municipalities are still making use of their powerful instruments to enforce a societal desired result.

Key words: Sustainable (urban) mobility, institutional obstacles, financial obstacles, Mobility as a Service (MaaS), parking, shared mobility.

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1. Introduction

1.1 Background

In the last decades, the debate about cities and their global impact on climate has accelerated (Jenks, 2019). The climate crisis and the rising urban populations are currently urgent issues in planning (Van den Hurk et al., 2021). Cities are reaching their overall capacity limits (Jabareen, 2006). The need for housing development to face the shortages and the increasing demand for urban mobility can no longer be met in the current way (Geerlings, 2012). Space is scarce, especially in densely populated areas (Sieux et al., 2019) and should be used in an efficient way (Geerlings et al., 2012). Densification is being considered by city governments as a suitable approach to counteract the urgent housing shortages. However, this approach does have consequences for urban mobility (Van den Hurk et al., 2021). Especially when considering that many cities already suffer a lot of congestion, particularly caused by private cars (Suzuki et al., 2013; Nieuwenhuijsen et al., 2019). It is assumed that urban form and mobility are closely linked (Jabareen, 2006; McIntosh et al., 2014). In the past, cities developed following the idea of car domination in urban mobility (Nieuwenhuijsen, 2020). Cars do have a negative impact on the quality of urban life (Burton et al., 2013; Geerlings et al., 2012), as fossil fuelled cars are a major cause of air pollution (McCreanor et al., 2007; McIntosh et al., 2014), and create unsafe traffic situations, (Nieuwenhuijsen & Khreis, 2016). It is debated whether the situation gets worse as more people come to live in the city since the demand for transportation is expected to grow as well (Nieuwenhuijsen, 2020). Therefore, alternative ways to meet the needs in urban transport are starting to get explored (Geerlings et al., 2012). Densification is argued to be a potential way forward as higher densities potentially increase the use of transportation and active modes (Van den Hurk et al., 2021). However, rethinking urban mobility, especially the role of the car in cities, remains a major challenge for city governments (Beatley, 2012).

1.2 Research problem

Today, some cities have already started planning for the transition to sustainable urban mobility (Banister, 2008; Nash & Whitelegg, 2012; Nieuwenhuijsen, 2020). In many cities, new mobility systems are formed, adapting to concepts such as Mobility as a Service (MaaS). Guiding these urban mobility transitions, however, turned out to be a very complex process (Loorbach, 2007; Stead, 2016). Cities do both physically and institutionally intervene by setting sustainable mobility goals, making policies for banning cars, and planning for urban forms that promote sustainable modes of transport (Banister, 2008). These interventions are financially, politically, and socially hard to implement in densely built urban areas (Nash & Whitelegg, 2012). First of all, the integration of sustainable mobility is a very complex policy area due to the involvement of many stakeholders with conflicting interests (Sieux et al., 2019). Furthermore, the sustainable mobility sector's structure is also very complex because the business sector as well as the implementation process is relatively new, which is accompanied by many insecurities (Geerlings et al., 2012; Hickman et al., 2013). Policies for urban mobility are needed that on the one hand support the requirements of urban accessibility and on the other hand have the requirements to guide a city to become liveable and sustainable (Nash & Whitelegg, 2012). Urban neighbourhoods are the first places where liveability is under

pressure, especially when more homes are to be added within the city. In terms of mobility, this requires more from landowners, governments, and residents, namely, to come to suitable mobility arrangements (Hickman et al., 2013). There is still a lot of uncertainty about what a sustainable urban mobility process should proceed. Stead (2016) stated that a comparison of various agendas for transport and urban mobility development from the last two decades revealed a number of similar themes that are just as important for sustainable mobility development as when they were first suggested. The key issues that persistently recur in mobility development processes are communication and information, technology and lifestyle, urban space and scale, regulation, funding and pricing, institutions, and governance (Stead, 2016). These issues can be merged into two groups of issues. These are institutional obstacles, including governance, actor involvement, communication, and behaviour related issues and financial obstacles, which are related to funding and pricing (Geerlings et al. 2012; Stead, 2016).

These issues lead to challenges. Questions such as what solutions should be devised and what strategy should be used for implementation of sustainable mobility are frequently asked. Vergragt and Brown (2007) argued that there is still a lot to be learned about how governments can overcome the obstacles in terms of financing the project and how to deal with all the interests of stakeholders involved. Furthermore, Geerlings et al. (2012) argues that there is a knowledge gap in how to structure new governance arrangements and new forms of cooperation between stakeholders in urban sustainable mobility transitions.

1.3 Research questions

This research aims to provide insights in how municipalities can guide the transition towards sustainable mobility in future high-density urban areas and overcome some of the key financial and institutional obstacles in the development of sustainable mobility in future urban neighbourhoods.

How do municipalities try to overcome institutional and financial obstacles in the integration of sustainable mobility services into the development of high-density urban neighbourhoods?

To answer the main question, four sub-questions were formulated. The first pair of sub-questions has mainly been answered through literature study and the second pair through empirical study on two Dutch cases with pioneering ambitions to sustainable urban mobility on the neighbourhood scale: the Sluisbuurt district in the city of Amsterdam and the Merwedekanaalzone district in the city of Utrecht. The empirical study is focused on these future high-density neighbourhoods.

Literature study

- What is sustainable urban mobility and how can it be integrated in high-density urban neighbourhoods?
- What institutional and financial obstacles do occur in the process of sustainable mobility integration in high-density urban neighbourhoods and how do they influence the planning process?

Empirical study

- What institutional and financial obstacles do municipalities come across in the implementation of sustainable urban mobility services in the high-density urban neighbourhoods Merwedekanaalzone and Sluisbuurt?
- How do municipalities deal with institutional and financial obstacles they come across in integrating sustainable ways of mobility in the high-density urban neighbourhoods of Merwedekanaalzone and Sluisbuurt and what approaches do they take to address them?

1.4 Societal and academic relevance

In the light of the current and future urban challenges, urban form and urban mobility need to be redesigned more sustainably. According to predictions, cities will continue to grow in the decades to come (Geerlings et al., 2012). A way of leading in the transition towards more sustainable urban living, is to start on the neighbourhood-scale. So far, the main focus of academic research has been on densification of inner cities that were already compact (Lam & Head, 2012). There is, however, a lot unclear about the densification and the associated transition towards sustainable mobility of other, originally less densely built urban neighbourhoods. Research on the implementation of sustainable alternatives for neighbourhoods is needed.

Also due to the popularity of the city, the increasing demand for housing and the issue of sustainability. The city is facing new challenges and tensions, which are a threat for the city's liveability and qualities. Many cities are struggling to anticipate on these societal challenges. A different role and new policies seem to be essential. According to Szyliowicz (2003), the traditional patterns of decision-making no longer result in policies and projects that promote sustainable mobility. He also argued that there is a great need for research that promotes an improved way of decision making in order to achieve sustainable mobility. Also, De Bruijne et al. (2010) highlighted the complexity of the issue of implementing sustainable mobility and importance of gaining scientific knowledge through studying real life projects or sustainable mobility experiments. May and Ison (2008) indicated that there is still much to be explored on how to overcome barriers within stakeholder involvement during processes of planning for sustainable urban mobility. Standing et al. (2019) pointed out that there is also little knowledge about the perspective, motivations, and experiences of involved stakeholders in the planning process of sustainable urban mobility. This knowledge is necessary in order to develop new ways public-private cooperation in response to a growing dependence on market parties. Also, May et al. (2017) indicated that there is still a lot unknown about how to finance complex, multi-actor sustainable urban mobility plans.

Holmberg et al. (2016) also noticed various institutional and financial obstacles in the implementation of sustainable mobility. They also highlighted a knowledge gap in how to deal with the problems that could be found during these processes. Karlsson et al. (2017) highlighted the importance of experimentation in pioneer mobility projects accompanied by empirical research in order to learn and find solutions to institutional and financial obstacles. May et al. (2017) attributed the obstacles to a large extent to the overall lack of knowledge among planners about how to overcome the obstacles in developing and implementing sustainable urban mobility plans. According to them, more research, data, and evidence on implementation practices is needed to overcome these obstacles (May et al., 2017).

This research aims to add knowledge about the institutional and financial obstacles that occur in the implementation of sustainable urban mobility and about both the role of the local government as the way the obstacles are counteracted. It explores the obstacles that occur in the planning process of sustainable mobility in future high density urban areas as well as the proposed actions to bypass or solve them. The research focuses on the neighbourhood-scale. Since the neighbourhood-scale could, according to De Bruijne et al. (2010), be considered as a suitable experiment for other projects on larger scales. It may benefit the transition in other existing high-density urban neighbourhoods or on a city-wide, regional, or even national scale.

1.5 Thesis outline

In this *first chapter* the research is introduced. Also, the purpose, motivation, and relevance of this research are discussed. The *second chapter* contains a literature study and provides a theoretical framework, in which the existing literature and the most important concepts in this research are explored. The shift towards sustainable mobility is central in the first part of this framework. The second part of the framework is about the institutional and financial obstacles that occur during the implementation of sustainable mobility. The *third chapter* discusses the methodological choices in this research including the research methods, data collection and data analysis. Additionally, operationalised abstract concepts that are found in the literature study are discussed. The *fourth chapter* explores the chosen case studies and provides a research context. The results of the empirical research are presented in *the fifth chapter*. The *sixth chapter* discusses the most important results and links these to theory. Finally, the *seventh chapter* concludes the research by answering the main question and thereafter reviewing the research process and placing the outcomes in perspective by interpreting them.

2. Theoretical framework

2.1 Sustainable urban mobility

Sustainable urban mobility is desired by many and is driven by many reasons. Heikkilä (2014) states that because of the awareness of the impacts of the current mobility systems, complemented with the development of new technologies, the call for more efficiency and thus possible business opportunities in urban mobility is occurring. Minor improvements in the current transport system are not likely to be sufficient (De Dios Ortúzar, 2019). A drastic transformation in mobility should occur according to Heikkilä (2014). In the recent decades, researchers and urban planners witnessed an acceleration in the debate on how to make urban mobility more sustainable. De Dios Ortúzar (2019) points out the extremely complex challenge of implementing sustainable mobility in urban areas. According to Foltýnová et al. (2020), sustainable urban mobility remains one of the unresolved topical concerns. Sustainable urban mobility is a not often applied practice, which causes a lack of knowledge about both the concept itself as well as its implementation (Banister, 2008; Jun, 2008). First, when a strategic policy document contains the word 'sustainable mobility', questions raise about what the definition of urban sustainable mobility is and how it should be operated in cities and by whom. Although there are various definitions of the concept and its implementation, there is no agreement about a universal definition (Foltýnová et al., 2020).

2.1.1 Defining sustainable urban mobility

Sustainable development

Sustainable urban mobility exists of two concepts: sustainability and urban mobility. The word sustainability is the most complex to describe, as its definition is still debatable. The concept of sustainability was first introduced by the International Union of Conservation of Nature and Resources (Beatley, 1995). The document, a proposal for a world conservation strategy, was later widely published as the 'Brundtland Report' (1989) (De Dios Ortúzar, 2019). The key idea of this report is that human civilisation must meet the needs of today, without harming the needs of future generations and to bring a strategy of how to maintain a balanced relationship between humans and nature (De Dios Ortúzar, 2019). According to Giddings et al. (2002), sustainable development exists of three main pillars: equity, environment, and economy. In between these pillars, sustainable development exists (Giddings et al., 2002).

Urban mobility

Beimborn et al. (1999) defined urban mobility as the ease of movement from one destination to another with the help of transportation network and available services. It is also defined as the demand for travel within a certain area (Kayal et al., 2014). The travel demand depends on many factors: demographics, transport availability, condition of infrastructures, land use development patterns on the placement of activities (Cervero, 2009). In a city, many problems occur due to increasing demands for mobility. Therefore, sustainable approaches are connected to mobility in order to counteract the problems that go hand in hand with an exponentially increasing demand for travel in cities (Kayal et al., 2014).

Sustainable urban mobility as a concept, provides an alternative idea of understanding the complex movement of people and goods in a city and reshapes links between transport and land use (Kayal et al., 2014). In essence sustainable urban mobility is about adapting the urban for changing the transport hierarchy by giving preferences to non-polluting, active modes and

more efficient ways of transport (Kayal et al., 2014). Another definition is: “Sustainable urban mobility is to ensure that environment, social and economic considerations are factored into decisions affecting transportation activity” (Kayal et al., 2014, p.8). This emphasizes the need for changing thinking and policymaking on urban mobility. Banister (2008) argues that the social dimension is important in sustainable urban mobility. As sustainable urban mobility is also about ensuring safe, affordable, quick, comfortable, reliable, and sustainable access to all citizens.

Sustainable mobility and urban design

Standing et al. (2019) argue that an integrated and holistic approach to sustainable urban mobility is needed. Holistic transport solutions are found in both adapting the physical environment of the city as well as realising a mobility system of high quality. The urban design is an aspect of great importance. Banister (2008), for example, emphasises the link between sustainable development and urban structure. According to him, cities need at least a population of 50.000 and a density of 40 persons per hectare. Besides, aspects as mixed land use and high accessibility are important. Also, McIntosh (2014) argues that the sustainable urban development is intertwined with ideas about how the urban should grow. Suzuki et al. (2013) also argue that sustainable mobility cannot be achieved without a different way of thinking about the physical environment (McIntosh, 2014; Marquet & Mirralles-Guasch, 2015). Kayal et al. (2014) stated the following about mobility and land use: ‘Sustainable urban mobility provides an alternate concept to understand the complex movement needs of people and goods in a city and amend the links between transport and land use’. (Kayal et al., 2014, p.7). Apart from the urban design alone, cities are the most promising locations for implementing new approaches of sustainable mobilities Midgely et al. (2011). According to Cervero (2013), a radical paradigm shift is needed in how we think about transportation and its relationship to the city. He argues that integrating transport infrastructure and urban development must become an important debate.

Smart Growth and mobility

Sustainable mobility focuses on a new hierarchy in travel modes. This means that the car and other privately owned motorised vehicles should be replaced by active travel modes in the future (Nieuwenhuijsen, 2020). Walking, cycling, and public transport are seen as the new main modes in urban mobility. In order to realise this shift towards sustainable modes, interventions are needed in the urban structure (Cerin et al., 2020; Næss, 2020). By strategically planning the urban space to become more compact, the need for travelling decreases, as distances decrease as well enabling citizens to use active modes (this is shown in fig. 2.1) (Lu et al., 2018; Burton et al., 2013). Sustainable urban development is in that perspective closely linked to Smart Urban Growth. Miller and Hoel (2002) define smart urban growth policies as: “a range of regulatory, financial and educational practices that may help to coordinate transportation and land use planning through integrated planning”. (Miller and Hoel, 2002, p. 1). And the American Planning Association (2002) argues that it is consisting of a set of compact, transit accessible, pedestrian-oriented, mixed use development patterns that form the principle of smart urban growth. Smart urban growth is related to concepts like the Compact City model, which aims at reducing urban sprawl and building cities more compact and mixed use (Breheny, 1995; Jenks et al., 2000; Jenks, 2019). The compact city is also related to the *walkable city* or *15 minutes city*, which refers to a city with a design favouring active modes (Marquet & Mirralles-Guasch, 2015). Another smart growth concept

is Transit Oriented Development (TOD). TOD aims to concentrate urban functions alongside transport corridors and hubs (Burton et al., 2000; Skovbro, 2002; Curtis, 2008). This makes citizens able to make use of transit within an area that can be reached with active modes (Schlossberg & Brown, 2004).

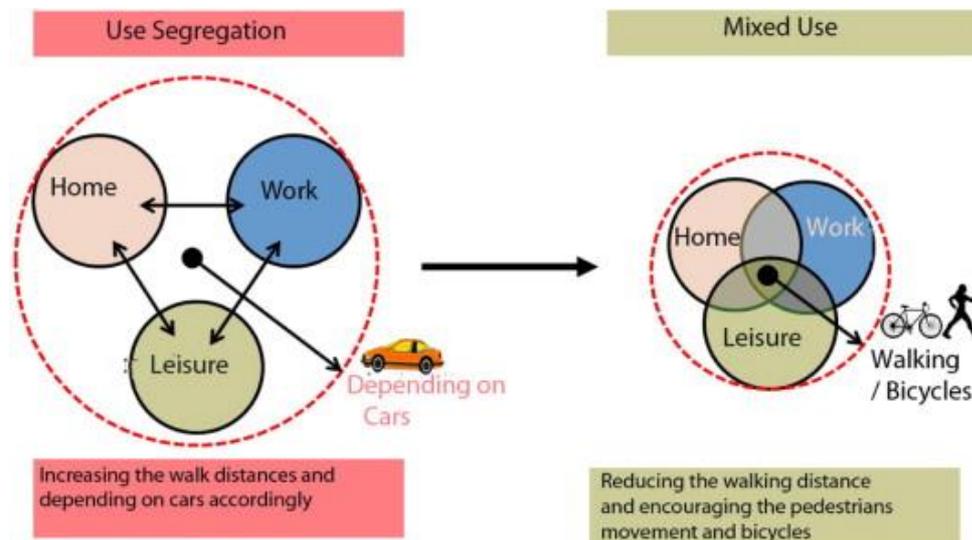


Fig. 2.1 The concept of mixed-use development (Nabil & Eldayem, 2015).

Rethinking urban transport in the city

Many cities try to implement sustainable measures in urban mobility plans to increase the quality of life within the city (Banister, 2008; Foltýnová et al., 2020). Sustainability has become part of the urban policy discourse in the last two decades (Foltýnová et al., 2020). De Dios Ortúzar (2019) points out the complex challenge of implementing sustainable mobility in urban areas. According to Foltýnová et al. (2020), sustainable urban mobility remains one of the unresolved topical concerns (Banister, 2008; Jun, 2008).

Sustainable urban mobility is a planning concept that is applied by local and regional authorities for strategic mobility planning. The concept encourages the shift towards the use of more sustainable transport modes. These modes are alternatives to private cars, such as walking, cycling, small electric vehicles, and all kinds of public transport vehicles. Together these alternative modes can be part of an integrated mobility system. According to Nieuwenhuijsen (2020), current technological developments suggest that cars, as used today, will be replaced by these alternatives in the future. Also, the current predictions to future urban growth are a reason for De Dios Ortúzar (2019) to argue that one can conclude that investing in enlarging the capacity is not the solution to the current urban mobility problems. The enlarging of the road capacity to allow more cars will not tackle the major issues, such as congestion and pollution (Nieuwenhuijsen, 2020). After all, sustainable urban mobility requires a shift in mindset (Lopez-Ruiz et al., 2013). One major purpose of smart urban growth is to make residents use transit and active travel modes instead of allowing them to use private cars (Cervero, 2013; Nieuwenhuijsen, 2020). Lam and Head (2012) argued that sustainable urban mobility is about 'the ease, convenience, affordability, and accessibility of travelling to the one's destination with minimal impact on the environment and others' (Lam & Head, 2012, p.359). This follows upon the ideas of sustainable development by requiring that the impacts of transport activities must not be a threat to the long-term environment. Carbon emissions that lead to climate change are expected to decrease when a new hierarchy of

sustainable modes is formed. This hierarchy is ideally consisting of modes such as, walking, cycling, public transport and shared vehicles are integrated in a functional system (Lam & Head, 2012). Regarding the second pillar of sustainable development, there has to be equity in mobility. Everyone must have the possibility to have access to a minimal level of mobility (Hoyer & Holden, 2007).

Cities can opt for various measures to implement sustainable mobility. According to Lopez-Ruiz et al. (2013), they can, for example, invest in the extension of public transport, so that it is more accessible for citizens. Secondly, cities can promote people to walk and cycle within the city by adapting the infrastructure. Also, cities can improve urban logistics and ICT to support more sustainable transport of goods and people. Finally, integrated mobility services, including vehicle sharing systems and other interventions, such as improving active modes infrastructure and parking management, can motivate people to stop using private cars (Lopez-Ruiz et al., 2013).

2.1.2 Mobility as a Service

Current private car-based transport systems are considered inefficient and unsustainable (Utriainen & Pöllänen, 2018). There is a constant need for new solutions for daily transport. Mobility as a service (MaaS), or Integrated Mobility Services (IMS) is considered as a promising option as it offers a new paradigm by placing the need of users in the centre of the transport system (Heikkilä, 2014; Muhktar-Landgren, 2016). By combining, for example, all forms of public transport, car-sharing, taxis and bicycles, MaaS enables convenient mobility options and alternatives for travelling (Melis et al., 2017). According to Lund et al. (2017) and Li and Voege (2017), MaaS can be seen as a key driver to enable the shift towards sustainable urban mobility. MaaS is considered to be a sub-product of digitalisation since it provides users with a service to plan, book and pay for multiple types of mobility services through an integrated digital system (Crozet et al. 2019). This corresponds with the definition that is given by Muhktar-Landgren et al. (2016):

Integrated mobility services are services where the passenger's transport needs are met by a service that not only integrates a range of mobility services, both public and private, but also provides one-stop access to all services through a common interface. (p.6)

The system gives citizens the ability to travel multimodally within an integrated system consisting of both public and private transportation (Utriainen & Pöllänen, 2018). By creating this opportunity, the concept announces a shift away from personally owned modes of transportation (Giesecke et al., 2016). Owning a car is, according to Li and Voege (2017), no longer a 'must have' as MaaS developments are progressing. Also, Ambrosino et al. (2016) argue that private car ownership will decrease in the near future as a result of the availability of shared vehicles. According to Standing et al. (2019), sharing systems are already making an impact on the taxi-sector. And it is suggested that, when true sharing takes place, 80 % fewer cars will be in circulation. The decrease of private cars could reduce traffic congestions and allow cities to reclaim streets and former parking areas.

Crozet et al. (2019) distinguish three main types of shared mobility and four different models. The main types of shared mobility are cars, scooters and bikes that can be shared through a digital platform. Although the models do share a lot of features, they also do differ a lot. A big

similarity is that all models of sharing mobility are rapidly growing and mostly private owned. The first model of sharing mobility is the peer-to-peer car rental, in which cars that are not in use are presented by an individual on a platform. The second model is more advanced, as the vehicles are managed and owned by a provider. Users can collect vehicles that are strategically parked in the city or at one or more central locations in the city. This model also relies on a digital platform for payment, planning and information. The vehicles can be organised in a way that they must be stationed on a designated location, or they can be so-called 'free-floating'. This means that they can be parked anywhere in a selected area. The third model that Crozet et al. (2019) distinguish, is more related to the current taxi business. A company is providing a service that enables users to get in contact with a driver who drives passengers to their destinations. And lastly, the fourth model is distinguished by the characteristic of passengers sharing the ride. A digital system connects passengers heading for the same direction within a city (Standing et al., 2019). This fourth model is mostly relying on larger vehicles, including cars (Crozet et al., 2019). Muhktar-Landgren et al. (2016) also highlighted the existence of a large variety of mobility services. In the system of MaaS, or IMS, a wide range of these mobility services are integrated.

Cities already develop MaaS practices such as expanding public transport that is relying on a single system (Van Audenhove et al., 2014; Butler et al., 2021). In addition, large cities are starting to experiment with mode sharing systems. Sustainable urban mobility is optimal when citizens do have a lot of mode choices (Giesecke et al., 2016). Therefore, these and other new mobility services are mainly geared to the dense city districts since there is sufficient demand for the service in these urban places (Heikkilä, 2014). According to Crozet et al. (2019), the first findings are promising. Firstly, the impact on pollution and congestion is likely to be neutral at its best and secondly sharing vehicles do already play an important role as that complement to public transport. Although these projects are still being operated at the local level; much effort is being made into turning MaaS into a global solution (Li & Voegelé, 2017).

Conditions to operating MaaS

Implementing and operating MaaS is however considered to be a rather complex as many actors are involved (Crozet et al., 2019). There is an increasing interest in the concept, however, implementing and operating a MaaS or integrated mobility service, requires a single system operated by various stakeholders (Li & Voegelé, 2017). Mukhtar-Landgren et al. (2016) focused specifically on the institutional conditions for integrated mobility services, and they argued that the institutional conditions can constrain but also enable sustainable urban mobility developments. These are conditions on a wide variety of levels and are connected to institutional factors as societal trends, individual's needs, actor interests, regulations, the organisational structure or the actor networks in collaborative processes. Institutional conditions and the involvement of actors are important since most of the transport operators in a city need to work with a digital system. (Li & Voegelé, 2017). This system is expected to be operated by a third party that collects data and sells the mobility services to the users. Muhktar-Landgren et al. (2016) argued that is required that private developers, governments, and many other parties work together in an extensive collaboration. Therefore, an agreement between involved actors is crucial since successful implementation of the relatively new MaaS-concept requires a strong cooperation between various mobility operators, developers, and users (Utriainen & Pöllänen, 2018; Butler et al., 2020). Van den Hurk et al. (2021) mentioned that this not solely include actors in the private sector, it also needs public involvement as the transition to integrated mobility systems is put on the larger urban agenda.

In the implementation of MaaS, involved public and private actors, as well as citizens, need to consider their role on mobility and its 'ownership' (Van den Hurk et al., 2021). In addition to the institutional conditions, Li and Voege (2017) mentioned other operating conditions that require attention of involved actors such as: the presence and availability of a wide range of (sustainable) transport modes, a feasible infrastructure. This raises the question: 'who is going to fund the requirements for MaaS?' and this is directly related to the question: 'who is going to own and operate MaaS systems?' Utriainen and Pöllänen (2018) added that it is important for sharing systems to be examined carefully before implementation, since the chances of succeeding do strongly depend on the context. Therefore, the context, for example the number of stakeholders, the size of a project, and the available resources, are considered as key factors for implementation. According to prevent potential barriers, Butler et al. (2021) emphasized that there is no 'one-size fit all' and local characteristics have to be taken into account since they are critical for a successful implementation of MaaS.

2.2 Obstacles to implementation of sustainable mobility services

Cities are starting to rethink its urban structures and transport systems in order to facilitate the need for transportation. Various approaches to the implementation of sustainable mobility are discussed. In Europe for example, many cities are planning for sustainability in urban mobility to keep cities liveable and attractive (May, 2015; Karlsson et al., 2017). But, as with any change concerning urban mobility, a large number of questions on how to achieve sustainability in urban transport are generated (Lopez-Ruiz et al., 2013). According to Li & Voege (2017) and Lund et al. (2017), integrated mobility services (MaaS) can be seen as a key driver to enable the desired shift towards sustainable modes. However, the implementation of these sustainable alternatives and measures to urban mobility are progressing slowly (May et al., 2017), despite many pilots and practices with Maas (Van Audenhove et al., 2014). May and Ison (2008) highlighted that there is a broad set of barriers or obstacles in funding, experience, and working in partnership with other public and private sector bodies.

Defining obstacles in urban sustainable mobility implementation

Implementation barriers are factors that can obstruct and prevent certain policies from being implemented or they limit a development, policy, or plan in the way in which it can be implemented (University of Leeds, n.d.; Agency for International Development, 2014). Implementation barriers are rooted in a variety of causes, including an opposition from key stakeholders as well as inadequate resources both human and financial (Lindau et al., 2014). Also, a lack of clarity on operational guidelines or roles and responsibilities for implementation is considered to be a barrier (Audenhove et al., 2014). This is coherent with another barrier among actors namely the lack of coordination and collaboration between different parties responsible for implementation. Also, a lack of motivation or political will is a barrier as discussed by Van Audenhove et al. (2014). Finally, a plan or policy can conflict with other existing policies or rules (Agency for International Development, 2014). Literature shows two main types of barriers to implementation (University of Leeds, n.d.). Firstly, institutional barriers, which include inadequate human resources, lack of collaboration and coordination and regulation problems. Secondly, financial barriers, which include the lack of financial resources. These two main types are related and coherent since they both depend on agreements between actors. These are funding and institutional barriers are discussed in the following sections.

2.2.1 Institutional obstacles

Before discussing the legal and institutional barriers, the institutional theory is discussed. This is important since it gives a certain perspective on how to look for these barriers and in what situations and systems these barriers do exist. These barriers include the lack of the ability of legal powers, as city governments, to implement a particular plan, since the responsibilities are split between different stakeholders with different interests, rules, and values.

Institutional theory

The work of Mukhtar-Landgren et al. (2016), Karlsson et al. (2017) and Lund et al. (2017) is about institutional factors that influence development of integrated mobility services. Both articles are built on institutional theory. Institutional theory describes how norms and values are internalised in an organisation. Within this paradigm there is little room for individuals, as behaviour is determined by rules and shared norms and values. Institutionalisation provides stability and legitimacy, which increases the viability of an organisation. Institutional theory thus assumes that an organisation has good chances of success when it adapts to its environment. The longer stakeholders work together, the more they will resemble and share goals and tools. The development of a shared goal also ensures sustainability of an organisation, which is important if a project is expected to have a long lead time. However, if an actor violates the expectations of its environment, there will be reduced support from the institutional environment (Selznick, 1957). Institutions range from societal regulations, planning processes, and consumption patterns, to individual habits and practices. Institutional theory emphasises the importance of institutions to understand both societal development and actions and goals of individual actors (Karlsson et al., 2017). Institutions can also be constraining when the context has to be changed to make the plan fit instead of adapting the plans to the context (Lund et al., 2017). The context, or institutional environment is the current situation in which developments related to sustainable mobility have been implemented.

Institutions are found at various levels (Lund et al., 2017). These are the macro, meso and micro levels that include extensive societal trends as well as individual's needs and behaviour (Mukhtar-Landgren et al., 2016). The levels include broader social and political factors, including both formal rules and informal norms and perceptions, such as certain habits and practices (Mukhtar-Landgren et al. (2016); Karlsson et al., 2017).

The macro level includes the national level. On this level, national visions, strategies, action plans, legislation, subsidies, and taxes are generated (Lund et al., 2017). The national government has an important role in implementing integrated mobility services and safeguarding the public interest. For the process of developing MaaS, for example, Holmberg et al. (2016), highlighted that public leadership is crucial for MaaS to be implemented.

At the meso level, regional and local authorities and private actors have an important role to create the environment that is suitable for an integrated mobility system. These authorities are responsible for the physical infrastructure, for public transport as well as for cycling and walking. Also, the system for car sharing is part of the infrastructure task at this level (Lund et al., 2017). The meso level refers to private, public, and public/private actors as well as non-profit organisations and communities including collaborative networks Karlsson et al. (2017).

The micro level refers to the level of the individual (Mukhtar-Landgren et al., 2016). Individuals are citizens with democratic rights. These individuals act in different roles, they consume

mobility services and are contributing as taxpayers (Lund et al., 2017). Individuals are as voters, democratic participators and included in the planning process. They also give feedback to the decision-makers that try to fulfil the needs of the citizens as well as putting effort in sustainability. This role of the individual can also create obstacles according to Muhktar-Landgren et al. (2016). These are related to the role of the paying customer or service consumer. If the citizens do not shift to public transport or other, more sustainable vehicles, but rather use their private car, a sustainable urban mobility plan is hard to succeed, also because it will not be lucrative in the case there are no users.

The institutions are also described by Crozet et al. (2019) in combination with integrated mobility services. Within cities the three main actors that are described are the users, public authorities, and mobility service providers (Fig. 2.2). This division is a simplified institutional view on the process. These groups of actors all have different motivations and objectives in the process.

Possible visions:

- **A user centric vision** : ease users' life, combine different modes;
- **A vision centred on new mobility service providers** : attract more users, lower commercial costs;
- **A vision centred on public authorities**: as mobility providers (public transit) but also as public mobility regulators.

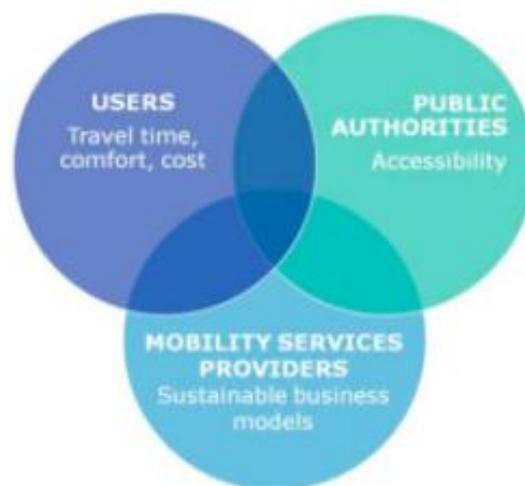


Fig. 2.2 The institutional setting in mobility processes (Crozet et al., 2019).

Hierarchy, roles, and responsibilities

Since all actors have these different positions and interests, they also be considered to take different roles within a process. However, this turned out not always be the case. Due to the increasing number of participating actors and shifting towards the private sector, the hierarchy is often missing. As Bräuninger et al. (2012) stated: “Both public and private actors tend to express uncertainty as to what their roles should be within the system [and process] of sustainable urban mobility” (Bräuninger et al., 2012, p. 35.). The problem of conflicting institutional roles is also found in European cases of sustainable urban mobility plan implementation by Bräuninger et al. (2012). They highlighted that those conflicting roles are caused by a lack of clarity and coordination in responsibilities of different levels of governments according to Bräuninger et al. (2012). Furthermore, in many of these European cases, governments, as well as involved stakeholders had no sufficient experience (May & Ison, 2008). Furthermore, there was a lack of data to provide evidence of the performance of specific solutions caused by a lack of guidance of involved actors and research on both theory and practice (Van Wee & Van der Knaap, 2004). Scharpf (2018) argued, that a negotiation between actors functioning in a hierarchical structure is more likely to lead to an agreement than a freestanding negotiation. Because when there is a clear hierarchy with a clear setting of roles, negotiations will be systematically influenced by the anticipation of a potential decision of a leading party (Scharpf, 2018).

In many cases in Europe, governments failed to encourage stakeholder involvement in the development of the mobility plans. This problem is due to the absence of a clear hierarchy in task division among the different governmental institutions (May et al., 2017). A critical point in this regard, is a robust institutional framework and regulatory and planning tools that facilitate collaboration and set clear roles between the different actors (Suzuki et al., 2013; Mozos-Blanco et al., 2018). New forms of inter-organisational collaboration are required according to Smith et al. (2019). However, these new collaborations to respond to the complex organisational process, are also likely to lead to new inter-organisational barriers. Smith et al. (2019), mentioned the challenging task of the distribution of new responsibilities and roles to different actors in both development and operational stages of the process. This is challenging due to the large number of uncertainties. Smith et al. (2017) related these uncertainties for a large part to the lack of experience mentioned as well by May & Ison et al. (2008). For sustainable mobility and MaaS, Smith et al. (2017) mentioned the responsibilities and roles of actors in projects like mode sharing or the facilitation of infrastructure as one of the major challenges. There are for example conflicting views on public and private responsibilities in the implementation of sustainable mobility and subsequently the realisation of MaaS: one view includes the belief that the public sector should take the front seat role in enlarging public transport and offer MaaS. Several studies point out that governments do have a major role in guiding the transition towards sustainable urban mobility (Vergragt & Brown, 2007). The second view includes the belief that the private sector should take the lead in the developments and that the public sector should stick to public transport (Smith et al., 2017).

The differences between public and private responsibilities, the 'public-private divide' is considered to lead to inter-organisational trust and understanding issues. These factors also make it difficult for institutional arrangements and collaborations to agree on business models and the division of tasks and responsibilities (Westergren & Holström, 2012). Munksgaard et al. (2012) suggested that five underpinning incompatibilities pose additional tensions in public-private partnerships. These are: objectives and interests, time horizons, risk behaviours, incentives for participation, expected rewards and innovation understandings. These are considered to have a strong impact on the collaboration of actors in the planning process.

Collaboration

The overall lack of public and private collaboration is, according to Karlsson et al. (2017), a potential obstacle in the implementation of sustainable transport systems. Collaboration means different public and private sector actors working together with a common goal. This goal is the implementation of a solution or policy, or in the case of MaaS the development of a shared mobility system that is supported by technical features for information and payment (Butler et al., 2021). According to Karlsson et al. (2017), collaboration between different actors is a requirement to be able to face a complex sustainable mobility process such as the implementation of MaaS in a city. Also, Smith et al. (2019), highlighted this requirement of a new actor ecosystem to emerge, with modified roles and an increased inter-organisational collaboration. Butler et al. (2021) identified the lack of private cooperation or political support as an important barrier in implementing sustainable mobility systems. The institutional theory highlights the importance of the formation of coalitions between different stakeholders to create more stability (Salancik & Pfeffer, 1978). A stakeholder or organisation that operates completely autonomously is not often seen. According to Scharpf (2018), the typical actor

arrangements in policy processes usually involve a limited number of individual actors, governments, business firms and other unions. Although these actors do have different goals and interests; they are involved and generally aware of their interdependence (Scharpf, 2018). The involved actors respond and try to anticipate on the other's moves. About this interdependence, Crozet et al. (2019) argued that many sustainable urban mobility initiatives such as modal sharing systems are mostly controlled by private companies or in partnership with local authorities since private companies do have the capital and expertise for investing in integrated sustainable mobility plans. Public funding constrains could make governments dependent on private actors (Westergren & Holström, 2012; Crozet et al., 2019). The government, however, can influence these private actors, however, through regulation and legislation (Crozet et al., 2019). Because, as van den Hurk et al. (2021) highlighted, platforms that are owned privately often becomes a part of a strong societal and political debate when the public interest is to be under pressure.

Regulation

The market for providing sustainable urban mobility is rapidly growing. Van Audenhove et al. (2014) argued that innovative and integrated business models are formed by a system-level collaboration between all stakeholders of the mobility ecosystem. A certain guidance is however needed in order serve the public interest (Van den Hurk et al., 2019). This is another a major issue according to Karlsson et al. (2017) because of the certain degree of uncontrollability of these business-oriented service providers. Smith et al. (2018), therefore, stated that new partnerships have to be formed. They argue that private actors should play a larger role in the creation of public value. According to them, it is key for actors to find a regulatory situation in which innovation is driven and the public benefits are central (Smith et al., 2018). The government regulates urban processes in order to protect the interest, health and safety of citizens.

Legislation, on the other hand, is believed to act as a barrier concerning the boundaries between state subsidised mobility services and commercially viable services and how they can be combined (Karlsson et al., 2017). For the urban neighbourhood this means that a company that is seeking to provide mobility services is forced to meet strict rules, which make it less attractive to invest (Karlsson et al., 2020). Standing et al. (2019) also highlighted the risk of over-regulation of transport planning. The over-regulation of transport planning complicates the implementation of innovations to the system since transport is in critical need of innovation. Innovations such as sharing systems need suitable legislation, regulation, and trust to be successfully implemented. New ideas, schemes, technologies, and business models can potentially make a big impact on transport (Karlsson et al., 2017; Standing et al., 2019; Karlsson et al., 2020). According to Karlsson et al. (2020) experimentation and innovation is crucial for learning about how sustainable mobility should be implemented. A well-debated legislation policy strategy should be applied for sustainable mobility plan implementation projects. Apart from the notion that a good practice is needed to increase the will to invest instead of creating a deadlock. Over-regulation is believed to be deterrent for private investors. Creating the opportunity to set up a pilot, can provide evidence needed for operators to invest or scale up (Karlsson et al., 2017).

The problems related to legislation and the term setting for involved actors, are mostly caused by a lack of knowledge on the rapidly evolving theory, experiences and insights, practices, and technologies on sustainable mobility implementation. According to Karlsson et al. (2020)

regulation does not always match with the situation. In the field of parking regulation, an important aspect of sustainable mobility implementation, legislation can create a substantial stumbling block for MaaS. The concept of MaaS is relatively new and in many cases the absence of a concrete definition of carsharing in the legislation often made it difficult for local governments to designate parking for sharing mobility (Karlsson et al., 2020). The redefining of essential aspects in sustainable mobility is needed according to Smith et al. (2019).

2.2.2 Obstacle related to financing sustainable mobility

Funding capacity

Institutional theory also describes that a lack of economic sources and other resources can be disastrous for an organisation. More economic resources provide an increased autonomy and less dependence on its environment (Selznick, 1957). This principle is associated with another set of barriers related to funding. Several studies concluded that over 80% of European cities stated that finance was a major barrier in implementing sustainable mobility (University of Leeds, n.d.). The institutional and financing obstacles are closely linked. The conflicting interests and uncertainty about responsibilities also raises the question about who should fund what. Bräuninger et al. (2012) stated about this:

(...) the question about who is going to fund a certain investment is raising between actors. There are nevertheless many questions to be resolved regarding the operation of public transport or roads, for example the degree to which the private sector should play a role and how efficient pricing of recurring expenses can be attained. Furthermore, existing infrastructure needs constant maintenance, also requiring significant funding. (p. 35.)

Lund et al., (2017) for example, also argue the integration and funding of physical and critical infrastructures to the service. These investments are for example suitable parking areas for sharing vehicles, roads, hubs, technical support systems, and several other adjustments to the urban infrastructure necessary for a sustainable mobility system to be operational (University of Leeds, n.d.). Bräuninger et al. (2012) also highlighted that funding is needed for a longer time to keep sustainable mobility systems operational. Maintenance costs are thus part of the debate about funding responsibilities. Also, it is for example still unclear about whether private car sharing systems can make use of public parking space and under which financial circumstances (Mozos-Blanco et al., 2018).

Furthermore, there is a debate about financing both plan preparation as plan implementation (Beria et al., 2011; Mozos-Blanco et al., 2018). These procedural costs are sometimes hard or impossible to monetise. However, Beria et al. (2011) gave insight in a big share of all the costs that are included in sustainable urban mobility development and tried to make them clear by means of a model. These models showed that the public sector accounts for a lot of costs, including subsidies, investments, running costs, organisational, and regulation costs. On the macro scale, also political costs are included, which are marked by Beria et al. (2011) as 'hard to monetise', Beria et al. (2011) also mentioned private costs. These costs are mostly investments, running costs and costs caused by regulation. On the contrary, private sector also requires profits.

Finally, there are costs on the micro scale, the individual has user costs, which are fares, taxes, and tolls. The benefits for the user are considered to be very high. From a decrease in travel

time and an increase in comfort to other hard to monetise-benefits such as health effects, social inclusion, and quality of cityscapes (Beria et al., 2011). Because of the lack of clarity and the complex divisions of profits and costs, it is hard to anticipate on them. It is crucial to make the services inclusive and affordable in order to be used by the public. This calls for a public-private agreements or regulation.

Business case

Mobility service providers often have to deal with missing a proper business case since the sector is relatively new (Karlsson et al., 2017). This makes investing in an extensive mobility system full of risks. Providers, however, are needed to make a MaaS approach possible. In many cases additional funding is needed to conclusive a business case (Heikkilä, 2014). Over the last years many sharing providers reported funding difficulties and a large share faced bankruptcy. As a result of that, many stakeholders and service providers turned to the authorities for funding (Crozet et al., 2019). These difficulties are expected to lead to new partnerships between operators, developers, providers, and the public mobility authorities. However also public mobility authorities experience difficulties because of retrenchments and high future investments. This leads to the privatisation of mobility, a trend that was noticeable over the last decade (Crozet et al., 2019). It is namely believed that private companies have the ability to achieve more in a faster and cheaper way.

As in many other European cases, there turned out to be a lack of adequate funding for both the development as the implementation of the plans (May & Ison, 2008). Planning for sustainable urban mobility turned out to be a very difficult task for both public and private planners (May et al., 2017). As mentioned, according to Bräuninger et al. (2012), this is also largely caused by the previously discussed lack of clarity about responsibilities and roles between actors in a sustainable mobility process. Because, if there is no clarity about who is responsible for what development, it is also unclear what party is responsible for the financing of a certain aspect of the plan. Bräuninger et al. (2012) therefore noticed the lack of public-private legally-binding agreements between actors. These agreements give clarity about the distribution of risks and the responsibilities of involved actors (Bräuninger et al., 2012). Also, Karlsson et al. (2017) highlighted that public-private leadership could be a solution to funding problems since costs can then be distributed among different actors. Karlsson et al. (2020), argued that the absence of public-private leadership is partially caused by a lack of trust and fear of losing control. However, Karlsson et al. (2017) debated whether, the public sector should take the lead and operate the service in a non-commercial way to provide financial stability and safeguarding public interests and goals. This role of the government is believed to be important in order to overcome what is mentioned by Karlsson et al. (2017) as the biggest barrier, namely the access to capital to take away the risks of crucial actors that need to invest. Bräuninger et al. (2012), also argued that the absence of a business case calls for public interventions in order to secure mobility provision.

2.3 Conceptual framework

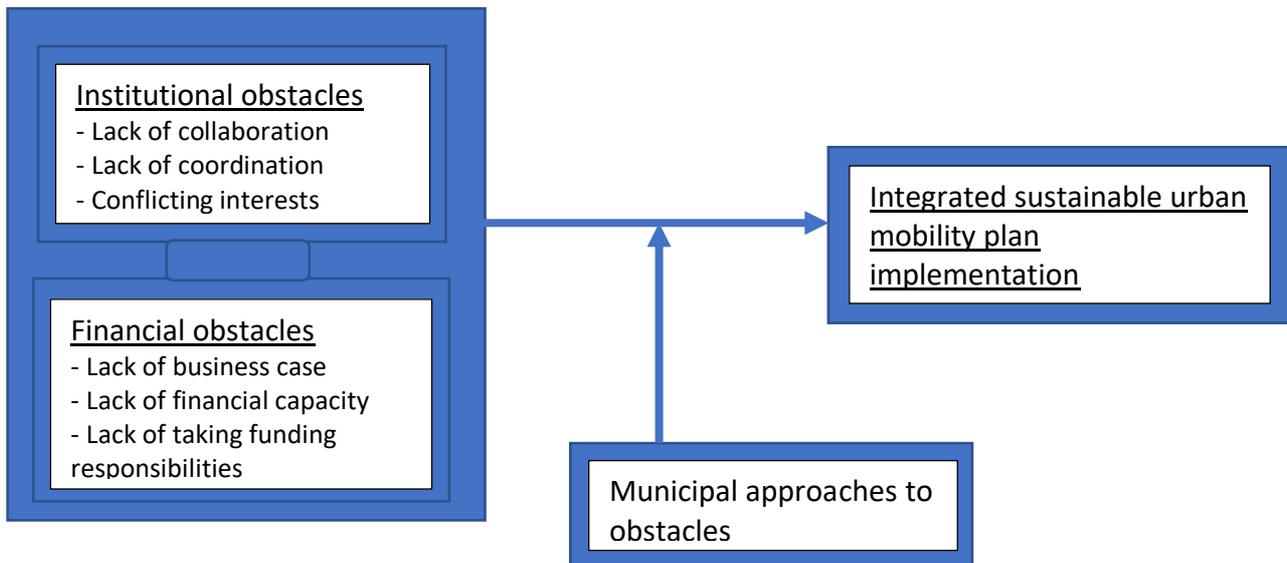


Fig. 2.3 Conceptual Framework (own image).

In the conceptual framework (Fig. 2.3), the main concepts that are found in literature are presented. The figure illustrates the relations of the main concepts. It shows the expected cause-effect relationships between the variables in this research. As discussed in this chapter, several institutional and financial obstacles are found. These obstacles are closely related since, for example, the conflicting roles and interests are mostly financially originated. On the other hand, the lack of a business case is expected to cause tense actor relations and the need for institutional arrangements. In general, the obstacles are aspects that obstruct sustainable urban mobility from being integrated.

The implementation of integrated sustainable urban mobility plans is desired by the actors. The obstacles, conflicting roles, lack of collaboration and regulation, as well as the lack of resources and a proper business case are expected to strongly influence the process of implementation of these integrated sustainable urban mobility plans.

The obstacles have to be tackled in order to realise a desired and well-functioning mobility system within a future urban neighbourhood. The third variable are the approaches to the obstacles by the local governments. This moderating variable is expected to influence the effect of the obstacles to the sustainable urban mobility plans. The approaches are searched for in the empirical research which will be introduced in the next chapter.

3. Methodology

In this chapter the selected research methods and the way of collecting and analysing data are discussed. The methodological choices and the reliability, validity and ethical aspects of the research are explained. Finally, the main concepts that are discussed in the previous chapter are operationalised in order to be studied.

3.1 Research design

In order to answer the main research question: “How do municipalities try to overcome institutional and financial obstacles in the integration of sustainable mobility services into the development of high-density urban neighbourhoods?” and sub-questions, qualitative research methods have been selected. These methods are selected since the study aims to gain insights into different interpretations and beliefs of involved actors in the process of implementing sustainable mobility (Mason, 2018). Before doing the empirical research, the most important concepts are analysed and discussed. The study of existing literature gave insights in recent debates and gave the researcher an idea of where, how, and what to look for (Scheepers et al., 2016). For answering the research question, qualitative research methods are fitting this exploratory research best (Scheepers et al., 2016). The following qualitative methods are selected, semi-structured expert interviews and the analysis of (policy) documents.

Document analysis is a systematic procedure for reviewing and evaluating documents. Like other methods in qualitative research, document analysis requires data to be examined and interpreted in order to draw meanings and understandings and to develop empirical knowledge (Bowen, 2009). According to Bowen (2009), document analysis is often used in combination with other qualitative research methods. According to Patton (1990), the examination of data that is collected through different methods, is believed to make a researcher able to corroborate findings from different data sets and reduce the impact of potential biases that can exist in a single study. Yin (1994) argued that document analysis, as a research method is particularly applicable to qualitative case studies. Documents from these cases are expected to contain information about organisation, programming, goals, objectives, and substantive contents. Documents of all types help the researcher to find meanings, develop understandings and discover insights that are relevant to the research problem (Bowen, 2009). Documents can provide data on the contexts within research participants operate. This background information can suggest questions that need to be observed or asked as part of the research (Bowen, 2009). In this research, therefore the data that is drawn from documents, for example municipal strategy plans, are used to prepare contextualise data collected during the conducted semi structured interviews.

The documents in this research are selected from the case studies Amsterdam Sluisbuurt and Merwede Utrecht. These documents provided understanding and empirical knowledge about the processes in these cases. The analysis was therefore considered as highly functional to the research, following the statement of Patton et al. (1993): “[Policy document analysis] Is the process through which we identify and evaluate alternative policies or programs that are intended to lessen or resolve social, economic, or physical problems” (Patton et al., 1993, p. 21).

Secondly, non-standardised, semi-structured interviewing is chosen since it is a useful research method within qualitative studies that follow an inductive approach (Bryman, 2012;

Mason, 2018). Semi-structured interviews use open questions and allow the researcher to explore the contextual boundaries (Gubrium et al., 2012). Additionally, interviewing experts within the selected case studies, the researcher asked for their experiences and their insights on the relevant research topics. Semi-structured interviewing enabled to ask additional questions when a relevant aspect or new insight was mentioned by the respondent. In general, interviewing experts is essential to get access to exclusive and objective data (Scheepers et al., 2016). Therefore, a selection is made of people involved, policy makers and managers on mobility in the case studies Merwede and Sluisbuurt.

3.2 Case study selection

This research used a multiple-case study design as it tried to find phenomena in the real-life world, namely, the implementation of sustainable urban mobility in high-density urban districts. Therefore, using case studies was a requirement (Yin, 2009). For this research two case studies are selected: The Merwede or sub-area 5 in Merwedekanaalzone in the city of Utrecht and the Sluisbuurt a sub-area from Zeeburgereiland in the city of Amsterdam. These cases are selected because of their relatively similar ambitious plans for constructing a dense urban area within the city boundaries where sustainable urban mobility becomes the norm. The scale of the projects and the ambitions are unique and draw international attention.

According to Sluis & Peek (2020), the case of Merwede is highly interesting for researching. This is because it is argued to be a critical case, because of its close intertwining between the two major challenges of urbanisation and sustainable mobility. Also, in Sluisbuurt these two challenges play a central role in the neighbourhoods' development. Therefore, the cases can be seen as pioneers. In the Netherlands, no other projects are integrating such extensive and drastic mobility plans. Since these projects are revolutionary in their high ambitions and size, many new and existing obstacles are expected to be encountered. These cases, for example, featured many actors, including an involved local government. The scattered institutional field with different levels of interests are expected to lead to difficult processes to come to agreements. The role of the local government in the integration of sustainable mobility and overcoming obstacles is expected to be very complicated. The funding of these mobility services is also very interesting to analyse, since high density urban neighbourhoods are expected to be promising places for sustainable urban mobility (Banister, 2008).

According to Kaarbo and Beasley (1999) a comparative case study design is suitable for a research that is relevant to societal problems and in which contexts can make a difference. Goodrick (2014) stated about a comparative case study design "Comparative case studies are particularly useful for understanding and explaining how context influences the success of an intervention and how better to tailor the intervention to the specific context to achieve intended outcomes." (Goodrick, 2014, p.3). Comparative case studies involve the analysis and synthesis of the similarities, differences, and patterns across two or more cases that share a common focus or goal (Goodrick, 2014). In this research, both cases are analysed and compared. The findings that are corresponding can be just as interesting and important as those that differentiate the cases (Bryman, 2012). The key in this case study design is its ability to allow the distinguishing characteristics of two cases and draw theoretical reflections from them (Bryman, 2012).

3.3 Operationalisation

An operationalisation turns abstract concepts into measurable observations. This is done by selecting non-abstract and observable phenomena that can represent an abstract concept. These indicators help to create measurable data. The concepts that are discussed in chapter 2 are operationalised into indicators suitable for the qualitative methods in this research.

Table 3.1 Operationalisation

Abstract concept	Definition	Dimension(s)	Indicator(s)
Institutional obstacles	Any factors related to cooperation, institutional rules and power relations that can obstruct the capacity for organisations to implement plans and actions.	Challenges with the participation or involvement of actors in the process.	Extent to which there are difficulties with the degree of actor participation in the process.
		Challenges with coordination and management.	Extent to which there are difficulties in managing and coordinating actors in the process.
		Challenges with cooperation within the project.	Extent to which there are problems with the formation with a coalition or organisation. Degree to which there is a strong opposition or lack of support for a certain interventions or strategy.
		Challenges as a result from policy constrains from environmental/strategy plans.	Degree to which legal constrains limit the possibilities of implementation of the project.
Financial obstacles	Any factors related to the funding of a plan or/and financial coordination or/and adequate private or public financial resources that can obstruct the implementation of plans and actions.	Challenges with the financial capacity.	Degree to which there are funding problems in the process.
		Challenges with the duration of funding the problem.	Degree to which actors involved are willing to cooperate and to co-fund aspects of the project for a certain period.

Following the table (Table 3.1) above, some sample questions for the semi-structured questionnaire are formed. They are split between 2 blocks: Institutional barriers and financial barriers as these concepts are the main focus in this research. Combined with the more concrete concepts, the topic list for semi-structured interviewing is lined up in appendix 5 A-I.

3.4 Data collection and analysis

The selected qualitative research methods needed a specific way of data collection which are explained in this paragraph.

3.4.1 Document analysis

Firstly, for the document analysis, the used documents are carefully selected from publicly available sources. To be able to do that, one has to know about forms and nature of the documents. According to Bowen (2009), documents contain text and images. This criterium allows a document to have a variety of forms and sources. These include advertisements, agendas, journals, maps, manuals, newspapers, and notes. These documents can be found in libraries, archives, or institutional files. A strong requirement is that the selected documents

are to be recorded without an intervention of the researcher. Several (policy) documents and news articles of the case studies were selected (Table 3.2 & 3.3).

Table 3.2 Sluisbuurt Amsterdam

Policy documents	News articles	Maps, videos & factsheets
Urban design plan Sluisbuurt. (Municipality of Amsterdam, 2017)	Sharing mobility Sluisbuurt. (Van Duijnhoven, 2019)	Mobility plan map east Amsterdam [map]. (Municipality of Amsterdam, 2019a)
Environmental strategy plan Sluisbuurt. (Municipality of Amsterdam 2018)	First plot tender in Sluisbuurt. (Weessies, October 23, 2020)	Measures for public transport Zeeburgereiland [map]. (Municipality of Amsterdam, 2019b)
Mobility plan Zeeburgereiland. (Municipality of Amsterdam, 2018a)		
Coherent completion of shared mobility and parking in Sluisbuurt. (Municipality of Amsterdam, 2019)		

Table 3.3 Merwedekanaalzone Utrecht

Policy documents	News articles	Maps, videos & factsheets
Environmental strategy Merwedekanaalzone (part 1). (Municipality of Utrecht, 2017)	Mobility in Merwedekanaalzone. (Goudappel, april 17, 2018)	Video of landowners: This is Merwede. (Merwede, 2021)
Mobility strategy of Merwede. (Municipality of Utrecht, 2018)	Mobiliteit is randvoorwaarde voor nieuwbouwprojecten. (Rottier, February 20, 2020)	
Urban Design plan Merwede. (Municipality of Utrecht, 2020)	De mobiliteitstransitie in Merwedekanaalzone. (Sluis & Peek, September 25, 2020)	
Environmental strategy Merwedekanaalzone (part 2). (Municipality of Utrecht, 2021)	Verstedelijking vereist duidelijke doelstellingen voor mobiliteit. (Gebiedsontwikkeling.nl, October 1, 2020)	

The first step in the analysis was to get a clear framework for analysis Patton et al. (1990). This framework is based on the operationalisation (Table 3.1). This operationalisation strategy functioned as a foundation for an effective and efficient framework for the whole process. The operationalisation is based on concepts that are found in literature and made it possible for the researcher to know what topics to look for in data sources. As Fereday and Muir-Cochrane (2006) argue, using a coding manual (Table 3.4) for the study is important, as it serves as a data management tool as it organises segments and assists in interpretation.

After setting up an operationalisation strategy, the documents were analysed. Bowen (2009), states that document analysis first involves skimming, which is a superficial way of reading. The content-analysis in general is, according to Bowen (2009), the process of organising the information into categories that are related to the research questions. For this research, a thematic analysis is conducted based on a coding manual. A thematic analysis entails a more focused method of reading of data, and a categorisation or coding of the selected data since this way of analysing made it possible to uncover themes that are related to the operationalised research concepts.

Subsequently, the categories or codes were connected. According to Fereday and Muir-Cochrane (2006), this is an important step for uncovering patterns such as causalities, similarities, and differences in the data. According to Bowen (2009) it is important for a researcher not to literally take passages or words from an analysed document. Instead, the meaning of the document and its contribution to the issues have to be explored. Therefore, in this research, after being coded, all collected data were summarised. Summarising is

believed to be a useful tool to put all data in perspective and to find potential gaps in understanding (Bowen, 2009). Therefore, this knowledge gave insights in the perspective of the local governments and participating (private) developers. The researcher explored among other things, policies, motivations, ambitions, and strategies related to sustainable urban mobility in both case studies. Also, the institutional framework of the cases and legislation policies have been searched for in the documents. Additionally, in order to get a full understanding of the cases, various news items related to sustainable mobility in Sluisbuurt and Merwede, are analysed.

Table 3.4 Coding manual for documents

Abstract concept	Definition	Dimension(s)	Indicator(s) in documents
Institutional obstacles	Any factors related to cooperation, institutional rules and power relations that can obstruct the capacity for organisations to implement plans and actions.	Challenges with participation or involvement of actors in the process.	Words: 'governance', <i>participatie</i> {participation}, 'uitdagingen/opgaven [challenges]'.
		Challenges with coordination and management.	Words: 'organisation', <i>coördinatie</i> [coordination], 'uitdagingen/opgaven [challenges]'.
		Challenges with cooperation within the project.	Words: 'samenwerking' [cooperation]', 'uitdagingen/opgaven [challenges]'.
		Challenges as a result from policy constrains environmental/ strategy plans.	Words: 'Beperkingen [limitations]', <i>beleid</i> [policy], 'parkeernorm [parking norm]'.
			Themes: Plans, ambitions, and restrictions.
Financial obstacles	Any factors related to the of a funding plan or/and financial coordination or/and adequate private or public financial resources that can obstruct the implementation of plans and actions.	Challenges with the financial capacity.	Degree to which there are problems in the process.
		Challenges with the duration of funding the problem.	Degree to which actors involved are willing to cooperate and to co-fund aspects of the project for a certain period.

3.4.2 Interviewing

For the purpose of this research semi-structured interviews were used. Semi-structured interviews with several respondents participating in the process mobility planning in the selected case studies are conducted. The interviews were conducted with various respondents (Table 3.5). Among these respondents were several municipal officials of the municipality of Amsterdam and Utrecht. These officials were involved in managing and policy making of mobility plans. Also, three private developers and a mobility consultant were interviewed. These respondents were selected due to their involvement, perceptions, and experiences in the cases. Many of them have central positions in the sense that they are experts in their field or managers. The respondents work with issues connected to parking and sustainable mobility. Apart from understanding the case study and its challenges and objectives as well as a personal view of the stakeholder, the interviews were mainly focused on the emerging obstacles in the process so far. Subsequently, the way of counteracting of the problem is questioned in the interview in order to be able to draw lessons from these processes.

Table 3.5 Table of respondents:

Respondent	Function	Case
A	Smart mobility manager municipality of Amsterdam.	Sluisbuurt
B	Project manager at developer AM.	Merwede
C	Project manager at developer Lingotto.	Merwede
D	Program manager shared mobility at municipality of Utrecht.	Merwede
E	Real estate developer at Boelens de Gruyter.	Merwede
F	Mobility Expert at Studio Bereikbaar.	Sluisbuurt
G	Project manager mobility and real estate developer at Janssen de Jong	Merwede
H	Parking and mobility manager at municipality of Amsterdam	Sluisbuurt
I	Former mobility manager on Zeeburgereiland at the municipality of Amsterdam	Sluisbuurt

The topic list (Appendix 3) is based on the operationalisation of abstract concepts (Table 3.1) and is used as an interview guide during the interviews. This guide was both flexible and steering simultaneously. The prepared questions were necessary to ensure the satisfaction of research objectives. These questions were sent in advance to the respondents, to prepare them and to remind them of the interview appointment. The flexibility of the research guide, on the other hand, allowed the researcher to ask additional questions when explanation is needed, or relevant (side) issues were discussed (Scheepers et al., 2016).

Conducting the interviews

The empirical data is collected in the months June and July in 2021, during the COVID-19 pandemic, causing some research limitations. Since, as a result of the pandemic, government measures do not allow or strongly advise against physical meetings. This led to an alternative way of doing research. As a result of the limitations, interviews had to be conducted online. This shift to online communication was accompanied by both benefits as disadvantages. On the one hand, respondents were expected to be more comfortable in a familiar environment and had less travel time. However, online interviewing is characterised as risky regarding potential complications in non-verbal communication and reliability reduction due to dependence on technical tools (Upadhyay & Lipkovic, 2020). For conducting the interviews, Microsoft Teams was used, since this is a widely used, formal communication platform during the worldwide pandemic. However, in the case a respondent favoured another platform, the researcher adapted to this. Interviews were planned to last 30 to 45 minutes, which was exceeded in 6 interviews by mutual approval. Also, the interviews (Appendices 2 & 3) were recorded with a dedicated application in accordance with the respondents. Recording the interviews helped to facilitate the analysis as well as increasing the accuracy of the analysis. The accuracy was improved by recording since data were in that case not depending on the memory of the researcher alone. During the interview additionally notes were taken in case a technical problem appeared.

Table 3.6 Operationalisation for interviewing

Abstract concept	Definition	Dimension(s)	Indicator(s)	Interview questions
Institutional obstacles	Any factors related to cooperation, institutional rules and power relations that can obstruct the capacity for organisations to implement plans and actions.	Challenges with participation or involvement of actors in the process.	Extent to which there are difficulties with the degree of actor participation in the process.	<ul style="list-style-type: none"> - To what extent do you experience difficulties with informing and involving of actors? - To what extent are the co-developers able to participate in the plan making process?
		Challenges with coordination and management.	Extent to which there are difficulties in managing and coordinating actors in the process.	<ul style="list-style-type: none"> - To what extent is there a clear hierarchy in the process? - To what degree is an actor managing the process and how? - To what degree is there consensus between actors?
		Challenges with cooperation within the project.	Extent to which there are problems with the formation with a coalition or organisation. Degree to which there is a strong opposition or lack of support for a certain interventions or strategy.	<ul style="list-style-type: none"> - To what degree are actors working together and in what kind of organisation/formation? - To what extent are there arrangements in task division between actors in the process? - To what extent are there issues with trust among actors? - To what extent are actors benevolent in cooperating in the process?
		Challenges as a result from policy constrains from environmental/ strategy plans.	Degree to which legal constrains limit the possibilities of implementation of the project.	<ul style="list-style-type: none"> - To what extent are policy constrains limiting the plan from being implemented?
Financial obstacles	Any factors related to the of a funding plan or/and financial coordination or/and adequate private or public financial resources that can obstruct the implementation of plans and actions.	Challenges with the financial capacity.	Degree to which there are funding problems in the process.	<ul style="list-style-type: none"> -To what degree is there a problem with funding the plans? -To what degree is there a lack of financial capacity among the actors? -To what degree is additional or external funding needed?
		Challenges with the duration of funding the problem.	Degree to which actors involved are willing to cooperate and to co-fund aspects of the project for a certain period.	<ul style="list-style-type: none"> - To what extent are actors willing and able to maintain the project and for how long? - To what extent do actors participate in funding arrangements?

Transcribing

The data in the form of notes and recordings were transcribed intelligently. Intelligent transcription focuses on light editing of an audio or video file (Mason, 2018). This means that ‘ums’, ‘hmms’ and pauses in between discussions and expressions were omitted from the transcripts. The main point of this way of transcribing is the elimination of irrelevant phrases. These do not necessarily contribute to the conversation or discussion of the main subject. The transcripts were written in formal language and, if desired, checked by the respondent that

was interviewed. The names of the respondents were replaced by the letters A to I to ensure their anonymity. The transcripts of the interviews can be found in appendix 5, A-I.

The second stage of analysis was open coding, which entailed the reading of the data in order to find categories and to get an idea of how patterns could be clustered and coded (Mason, 2018). Open Coding involves naming the identified categories and breaking them down into discrete parts and examining them. This allows the researcher to questioning the phenomena that are reflected in them. Open coding was a crucial step in considering if all answers were given and if additional interviews were needed. The open coding was done through globally highlighting relevant phrases with different colours, serving as categories.

Thirdly, axial coding was done. This next step in analysing data and involved looking for links, differences and similarities between the themes and categories highlighted at open coding, so that related themes could merge and others that could be divided into sub-categories. For this way of coding, NVivo 12 was used as it is considered to be suitable software and therefore recommended.

Finally, the researcher used selective coding. Selective coding is considered as an important step in analysing data. The coded data, or the concepts that were found, were put into perspective. Found data were constantly compared to find any types of coherence or exceptions. These relations are for example established based on the frequency in which concepts recur in the data from both case studies (Mason, 2018).

3.5 Reliability and Validity

It is important to consider reliability and validity when doing research (Bryman, 2012). Reliability and validity are discussed in this paragraph.

3.5.1 Reliability

Reliability deals with the stability of the results. This means that a repeating research will come to the same conclusions. In qualitative research it is however possible that there are some changes in findings between repeating researches. This is for example as different experts are interviewed, since they all have different opinions, qualities, and perceptions (Bogner & Menz, 2009). This concern can be tackled by interviewing multiple experts. All experts have a specific field of interest and a different perception of the situation of the research area. By interviewing multiple actors, the research is more reliable since less bias is expected to be formed. Also, prejudice from the researcher can be tackled. It is therefore necessary for the researcher to work as open and structured as possible in conducting the expert interviews. Furthermore, As mentioned by Bryman (2012), the use of multiple ways of data collection. So apart from expert interviews, it is encouraged for researchers to analyse of policy documents and a do an elaborated literature study.

3.5.2 Validity

In research it is important to think about the validity of the research. Improving the validity of the qualitative research can be established by considering the quality differences between conducted expert interviews and creating an interview guide with a set of open-ended questions. The guide helps researchers to be better prepared for the interview and improves the quality of the interview. The validity is achieved if, at the end of the collection of data, a researcher can properly define an answer to the research questions (Bryman, 2012). Further,

it is important for the external validity that data is to be collected under the same circumstances. In this research, the interviews were all conducted online in a situation kept realistic by an active respondent involvement during the interviews. The interviews all took place in a for the respondent comfortable setting. The validity of the answers of the respondents are only expected to be limited by the home setting of the respondent (Upadhyay & Lipkovic, 2020).

In order to improve the internal validity of the research, respondents were asked in the first section of the interview to elaborate on their experience and knowledge and their involvement in the integration of sustainable mobility in the high-density urban neighbourhood. The researcher was in this first section of the interview able to reflect if the respondent had sufficient expertise to provide valid answers for the research (Mason, 2018).

3.6 Ethics

Ethical research is needed. A researcher has to respect the privacy of the participants of the research (Mason, 2018). The research should not harm the participants as stated by Bryman (2012). Researchers should act respectfully and in ways that are just. Ethical behaviour protects the right of individuals that are involved in the research. Therefore, the rights of interviewees and the purpose of the research has to be communicated clearly. This means that respondents remained anonymous in the research and were solely named by their function or way of involvement in the project. And, as mentioned earlier, all participants were asked about recording of the interviews in advance. After the interviews the respondents were given the opportunity to check the transcripts to prevent sensible topics, false information, or misunderstandings to be used in the research. This benefits the validity and reliability of the findings of the research (Mason, 2018). Furthermore, the respondents were told about the purpose of the collected information on which they were able to agree or disagree. Since the participants participated voluntarily, they were also free to withdraw from the research at any point and for any reason. According to Clifford et al. (2010), researching ethically also has some practical advantages to the researcher; the win of trust from the participants to participate in the research.

In the next chapter, the data that are collected during the qualitative research are presented. In the first sections, the cases and their characteristics are introduced. In the second part of the mobility plans are generally presented.

4. Case studies: Merwede & Sluisbuurt

On the basis of the analysis of several policy documents of the two cases in combination with data from the interviews, this chapter discusses the background, goals, plans and strategies, organisations and challenges of both Merwede and Sluisbuurt. First, the cases and their characteristics are briefly introduced. Finally, the organisation structure and mobility ambitions and plans are discussed.

4.1 The case of Merwede

Merwede is a planned neighbourhood in the fast-growing city of Utrecht (Fig. 4.1). The City of Utrecht has chosen to accommodate the growth of the city in existing urban areas. To make this possible, building in higher densities is needed (Municipality of Utrecht, 2017). The Merwedekanaalzone, or Merwede sub-area 5, is one of the places high densities are planned (Municipality of Utrecht, 2018). The former business and industrial area will be transformed into a mixed-use urban district. The municipality, together with various developers, are planning to transform the former industrial district into a lively, healthy and sustainable area for people of all ages to live in (Municipality of Utrecht, n.d.). The district is expected to be completed in the next two decades. It is proposed to develop around 6000 houses in the area (Van den Hurk, et al., 2021). The district will be green and almost entirely car-free: roads and public spaces are designed for walking and cycling. Also, parking standards are lowered to 0,3 per residence instead of the traditional norm of between 0,7 and 1. Also, a car and (motor)bike sharing system is planned in the area. The area is planned to be richly equipped with amenities such as: shops, employment opportunities, sports facilities, schools, and healthcare. Amenities are in close proximity so that there is no need for citizens to travel long distances and therefore reduce the need for car ownership (Municipality of Utrecht, n.d.).



Fig. 4.1 The Merwede 5 plan (Architectenweb, 2020).

4.2 The case of Amsterdam Sluisbuurt

Since 1984 Amsterdam has been growing rapidly. The city grew with 10.000 citizens per year over the last ten years. To be able to give all these new dwellers a home, Amsterdam has to build approximately 5.000 houses per year (Municipality of Amsterdam, 2018). In the Amsterdam strategy plan, locations for housing development are appointed. The intention is to accelerate the development of various projects in the next ten years (Municipality of Amsterdam 2018).

One of the foreseen locations for housing development is the future Sluisbuurt (Fig. 4.2) in the Zeeburgereiland area. This former business location is planned to be transformed to a high-density urban area on the outskirts of the city (Niitamo, 2020). The area is an extension of the city centre area with an attractive waterfront. The neighbourhood is proximity is one of the pillars in this project. When thinking about urban densification, the importance of proximity is discussed. The municipal strategy assumes that the proximity of the city centre offers opportunities to create a highly urban residential-work environment, with many amenities and low car use (Soeters & Wester, 2017). High densities are desired in the larger cities since the Netherlands is struggling with increasing housing shortages. The municipality of Amsterdam, therefore, has drawn up an urban development plan for this location. The area is expected to have space for 5.500 houses and a large variety of amenities (Soeters & Wester, 2017; Milikowski, 2018 and Duijnhoven, 2019).



Fig. 4.1 Urban plan of Sluisbuurt (Architectenweb, 2020)

4.3 Sustainable urban mobility in Merwede and Sluisbuurt

Challenges leading to new approaches in mobility

Both cases are planned as a mixed-use and densely built urban neighbourhood in two of large cities in the Netherlands and share a lot of characteristics (Table 4.1). The cities of Utrecht and Amsterdam are both dealing with some major challenges the Dutch society is currently dealing with. These societal challenges are in general strongly related to an increasing and urgent demand for housing, a lack of space for development and climate issues (Respondent I). In urban planning these challenges come together and, in order to develop new urban spaces, a different approach to shaping the city is needed. According to respondent D, Merwede and Sluisbuurt are among the first projects where urban planners rare think differently about urban mobility in combination with the built environment, especially on this scale.

Table 4.1 Characteristics of the cases

Characteristic	Sluisbuurt	Merwede
Location	Amsterdam, Zeeburgereiland	Utrecht, Merwedekanaalzone
Neighbourhood type	Former brownfield redeveloped into mixed use dense neighbourhood.	Former brownfield redeveloped into mixed use dense neighbourhood.
Planned households	5.500 households	6.000 households
Realisation period	2020-2030	2016-
Project size	25 Ha	24 Ha

The cities of Amsterdam and Utrecht both need to build thousands of houses, of which a large share within the current city boundaries. In Amsterdam, Zeeburgereiland and in Utrecht, the Merwede are considered as a suitable location for large scale urban development. Within these greater areas are the two sub-areas: Sluisbuurt Amsterdam and Merwedekanaalzone Utrecht. The lack of space and the urgent need for housing leads to the need for cities to build denser by redeveloping former industrial areas and filling in empty spaces. These new developments are expected to run against mobility limits (Municipality of Amsterdam, 2018a & Municipality of Utrecht, 2020). More houses, generate more traffic, of which a large share is car. More cars cause air pollution, congestion, and leave less space due to the need for more parking spaces. Therefore, the larger cities know the urgency to look for alternative ways of mobility.

In Merwede and Sluisbuurt mobility must be planned differently. According to respondent D and G, the highways around Amsterdam and Utrecht are of major national importance. The additional number of cars forecasted in Merwede and Sluisbuurt, are threatening the major highways with severe congestion. Respondent I, explained: “During the design process of Sluisbuurt, fellow municipal officials realised that with the number of planned homes in the eastern part of the city of Amsterdam, congestion problems would arise.” (Respondent I). Thus, apart from the desire to ban cars because of their bad effects on liveability, there is simply too little road capacity to handle the additional cars (Goudappel, 2018). The local governments therefore aspired new approaches to mobility and included in the environmental strategy plans (Municipality of Amsterdam, 2017; Municipality of Utrecht 2017 & Municipality of Amsterdam 2018a). Respondent D argued:

“What is a major problem in Merwede and Sluisbuurt, is that the road infrastructure within and around the neighbourhoods do not have the capacity to cope with additional housing. So, it makes sense that measures must be taken eventually.”

Respondent D (Utrecht municipal official at mobility Merwede)

The ambitions in the municipal strategy plans are thus more or less required. The City of Utrecht had to take measures due to road capacity constraints within the city. The capacity constraints impeded the development of a traditional mobility plan dominated by private car use in the area (Van den Hurk, et al., 2021). An attractive and accessible mobility and mode sharing system is considered to be a criterium for the neighbourhood to function (Municipality of Utrecht, 2017). A digital platform is proposed to support attractiveness and accessibility of this system following the concept of MaaS. Apart from this, the area is planned in high densities so that all necessary amenities are walkable, which reduces the need for long-distance travel (Respondents F & H). Short distances make it possible for citizens to travel with other, more active, and non-polluting modes. Therefore, Merwede and Sluisbuurt both handle a certain prioritisation of modes, following the Dutch ‘*Stop-principle*’. This stands for *Stappen* (walking), *Trappen* (cycling), *OV* (public transport) and *Personenauto*, (Driving) (Municipality of Amsterdam 2018b; Respondent A & H). The latter is also divided into shared vehicles and privately owned cars (Respondent B, F & G). This principle means that the infrastructure and public spaces in both areas are prioritising walking and cycling. Merwede is planned completely car free and therefore, bridges, large pavements, cycle lanes, cycle parking garages are expected to facilitate this shift in modes (Respondent D, Municipality of Utrecht, 2018). Sluisbuurt is slightly less radical by partially banning cars out of the neighbourhood. A route system for cars to ensure car free spaces, indoor parking to move cars from the streets and out of sight, and additional public transport ferries, trams, and buses (Respondents A & H). Respondent A stated about this approach:

“First of all, we need to make the neighbourhood more attractive for pedestrians. The neighbourhood must also be easily accessible for cyclists and public transport. Also shared mobility must be present. The car comes at the final place and its accessibility to the neighbourhood must be very limited.”

(Respondent A, municipal official Sluisbuurt)

Secondly, a lower parking standard is an important measure for municipalities to decrease the number of car traffic in the neighbourhood. Less parking spaces means less space for cars, which is believed demotivates privately car ownership (Respondents A, H & I). Many respondents argued that a lower parking standard the most effective measure is to decrease private car ownership (Respondent A, D, G, H, & I). Respondent D, for example, stated about this: “If fewer parking spaces are built, there will of course be fewer cars.” If less cars are being facilitated, private car ownership is expected to decrease. The parking standard in Merwede is planned to be around 0.3 per household and in Sluisbuurt between 0 and 0.3 (Respondent A, C, D & H). In Amsterdam, citizens already own fewer cars, according to respondent H. Therefore, the city of Amsterdam handles lower parking standards than the City of Utrecht. Respondent D stated about this, that the lower car ownership and lower parking standards in Sluisbuurt can be seen as a possible advantage for the Sluisbuurt project. Since the transition to sustainable mobility benefits from low car ownership.

Thirdly, Sluisbuurt and Merwede are planned to become pioneers with the plans for a large-scale shared mobility system. Despite low parking norms, the demand for long-distance travel will continue to exist. Even though a large share of this demand is expected to be covered by high-quality public transport, the high degree of mobility of a car is still desirable (Respondent A & D). Therefore, the municipalities need to provide future citizens with alternatives to the private car. Apart from active travel, sharing mobility is planned to be provided in both neighbourhoods. The plans of the municipalities Amsterdam and Utrecht are inspired by the emerging concept of MaaS (Respondents A, C & G). An integrated system or application will connect the future sharing modes in the neighbourhoods. There is however still a lot unclear about how the system will function. Also, the number of vehicles and the type of shared modes are still unclear in both cases. Respondent C stated about Merwede: “Shared mobility is operated from mobility hubs in parking garages. The majority of shared mobility consists of shared cars” (Respondent C, Private developer at Merwede). According to respondents D and G, Merwede will provide between 250 and 350 shared cars from public garages and mobility hubs. Sluisbuurt on the other hand, will provide around 300 shared cars from two public garages according to the latest plans (Respondent H). An overview of the mobility strategy per case is provided by table 4.2.

Table 4.2 General mobility strategy per neighbourhood

	Sluisbuurt Amsterdam	Merwede Utrecht
Mobility strategy	STOP-principle: walking cycling, public transport shared mobility, and private car.	STOP-principle: walking cycling, public transport shared mobility, and private car.
Mobility plan	System with multiple hubs and two parking garages in which sharing mobility is provided. Also, in combination with public transport consisting of tram and ferry.	Car-free neighbourhood with several mobility HUBS with sharing mobility and high-quality public transport.
Parking	Indoor parking and in public garages within accessible by a few roads in the area. Parking standard of 0-0,3 per household.	Indoor parking on the edges of the neighbourhood only accessible from outside main road. Parking standard of 0.3 per household.
Shared mobility	100 shared cars in public garages and additional private shared cars on private plots. Bikes and scooters are optional. MaaS is the starting point.	250-350 shared cars in public garages. Bikes and scooters are optional. MaaS is the starting point.

4.4 Institutional situation of the cases

Another important characteristic of the cases is the institutional situation. From the start there is major a difference between both cases. This difference is, according to respondent D, who was involved in both cases, mainly caused by the institutional setting since there is a difference in composition of actors. Respondent A mentioned the differences in landownership between

the two cases, which influenced the planning processes differently. Respondent D, a mobility expert involved in both cases, stated about this:

“The difference mainly lies in the fact that land in Merwede has already been divided among the parties in an early stage in the planning process. In Sluisbuurt, the land belongs to the municipality of Amsterdam.”
 Respondent D (Municipal official at Merwede)

The Municipality of Utrecht cooperates since the beginning of the process with 9 other landowners in planning and designing the future neighbourhood and its mobility strategy and implementation (Table 4.3) (Municipality of Utrecht, 2020).

Table 4.3 Owners in Merwede

Stakeholder(s)	Function	Position
AM/Synchroon	Real estate developer	Landowner
BPD	Real estate developer	Landowner
Greystar	Real estate developer	Landowner
G&S Vastgoed/Boelens de Gruyter/ Round Hill Capital	Real estate developer	Landowner
Janssen de Jong	Real estate developer	Landowner
Lingotto/3T Vastgoed	Real estate developer	Landowner
Municipality of Utrecht	Developer and designer	Landowner

Table 4.4 Owners in Sluisbuurt

Stakeholder(s)	Function	Position
Municipality of Amsterdam	Developer and coordinator	Landowner
DUWO	Housing cooperation (primarily students)	Expected buyer of a plot
MEI Architecten	Designer	Expected buyer of a plot
In Holland	Developer	Expected buyer of a plot

In Sluisbuurt, on the other hand, the municipality of Amsterdam owns all the land and is the only initiator in the process (Table 4.4) (Respondent A). In Sluisbuurt, the first plot developers are getting involved in the process (Weessies, 2020). These developers are a housing cooperation, an association of owners and a university of applied sciences. This puts the municipality in a position of power, since the party that owns the lands is overall considered dominant. The municipality of Amsterdam did not deviate from this ‘rule’ in planning: It makes its own policies and ambitions for the area. By setting the terms for developers, the municipality is more able to ensure the realisation of their ambitions (Respondent A & F). In tenders for plots, the municipality can determine who is allowed to develop and under what conditions. Respondent D argued about this:

“The municipality of Amsterdam can therefore first make extensive plans and then impose requirements on the buyers of the plots. The municipality will tender with the idea of: ‘take it or leave it’. This is different in Merwede. The plans and concepts are in Merwede a real co-creation of the municipality with other private parties.”
 Respondent D (Municipal official at Merwede)

Weessies (2020) explained the procedure of tendering plots by the municipality in Sluisbuurt. The procedure consists of two rounds. A maximum of four parties are selected in the pre-selection, which proceed to the final selection. The selection is, according to the municipality

of Amsterdam, made on spatial and programmatic quality of the plans and sustainability of the plans, as well as other options to, for example, sustainable mobility.

In Merwede, the municipality had to cooperate with multiple stakeholders that owned land from an early stage in the process. In 2021, ten different actors owned land in the Merwedekanaalzone sub-area 5. The municipality of Utrecht owned approximately 30% of the land in the area and it will remain owner at least until realisation of the project. To get to realisation, the municipality of Utrecht had to collaborate with the other private owners (Respondent C). In the first part of the municipal environmental strategy for Merwede, the municipality stated that it is aware of its position and the urgency to work together with other actors in order to implement the high ambitions on for example sustainable mobility (Municipality of Utrecht, 2017).

In Sluisbuurt, the municipality of Amsterdam will sell the lands to private developers in different plots. Respondent D therefore argued that the process of Sluisbuurt is in terms of the institutional aspect considered to be less complex. Respondent A explained the institutional situation of Sluisbuurt in which sustainable mobility implementation is expected to be a task for the municipality of Amsterdam, apart from the terms that the municipality sets for future private developers and mobility businesses. Respondent A summarised the approach of the municipality of Amsterdam as follows:

“[The municipality of Amsterdam] will recruit providers of shared mobility and then set certain requirements and conditions and may contribute to the provider. It will also impose terms and conditions on buyers of the plots. The institutional situation in Sluisbuurt will therefore not be a coalition, rather a one-to-one relation or tender. This is planned differently [than in Merwede].”

Respondent A (Municipal official at Sluisbuurt)

This difference in institutional setting is considered to be the main difference between the cases. Figure 4.3 shows in a schematic representation the situation in landownership and collaboration between actors per case from process start until the start of construction of the first buildings. The blue circles represent the developing landowners and their mutual and intertwined relations between all owners. In Merwede owners will remain involved as they develop their own plot of land. Sluisbuurt will start the construction stage with plot buyers in a one-on-one relation. Each circle represents an actor, and its size represents the owned share of land.

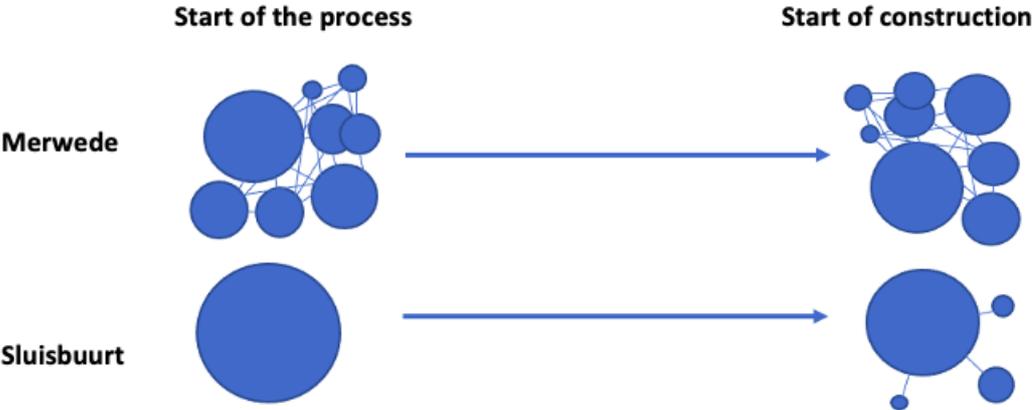


Figure 4.3 Simplified schematic representation of collaboration (Own figure, 2021).

5. Results

In the previous chapter, the two cases and their main characteristics are introduced. Additionally, in this chapter, data from the policy analysis and semi-structured interviews are presented. It discusses the complexities, challenges, and obstacles in the implementation of sustainable urban mobility in the two cases Merwede and Sluisbuurt. Subsequently, the approach of dealing with these obstacles is discussed.

5.1 Institutional obstacles

The research is focused on obstacles municipalities come across in planning for sustainable mobility in high density neighbourhoods. These areas are suitable for sustainable mobility implementation, since the urgency is high, amenities are relatively close and there are many potential users. Both the interviews and the policy analyses however, pointed out the complexity of the transition towards more sustainable mobility. All respondents noticed the risks and uncertainties of such a pioneer project entails. For example, respondent E, a private developer at Merwede, stated that the implementation of mobility is argued to be a pilot, since there has never been a project on this scale, with this many actors. This will, according to respondent E undoubtedly lead to face problems and challenges. “We have to anticipate on challenges or barriers and learn from them” (Respondent E). In case of Sluisbuurt, Respondent D argued that one can be sure that unexpected situations will occur in the near future. He is however positive since the municipality of Amsterdam and Utrecht and their partners are progressing generally well. Respondent G stated that he was also aware of the challenges in Sluisbuurt that have to be faced due to the uncertainties and the pioneering position of this project.

Apart from the pioneer position and the uncertainties that come with it and the overall satisfaction about the progress of the process of planning for sustainable mobility in Sluisbuurt and Merwede, the respondents mentioned, the governance aspects of the process as a great challenges and barrier. Respondent B, for example mentioned in the case of Merwede: “Despite promising progression, it is still hard to say how the mobility project of Merwede will function, especially in terms of governance” (Respondent B). Also, respondent A mentioned the institutional situation of both cases as a large cause of the complexity of both cases. As mentioned, there is a major difference between the case of Merwede and Sluisbuurt, namely the institutional setting mentioned in chapter 4. Respondents A, C, D, E, and F also pointed out to this issue as a cause for complexity and emphasised the difference between the two cases on the governance aspect.

5.1.1 Collaboration obstacles

As discussed, there is a difference in complexity between cases due to challenges caused by the differences in landownership. The large number of landowners in the Merwede case forced the formation of a coalition (Respondent C). The ambitions of the municipality of Utrecht were a starting point to guide the process of coalition forming. This process towards the so-called ‘coalition of owners’ was, according to respondent E, initiated by the municipality of Utrecht. The ambitions of the municipality were a base for a long-during negotiation between these landowners with all different interests (Respondent G). According to respondent D, it was, and still is, a difficult process to bring the interests of the private stakeholders and the high ambitions together. The scale of the project and the frameworks

set by the municipality to respond to the foreseen challenges, had a compelling effect. Collaboration was crucial in order to make the project as a whole operational as stated by respondent C, a private developer at Lingotto. Therefore, involvement of all owners was more or less a requirement to be able to develop anything at all. In Merwede, a well-functioning mobility system was therefore a strong requirement for adding houses in the area. Without a plan for mobility, developers were not allowed to build in the area since the municipality would not approve the plans. A joint approach was considered to be the best option to the mobility issue (Respondents D & E). That is why a unique collaboration was created in which all owners would set up a mobility company together. This collaboration was part of the owner's agreement, and it is planned to be an extensive and multi-year project. Respondent D explained about the collaboration on mobility with private developers and investors in Merwede:

“Merwede is in fact a new situation. Project developers have traditionally been interested in buying, developing, and selling real estate. So, they have no need at all to participate in a multi-year project in a collective of owners. The developers were already quite dissatisfied about being forced to enter a collaboration in which they have to be risk-bearing for around ten years. I think 9 out of ten will leave this collaboration as soon as it is possible.”

Respondent D (Municipal official at Merwede)

5.1.2 Participation and cooperation

Traditionally, developers buy land, develop property, and sell it to individuals, investors, or other housing organisations. The main interest of developers is making profit (Respondents C, D & E). However, the challenges that limited possibilities in Merwede, forced developers to contribute to the neighbourhood. Private developers must participate in a long-term involvement, contribute financially, and take seat in complex collaborations as the Merwede mobility company. There are high risks in such a project and often undesired by private developers. In Merwede and Sluisbuurt, private developers partly perform tasks that were traditionally seen as government tasks. On the other hand, respondent E and G also stated that the role of the municipality of Utrecht is also relatively different from average projects. The municipality of Utrecht is on the one hand, a framework-setting government and thus has characteristics of being a (private) developer. About the cooperation in Merwede, private developer and mobility manager (Respondent G) stated that the process went relatively well so far. He and respondent D pointed out to the awareness among the involved actors of the long-term arrangements of the process. Respondent D mentioned that private developers are constantly trying to get out of the long-term agreements in negotiations. Despite this, the municipality is satisfied as well. Especially with the agreement and the collaboration between the owners. It is according to respondent B, a strong foundation for making the mobility plan working.

Sluisbuurt is different since there is no strong actor participation yet. As shown in fig. 4.3 a complex network or collaboration form of different actors is not found in Sluisbuurt since the municipality of Amsterdam sells plots to various developers after making policies and conditions for the area. According to respondent A, this is situation demanded for a different approach and could be described as ‘less complex’ as the municipality is not yet strongly depending on other, private, developers. On the contrary however, the municipality has to take the lead and the largest part of the responsibilities on realising its own ambitions.

Respondent A and D assumed that the situation in Sluisbuurt leads to the municipality to funding mobility facilities, its process and operation costs. In Sluisbuurt, risks are not shared in the earlier stages of the process, which puts the municipality in a vulnerable position (Respondent A). Respondent D described the differences between the cases as follows:

“The advantage is that working together makes more financially powerful as a collective. The disadvantage is that a lot of coordination is necessary, which takes a lot of time. And concessions have to be made. The municipality of Utrecht has a less framework-setting role than Amsterdam. In Sluisbuurt, the municipality is strong in setting terms, but the municipality of Utrecht is strong from an organisational point of view.”

Respondent D (Municipal official at Merwede)

Both cases do have different institutional situations. These situations influences both processes. But every approach has its advantages and disadvantages as described by respondent D. The institutional system of Amsterdam seems to be more decisive due to lesser negotiation with extern parties. And Merwede is likely to be more decisive due to its extensive collaboration.

5.1.3 Obstacle of conflicting roles

Conflicting roles and a lack of hierarchy are considered to be an obstacle or a threat to the process of implementing sustainable mobility. A good actor involvement, with a clear allocation of responsibilities within a legally-binding contract between public institutions and the private sector, is needed to get the optimal result. This coordinating role of the municipality is according to respondent B of major importance since the mobility plans transcend the single plot-level in the neighbourhoods. Respondent B stated about the role of the municipality of Utrecht in Merwede:

“The role of the municipality of Utrecht is very important in planning for sustainable mobility. Because the municipality is a policy maker, therefore a coordinating role cannot be avoided. The municipality must give clarity to parties involved. Sometimes, that role is missed, especially on the city-wide level.”

Respondent B (Private developer and mobility manager at Merwede)

Respondent B argues that there he experienced a lack of coordination by the municipality of Utrecht. He argued that the central approach and coordination for mobility is of high importance. Respondent E also had a comment on the role of the municipality of Utrecht within the process: “The municipality of Utrecht has a double role, as it acts as a private developer as well since it owns land as well. This is sometimes confusing since these interests could conflict” (Respondent E). The municipality has in that perspective two roles: an initiator or coordinator and a developer that owns 30% of the total land (Respondent G). Respondent G stated, however, that although the municipality council approves the plans, the municipality did not necessarily make the plans. “Actually, most of the plans were made in an early stadium within the owners’ collective. It was a collective process” (Respondent G, private developer at AM and mobility manager at Merwede). However, the respondents in Merwede did not really experienced other difficulties in the involvement of actors in the process of implementing sustainable mobility. Respondent G, for example stated:

“By working together work, costs and risks can be distributed between participants. Together mobility experts were hired. These experts collectively provided reports and advice to the collective. This was the start of the process a collective.”

Respondent G (Municipal official at Sluisbuurt)

Plans are made together in a new collaboration form (Respondent E). The respondents seem to be aware of the scale and complexity of the project and understand that it will take years of preparation. Respondent E, G and C are private developers. They are generally satisfied with the process and the agreements so far. Municipality official at Merwede, respondent B stated that the only obstacle that the municipality experienced on the collaboration is the risk that private developers will withdraw from the collaboration and the corresponding responsibilities before the project functions properly. This would mean that the concept of sustainable mobility is endangered, which is a crucial part of the entire Merwede neighborhood plan (Respondent B). This obstacle or challenge can also be linked to the problem of conflicting interests. Actors do not often share the same opinion about what role they should have to take in the process. Therefore, the municipality demands, with its legal instruments, such as the environmental plan, other owners in the collective and the mobility company to remain involved for a certain period (Respondents B & G).

Also, for Sluisbuurt, respondent I acknowledged the importance of a guiding actor, which is in Sluisbuurt the municipality as single owner in a strong position. The problem of a lack of coordination is however not the case in Sluisbuurt since there are not yet many private actors involved. Respondent F stated about this:

“The municipality sells the lands and facilitates the policies and plans. The developers then start building real estate following the municipal requirements, frameworks, and ambitions. Also, mobility providers are being selected for offering mobility services. At Sluisbuurt the first two steps of the municipality building and constructing public parking facilities are ‘traditional’ for a municipality. However, the municipality itself will not be providing mobility services itself. The municipality however offers a suitable place for shared mobility.”

Respondent F (mobility expert at Sluisbuurt)

According to respondent F & I, the role of the municipality in Sluisbuurt is very extensive and, in that sense, very traditional. Respondent I stated that Amsterdam is also a special case since all land is owned by the municipality which has a long history of developing its own lands. “Without owning a majority of the lands, a municipality have to act differently, resulting in another role” (Respondent I). This is considered to be an advantage since it provides the municipality to be very flexible. However, also the municipality of Amsterdam has to deal with a variety of private actors in the near future. In order to tackle future problems for sustainable mobility, an institutional approach is needed. Where Merwede is strongly focused on a shared owned mobility enterprise, Sluisbuurt will motivate future developers to add sharing mobility to their own plots. “The municipality has a strong coordinating role by tendering plots and challenge developers to set up shared mobility. But when a problem arises, the municipality will use public parking garages as a backup for placing sharing vehicles” (Respondent H). Apart from flexibility, Amsterdam has to take high risks and make high investments.

5.1.4 Obstacle of different interests

A variety of actors, bring different interests (Respondent G). As mentioned, to come to an agreement in Merwede and Sluisbuurt, the municipality mostly took the role of initiator and coordinator. According to respondent C, the double role of the municipality in the process of Merwede, also made that the municipality had something at stake as well. Both public and private actors benefited from an agreement, due to the uncertainty of the market. A financial setback in a crisis was undesired. On the other hand, the high ambitions set by the municipality had to be realised (Respondent D). Respondent C stated about this:

“We should ask ourselves to what extent we can develop and finance the sky-high ambitions. Therefore, we really have to work this out together, which is an essential choice for the municipality and private actors. From my perspective, the project is progressing as desired, and I think the public and private interests and ambitions will be achieved in general. Because when working together in the collective of owners, concessions are often needed and unavoidable. Without the agreements and collaborations, no progression is expected.”

Respondent C (Private developer at Merwede)

For private developers, in Merwede and Sluisbuurt, making profit is their main goal. However, municipalities serve the public interest. Both actors private and public understood that sustainable mobility measures have to be taken in order to make the neighbourhoods liveable and attractive for residents and visitors. In Sluisbuurt, tendering and thus a strong coordinating role of the municipality is a foreseen way of bringing interests together. In Merwede this had to be done differently. Namely, in a long negotiation in which the interests differed so much that the negotiation got often stuck. Respondent D compared the situation to a war in trenches. Respondent D was involved in the negotiation between the municipality of Utrecht and the other owners in the collective of owners. The negotiation process accelerated by constantly giving and taking. The municipality was the initiator of this breakthrough and was considered to be an important step (Respondent E). Respondent D added to this that Merwede also had an advantage over Sluisbuurt, because the more owners and stakeholders, the more resources and expertise there is. The situation is described by respondent D as: “Organisationally we are strong in Merwede, as municipality, however, we are less framework setting than in Amsterdam Sluisbuurt” (Respondent D). This means that the more owners are involved, the more negotiation is needed for implementing public plans and ambitions.

In Sluisbuurt, actor negotiations could become an issue in a later stage of the process. The municipality, however, will guide the negotiation with developers in a more inspirational and motivational way. This entails that helping developers to explore the possibilities for sustainable mobility that lays within their power. According to Respondent H & I mostly parking is discussed with these owners since it is a very important aspect of sustainable mobility. The problem however remains for a large part, that private developers are not forced to build parking spaces. In the municipal strategy and urban designs is established that parking should mainly be situated within buildings (Municipality of Amsterdam, 2019). According to private developer Respondent D, E & H, however, is building a parking within a building far more expensive and puts pressure on the profits. It may happen that a private developer in Sluisbuurt will not construct the proposed amount of parking space. This will put the municipality of Amsterdam in a difficult position.

5.1.5 Institutional obstacle: parking

The obstacle that is mentioned in both cases and by all respondents is parking. As mentioned, parking is closely connected to sustainable mobility, since there is a relation between the amount of parking spaces and car ownership in the neighbourhood. Both municipalities, Amsterdam and Utrecht gave minimum and maximum parking requirements to the projects at the start of the process. According to Respondents D, E, G, H, and I, this was an important and comprehensive obstacle for mobility managers to deal with. As the municipality council set the terms for the area, project managers should implement these in the plans as part of the municipal ambition. According to Respondent H, this was a major issue since the parking spaces had to be distributed over the plots of future developers. Despite the relatively low parking standard between 0 and 0,3, the mobility managers must ensure that the maximum number of parking spaces will be realised. Respondent H, municipal manager on parking at the municipality of Amsterdam, stated that it was deviant from traditional developments and a new strategy was needed to tackle this issue. He explained the situation as follows: “[A maximum amount of parking spaces] is a fairly inflexible matter. Because if you allocate a parking space to a private developer’s plots, for example, who will demand from developers that it is realised eventually?” (Respondent H).

In Sluisbuurt, future developers do not need to build parking spaces at all (Municipality of Amsterdam, 2019). Forcing them to build parking spaces, was not an option according to respondents H and I. To tackle the problem, the mobility managers in Sluisbuurt decided to build two public parking garages. That will compensate the non-build parking spaces and at the same time function as a hub for sharing mobility (Municipality of Amsterdam, 2018 & Respondent H). “Keeping 600 parking spaces in our possession and distribute the other parking spaces over private developers puts us, as municipality in a more flexible position.” (Respondent H). This means that the municipality will not lose control over parking spaces in the area, which is important to provide parking spaces and sharing mobility spaces for future dwellers and visitors of Sluisbuurt (Respondent H). Municipalities are more flexible in ensuring the realisation of public ambitions when they are not depending on private actors, because, otherwise, the parking and mobility facilities for future social housing in the area would be endangered (Municipality of Amsterdam, 2018 & Respondent H).

Also in Merwede, a similar approach to the ‘parking obstacle’ is adopted. In the case of Merwede, the municipality has decided to take care of the mobility for the most part. Due to the high risks of private interests and the withdrawal of actors from the owners’ mobility company, this measure is adopted (Respondent E & G). In Merwede, parking is situated within buildings on several plots accessible from the edges of the project area. The municipality will buy the parking garages against non-profit prices from private developers, in order to keep control over these parking spaces and be able to provide sharing mobility in them (Respondent D & E).

Ensuring and securing the realisation of needed facilities for sustainable mobility and keeping them public seems to be key in tackling obstacles. These obstacles are on the one hand the issue of dealing with many private interests and on the other hand the by the council given maximum number of parking spaces that are to be built in a dense neighbourhood. Also, a consulting report for Sluisbuurt advised municipalities to keep parking garages and spaces in public hands. Public owned parking spaces put the local government in a flexible role for providing mobility services and anticipate on future developments and innovations. Additionally, it protects the essential mobility services from possible market failures

(Duijnhoven, 2019). According to respondent G, these public interventions will help the projects in its realisation, as the private developers have more insight into a clear end date to their involvement and the neighbourhood as a whole a better chance of success with secured mobility facilities. Private developer, respondent E, also highlighted the aspect of risks that exists for private developers in long-time involvement. 'It is undesirable to stay involved due to financial risks and it is therefore very promising that the municipality will be the buyer of the parking real estate' (Respondent E). According to respondent I, this public intervention is essential, and it offers a 'safe' space for mobility providers to experiment with mobility modes. This approach is also estimated to make investing in the neighbourhood more lucrative for private developers and mobility providers (Respondent G). In paragraph 5.3, the financial aspects to these obstacles and interventions are among other things discussed.

5.2 Financial obstacles

Conflicting roles and unclear responsibilities, high ambitions and different interests are among other things also causing funding problems for mobility in both Merwede and Sluisbuurt. But also, other issues are causing difficult challenges to funding mobility in Sluisbuurt.

5.2.1 Lack of business case

In both cases, some parts of the project do have difficulties in financing mobility. These issues are mostly on parking. As aforementioned, the risks are very high, as the projects in Merwede and Sluisbuurt are never done before. Respondent D for example, concluded that for private developers and investors, operating and investing the mobility company, was not going to work: "Those [private] parties will not participate with these costs and risks." (Respondent D). According to respondent D, this is due to the high costs of parking spaces in Merwede. A parking space in Merwede has an average price tag of 50.000 euros. This is caused by the high construction costs to build them underground and indoor and the scarcity of parking space in the area, which has a price-increasing effect. A private service provider of parking and sharing mobility does not get the costs covered and enters a loss-making business. According to respondent D, providing sharing cars will even increase the costs further, because, although the market is growing, sharing cars are still far from lucrative. Thus, the absence of a proper business case for private investors was missing and became a challenge in both Merwede and Sluisbuurt.

In order to tackle the problem, both municipalities had to intervene. In Merwede this led to a plan for a mobility system funded by all owners in the area, including parking, shared mobility, and other services. As mentioned, private developers agreed to this with some reluctance, due to the financial and institutional consequences. Since parking was a major issue and get to an agreement about it was very complex, the municipality decided to buy all parking spaces from private developer for a fee that covered the construction costs (Respondent E).

"The arrangement is set now that the municipality is buying parking spaces from developers. They do however not pay the real cost price for developers, but rather a compensation. This price was generally calculated by considering the construction costs and the predicted maximum rent prices against parking space can be rent out for."

Respondent D (Municipal official at Merwede)

According to respondents D, E, and G the municipality of Utrecht took a high risk by buying the parking facilities in Merwede. However, they argued that on the contrary, the price the municipality paid to the private developers for the parking spaces is still below the construction costs. Furthermore, by owning the parking spaces, the municipality will secure a better position. The agreement between the municipality and private developers was a product of an extensive negotiation. The private developers wanted an anti-speculation clause and the municipality wanted private developers to be involved and partly risk-bearing in the operation of the parking spaces for the first ten years (Respondent D & E). From these public parking garages, both parking spaces are rented out to citizens and sharing mobility is provided. The price for a parking space in Merwede is estimated to be around 200 euros per month. "A mobility provider cannot be asked a lease price of 200 euros a month since it will not be lucrative than." (Respondent D). This means that the collective of owners must contribute to mobility or parking providers, this is however questioned by Respondent F:

"The aim is to encourage shared mobility in those parking spaces. But then the municipality will have to contribute to service providers. The question is however, is it desirable for municipalities to get involved in the market? Will the municipality decrease the lease prices for mobility providers?"

Respondent F (Mobility expert at Sluisbuurt)

In Sluisbuurt, as mentioned, the same issue had occurred but slightly different (Respondent G). The municipality of Amsterdam namely has to fund this provider on its own and in Merwede it is done within the collective mobility enterprise. Public garages however considered as suitable places for municipalities to allow providers to experiment with shared mobility. Additionally, according to respondent I, the funding of parking garages is not seen as a big issue since Amsterdam has a long history of operating municipal parking garages against high profits. The construction of the parking garages can be funded out of this lucrative activity. He added that the garages could also be operated by market parties as well if necessary.

5.2.2 Lack of resources: financial capacity

Although in both cases, respondents experienced uncertainties and difficulties in funding mobility, the overall financial capacity was not a major issue. However, Merwede and Sluisbuurt do differ in approach due to the difference in institutional situation of both cases. Firstly, according to Respondents B and C the generally high ambitions set by the (local) government require more financial resources, which have to a large extent come from the private actors. In Merwede, the owners came to an agreement about the division of costs in an early stage of in the development. According to respondent D, the strengths, knowledge, and resources are joined by all owners. Together, respondents D and E argued, there are more possibilities. This made the collaboration more successful. Different sub-groups were established for specific expertise support. Together the owners of Merwede hired an independent project manager for project support and several consultancies for advice.

In Merwede's owner's collective, there has been made an agreement about the funding of a large part of the overall costs of the future mobility enterprise. Namely, every owner pays a share that equals the share of land the owner owns in Merwede sub area 5 (Respondent E). "For example, real estate developer Lingotto owns almost a 5,5 percentage of the total lands. This means that Lingotto will contribute for roughly 5,5% of the costs" (Respondent C). These costs include the future mobility enterprise of Merwede. According to respondents C and E,

the municipality of Utrecht will contribute the most since it is owner of around 30% of the lands and it is responsible for a large part of the necessary infrastructures, public space, and parking garages. Despite mentioning details, the private respondents mentioned that the contribution of private companies is very high.

In Sluisbuurt, however, the municipality has to account for more costs, which have to be funded by the profits from selling land and operating public parking spaces (Respondents A & I). The municipality is highly experienced in operating public parking garages, according to respondent I. Shortages are however expected. The costs that are not covered by the profits from land sales, must be taken from other city budgets (Respondent H & I). According to respondent F, the costs are in this stage of the process of Sluisbuurt still highly uncertain. It is expected that the municipality also has to contribute to the providers of modes. Respondent F stated about this: “If shared mobility is provided, the costs will increase, especially in the early stage of the provision of modes. When the market grows, profits will gradually be made eventually” (Respondent F) This, however, also implies that the profit of public parking spaces from which mobility is provided, will be lower in the beginning. Respondent I mentioned this not to be a major problem as city-wide budgets for projects and programs like park & ride and shared mobility can potentially cover the costs. At the same time, respondent I, mentioned, the municipality of Amsterdam offers mobility providers who struggle with their business cases a safe environment for practicing their services. Respondents A and F highlighted a consideration still has to be made for Sluisbuurt when it comes to covering the costs. Respondent I and H are generally more optimistic about this insecurity due to the well-functioning parking management of Amsterdam and the expected profits from land sales. Additionally, respondent I mentioned the possibility to make the real estate that need to be established for the mobility hubs, to be multifunctional and mixed use. This could possibly increase the chance of a healthy business case for mobility providing enterprises. This idea corresponds with the topic of flexibility, which will be discussed in the following section.

5.2.3 Lack of flexibility

There are unclear or partially unclear strategies for funding sustainable mobility facilities in both cases according to many respondents of both cases (A, D, E, G and H). As mentioned, an essential debate in both cases is parking and its costs (Respondents E & H). As respondent D argued, parking is in both cases a major issue and a constantly recurring topic in arrangement negotiations between actors in Merwede. Despite the strong position of the municipality of Amsterdam, also in Sluisbuurt, respondent H estimated parking to become an inconvenient topic. Respondent E, private developer in the case of Merwede stated about his issue:

“The costs and the roles of the actors in financing are actually all laid down in the owners’ collective. But before we could cover these costs, we had to solve an important issue, which was parking and its funding.”

Respondent E (Private developer at Merwede)

The institutional arrangements in Sluisbuurt and Merwede in regard to parking is already discussed in paragraph 5.1. The municipalities will be the owner of the major parking garages. As several respondents pointed out to parking as a major obstruction, publicly owned parking garages are expected to help the process progressing. The garages will function as hubs and are fundamental for sustainable mobility in the neighbourhoods. However, according to respondent H and E, constructing a parking garage is a very high investment for both public

and private actors. And, although parking standards are low, the proposed alternatives for private cars, parking garages and parking space are still needed in both neighbourhoods. The problem is however that risks are very high due to the lack of flexibility in the new and uncertain approaches to sustainable urban mobility. There is in that sense, little evidence of success, especially on this scale (Respondent G). Respondent G also added that a project as Merwede and Sluisbuurt may not go wrong since, apart from the financial disastrous effects, there are people going to live in the neighbourhoods. As respondent D described it as: “when the construction of parking real estate is cast in concrete, there is no way back.” This means that when something is realised, it hard to change and therefore inflexible.

As the municipalities accounted for public garages, due to the lack of business case for private companies. The municipality of Amsterdam is used to operate parking garages and, according to respondent A, a profit will be made in the long term on public garages. In Sluisbuurt, the municipality covers all the costs for the necessary infrastructure since it is the only owner. According to respondent G, a contribution from future developers is not the case. They contribute indirectly by buying the plots from the municipality. The public investments are refunded in the shape of profits from plots and societal improvements according to respondents A and H. However, sharing mobility is new and it is still uncertain how the municipality is going to operate these.

A considered tool that can help both municipalities to spread the financial risks for future mobility services, is by building in flexibility. The municipality of Amsterdam chose to first create a temporary parking facility from which mobility services such as sharing mobility is provided (Respondents A, D, H and I). This also has an additional advantage since early inhabitants of the area, can get familiar with shared mobility from the earliest stage, which is expected to have a positive effect on the frequency of use (Respondent I). “When you start early, shared mobility will become part of the neighbourhood and will consequently benefit the business case as well” (Respondent I). Following on this statement, respondent D summarised the approach of Sluisbuurt and also wanted this approach to be used in Merwede:

“If one does not know how many parking spaces are needed, [...] one just has to start with a temporary parking space. And if one gradually starts to get a better feeling about the mobility system during the plan, one can expand it further. If a physical and definitive component is to be realised, one has to reference to the latest developments in the temporary pilot, as it reflects the demand for mobility for the neighbourhood. One then can build exactly the right capacity. In this situation, no unexpected setbacks will appear. Building the definitive component can be done when 2/3 of the neighbourhood is realised.”

Respondent D (Municipal official at Merwede)

According to respondent D, in Merwede a less flexible approach is chosen, since parking and real estate are intertwined in real estate. Parking and real estate had to be separated in order to be more flexible, more adaptive to changing trends and separating them is much cheaper due to the absence of high construction costs (Respondent D & F). According to respondent C and the policy strategies (Municipality of Utrecht, 2018) as well as the respondents highlighted that flexibility is also implemented in Merwede by developing the area in two phases and allow shared mobility to scale up within parking garages. The first is done through selecting specific projects to start first and learn from them. The latter is done through work with

temporarily private parking lease contracts with future inhabitants in Merwede. At every extension, the amount of shared mobility can be adapted to the neighbourhood's demand.

Respondent D stated that the problem with the flexibility approach of Merwede is that it is still realised intertwined with real estate and casted in concrete without being tested on a small scale. In Sluisbuurt, the approach is considered to be far more flexible as it is also desired by respondent D for Merwede as well. The idea is, according to respondent I, that one learns by doing. He meant that before constructing fixed parking garages, the concept of sharing mobility and hubs are tested in a small scale on a temporary site (Respondent H & I). This is considered to allow service providers, users, and plot owners to get used to the facilities, find errors and trends, and learn from them without far reaching consequences.

In the next chapter, the found data, including the most important and remarkable findings, are discussed. Finally, in chapter 7, conclusions are drawn from the discussion, followed by research reflections and remarks.

6 Discussion

This chapter focuses on discussing the sub-questions of this research. By answering the sub-questions and by linking the outcomes of the research to existing theory a good foundation has been laid for finally answering the research main question in the next chapter. This chapter is structured, following the order of sub-questions.

6.1 Sustainable urban mobility

This first section elaborates on sustainable mobility and its integration and therefore answers the first sub-question: *What is sustainable urban mobility and how can it be integrated in high-density urban neighbourhoods?*

As cities grow, the demand for mobility services increases which causes undesired problems affecting the liveability of a city (Nieuwenhuijsen, 2020). This is also found in the analysed case studies. Respondents in Merwede and Sluisbuurt did experienced problems with accessibility due to congestion. This is also widely described in the municipal policy documents and therefore the reason for cities to start thinking differently about urban mobility. Alternatives to the current mobility systems had to be found, especially for private cars. This alternative is according to the respondents in both case studies a wide set of interventions in order to demotivate or ban car traffic in new high-density urban districts.

In the mobility approach of the case studies, there turned out to be a strong relation between sustainable urban mobility and the built environment as dense and mixed-use urban spaces enable active mobility modes. The relationship between mobility and the built environment is debated by Banister (2008), Macintosh (2014), and others. Furthermore, following the respondents and municipal policies of the two cases and Li en Voege, (2017), new modes such as shared vehicles, high-quality public transport, and a suitable supporting system; the concept of Mobility as a Service, are a requirement. Sustainable modes, integrated mobility systems, and the built environment determine the success of the future project regarding sustainable urban mobility. The effects on the decrease of private cars by the rise of sharing mobility as a proper alternative to private car is recently mentioned by Standing et al. (2019).

Many respondents highlighted that thinking about sustainable mobility just started recently and finds itself in a relatively early stage. The financial and cultural climate were not right for sustainable mobility to occur in the recent past. In 2008, May and Ison (2008), already mentioned this. Despite awareness of the problems that are caused by the current mobility system in large cities and despite a great interest in solutions, large-scale mobility alternatives and plans are difficult to realise. Much of this is based on social, cultural, political, and financial factors of both public and private bodies, also described by Muhktar-Landgren et al. (2016) on institutional theory.

It can be concluded that Merwede and Sluisbuurt are progressively looking for alternatives to mobility in order to be able to add more houses to the city. Despite some differences in mobility approaches there are many similarities between the analysed cases. Respondents of both cases emphasised that interventions such as prioritising active modes, building dense and mixed and creating a variety of alternatives to car travel, such as shared mobility within a highly accessible and integrated mobility system, were necessary to be able to build houses in Merwede and Sluisbuurt at all.

6.2 Obstacles

This second section focuses on answering the second and third sub-questions. The previous section has discussed sustainable urban mobility and the process of its implementation in high-density urban neighbourhoods. This turned out to be a very complex process. It is therefore important to study the factors making these processes so difficult. The sub-questions are: *What institutional and financial obstacles do occur in the process of sustainable mobility integration in high-density urban neighbourhoods and how do they influence the planning process?* And the third, mainly focused on the analysed cases: *What institutional and financial obstacles do municipalities come across in the implementation of sustainable urban mobility services in the high-density urban neighbourhoods Merwedekanaalzone and Sluisbuurt?*

It can be concluded that financial and institutional obstacles are experienced by all respondents during the processes. This section elaborates on the found obstacles in the analysed cases and makes a connection with the obstacles found in the literature.

6.2.1 Institutional obstacles

This section discusses the institutional obstacles that municipalities come across during the process of planning for sustainable urban mobility.

Participation and cooperation

In the analysed case studies, institutional obstacles were found. Firstly, the lack of actor participation in the process. This obstacle was defined by Karlsson et al. (2017) and May et al. (2017). But it turned out, however, to be a minor problem in the cases of Merwede and Sluisbuurt. In the early stage of Merwede difficulties were experienced in the involvement of actors in the process. This was caused by the complex institutional situation of the Merwede case. Many landowners mean many interests causing mutual interdependency and a long and expensive process of negotiation and coalition forming. Despite the complexity and duration of this part of the process, both municipal officials and private developers indicated that negotiation was urgently needed. This finding corresponds with statements about actor interdependency awareness of Scharpf (2018) and Crozet et al. (2019). The finding that the obstacle of actor participation was not a major problem corresponds with the idea, found in institutional theory. This entails that the longer actors work together, the more they share goals and tools. Generally, sharing the same goal ensures a sustainable and well-structured actor organisation (Muhktar-Landgren et al., 2016). Sustainable urban mobility implementation processes were described by respondents as long-term processes that require experience, shared commitment, and shared capacities. However, according to Lund et al. (2017) the institutional context is an important factor this is apparent from the differences between Merwede and Sluisbuurt. Because in Sluisbuurt, the institutional situation was estimated by several respondents as less complex due to the absence of a strong interdependency between different actors and landowners since the municipality owned all lands. Respondents emphasized however that the stage of actor involvement was not started yet. Following Muhktar-Landgren et al. (2016) and others about institutional theory, this can turn out to be a potential problem as shared goals and a sustainable and long-term collaboration are beneficial in processes like sustainable urban mobility implementation.

It can be concluded that, although respondents in the case of Merwede experienced complexity in actor participation in an early stage of the project, negotiation was beneficial in

a later phase of the process, as it enabled a strong sustainable coalition of landowners. This collaboration resulted in necessary arrangements. In Sluisbuurt, however, actor participation was in a too early stage since it included only exploratory talks with buyers of plots.

Coordination

Secondly, the obstacle of the lack of coordination and the absence of a clear hierarchical structure in Merwede and Sluisbuurt was not implicitly experienced by the respondents. This obstacle is widely discussed by Bräuninger et al. (2012). It includes that both public and private actors tend to be uncertain about what their roles should be within the process. All respondents mentioned that the actors in Merwede and Sluisbuurt agreed on the importance of the municipality or government taking a coordinating and leading role in the process of sustainable mobility implementation. They mentioned the relatively strong position of the municipalities as landowners in both cases as a reason for this. Moreover, municipalities do have strong legal powers and an overall responsibility in serving the public interest. In that sense, respondents argued, the municipality should intervene where the market is not acting in the desired direction or when the market fails to comply with the agreements.

It can be concluded that there are no clear hierarchical obstacles in the project of Merwede and Sluisbuurt. This means that in both projects the municipality, strongly represented as landowner as well as policy maker, was a decisive coordinator in the cases by way of leading the discussions, gathering the actors, and by making final decisions. Therefore, the municipality, as a matter of course, took the main role in the process.

Conflicting interests

Thirdly, apart from the role as coordinator of the process, responsibilities are however still considered to be an issue. In Merwede and Sluisbuurt negotiation is expected to be a common feature in the remaining project stages. The struggle is mostly about who is going to take what responsibility, what is also discussed by May et al. (2017). Different views on division of responsibilities and conflicting roles are according to Smith et al. (2017) a major obstacle. There is a strong divide in interests between private developers and the municipality of Utrecht. The municipality's interests are that the plans are carried out following the environmental vision, which is considered to be in favour of the public interest. On the other hand, is making profit without a risk-bearing position the major market interest. Private developers are traditionally not involved very long after realisation. As respondents stated and theory highlighted, this sustainable mobility asks however for a different approach. Therefore, the municipality insisted on a longer partnership in which private developers are risk-bearing for the shared mobility enterprise until it operates properly. This was, according to respondents a revolutionary approach.

In Amsterdam Sluisbuurt, plots future developers are given responsibilities for their own plots. This is not seen as a major obstacle in Sluisbuurt, as long as enforcement takes place if the conditions are being abide. In that sense, however, despite mutual actor collaboration, the municipality of Amsterdam is still depending on single developers for sustainable mobility implementation. In Merwede the situation turned out to be more complex. Because private developers must collaborate since they are, as current owners, jointly responsible. However, respondents mentioned, there is limited mutual trust among the actors in Merwede. This corresponds with the work of Westergren and Holström (2012) and Munksgaard et al. (2012). They stated that there are tensions in public-private partnerships. The most important

incompatibilities among actors that cause tensions are different interests, risk behaviour, and time horizons. Private actors do not want to invest plots of other actors, they want to build as fast as possible and do not want to stick after realisation. Selling the project is the main objective of the private developer. However, as previously mentioned and discussed by many scholars, sustainable urban mobility in a future urban neighbourhood requires a long-term actor participation. This long-term involvement is generally undesired by private developers as it means that a lot of risks have to be taken. This corresponds with the studies of May & Ison, (2008) and Bräuninger et al. (2012) on private actor involvement. Many factors and high costs could threaten the business case of private developers. This obstacle of conflicting interests influenced the planning processes of both cases by the extended negotiation process, the selection benevolent developers, and it caused the need of a strong intervening and burden-bearing local government.

Additionally, as mentioned by a respondent, the municipality is also causing a problem with conflicting interests since the municipalities of Amsterdam and Utrecht are both project developer as legislator. Although the double role is according to respondents not a problem at the moment, it could always become one in the future. This has to do with mutual trust among the actors.

It can be concluded that the conflicting interests and unclear responsibilities asked for a strong local government that coordinates negotiations between public and private actors. In both cases the municipalities had to lead the process and intervene or take additional risks into account in order to help the process progressing over time. Friction was found between actors in the case of Merwede and the municipality of Amsterdam is expected to take an enforcement role towards private developers in order to steer the plan in the desired direction. However, in Merwede and to a lesser extent in Sluisbuurt, newly and context specific actor arrangements and collaborations were formed under the guidance of the local governments.

Regulation

Finally, the institutional obstacles also included the regulation obstacles. Legislation obstacles were experienced in the case of Merwede and Sluisbuurt. This obstacle was related to parking. Four respondents mentioned this obstacle when they were asked about if they experienced other institutional obstacles in sustainable mobility implementation. As parking and sustainable mobility are strongly connected. This obstacle is also mentioned by respondents to have had a major impact the projects, exceeding the sustainable mobility components of the plans. Both Merwede and Sluisbuurt were imposed by the own local councils to realise a fixed number of indoor parking spaces. This not only went against the ideas of an at least partly car-free neighbourhood, as discussed by Nieuwenhuijsen et al. (2020), it also meant that expensive parking spaces had to be built and imposed on developers. This caused a lot of consequences for municipalities because it had to be ensured that these parking spaces were built. In order to tackle the problem Sluisbuurt and Merwede chose a similar approach by taking care of the majority of parking spaces to be realised. Also, in this perspective, the municipalities intervened to help the process progress. Because private developers were not interested in taking the risks of building loss-making indoor parking spaces. Besides, the parking spaces were necessary for the project as shared mobility is provided from them. This corresponds with Smith et al. (2019) and Karlsson et al. (2020) since they mentioned parking

legislation to be a stumbling block to MaaS. All respondents emphasized the importance of the decision of the local governments to intervene in this situation.

It can be concluded that parking was found to be a major obstacle in both cases as a fixed number of parking spots had to be realised. Since no private developer would have taken the risk to build these indoor parking garages, the municipality had to intervene. A strong municipal role turned out important in tackling this regulation obstacle. In general, a flexible and progressive local government is required for sustainable urban mobility implementation.

6.2.2 Financial obstacles

This section discusses the financial obstacles that municipalities come across during the process of planning for sustainable urban mobility. This set of obstacles turned out to be highly relatable to the previously discussed institutional obstacles. The main cause of institutional friction was taking responsibilities as actors. Taking responsibilities means relatively often paying the costs. It turned out, however, that various actors are not eager to pay a necessary share of the costs or guaranteeing contribution if errors occur in the future.

Lack of Business case

Respondents of Merwede and Sluisbuurt mentioned that, since concepts such as MaaS are relatively new, it comes with many uncertainties. For private developers, the extent of conclusiveness of a business case is a major concern. This finding corresponds with the findings of Karlsson et al. (2017). However, respondents also mentioned that the market for integrated mobility systems is growing fast. Despite this, the absence of a proper business case for developers and mobility providers was found in both cases. The ideas of Crozet et al. (2019) on the emergence of new collaboration forms corresponds with the case of Merwede.

In Merwede all owners decided to share the costs for the provision of sustainable mobility to future residents. A new and unique collaboration emerged, the so-called 'shared mobility enterprise'. Every landowner has to fund a share of this enterprise, depending on the percentage of owned land in Merwede. Owning 5% means funding 5% of the enterprise costs. Additionally, the municipality of Utrecht is making plans for creating a suitable environment for mobility providers to develop within public garages. Subsidies and discounts to providers are examples of the steering tools of the municipality. This additional option is also suggested by Mozos-Blanco et al. (2018) he was however not sure whether this option was possible.

The concern about the lack of private business cases is also observed in Sluisbuurt. The municipality of Amsterdam chooses for a similar approach and also creates a suitable environment, with suitable conditions for mobility providers, only without private partnerships. This showed that the municipality intervenes in both cases when a business case is absent. This corresponds with Bräuninger et al. (2012), stating that the absence of a proper business case calls for public interventions. The municipality being the only owner, caused that the instalment costs are entirely for the municipality of Amsterdam. Instead of contributing to mobility provision, future private developers are encouraged to develop their own alternatives to private cars on plot level but are not obligated to do so. In that sense, the only steering tool of the municipality of Amsterdam are providing information and lowering the parking standards. Smith et al. (2019) mentioned the difference in municipal approaches are partially caused by a lack of knowledge about sustainable mobility implementation. As respondents mentioned, it is also the specific context of a case that is strongly influencing the

governance approach of the municipality, implying that the approaches always need customisation.

To conclude, in both cases the absence of a conclusive business case for providers of shared mobility, which is a necessary aspect of sustainable mobility, caused major concerns. The absence of a business case can therefore be considered as an obstacle as it causes risks and public costs. As found in theory, the municipality intervenes in both cases by protecting the niche of sharing mobility. The difference in approach of the two cases however turned out to be caused by institutional factors. Finally, it can also be concluded that municipalities can intervene in the market of mode sharing systems in order to keep it operational.

Lack of Financial capacity

Respondents in Merwede did experience obstacles caused by insufficient financial capacities of the involved actors as an obstacle. As found in theory, a lack of economic sources and other sources can obstruct sustainable mobility implementation. It turned out that individual owners in Merwede were not capable of implementing sustainable mobility and its fundamental facilities. There was also a lack of experience. However, together, the owners were more financially strong and more efficient. This corresponds with the ideas of Karlsson et al. (2020). They stated that public-private leadership could be a solution to funding problems. However, in order to get to a suitable mobility arrangement with all involved owners, a strong process of negotiation was needed. According to respondents a lot of time, effort, and many resources are invested in this negotiation process, however benevolence and mutual interdependency awareness was key in achieving this. Beria et al. (2011) stated about the costs of this process as it being hard to monetise. Due to the high costs and the long duration time, this could potentially scare off private developers. However, respondents argued that this was not experienced as being a major obstacle.

Despite funding being a major barrier in almost 80% of all European sustainable mobility implementation projects, respondents from the municipality of Amsterdam did not specifically mention this problem. Apart from the lack of a proper business case for mobility providers, the municipality of Amsterdam expects to fund the mobility implementation by using profits from land sales, subsidies, specific city-wide budgets, and a municipal parking management. The situation is mentioned by respondents in the Sluisbuurt case as potentially less complex. This can be motivated by Karlsson et al. (2020) stating that the role of the government can provide financial stability as the municipality is powerful, which can help to overcome obstacles.

It can be concluded that in both cases funding and financial capacity played a major role. However, it turned out that both cases found a strategy or solution to most of the problems. Leading to the finding that for implementing sustainable mobility a single owner, or a strong actor arrangement on collaboration with clear funding responsibilities, is more likely to tackle obstructions to sustainable mobility implementation.

Lack of Flexibility

The lack of flexibility is found in both cases during the empirical research. This obstacle can be partially derived from theory as the lack of a clear strategy for funding the integrated sustainability system as well as the lack of clear funding responsibilities and strong over-regulation. The lack of flexibility in the implementation of sustainable urban mobility was, according to almost all respondents from both cases, a strong obstacle. The obstacle was

caused in the early stages of the planning process by forms of overregulation or due to inexperience and is strongly related to parking.

In the case of Merwede, the planning process went relatively good in the beginning of the process. The high municipal ambitions were adopted by the involved landowners and a shared environmental strategy plan on mobility was formed. Because of these early policies, as well as the high ambitions of the municipality on the number of parking spaces and the way these parking spaces should be carried out within the real estate of the neighbourhood, caused problems later in the process. Due to an absolute number of parking spaces, and fixed underground and indoor parking garages the costs were estimated too high for private developers to realise them. Therefore, the municipality had to agree on buying the parking spaces and operating them by itself. Despite this being a financial setback, the respondents all agreed on it being a good intervention and a breakthrough in a very complex negotiation. The municipality will enable private mobility providers in the parking spaces and as owner, the municipality can be flexible in renting out parking spaces. By offering parking spaces to residents for a certain period of time, the municipality can respond to changing shared mobility demands. This finding corresponds with Beria et al. (2011) as it is also a new public-private arrangement and good use of governmental tools.

A fixed, or absolute number of parking spaces was also found in Sluisbuurt. Respondents mentioned this as being a major problem in Sluisbuurt mobility implementation. First, sustainable mobility plans were taken into account too late in the process, what created difficulties in fitting in the required facilities as well as a complex parking strategy. Repurchasing land is expensive and puts pressure on the budget. The findings to the obstacles and the solutions are corresponding with Karlsson et al. (2020) and Smith et al. (2019). They highlighted the importance of experimentation and learning on mobility implementation. As mentioned, the municipality took the responsibility of realising parking garages, with the required number of parking spaces, however before doing constructing them, experiments on mobility provision are planned from a temporary lot. According to respondents this is expected to help estimate the final capacity needed for the neighbourhoods' future mobility demand. As theory and respondents suggested, remaining flexible during sustainable mobility implementation by adopting a learning by doing approach, can help tackling funding problems by risk reduction, lack of knowledge and experience.

It can be concluded, the obstacle referred to as the lack of flexibility is caused by poor planning, over ambitious planning, and traditional ideas on parking in high density urban neighbourhoods. It turned out in both theory and practice, that a flexible approach is expected to lead to a qualitatively better implementation process with the most desired outcomes.

6.3 Approaches to obstacles

As already discussed in the previous sections, the found obstacles are in many cases anticipated on by the landowners and developing actors. This section focuses on answering the final sub-question. This sub-question is: *How do municipalities deal with institutional and financial obstacles they come across in integrating sustainable ways of mobility in the high-density urban neighbourhoods of Merwedekanaalzone and Sluisbuurt and what approaches do they take to address them?* A schematic overview (Table 6.1) of the obstacles and the related approaches to the are showed and generally concluded.

As found in the policy analysis, interviews and theory, the government took a major role in the cases so far. This was considered necessary due to the municipalities power, possibilities and instruments and its responsibility for safeguarding the public interests, respectively the liveability of the future urban neighbourhood. It turned out to be the case in Merwede and Sluisbuurt, however there were found differences.

Many institutional obstacles in Merwede turned out to be anticipated on. The institutional situation was the cause of lots of different actors with different interests and ideas. The municipality had to act as a coordinator helped by the benevolence and awareness towards the plan and its potential obstructions among private actors. Arrangements such as the owner's collective, mobility enterprise and the obligated period of actor involvement during and after realisation turned out to be of major importance.

In Sluisbuurt institutional obstacles were limited to the providers of mobility and the future private plot developers. The municipality has strong steering possibilities to intervene if necessary. This means that through tendering and guidance by experts, no drastic obstruction is foreseen.

The financial obstacles in Merwede were a cause of strong negotiation. The municipality guided this negotiation and ensured that concessions were made, including payment arrangements. The major obstruction required governmental intervention. This was the issue of financing parking garages. The municipality agreed on taking the ownership for a suitable price. Owning public garages simultaneously added contributed to the obstacle of the lack of business case for both private property development and mode sharing provision.

In Sluisbuurt, the municipality was the only owner. The same problems however appeared as the parking spaces were not mandatory imposed on future developers. In order have control over parking garages and the realisation of a fixed number of parking spaces, the municipality took the ownership of these garages. Funding these parking spaces and sustainable urban mobility in the neighbourhood is done through profits of land sales, parking operation and claims on city-wide budgets. In order to help private developers, have a proper business case, the municipality accounts for most of the costs and provides subsidies or discounts to providers of sustainable mobility.

Table 6.1 gives an overview of the obstacles, whether they have been observed and in what form they were tackled. The degree of observation is noted in 3 ways. Firstly, an obstacle is observed, which means that an obstacle is found in a certain form within the case. Secondly an obstacle is to a certain extent observed, which means that an obstacle is observed but not estimated by respondents as resulting in major impacts. And finally, an obstacle is not observed: which means that an obstacle is not found within the case. As discussed in the previous sections, the approaches are relatively corresponding with what was found in theory. In general, Holmberg et al. (2016) highlighted the knowledge gap in how to deal with known

and unknown obstacles during the process. The general approach in the cases, can be defined as ‘learning by doing’ as mentioned by a respondent in Sluisbuurt. When an obstacle is experienced, a solution is expected to be found in the relatively short term in the process.

Table 6.1 Overview of municipal approaches to obstacles

Obstacle	Case	Observation	Approach to obstacle
Lack of actor participation	Merwede	To a certain extent observed	Responding to mutual interdependency and organising partnerships.
	Sluisbuurt	To a certain extent observed	Tendering plots followed by a selection and a follow-up planning process with one-on-one actor relationships guided by the municipality.
Lack of coordination	Merwede	Not observed	The municipality was a strong coordinator from the start of the process.
	Sluisbuurt	Observed	Municipality is a strong guiding actor. However, sustainable urban mobility plans were considered too late in the process.
Conflicting interests	Merwede	Observed	Strong negotiation process, focused on making concessions was guided by the municipality led to unique mobility arrangements with joint forces.
	Sluisbuurt	To a certain extent observed	Tendering plots and a selection of suitable developers that are later be guided in the desired direction through terms, regulation, and negotiation.
Lack of business case	Merwede	Observed	The municipality buying parking garages at good prices from developers and shaping a good financial environment for private mobility providers in these garages.
	Sluisbuurt	Observed	The municipality realising public parking garages and creating a good financial environment for private mobility providers.
Lack of financial capacity	Merwede	Observed	By joining resources and sharing risks in a collective of owners and collective mobility enterprise with strong arrangements as paying a fixed actor share linked to the share of ownership.
	Sluisbuurt	To a certain extent observed	City-wide approach connecting unprofitable peaks and investments to various city budgets. Also, land-selling profits are used to fund mobility.
Lack of flexibility	Merwede	Observed	Planning for phased total plan construction combined with municipal-owned flexible parking management for shared mobility. Adapting regulation to situation.
	Sluisbuurt	Observed	Planning for mode sharing experimentation on low-cost facilities to be able to provide in parking and mobility service demands.

It can be concluded that both cases had a strong governmental led approach. The public sector accounts for a large share of the costs. This is however considered to be the most suitable way, as the municipality remains involved and does not have making profit as the main goal. The institutional context as well as case characteristics influence the municipal approaches on dealing with obstructions in sustainable urban mobility implementation. This implies that dealing with obstacles is custom work in which building in flexibility is key.

7. Conclusion

This research has focused on obstacles in the process of sustainable urban mobility planning and the municipal approach in overcoming them in the case studies of high-density neighbourhoods Merwede in Utrecht and Sluisbuurt in Amsterdam. This research was therefore initiated by posing the following main research question: *How do municipalities try to overcome institutional and financial obstacles in the integration of sustainable mobility services into the development of high-density urban neighbourhoods?*

7.1 Answering the main question

The literature review and empirical research have shown that implementing and integrating sustainable urban mobility in future high-density urban areas is very complex due to multi-actor involvement and inexperience. Rethinking urban mobility is relatively new and asks for new approaches. The empirical research has shown that obstacles do occur, and that the municipality tries to anticipate on them. The case studies have shown that implementing sustainable urban mobility requires a local government to communicate, cooperate, and build consensus on municipal ambitions and policies with other actors. Building-consensus and decision-making turned out to be a difficult and a time-consuming task for the municipality due to high municipal ambitions and conflicting interests.

The literature review (Bräuninger et al., 2012; Karlsson et al., 2017) and empirical research in the case studies turned out that municipalities do participate in the planning, implementation, and to a certain extent to the operation of sustainable urban mobility. The municipal role is largely caused by its responsibility of serving the public interests, which is keeping the neighbourhood and its surroundings liveable and functional for its residents. The municipality can take a strong, influential, and demanding role due to its position of legal power. In addition to owning land within a future high-density urban area, the municipality has also lots of legislative power and access to resources.

The literature review discussed that for implementing an integrated sustainable mobility system, new public-private arrangements were required and therefore likely to be formed (Suzuki et al., 2013; Mozos-Blanco et al., 2018; Smith et al., 2019). Moreover, sustainable urban mobility is in theory and practice strongly linked to the concept of MaaS, which requires a strong arrangement between a wide variety of public and private actors. These public-private arrangements are however hard to organise (Muhktar-Landgren et al., 2016; Utriainen & Pöllänen, 2018; Butler et al., 2020). The empirical research however found that the requirement of strong public and private arrangements is strongly depending on the division of land ownership and the involved actors. Also, the impact of the obstacle on the implementation process was limited due to the overall benevolenced mind-set of actors. These actors are partially selected by the municipality or agreed to municipal terms.

The strong legal position of the municipalities made them able to organise a case-specific institutional structure. The empirical research has shown that this institutional organisation helped to resolve several challenges and uncertainties caused by the institutional situation and the lack of public and private experience with the implementation of sustainable mobility and its features. Taking a strong leading role helped to guide the other actors in the desired direction and tackle obstacles in collaboration and funding.

Empirical research also shown that the municipal legal powers and broad set of resources also led to the possibility to intervene, to solve, or avoid obstacles and help progress the process.

These interventions were necessary when specific and essential features were not carried out effectively or constructively by the private sector. Without public intervention, market failure could have formed a threat to the future neighbourhoods' mobility system.

The empirical research has shown that the municipal role is strongly depending on the institutional setting, the context, and physical characteristics of the project. The arrangements are led by the government, but the municipal role can vary from framework-setting to mediator and co-developer. As can be concluded, the more land the municipality owns, the less dependent the municipality is on private parties. At the same time, however, more mutual interdependency leads to stronger public-private collaboration forms that are expected to tackle financial obstacles better.

Finally, the literature review discussed the inexperience of actors and the lack of knowledge due to the recent development of integrated sustainable mobility services (Karlsson et al., 2017; Standing et al., 2019; Karlsson et al., 2020). The empirical research has also shown that the municipality tries to plan and work as flexible as possible and simultaneously the idea of 'learning by doing' is suggested. Keeping the risks as low as possible is key in this approach. Additionally, depending on the institutional and financial situation, municipalities made demands to the involved private actors, varying from a set of tasks and responsibilities to a fixed period of private involvement in mobility arrangements. And finally, municipalities intervene in the process by making decisions or take complicated issues into own account. Especially, the complex parking situation was found to be the most complex due to the high ambitions and the unattractiveness of investment. Municipal intervention, guiding and steering was therefore needed.

To conclude and give a definitive answer to the main research question: The municipality tries to overcome institutional and financial obstacles in the integration of sustainable urban mobility services into the development of future urban neighbourhoods by adapting their approaches to the institutional context of the project. The specific approaches differ per case, however in this research it turned out that the municipality generally had leading role that was focused on making policies and creating an institutional structure by motivating private developers to participate in sustainable mobility arrangements. In these arrangements the municipality was setting the terms and conditions for development and stimulate consensus among actors to guide and protect interests. In case of a major obstruction, which turned out to be forcing actors to make concessions, the realisation of a fixed number of parking spaces and the establishment of proper business cases for mobility providers, the municipality intervened and sometimes took a risk-bearing position into account. In addition, in order to anticipate on funding obstacles, municipalities are focusing on a flexible and demand-based approach to providing mobility services. Also, in the case of multi-ownership, municipalities demand private contribution and involvement for a certain period. Generally, municipalities and private actors combined their knowledge and resources to more decisive.

7.2 Recommendations and limitations

This thesis provided information and research on the process of the integration of sustainable urban mobility services in future high-density neighbourhoods in large Dutch cities. It has discussed the major obstacles in the process of mobility integration and provided an overview of the municipal approaches to counteract these obstacles. Since these neighbourhoods with very high ambitions on mobility, they are the first of their kind. However, with the current

societal trends, it is likely that many more future and existing neighbourhoods will experience a similar mobility process in the foreseeable future. In that perspective, this research provided interesting new insights into the role of the local government in the integration of sustainable mobility services. The following paragraphs provide recommendations for further research on sustainable mobility integration and how to overcome obstacles that are experienced in these processes. Thereafter, pragmatic recommendations are also discussed for the improvement of the processes for the integration of sustainable mobility services in urban neighbourhoods.

First, it is important to reflect on the research process and acknowledge that it has had its limitations. The entire research was executed within a time frame of approximately 10 months. Therefore, a limited number of cases have been studied and a select group of people have been interviewed. The cases were selected due to their size and their phase in the process. However, further research could study more diverse and smaller projects. Since the cases that were selected for this research showed major differences, other cases could be interesting as well. In these cases, other challenges in the implementation process that municipalities have to deal with could be found. Also, these studies could focus on different phases of the implementation process. The actor arrangement phase, the actual realisation and the period after sustainable mobility implementation are interesting to study. Furthermore, this research focused mainly on the perspective of the municipality. However, there are many other stakeholders both public as private. Taking into account the perspective of the future user of sustainable urban mobility services within a neighbourhood. The individual behaviour is highly determined for the success of sustainable urban mobility.

The research looked for obstacles and approaches to obstacles. However, it is hard to name a challenge since it turned out that experiencing a challenge is partly subjective. Despite, a clear operationalisation on the term obstacle, many respondents seemed not very clear what to point out to as a clear obstacle. Partly, due to the overlap of obstacles. Therefore, a more concrete and objective scope is needed. Further research could focus on a single and more specific obstruction to sustainable mobility implementation. This also provides a more in-depth look at a specific challenge.

Respondents mentioned, and the research turned out, that the process of sustainable urban mobility implementation is a process of learning by doing. This highlights the necessity for further research on other aspects of the process and its governance or to integrated sustainable urban mobility (IMS or MaaS) as a concept. As frequently noticed during this research, the call for a more region-wide or national-wide approach to mobility systems is desired for example. For further research it could be interesting to look for the advantages of an approach that is more cross-regional. It turned out that the municipality of Amsterdam benefitted from this approach.

Secondly, pragmatic recommendations on tackling obstacles in sustainable urban mobility implementation are given. Many interesting and important lessons could be drawn from this research. As mentioned, for sustainable urban mobility implementation could benefit from a cross-regional approach. Scaling up could potentially benefit the funding of mobility services and could further extend sustainable mobility services beyond the neighbourhoods or city borders. On the other hand, small-scale mobility pilots could also benefit

Also, as found in this research, municipalities do not often plan for mobility in an early stage of the process. It can be recommended to take sustainable mobility implementation into account in an early stage in the process. Also, the communication of these plans to all actors

involved could be beneficial. Because actors are able to anticipate on the plans at an earlier stage in the process. Benevolence among actors and a strong actor involvement are of major importance.

Additionally, building in flexibility in the process is also highly recommended. If a situation comes with high risks, a flexible approach could help to minimise the effects of these risks. Especially with the current inexperience and uncertainties with sustainable mobility and its facilities, challenges could be prevented. It is therefore also highly recommendable that municipalities built in room for experimentation and thus anticipate on success and failures. In that situation, the market is estimated to be able to shape a proper business case by adapting to the demands. This should also be taken into account for legislation and policymaking. A fixed number of parking spaces turned for example out to be a major obstruction in both cases. This research therefore recommends the use of public space for mobility provision as it could be scaled up and scale down relatively easily at low costs.

Finally, an overall strong and coordinating local government is desired and needed in sustainable urban mobility implementation processes to overcome and anticipate on potential obstacles. In the case a municipality does not own any land in a project, the public legal powers have to be used effectively to protect municipal ambitions for mobility and indirectly serve the public interest. A well-coordinated public and private partnership is expected to effectively tackle the major challenges in the implementation of sustainable urban mobility.

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