An Urban Governance Model for Carsharing

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Preface

My Master Thesis, “An Urban Governance Model for Carsharing” is presented here. This thesis is the final product of my graduation project and marks the end of my study period at Tilburg University, in the Master's program Public Governance. This research was conducted based on, among other things, a literature review, case studies, and several interviews, resulting in this academic thesis. From January 2022 to August 2022, I have been working on the thesis. I look back on interesting and exciting years at Tilburg University in which I learned a lot about society, and I met many interesting people.

This thesis topic stems from my interest in sustainable development. This research aimed to gain more insight into the development of the mobility system in the Netherlands and how it relates to urban governance. Building on Pierre’s (1999) urban governance models and existing literature on shared economies, an in-depth, multiple case study has been conducted.

I am thankful for the support and guidance from my academic supervisors during the thesis. Especially, I want to thank my first supervisor Michiel Stapper for his help and effort. Additionally, I want to thank my second supervisor Martijn Groenleer for your feedback and suggestions. The thesis circles with the other students provided me with the ideal environment and support to conduct my master thesis with help from others. Finally, I would like to thank all interviewees for their contribution and response to the research. Your responses, creative ideas, critical views, and questions helped me complete this study.

Last but not least, I would like to thank my friends, family, and fellow students for their support and assistance during this period.

I hope you enjoy reading this thesis.

Mieke Beerens

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Abstract

There has been considerable attention to making the current mobility system more sustainable. Also in the Netherlands, the current mobility system is changing because of present ecological, spatial, and social problems (Loorbach et al., 2021). One development in the mobility system is the emergence of sharing economies. Concepts in the sharing economy have the potential to have a positive impact on the dimensions of sustainability from an environmental, economic, and social perspective (Boar et al, 2020). One specific mode within sharing economies is carsharing, with the potential to impact the current mobility system.

Cities around the world attempt to incorporate sustainable solutions, like carsharing, into their mobility system. However, research indicates that cities adapt these sustainable solutions and policies differently (Araos et al., 2016). There is variability in how quickly transitions and adaptations are implemented in cities. Although it is known from the literature that variations exist among local governments, both in a general sense but also regarding the realization of carsharing services, the reason for these variations remains uninvestigated. In realizing carsharing services, public and private interests come together par excellence, because private companies offer the vehicles to users, but operate in public areas. The theory of Pierre (1999) provides a useful account to investigate the variations among cities in the Netherlands. By conducting multiple case studies in a holistic view, supported by different theories, a systematic analysis was conducted to investigate and explain variations among Dutch cities regarding the realization of carsharing services by using urban governance theory.

The findings show that there are major variances among cities regarding their policies concerning carsharing, the roles that private businesses fulfill in carsharing, and the roles of local governments. Interestingly there are also variations in the variables related to different urban governance models as defined in the theory of Pierre (1999). The variance in the policies concerning carsharing can be explained by considering the capacity of local governments, which is also accommodated in Pierre's (1999) theory. Second, the variance in the role of businesses can be explained by the influence of local politics on parking costs and taxes and the local context of the city. Third, the variation in the role of governments can partly be explained by the capacity of local governments. However, in addition, this study has shown that this is also due to the dynamic and transformative nature of carsharing. Finally, there is variation in the urban governance models identified in the cities, however, this variation cannot be fully explained by Pierre's (1999) theory.

To build on Pierre's (1999) theory and succeed in the urban governance models of his theory in 2022 with regard to shared mobility modalities, an expansion of the urban governance model is conducted, namely; experimental governance. This insight should contribute to the implementation and realization of carsharing models in cities. I suggest that before experimental governance is introduced, a study similar to this one should be carried out on examining the model in practice.

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1. Introduction

1.1. Background

The mobility system in the Netherlands is based on private car use (Münzel et al., 2020). In the decades after the Second World War, the car had become a symbol of freedom, associated with individuality, and the ability to get everywhere. Cities in the Netherlands have historically evolved with car-based cultures, practices, and structures (Loorbach et al., 2021). However, the environmental impact of individual car mobility is large, with an average use of public space of 8-12m2 for parking a car, and moreover, a car is parked about 95% of the time (Loorbach et al., 2021). The environmental impact is related to the high public expenditure on (urban) parking. As the population grows and cities become more densely populated, the 21st century is concerned with environmental issues, the problems caused by the use of limited natural resources, and the quality of life of residents in urban areas (Machado et al., 2018). With increasing urbanization in cities, cities are facing multiple challenges, such as environmental degradation, overpopulation, worsening air quality, and so on (Voytenko et al., 2021).

One development in mobility is the emergence of sharing economies. Research by Boar et al. (2020) revealed that the sharing economy helps to achieve the Sustainable Development Goals. The sharing economy has the potential to have a positive impact on the dimensions of sustainability from an economic, environmental, and social perspective (Boar et al, 2020). The concept of sharing economy can be seen as a new paradigm that enables access to goods and services without ownership (Machado et al, 2018). Recently, concerns about the growing cities, and economic, and environmental forces have rapidly given rise to the sharing economy (Cohen & Shaheen., 2016). Shared mobility is one of the concepts of the sharing economy, with the potential to be a solution for urban transportation systems (Machado et al., 2018). Shared mobility can be understood as;

> "The shared use of a vehicle, bicycle, or other low-speed modes that enable users to have short-term access to transportation modes on an 'as-needed' basis, often serving as a first- or last-mile connection to other modes, such as public transit" (Shaheen and Chan, 2016, p. 2).

Carsharing is one of the components of shared mobility and can potentially reduce car use and the pressure on city parking spaces (Shaheen et al., 2016). Carsharing is a service where the user has temporary access to a vehicle without having to incur the cost and responsibilities of ownership (Shaheen et al., 2016). Carsharing gives consumers an alternative to private car ownership and use, thereby reducing average vehicle use by 40 to 60 percent among drivers who rely on it (Litman, 2000). According to research, car sharers drive 15 to 20 percent fewer car kilometers than before, shard cars mostly replace a second or third car, and car sharers emit less CO2 emissions related to car ownership and use (Nijland & van Meerkerk, 2017). The concept of carsharing has been in flux recently; more citizens, policymakers, and corporations see the potential of shared car use (Münzel et al., 2020). However, the carsharing concept is in its relatively early stages in cities in the Netherlands. According to the national traveler survey by the Ministry of Infrastructure and Water Management (2021), only 4% of Dutch people over

18 have used carsharing in 2021. Despite the potential, growth, and positive environmental impact of carsharing, sharing cars is a niche market compared to private car use. Local governments are searching for ways to stimulate the use and supply of carsharing models (Münzel et al., 2020).

1.2. Research problem, question, and aim

Despite the opportunities and potential benefits of carsharing, governments remain confronted with challenges in realizing shared mobility services, especially carsharing services. Cities have encountered difficulties in implementing policies to keep pace with innovations of shared mobility while addressing issues of insurance, public safety, and equal practices (Shaheen et al., 2016). This is partly due to the fact that there are multiple interests from different actors involved. In the realization of sharing economies, and especially carsharing, public and private interests come together par excellence. Carsharing is in between public and private transport, using private companies that offer the vehicles to users, but operate in public areas. Research by Docherty et al. (2018) has reported that current mobility changes are challenging the capacity of governance systems and structures. In fact, changing networks of actors, resources and power, new consumption logic, and shifts in the way mobility is regulated, priced, and taxed - will have to be successfully negotiated if the transition in mobility is to be effective for the public. Moreover, the role of governments in regulating shared mobility has proven difficult, as it involves many different actors and can undermine existing practices (Alyelken et al., 2018).

Cities around the world are confronted with major risks from climate change and therefore cities have decided on local climate goals making the local level a fundamental area for climate governance (Khan, 2013). The persistent ecological, spatial, and social problems related to the current mobility system, which is dominated by private car ownership, have created a context in which policymakers, business actors, and citizens are looking for transformative change in mobility (Loorbach et al., 2021). Research by (Araos et al., 2016) indicates that different cities are adapting to climate change faster than others. There is variability in how quickly transitions and adaptations are implemented in cities. The research shows that there are cities that make extensive adaptations, but there are also moderate adapters and adaptive cities that are in an early stage of change (Araos et al., 2016). Similarly, there is little information on variation between cities in relation to carsharing and the policies that local governments are adapting to it.

Although it is evident from the literature that variations between local governments exist, both in a general sense but also with regard to the implementation of carsharing, the reason for these differences remains unclear. Due to the nature of carsharing, with private companies operating in the public area, it is important to consider the role of (local) governments. In previous research, the analysis of variation in (local) governance has been done in different ways: either quantitatively, through empirical research (Voytenko Palgan et al., 2021; Bernardi & Diamantini, 2018) or qualitatively, through the application of conceptual models (Araos et al., 2016; Barile et al., 2021; Pierre, 1999). Given the upcoming nature of carsharing and the lack of sufficient data, a quantitative analysis seems to be best suitable. A commonly used model in city governance is urban network governance; in which public and

private actors blend and coordinate their interests (Pierre, 1999). The work of Pierre (1999) is often cited in urban studies and research. For example, Pierre (1999) is used in an exploratory study on the role of local government and the sharing economy in Seoul and Milan (Bernardi & Diamantini, 2018). Herein, the role of government is critically reflected, because it is a core element in governance, with the power to support the success of the sharing economy, but it also has the power to slow down its development. Furthermore, Pierre (1999) is used in research to identify modes of "smart" city governance (Meijer, 2015). For these reasons, it is decided to use Pierre's (1999) influential theoretical paper on urban governance to explain variances among cities in the Netherlands regarding the realization of carsharing services. The following question is formulated to address the problem mentioned above:

To what extent can Urban Governance theory explain the variation among Dutch cities regarding the realization of carsharing services?

The following sub-questions are formulated to answer the central question:

I. What is understood by shared cars?
II. Who is involved in the realization of shared cars?
III. How do cities in the Netherlands currently realize carsharing?
IV. What variations in the realization of carsharing exist among cities in the Netherlands?
V. What possible explanatory factors regarding urban governance can explain variations among Dutch cities?

1.3. Scientific and societal relevance

The scientific relevance of this thesis can be explained through the fact that it attempts to build on the previous scientific knowledge, and will try to fill the gap in understanding the urban network governance models in relation to carsharing. There is extensive research about network governance structures in infrastructure projects on the local level (Koppenjan et al., 2010). Additionally, there is literature on shared mobility services, concepts, and characteristics of the users of shared mobility (Machado et al., 2018). However, the connection between both fields of study has not been made before. This study advanced the field of public governance by providing insights into this connection.

This study has significant societal relevance, as it provides policymakers at the national and local levels with an insight into the models of urban network governance, the variables and factors within these models, and how they explain variances among cities regarding the realization of shared cars. Given the fact that urban areas will expand in the coming years, and with the need for a sustainable and green urban environment, the need for shared cars will increase. Therefore, it is useful for policymakers in this field to understand urban network governance related to carsharing, to provide for these needs. The descriptive models can help explain problems in the governance of carsharing. Currently, cities are governing the sharing economy phenomena with different policy approaches, and this research provides insight into possible explanatory factors related to urban network governance for variances in this among Dutch cities.

1.4. Structure

The remainder of this research is organized as follows. Firstly, the relevant literature on carsharing and urban governance will be reviewed and reflected upon. Subsequently, a description of the data and methodology will provide the reader with a better understanding of the details of the data used in the study and how it aims to investigate the concepts. Next, a detailed review of the obtained results will follow and be discussed in light of the literature. Finally, the study will conclude with a conclusion and discussion.

2. Theoretical framework

In this section, literature and concepts related to this research are explained. First, the sharing economy, more specific shared mobility, and carsharing will be explained. Second, the relationship between carsharing and urban governance will be addressed. Hereafter, the academic literature on urban governance will be outlined, followed by an explanation of the role of businesses and governments in carsharing. In doing so, answering sub-questions I and II.

2.1. Sharing Economy

Before diving deeper into the concept of carsharing, it is important to clarify the definition of the sharing economy. The sharing economy can be defined as "a developing phenomenon based on renting and borrowing goods and services rather than owning them" (Shaheen et al., 2016). Sharing services can improve efficiency, make better use of underutilized resources, save costs and provide social and environmental benefits. Cohen and Shaheen (2016) describe the sharing economy as a collective of consumers and entrepreneurs who use technology to share resources and money to generate capital. The phenomenon of sharing is not new, but the sharing economy has seen significant growth in recent years (Cherry & Pidgeon., 2018). The concept is based on the need to share, and utilize unused capacity; by giving each other access to existing goods and services. Sharing economies have the potential to promote sustainable consumption, and encourage the distribution, and use of underutilized products or services (Cherry & Pidgeon, 2018).

Shared mobility is one facet of the sharing economy. Shared mobility can be defined as the short-term access to shared vehicles, bicycles, or low-speed modes that the user provides for their needs and convenience, instead of requiring vehicle ownership (Shaheen and Chan., 2016). Shared mobility includes the following:

> "Carsharing, personal vehicle sharing, bicycle sharing, scooter sharing, ride-sharing, and on-demand transport services. In addition, alternative transport services such as shuttle, micro-transit, and paratransit. And also ride-sourcing, such as Uber, ride splitting, where passengers share a fare, and app-based taxis. Finally, courier network services (CNS) or flexible freight delivery" (Shaheen et al., 2016).

The first bike sharing and the carsharing program launched in North America in 1994. Several trends and innovations have impacted the growth, and development of shared mobility, such as the change in the labor market and consumer trends, and technological developments (Shaheen et al., 2016). The concept of shared mobility is rapidly developing around the world, mainly in developing countries (Machado et al., 2018). Shared mobility has improved the accessibility of transport in cities while reducing vehicle occupancy and, reducing the number of kilometers traveled. Besides the advantages of shared mobility, it has disadvantages, such that personal interests may differ, including hygiene, ability to pay, and the comfort of shared services. In addition, public acceptance of the sharing economy depends on broader social

values, such as social equity and ensuring that business practices are conducted fairly (Cherry & Pidgeon, 2018).

2.2. Carsharing

Carsharing is a key mode of shared mobility. Carsharing is a system that allows people to use cars at any time and for any duration (Frenken, 2015). Carsharing can be defined as:

> "The temporary access to a vehicle without having to incur the costs and responsibilities of ownership. People usually get access to these vehicles by joining an organization that maintains a fleet of cars and light trucks in car parks in neighborhoods, public transport stations, universities and colleges, and employment centers. The carsharing company provides insurance, parking, petrol, and service. Usually, the participants pay a fee per time they use the vehicle" (Shaheen et al., 2016).

Carsharing is mainly offered through business-to-consumer (B2C), business-to-business (B2B), and peer-to-peer (hereafter; P2P) models (Doody et al., 2021). Carsharing is an emerging local phenomenon currently growing in many places, especially in large cities. It is a global phenomenon in the sense that carsharing is taking place in many countries worldwide (Frenken, 2015). The shared car users are generally young (between 25 and 45 years old), highly educated, live in urban neighborhoods, and often have higher than average incomes (Doody et al., 2021). The potential impact of carsharing systems is significant because cars require physical space when not in use. The average surface area of a parking space is 15m2 to 30 m2 (Warringa, 2022). According to KiM (2018), the number of parking spaces in the Netherlands is estimated at 14 to 18 million. The potential impact on space is great, as parking spaces currently take up 1% of the total space in the Netherlands (Warringa, 2022). In urban areas, the share of parking spaces is 10% of the total space. The availability of shared cars leads to a reduction in car ownership when car sharers no longer need a private car, thereby reducing the number of parking spaces needed (KiM et al., 2021). The advantages of carsharing include; the reduction in the frequency of private car use and the elimination or reduction of car ownership. Namazu and Dowlatabadi (2018) reinforce the view by stating that shared cars have a higher occupancy rate, reducing the environmental impact of the cars. In short, carsharing holds potential, given its advantages compared to private car ownership.

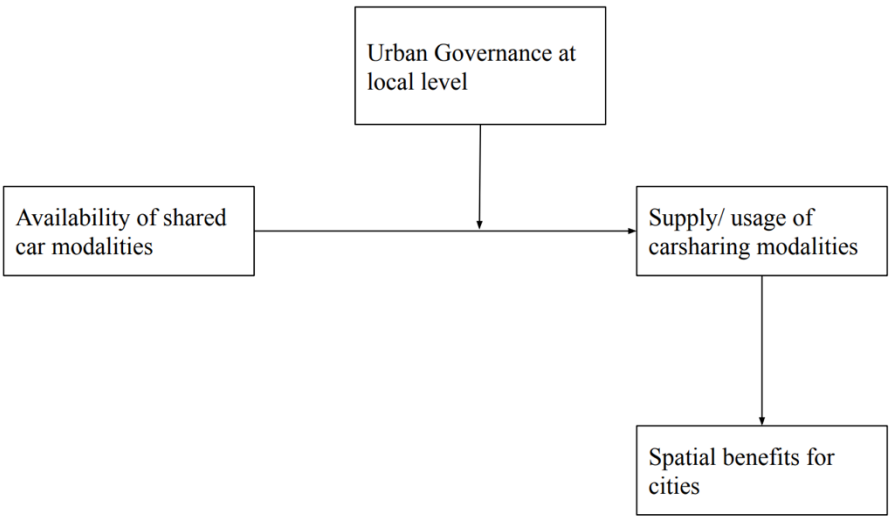
2.2.1. Urban governance and carsharing

Urban mobility is about moving people from one location to another location within or between urban areas (World Bank & Fang, 2015). Policymakers, and urban and transportation planners spend a lot of time and money on improving urban mobility, on the basis of two main assumptions: people need to move to access housing, urban services, jobs, and education and entertainment. And second, people prefer motorized mobility to non-motorized mobility, because of economic efficiency, especially as cities grow and society becomes more affluent (World Bank & Fang, 2015). As discussed above, carsharing occurs between public and private sector transport, as private companies offer the vehicles to the users but operate in public areas.

Carsharing is regulated by the local government, and therefore, it is important to investigate the role of the local government. The implementation and governance of shared mobility take place at the local level, where the concept has to be integrated into the current urban mobility network and the traffic and transport policy of the city (Ministerie van Infrastructuur en Waterstaat, n.d.). In previous empirical research, the analysis of local governments has shown that some local governments are reluctant to grant permits for shared cars; the application procedures are often complex and differ per municipality, which affects the supply of shared cars per municipality (KiM et al., 2021).

Taken together, to integrate carsharing into the current mobility network of the city, the role of local urban governance is considered important. The preliminary conceptual model below visualizes the relationship between carsharing and urban governance at the local level (see figure 1). As carsharing occurs on the interface between public and private transport, the role of local governments is considered essential. Therefore, the theory on urban governance is suited to illustrate the variations among cities in realizing carsharing services. The availability of shared car modalities influences the supply and usage of shared cars, whereas local urban governance could facilitate or, on the contrary, hinder the supply and usage of shared cars. Based on the conceptual model it is hypothesized that "a higher supply and usage of carsharing modalities, influenced by local urban governance, will lead to less private car ownership and use, and thereby to spatial benefits, especially in city centers". In the next section, the most influential theoretical paper in urban governance literature by Pierre (1999) is examined in relation to shared mobility.

Figure 1: Preliminary conceptual model: relationship carsharing and urban governance



2.3. Urban Governance

To integrate emerging shared mobility models like carsharing into the mobility network at the local level, an understanding of urban governance is needed. Governance in this sense refers to the process by which local governments, in consultation with private parties, seek to achieve common goals, which is therefore suitable to use in the context of carsharing. The overarching literature is network governance. Network governance is the connection or sharing of

organizations' resources, activities, information, and competencies to realize an outcome together. Specifically, this refers to situations where services or products are the results of a partnership of different organizations, both public and private (Kenis & Provan, 2008). Practitioners and scholars widely recognize networks as a basic form of multi-organizational governance (Provan & Kenis, 2007). One feature of networks is that actors and stakeholders are interdependent and cannot implement decisions alone (Khan, 2013). This is also the case with the realization of carsharing: as mentioned, private providers operate in the public domain to offer vehicles to users and, on the other hand, local governments want to use carsharing concepts to redesign the mobility system. Thus, both actors depend on each other's interests. Considering the contributions of the studies together, the overlapping theme between them is easy to observe: both carsharing and urban governance are a process that blends and coordinates public and private interests.

Pierre (1999) describes urban governance in four main points; First, cooperation between public and private interests will strengthen the governance capacity of local authorities but may expose them to the whole political pressure of business and society (Pierre, 1999). Second, understanding the capacity of local government is essential to understanding urban governance (Pierre, 1999). Third, Pierre (1999) argues that different institutional models of urban governance have different systems of values, norms, practices, and beliefs. These value systems influence the choices and outcomes of institutional policies. Finally, Pierre (1999) suggests that the local context in which the urban network operates can significantly influence. National politics and traditions are essential factors in various aspects of urban governance, including urban political economy, urban political conflict, and strategies of local mobilization. Based on the above-mentioned characteristics, it is hypothesized from the literature that variations exist among cities regarding urban governance. Pierre (1999) has analytically reduced the variety of urban governance objectives to four general models, which are elaborated in the next section.

2.3.1. Models of urban governance

The four descriptive models of urban governance should be seen as ideal types, rather than exact accounts of urban governance (Pierre, 1999). Furthermore, the different models may be typical of a particular model of urban political economy, a particular national context, or a particular sector of local government. The descriptive models help to give meaning to urban governance and, moreover, problems in urban governance can be explained by differences in priorities, objectives, and strategies (Pierre, 1999). The models consist of; managerial, corporatist, progrowth, and welfare governance (see table 1). The models are described according to four variables; the key participants, overarching objectives, main instruments employed to obtain these objectives, and the most common outcomes.

Table 1: Models of urban governance. Based on Pierre (1999)

Models: / **Variables:**	**Managerial**	**Corporatist**	**Progrowth**	**Welfare**
Participants:	Managers in organizations producing and delivering public services and customers. Consumers are essential	Two-tiered model of participation and only top organizational leadership has involved	Downtown elite and senior elected officials who share an interest in boosting the local economy	Bureaucrats, local and national government officials
Objectives:	Enhancing the efficiency of public service production and delivery, focusing on cost, demand, and professional management	The distribution of interests of organizations membership shape urban policies/services.	Economic growth, ideally long-term and sustainable.	Redistribution of long-term inflow of state funds to sustain local economy
Instruments:	Contracts, strategies of recruitment, internal market and other forms of competition	Deliberations with the involved parties (inclusive nature)	The mobilization of resources from the regional and national government, infrastructural development, and public-private partnerships	Networks with higher echelons of government
Outcomes	Increase the efficiency in service production and private-sector experience in the public sector	Reduce fiscal discipline and frequently create inequalities between members	Economic growth and the relation with local political choice	Cannot sustain in long-term

First, managerial governance aims to achieve a market-like exchange between products and consumers of urban services, where consumer choice determines what services are offered and by whom (Pierre, 1999). The managerial model focuses on cost, efficiency, demand, and professional management, which is the core of New Public Management (NPM). Managerial governance poses challenges for local governance, as services operate at arm's length from elected officials, so the role of local politicians will be limited to defining long-term goals for urban services (Pierre, 1999). The outcomes of managerial governance contribute toward more efficient production of services, bringing expertise from the private sector into the public sector (Pierre, 1999).

Secondly, corporatist governance. One of the characteristics of this model is the participatory nature consisting of two layers, where only the top of the organization is involved in the political process (Pierre, 1999). In this model, the political and democratic system involves social groups and organized interests in the urban political process. This is an

instrument of governance, involving all the vital interests and actors that belong to the degree of social acceptance. As a result, implementation is often complex and slower than in other models (Pierre, 1999).

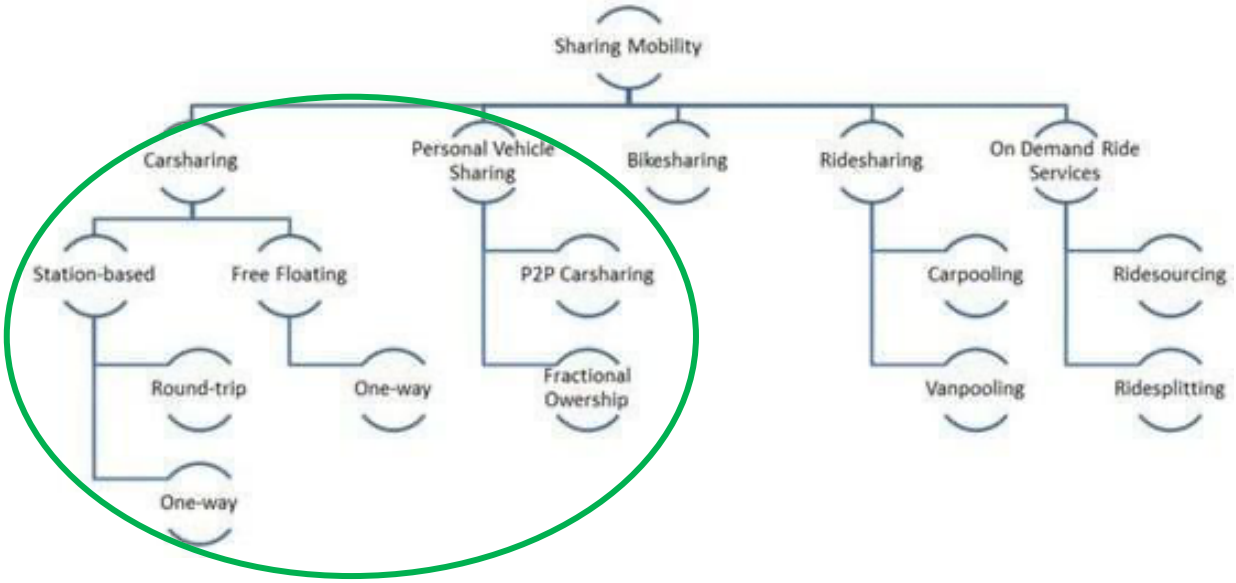
Third, progrowth governance. In this model, downtown elites and senior elected officials intend to stimulate the local economy. Progrowth governance is characterized by the interaction between the government and the private sector (Pierre, 1999). Local political choices influence the structuring of progrowth governance. In progrowth governance, mass involvement does not play a role because participation in the progrowth strategy would be immediately politicized by competing local government spending (Pierre, 1999). The fundamental problem with progrowth governance is that the political dependence of cities is on private capital for their tax base and revenues (Pierre, 1999).

Fourth, welfare governance. Cities with passive state policies and a stagnant local economy are called welfare states. Welfare governance refers to the governance of this political and urban environment (Pierre, 1999). In these cities, limited growth of the local economy happens. The main inflow of capital to the economy comes through the welfare system, making these cities vulnerable and dependent on the state. This form occurs mainly in cities with high unemployment, which often leads to these cities being politically leftist (Pierre, 1999). For this reason, the political leaders primarily rely on the state to implement programs. A hostile attitude toward private enterprise can accompany welfare governance, and local politics tend to be disconnected from the local economy. For this reason, this governance model is least suited to attracting private investments (Pierre, 1999). According to Pierre (1999), in real-life cases, several models of urban network governance can be identified, and the models can change over time as the context changes.

2.4. Role of businesses in carsharing

As stated, in realizing carsharing public and private interests come together, therefore the role of private businesses is important, as they provide vehicles to the users. By making the role of private businesses explicit, the cooperation between private and public interests in realizing carsharing can be better understood and variances can be revealed. Carsharing users enjoy the benefits of a vehicle without the responsibilities and costs of ownership. Users gain access to the shared car by joining an organization that operates a fleet of vehicles (Machado et al., 2018). Fleet managers have vehicles set up at parking spaces in neighborhoods, public transport stations, employment centers, colleges, universities, or on-street parking. The fleet operator takes care of the vehicle's maintenance, fuel, parking, and maintenance (Machado et al., 2018). Carsharing involves various concepts in which private parties have different roles to fulfill. Figure 2 shows the carsharing modalities, which are subsequently explained.

Figure 2: Figure from Machado et al. (2018): overview of shared mobility and its modalities



Carsharing can be divided broadly into two categories: station-based (round-trip and one-way) and free-floating (one-way). First, station-based round-trip carsharing, is a two-way service where users pick up a vehicle at a designated station. The user of a shared car must return the vehicles to the same place where they were picked up (Machado et al., 2018). The available vehicles are parked in pick-up stations in this shared car mode. These are pre-determined and are owned by the service provider or the local authority. Customers need to reserve their cars in advance; the provider will provide an available vehicle in the short term. However, this can be difficult when there is a low occupancy rate (Machado et al., 2018).

Secondly, in station-based one-way carsharing, the user has no obligation to return the vehicle to the same place as the pick-up point. The user can park in a designated place, which may be scattered across a region or city. The operational management is more complex because the operator has to guarantee the vehicles are available at the station. Providers, therefore, need maintenance algorithms to balance the supply of vehicles at local car parking areas (Machado et al., 2018).

Thirdly, free-floating carsharing. This type enables the users of the vehicles to pick up the car and drop it off anywhere within a designated area. There are no specific stations or parking places. The operator is responsible for the supply of shared cars in the designated area (Machado et al., 2018).

Furthermore, two forms of personal carsharing; P2P-carsharing and fractional ownership. P2P-carsharing is a mode where privately owned vehicles are made temporarily available for shared use by an individual or members of a P2P company (Machado et al., 2018). An operator service connects the parties involved in the rental procedures and is responsible for confirming or rejecting requests for access from members and setting up timetables for when the vehicle will be available. The P2P operator is responsible for insurance during rental periods for which the operator receives part of the user fee (Machado et al., 2018). The pick-up and drop-off locations are agreed upon by the owner and renter of the car; this allows for a broader

range of locations as well as vehicle types and day and hour prices compared to the other carsharing models (Machado et al., 2018)

Finally, fractional vehicle ownership is a model for sharing ownership of a vehicle among a small group of people (Machado et al., 2018). The individuals share part of the cost of access to the shared service. This model can be applied in partnerships between the carsharing operator. The operator provides the shared car to a group of people for a fixed lease rate (Machado et al., 2018). Table 2 presents an overview of the carsharing models and the roles of businesses.

Table 2: Carsharing models and role of business. Based on Machado et al. (2018)

Carsharing model:	Role of business:
Station-based: round-trip	Provide vehicles at the parking location
Station-based: one-way	Provide vehicles at the parking locations and balance the supply at the parking areas.
Free-floating: one-way	Provide vehicles in the designated areas and balance the supply within these areas.
Personal vehicle sharing: P2P sharing	Connecting the parties involved and responsible for insurance during the rental period.
Personal vehicle sharing: Fractional ownership	Provide and maintain the vehicle for a group of people.

2.5. Role of governments in carsharing

As indicated previously, given the nature of carsharing, the role of local governments is important. Local governments are the public operators of shared mobility because of their role in transportation planning, public transportation, and parking policies (Shaheen et al., 2016). Shaheen et al. (2016) defined nine common areas wherein local governments play a role (see table 3).

Table 3: Nine common areas and the role of government. Based on Shaheen et al. (2016

Common areas:	Role of government:
1. Health, safety, and consumer protection	Administrative regulations, administrative regulations, laws, and ordinances
2. Taxation	Tax incentives and taxation on shared mobility
3. Parking and access to Rights-of-Way	Management of on-street parking for shared transport modes
4. Signage and Advertising	Setting policies associated with signage and advertising of shared mobility
5. Insurance	Insurance limits and requirements
6. Multimodal integration	Policy guidance and technical assistance
7. Planning processes	Integrating shared mobility into municipal general plans within the transportation system
8. Data sharing, Privacy, and Standardization	Public and private partnerships to standardize data, protect sensitive data and share data
9. Accessibility and Equity issues	Challenges to accessibility and standards set by local authorities

The first area; health, safety, and consumer protection. Public agencies and local and state governments have established guidelines, regulations, ordinances, and laws that impact and regulate shared mobility service providers. Consumer protection legislation generally aims to prevent unfair commercial practices (Shaheen et al., 2016). The public sector must respond with appropriate legislation to ensure public safety and formulate policies to maximize the benefits of shared mobility (Machado et al., 2018).

Second, taxation of mobility services is the responsibility of local governments. Taxes on shared cars include excise taxes, sales taxes, convention center surcharges, and transaction fees (Shaheen et al., 2016).

Third, the allocation of parking spaces and rights-of-way is an essential component of carsharing (Shaheen et al., 2016). The responsibility for parking policy in the Netherlands rests with municipalities, and municipal parking policy can affect the mobility policies of the local authorities (KiM, 2018).

Fourth, local authorities play a role in defining policies on shared mobility signage and advertising. This role includes street and pavement marking, signs, and private sector advertising (Shaheen et al., 2016).

The fifth area is insurance; insurance has become increasingly available and affordable for carsharing; however, more insurance challenges have arisen with the advent of many innovative shared carsharing models (Shaheen et al., 2016).

Sixth, the policy of multimodal integration can play a crucial role in removing obstacles, such as technical barriers and lack of integration within existing transport systems. Local public transport authorities can play an essential role in this (Shaheen et al., 2016).

Another area is planning processes; governments have multiple goals for incorporating shared mobility into the transportation network. These goals include reducing parking spaces, reducing car ownership, improving air quality, achieving climate goals, and providing access to shared vehicles to underserved populations (inclusiveness). Integrating shared mobility into municipal plans and planning tools can help identify opportunities and possibilities in the current transportation system (Shaheen et al., 2016).

Subsequently, data sharing, privacy, and standardization are essential to understand the impact of shared mobility on the transport network and encourage innovation. Besides data sharing, data privacy and security are essential issues for shared mobility users. Sharing mobility providers request sensitive data from users, such as personal identification, trip, and financial information (Shaheen et al., 2016).

Finally, accessibility and equality in shared mobility is a crucial challenge for local governments, public authorities, and providers. At present, shared mobility does not yet receive (partial) support from federally funded agencies (e.g., free or reduced-price), which can cause exclusion of specific populations (Shaheen et al., 2016).

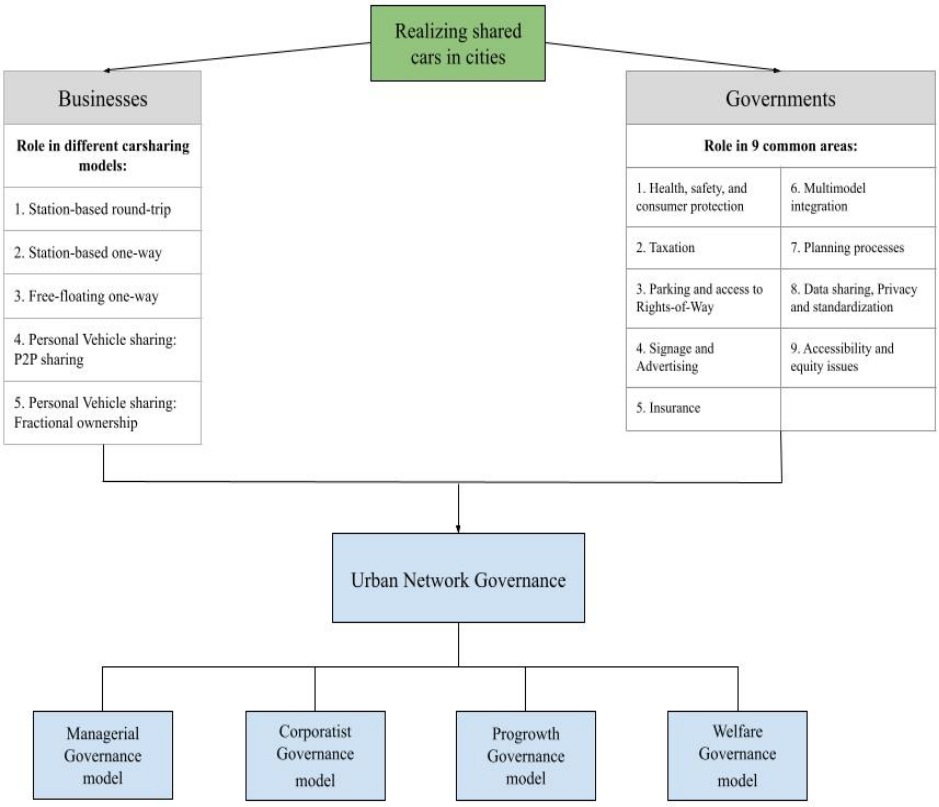
To conclude, using these defined roles by Shaheen et al. (2016), it is possible to examine what tasks local governments perform with regard to shared cars. Subsequently, urban governance models can be used to identify and clarify variations among cities.

2.6. Conceptual framework

As defined, in carsharing public and private interests come together because carsharing is implemented in the public domain and offered by private companies. The roles of local governments and private businesses are therefore considered important. Although it is found that there are variations among local urban governments regarding the realization of carsharing services, the reasons for these variations remain uninvestigated. To explain these variations, the literature on urban governance (Pierre, 1999) is appropriate, because this theory defines different urban governance models, which can explain problems of governability, and thereby address variances.

Taken together, the key concepts in this present study are connected by analyzing the role of private businesses and local governments in realizing carsharing in cities. Therefore, the arrows in the figure below point to the role of businesses and governments (figure 3). Thereafter, based on the results, it is aimed to identify urban governance models by bringing this information together. The urban governance models defined by Pierre (1999) hypothesized that there are variations between cities, but also that the different models may be typical in a particular sector of local government. By examining the urban governance models in the specific context of carsharing in different cities, variances in the realization of carsharing among Dutch cities can be explained by using urban governance theory.

Figure 3: Conceptual framework



3. Methods

3.1. Research approach

This thesis aims to provide insights into the variations among Dutch cities regarding the realization of carsharing services and to what extent Pierre's (1999) theory on urban network governance can help as an analysis method to explain these differences. To answer the main research question: *To what extent can Urban Governance theory explain the variation among Dutch cities regarding the realization of carsharing services?* qualitative research is conducted. This research does not necessarily look at the effect of one variable; rather, it is more in-depth research on how carsharing is realized in different cities in the Netherlands and how local urban governance influences this. This cannot be determined in figures but can be examined in more detail by looking at how it operates in real life, according to interviewees. This is a typical feature of qualitative research (Miller et al., 2007). Through qualitative research, not only can the challenges in the models be brought to the surface, but new ideas can be found to shape the governance; this cannot be expressed in numbers; this is about objective experiences of policymakers in the field.

An extensive literature review has been conducted to answer the research question as presented in the theory section (section 2). Next, a multiple case study with case-related interviews was conducted. There are multiple definitions of a case study; by its nature, a case study contributes to the knowledge of individual, social, organizational, and political phenomena (Yin, 1984). Furthermore, a case study makes it possible to look at details, completeness, and variance, i.e., more in-depth the unit under study (Flyvbjerg, 2011). Finally, a case study focuses on the "relationship to the environment," which is the context is essential. In the case study, qualitative data collection methods are used. The primary data collection consists of interviews, and the secondary sources consist of literature and case-related policy documents and reports.

3.2. Case selection

In this study, three case studies and ten case-related interviews are selected. The case studies meet the criteria of DePoy and Gitlin (2016); they examine a unit as one global phenomenon. A holistic approach is used, integrating data from three cases; Tilburg, Rotterdam, and Amsterdam. The three cases and their respondents were selected through purposive sampling (Campbell et al., 2020). The cases analyzed were selected because these cities are growing in terms of population. The three selected cities face the challenges of densification, with high parking pressure in urban areas. Carsharing is seen by an increasing number of municipalities as a way to reduce the large number of private cars in cities. In the coming years, the large cities of the Netherlands, including Amsterdam, Rotterdam, and Tilburg, will be attracting more residents, with all the consequences this has for mobility. More inhabitants mean more cars, which leads to congested traffic, more emissions, and an unhealthy living environment. Carsharing can offer a solution to this. In the Netherlands, there is a nationwide growth in the number of shared cars, and this growth is continuing and accelerating. Recent research by the Netherlands Institute for Transport Policy Analysis (KiM) reveals the number and use of shared

cars is not consistent in every municipality (KiM et al., 2021). However, there may be a number of factors influencing the realization of carsharing concepts in different cities.

The case selection aimed to maximize variation between cases; The city of Amsterdam has been selected because it has the most shared cars per 100,000 inhabitants (Kennisplatform CROW, 2021). In addition, the growth of the number of shared cars in Amsterdam is remarkable, with 4017 new shared cars in the year 2021. That is more than twice as many as the number 2; Rotterdam, with a number of 1896. Therefore, the second city is selected; Rotterdam. The total number of shared cars in Rotterdam is growing, but not yet as strong as in Amsterdam. According to the Dashboard carsharing 2021 by Kennisplatform CROW, provinces in the Randstad region have the largest number of shared cars (Kennisplatform CROW, 2021). In the provinces outside this region, the number of shared cars is growing, but not as fast. To address this, a city outside Randstad has been selected. Specifically, Tilburg has been selected, because this city does not appear in the list of top 10 municipalities with the number of shared cars per 100,000 inhabitants, and the top 10 absolute growth rates of shared cars (Kennisplatform CROW, 2021). Strikingly, cities like Breda and Eindhoven do appear in this list, although these cities are not located in the Randstad either. By including the city of Tilburg in this study, it may be explained why the growth of shared cars in this city remains behind. Based on this, the cases can be categorized and ranked as “leading", "growing " and "entering" (see figure 4). The realization of carsharing generally follows the same process, by analyzing these three cases explanations can be found for variations among cities because these three cities are in different stages of realizing carsharing services.

Figure 4: Location of selected cases

Source: MapChart 2022

3.3. Data collection and analysis

This thesis follows a case-study design, with in-depth interviews with involved actors in the case study. Before the interviews, desk research was carried out to obtain a picture of the shared mobility services in the municipalities Tilburg, Rotterdam, and Amsterdam. Related policy notes, documents, reports, covenants, and news articles are analyzed, and an overview of these can be found in appendix A. Subsequently, field research was carried out in the form of semi-structured, face-to-face interviews. As all respondents are Dutch speakers, the decision was made to conduct and transcribe the interviews in Dutch. Semi-structured interviews are used in which respondents have opportunities to contribute and to elaborate on specific points during the interview. Before the interviews, an interview design was made with themes and topics, which is presented in Appendix B. By conducting interviews with the actors involved, a more detailed picture of the local context could be obtained, which is considered necessary according to the literature (Pierre, 1999). In total, 29 interviewees were approached for an interview: policy advisors from the various municipalities, market providers of shared cars, councilors from various municipalities, and policy officials in metropolitan regions and provinces. This resulted in a total of ten interviews. An attempt was made to speak to at least one policy advisor of the three cases, one advisor at the regional or provincial level, and an involved councilor to ensure consistency in data. In addition, the perspective of shared mobility providers has been included in this research. The study held two interviews with shared car providers, one station-based provider, and one free-floating provider. Table 4 below contains a complete list of interviewees and how they relate to the cases. To protect privacy, the names have been replaced by numbers. Transcripts were made and coded to thoroughly analyze the findings using open, axial, and selective coding. The interviews are coded to organize the raw data in a standardized layout. This makes it possible to identify and label essential themes, concepts, and components (Whitehead et al., 2016). An overview of the coding scheme is presented in Appendix C.

Table 4: Overview of interviewees

Interview:	Case:	Function:
A1	Tilburg	Policy advisor Tilburg municipality
A2	Tilburg	Council member D66 Tilburg
A3	Tilburg	Program Manager Public Transport Innovation at Province of North-Brabant
B1	Rotterdam	Policy officer Municipality Rotterdam carsharing
B2	Rotterdam	Mobility Advisor Municipality Rotterdam hubs
B3	Rotterdam	Two policy officers for transportation at the MRDH
C1	Amsterdam	Policy officer Municipality Amsterdam
C2	Amsterdam	Consultant MaaS and shared mobility at MRA
D1	None	Operational Specialist at carsharing provider station-based
D2	None	Advisor Public Affairs and Communications at carsharing provider free-floating

3.4. Quality

Case studies enable a detailed examination of a single example of a class of phenomena (Flyvbjerg, 2011). The main strength of a case study is in-depth and detailed information about the concept. In addition, interviewing enables gaining detailed information about the experiences of others (Weiss, 1995). By asking respondents about the roles of the parties involved and the key factors such as objectives, policy instruments, and desired outcomes as formulated in the literature, it is possible to link the theoretical models. This is conducive to the internal validity of the research (van Thiel, 2015).

However, conducting a case study and interviews also has its limitations. In both research methods, the researcher can be biased (Flyvbjerg, 2011). During the interviews, the researcher must be aware of this and try not to steer the respondent and ask open-ended questions. In addition, a topic list and interview design are set up before the interview. In order to obtain complete pictures of the different cases, an attempt is made to speak to several respondents per municipality who look at the situation from a different perspective. By interviewing several respondents in each municipality, it was possible to prevent a one-sided view of the situation. In addition, interviews are held with market providers who have knowledge of several municipalities and can therefore indicate apparent differences. To overcome the research bias in the case studies, various data sources are used from different informants and documentary sources. Another limitation of a case study is a weak understanding of the occurrence in the population of the studied phenomenon (Flyvbjerg, 2011). Nonetheless, it was decided to limit this study to three different cases that provide a representation of carsharing in the Netherlands.

A semi-structured interview schedule is used to increase validity, and the interviews are conducted under the same conditions as much as possible (van Thiel, 2015).

4. Results

In this section, the three cases are presented and analyzed. The results are presented based on case-related documents and data from the interviews. The cases are analyzed consecutively; first, the policy concerning carsharing, the role of business, and the role of government. Hereby sub-question II and III are addressed.

4.1. Case Tilburg

Tilburg is a municipality in the province of North Brabant. The municipality comprises 221.947 residents (January 2021) (CBS, 2022). In recent years, the municipality of Tilburg has invested significantly in the city center to create an attractive city center where people like to shop, work, live and recreate. The municipality has plans to build around 25,000 additional homes in the coming 20 years (Mobility Platform, 2021). The municipality intends to build additional housing within the existing city. This led to densification and has consequences for the public space (Gemeente Tilburg, 2021). The municipal council, therefore, wants to develop one system for shared mobility for Tilburg, to make people less dependent on their private cars.

4.1.1. Policy concerning carsharing

The increase in housing comes with an increase in the number of vehicles in the city. This is a challenge because space in the city center is scarce. In addition, the road capacity in the city cannot cope with the extra cars (Gemeente Tilburg, 2021a). However, mobility and car use are of importance to the inhabitants of the city. For this reason, the municipality wants to emphasize accessibility and mobility, the so-called mobility transition. The council of the municipality of Tilburg adopted the 4-track policy on 18 November 2021. The 4-track policy for parking and shared mobility consists of the following components (Gemeente Tilburg, 2021a):

> Track 1: Adding new products to the range of parking subscriptions and ensuring the remaining capacity in existing parking garages is used flexibly and effectively. These new products contain subscriptions for parking garages.
> Track 2: The municipality wants to take the lead in organizing a high-quality and inclusive supply of shared mobility in Tilburg together with market parties, reducing the need for parking facilities.
> Track 3: In considerable area development research the possibilities and the need to build parking facilities for residents and visitors.
> Track 4: Developing a parking strategy to facilitate the parking of visitors and employees in the city center at the edge of the city.

In this policy, a fundamental role is reserved for shared mobility (track 2) because the scarcity of parking space is an essential item on the agenda (A1). The municipality wants to have a clear directing role in setting up a high-quality shared mobility system with market parties. The main reason why the municipality wants to stimulate shared cars is the number of space cars require. The use of space generates an enormous amount of pressure on the

densification challenge of the city. The municipality of Tilburg states that cities become completely unreachable if there is no structural reduction in car use and ownership (Gemeente Tilburg, 2021a). Therefore, the municipality introduced a licensing system for the commercial provision of shared parking spaces, wherein seven goals are formulated:

1. Preventing the proliferation of shared mobility offers.
2. Achieving an inclusive and diverse supply of shared mobility
3. All shared vehicles to be emission-free as of 1 January 2025
4. Achieving efficient use of shared vehicles
5. Offer space to parties who are willing and able to offer an integrated service via one app
6. Allowing local players to enter the market of shared mobility
7. Offer providers of shared mobility in Tilburg a realistic chance of a healthy business case (Gemeente Tilburg, 2022)

4.1.2. Role of Business

As defined in the literature, various carsharing models exist in which private businesses play a role. In Tilburg, several providers are operating, such as Amber, Greenwheels, and Mywheels. Amber is a station-based one-way shared car provider. With Amber's shared car, the user can take or leave the car using a hub of Amber in Tilburg and Goirle (tilburg.com, 2022). The intention is that the user parks the car in a "reserved for Amber" parking place if possible. In addition, the provider Amber concludes contracts with large companies to allow employees of that company to use the shared car. “This is an incentive for employees to use shared car transport” (A3).

Additionally, the provider Greenwheels provides station-based round-trip carsharing, where the user returns the car to its fixed location where the car was picked up. The provider of the shared car pays the parking costs if the car falls within a paid parking zone. Greenwheels offers around 14 shared cars in Tilburg (Greenwheels, n.d.). A third carsharing provider is MyWheels, and this station-based round-trip shared car provider offers about 19 shared cars in Tilburg. The cars can be returned at a fixed location or in a designated zone (Gemeente Tilburg, 2021). In short, the current three providers are station-based carsharing models, both round-trip and one-way. In both cases, the providers are responsible for providing the shared cars at the designated locations. In addition, through the online platform Snappcar, people share their car with others or rent someone else's car. The providers decide on the price, meaning the rates may differ for each car (Gemeente Tilburg, 2021). This is a form of personal vehicle sharing P2P-sharing, whereby Snappcar is responsible for connecting the parties involved and insurance during the rental period (Snappcar, 2022).

In Tilburg, the businesses provide three carsharing models; station-based round-trip, station-based one-way, and personal vehicle sharing P2P-carsharing as also defined by Machado et al. (2018). In the municipality, there is no offer of free-floating models and personal vehicles sharing fractional ownership.

4.1.3. Role of Government

As defined, the role of local government is essential in the realization of shared cars. The municipality of Tilburg considers its role as a director, aimed at preventing the proliferation of mobility-sharing providers and ensuring an integrated supply of mobility-sharing (A1, A2). The municipality wants to be progressive in this respect and wants to take the lead. This includes;

> "Unambiguous connection of all shared mobility with a minimum number of vehicles, via the MaaS-principle, everything through one App, minimal use of the public space, realizing maximum service provision, realizing owning a car is no longer required, and making shared mobility available to everyone, thus ensuring exclusivity" (Gemeente Tilburg, 2021).

The municipality aims for a maximum effect with a limited number of vehicles to switch from car ownership to car use in the urban area (Gemeente Tilburg, 2021). One task is the introduction of a licensing system. In this first task, several common roles in different areas can be identified; parking and access to rights-of-way, planning processes, accessibility, and equity issues. A second task in the municipality's directing role is to generate cooperation between market parties. The municipality wants to achieve high-quality and affordable shared mobility, which requires cooperation between market parties and control by the municipality. The municipality wants to integrate state mobility services into a MaaS-app (Mobility as a Service) app. In this way, the municipality aims to contribute to realizing a full service with a minimum number of vehicles. In the Netherlands, no provider has been able to realize a successful MaaS-app (A1). This ambition of the municipality is part of the area of multimodal integration; however, this task has not been realized. The municipality is experimenting with integrating shared cars into the current public transport system (A3). A third task for the municipality is to set up a mobility hub next to the station. "The mobility hub building is currently under construction" (A1).

In short, the municipality wants to realize a licensing system, a MaaS-app, and a large mobility hub in Tilburg. All this is to tackle the challenge of densification, which is the main objective, and the municipality sees carsharing as an essential tool to achieve that objective (A1). "Moreover, the supply of cars extends beyond the municipal boundaries; with shared cars, one talks about regional, national, or even European governance" (A1). Therefore, the province of North Brabant is involved in shared mobility. The province investigates whether shared mobility can supplement regular public transport (Provincie Noord-Brabant, 2018). "It is the role of the municipalities to issue licenses, and the province is concerned with establishing shared mobility outside the cities" (A3). The role of the provincial or regional bodies can be identified in the common areas; planning processes, sharing data with other municipalities, and accessibility and equity issues. Next, local politics play a role in realizing shared car services. The local municipal council influences the parking fee policy decisions (Gemeente Tilburg, n.d.). Therefore, the role of the municipal council can be found in the era of taxation on shared cars.

In Tilburg, the role of governments fulfills six areas in the light of the literature of Shaheen et al. (2016); taxation, parking and access to rights-of-way, planning processes, data sharing, and accessibility and equity issues.

4.2. Case Rotterdam

Rotterdam is a harbor city in the province of South Holland. The municipality of Rotterdam consists of 651.631 residents in January 2021 (CBS, 2022). The municipality has been developing and overgrowing in recent years. Rotterdam is facing a substantial urbanization challenge: 18,000 homes must be realized by 2022 and 50,000 until 2040 (Gemeente Rotterdam, 2020). This enormous city growth requires changing and improving mobility to contribute to the accessibility of the city. Therefore, the City Council wants to organize the city differently. Moreover, to do it healthily and sustainably, with clean air, fewer CO2 emissions, and the stimulation of encouraging clean and healthy modes of transport (Gemeente Rotterdam, 2020). Shared mobility plays an essential role in this, and the use of shared wheeler transport is an efficient(er) use of the parking facilities. This way, space can be created for green spaces and better accessibility in the city (Gemeente Rotterdam, 2020).

4.2.1. Policy concerning carsharing

The municipality of Rotterdam formulated "De Rotterdamse MobiliteitsAanpak (MRA)," an approach to work on better accessibility of the growing city. The municipality attempts to provide substance to various tasks in the city and thereby contribute to the city's growth (Gemeente Rotterdam, 2020). In recent years, there has been significant growth in carsharing providers (Gemeente Rotterdam, 2020a). This, in combination with the challenge of increasing urban density, has led the municipality of Rotterdam to formulate a municipal vision for carsharing:

> "The "nota beleid en vergunningen deelauto's" provides an answer to the question of how and at what pace carsharing in Rotterdam should develop to optimally contribute to the formulated higher policy goals in the field of vital economy, healthy city, and attractive residential city" (Gemeente Rotterdam, 2020a)

This policy document contains strategic, tactical, and operational policy choices for shared cars, and an assessment framework has been drawn up for evaluating new applications from shared car providers. Sharing cars is part of the mobility transition of the city and is linked to urban developments. In Rotterdam, carsharing plays a prominent role in contributing to the city's objectives. The policy document of the municipality formulates three central tasks for carsharing up to 2030: First, "from ownership to conscious use": fewer car kilometers for cleaner air. Car sharing leads to less private car ownership in the city. By reducing the number of private cars, the number of car kilometers driven, and the use of cleaner shared cars, the CO2 emissions of the city will decrease. This contributes to the coalition agreement of the national government and the municipality to reduce CO2 emissions by 49% in 2030 (Gemeente Rotterdam, 2020a).

The second task; is "sustainable use of space": fewer cars to realize the housing challenge and a better balance of functions in the public area. Due to the city's growth, the pressure on public space is increasing, and the city's increasing population means more mobility demand. As residents own fewer cars and occupy less space, there is room for new developments (Gemeente Rotterdam, 2020a).

Moreover, finally, "more choice for the traveler": offering smart, attractive, and competitive alternatives for better door-to-door mobility (mobility transition) (Gemeente Rotterdam, 2020a). However, the number of shared cars in Rotterdam is insufficient to meet these objectives. The municipality of Rotterdam is currently conducting various pilots to contribute to this (Gemeente Rotterdam, 2020a). In addition, the municipality formulated a growth ambition; as a solid urban area, Rotterdam wants to be more ambitious than the average in the Netherlands. Therefore, the growth target for Rotterdam is that by 2030 between 4 and 5% of all cars will be shared cars. This amounts to 8,800 to 11,000 shared cars in 2030 (Gemeente Rotterdam, 2020a).

4.2.2. Role of Business

In Rotterdam, there are various carsharing providers; WitKar Rotterdam, Sixt, and Lev are providers of free-floating one-way carsharing. In the free-floating model, the shared cars have no fixed location where the shared car is offered or parked (D2). The vehicle must have a city-wide parking license to park in the regulated area. The providers must apply for this at the municipality (Gemeente Rotterdam, 2020a). In addition, various station-based round-trip and one-way providers are operating in Rotterdam, such as Greenwheels, Juuve, and Amber for business shared cars (Gemeente Rotterdam, 2020a). The provider offers the vehicles in one or more allocated parking spaces (D1). The user returns the car to the assigned fixed location. In the case of paid parking, the shared cars must have a parking license and a parking space (Gemeente Rotterdam, 2020a). For station-based one-way, the provider should distribute the supply of shared cars among the fixed locations to ensure sufficient supply.

Additionally, some individuals in Rotterdam offer their private cars via online platforms such as SnappCar (Gemeente Rotterdam, 2020a). This happens in two ways; the primary form in Rotterdam is personal vehicle sharing P2P (Gemeente Rotterdam, 2020a). The online platform provider takes care of the legal and administrative aspects of carsharing (Machado et al., 2018). Furthermore, there are forms of personal vehicle sharing fractional-ownership active in Rotterdam, such as “Buurtauto” (Gemeente Rotterdam, 2020a). The provider offers the car to a fixed group of users at a determined lease rate. The implementation and realization of shared cars come in three forms; provider-oriented, whereby the provider submits a request to the municipality. Building plot-oriented is where shared cars are integrated into an existing building complex or in a new spatial development. Alternatively, a third form is area-focused, similar to building plot-focused; the residents or employees in several building developments use shared cars (Gemeente Rotterdam, 2020a).

Based on the above, it can be concluded that five carsharing models are present in Rotterdam; station-based one-way and round-trip, free-floating, personal vehicle sharing P2P, and fractional ownership, which touch upon the roles as defined by Machado et al. (2018).

4.2.3. Role of Government

The local government is essential in the realization of shared cars in the city. The municipality of Rotterdam provides the licenses for shared car companies (D1, D2). Currently, there are two types of parking permits for shared cars in Rotterdam; a sector-based and a city-wide parking permit. A sector-specific parking permit is for shared cars with a specific parking space, i.e., for station-based shared cars. A city-wide parking permit is for a regulated area (Gemeente Rotterdam, 2020a).

The municipality of Rotterdam wants to increase the availability of station-based shared cars in the city in the coming years. The municipality is searching for cooperation with various parties involved, including private parties and other municipalities (B1, B3, D1, D2). The municipality wants to play an active role in this. How this active role will be shaped will be worked out later in the Rotterdam Climate Agreement (Gemeente Rotterdam, 2020). Two common areas can be identified in this role; parking and access to right-of-way and signage and advertising (Shaheen et al., 2016). Free-floating models are not attached to a fixed parking space; these vehicles can be parked in designated areas. This form is relatively new, and the distribution in the city is not developed. To prevent nuisance, the municipality has set a permit ceiling (B1). The municipality assumes approximately three to five providers with a maximum number of shared cars. These administrative rules and regulations are designed to keep shared car supply diverse, corresponding with "planning processes". The government is responsible for the city's densification; the city is becoming increasingly crowded but must remain accessible (B1). The municipal authority's task is to regulate carsharing to reduce market interference and determine where carsharing takes place (B2). One of the reasons for this is to combat transport inequality, which means that the city offers all its residents, visitors, and tourists the opportunity to walk, cycle, take public transport or drive a car (Gemeente Rotterdam, 2020). The government's role can be identified in the common area accessibility and equity issues (Shaheen et al., 2016).

Moreover, the Rotterdam municipality uses various instruments to share knowledge with the parties involved. The municipality has participated in courses and training sessions with other municipalities, the government, and private companies, during which workshops and in-depth sessions have been held. An important partnership is the Metropolitan Region Rotterdam The Hague (hereafter: MRDH) (MRDH, n.d.). This is regional government cooperation between 23 municipalities that cooperate on subjects of importance (B3). The MRDH's role is a connector, creating a network where projects and regional objectives can be subsidized (B3). In the region's overarching policy objectives, shared mobility plays a prominent role, where possible linking up with general objectives such as improving accessibility (B3). The interest of the region or province is to create a level-playing field for providers where not every municipality has different rules (B1, B3).

Additionally, the government focuses on sharing data. Various agreements have been laid down in the permit system of the municipality. One of the essential agreements is the obligation to share data. The provider makes the anonymized travel data of the subsystem available using the dashboard of CROW (Gemeente Rotterdam, 2021). Therefore, roles in the areas of data sharing, privacy, and standardization can be identified in this case. Furthermore, free-floating cars do not use fixed parking spaces. In the case of wrongly parked shared cars,

the municipality is authorized to impose an additional parking tax (Gemeente Rotterdam, 2020a).

In conclusion, in the case of Rotterdam, the role of governments does fulfill six areas parking and access to right-of-way, signage, and advertising, planning processes, accessibility, and equity issues, data sharing privacy and standardization and taxation, touch upon the areas as defined by Shaheen et al. (2016).

4.3. Case Amsterdam

Amsterdam is the capital of the Netherlands, with a population of 873,338 in 2021 (CBS, 2022a). Amsterdam is proliferating in the number of visitors and inhabitants. The number of daily transport trips in the city is expected to increase by 20% by 2030. This put increasing pressure on the use of public spaces (Gemeente Amsterdam, 2022). To keep the city sustainable, attractive, and accessible, a change in urban mobility is needed. Amsterdam is committed to becoming a car-free city, meaning residents and visitors have to walk, cycle, and use public transport more. The availability of sufficient shared cars is an essential precondition for the ambition of a car-free city (Gemeente Amsterdam, 2019). The use of shared cars is not new in Amsterdam; on 21 March 1974, Minister Irene Vorrink of Public Health and Environment opened the first public carsharing station at Amstelveld (Gemeente Amsterdam, 2019). This initiative was quickly spread throughout the city with 25 locations. In the followed years, more providers came to the city. The vision of the municipality of Amsterdam on carsharing can be summarized in four key points: first, carsharing is part of a wide range of measures to reduce car ownership. Secondly, the municipality is creating preconditions for further growth in carsharing. Thirdly, the municipality is taking measures to make carsharing utterly free of emissions. Finally, the local authority pays attention to carsharing in new urban development projects (Gemeente Amsterdam, 2019a).

4.3.1. Policy concerning carsharing

The number of shared cars is higher in Amsterdam than in the rest of the Netherlands. It remains a niche market compared to the total number of cars (more than 230,000) (Gemeente Amsterdam, 2021). On 13 February 2019, the municipal council adopted the carsharing policy agenda, which offers an integral vision of carsharing (Gemeente Amsterdam, 2019a). The municipality has embedded the concept of carsharing in existing policy documents;

- The *MobiliteitsAanpak Amsterdam 2030* (2013); the overarching framework for the Mobility Policy of the City of Amsterdam up to 2030. One of the goals is to reduce parking pressure and eliminate parking spaces in public spaces. Stimulating carsharing is one of the measures to achieve this.
- The *Uitvoeringsagenda Mobiliteit* (2015), includes concrete measures to create more space for people traveling by foot, bike, public transport, and car. Carsharing is seen as an important opportunity in this context.
- The Agenda for Sustainable Amsterdam (2015) focuses primarily on making motorized transport in Amsterdam more sustainable.

- The Action Plan for the Shared Economy (2016), states that the municipality has an open and proactive attitude towards the sharing economy.
- The Smart Mobility Action Plan (2016), states that the municipality of Amsterdam has the ambition to transition to the use of MaaS.
- The *Nota Parkeernormen Auto* (2017) describes how the municipality expects to deal with the growth of the city and the related parking pressure.
- Amsterdam has signed the "City Deal electric shared mobility in urban area development", like seven other cities. This document describes that in the coming three years, innovative housing projects are delivered with a large role for electric shared vehicles and other forms of shared mobility (Gemeente Amsterdam, 2019a).

In the policy agenda on carsharing, the municipality formulated a vision for carsharing; first, carsharing is part of a broader set of policies to reduce car ownership. This means that carsharing is accorded a significant role in the implementation of the policy frameworks described above (Gemeente Amsterdam, 2019a). Secondly, the municipality creates preconditions for the further growth of carsharing. The parking policy of the municipality has been aimed at deterring car ownership and use for some time through the parking fees and the permit system (Gemeente Amsterdam, 2019a). Third, the municipality is committed to completely emission-free shared cars by 2025. Finally, the municipality pays attention to carsharing in new area development. The municipality tries to stimulate demand through new urban development so it becomes attractive for carsharing providers to establish themselves in the area (C1).

In addition, the municipality of Amsterdam has entered into meetings with carsharing providers, resulting in the Covenant Carsharing: from niche to mainstream: available, accessible, and affordable for all residents of Amsterdam and its visitors (Gemeente Amsterdam, 2021). The covenant consists of 10 agreements:

1. Substantial growth in the number of carsharing vehicles by 2022 and spreading the supply throughout the city
2. Simplifying the application of shared car parking permits and parking spaces
3. Increasing the awareness of shared cars through (mutually reinforcing) communication
4. Stimulating the supply in neighboring municipalities in the region
5. Stimulating intercity rides between big cities and the surrounding cities of Amsterdam
6. Setting up a "public charging infrastructure" working group to smooth the transition to fully emission-free 2025
7. Establishing a closed platform where knowledge and information are shared
8. The integration of shared cars in Mobility as a Service service
9. Exploring the task, opportunities, and questions surrounding new area developments
10. Identifying and sharing available information and data

The covenant can be seen as the result of successful public-private partnerships (C1, C2). In addition, the municipality has set up a regular consultation with the shared car providers in which business progress is discussed and a desk where providers can ask questions and apply for parking licenses (C1). This process was less efficient in the past, but now shared mobility

is higher on the agenda, and the collaboration has taken a more concrete shape, it is going better (C1, D2).

To summarize, the municipality of Amsterdam is promoting carsharing through its launched carsharing mobility program (2019) and aims to make the city car-free, in which carsharing plays a significant role. In addition, carsharing is stimulated by the current parking policy and parking standards. Furthermore, finally, the municipality conducted Covenant carsharing in collaboration with the providers.

4.3.2. Role of Business

In Amsterdam, there are several carsharing concepts available, which are facilitated by the business. First, station-based round-trips, like Greenwheels and Mywheels (Gemeente Amsterdam, 2019a). In addition, Amsterdam has several free-floating one-way carsharing providers with their fleet. The vehicle does not have its own permanent parking space in this model. Different providers include; ShareNow, GreenMobility, Sixt share, and Amber (Gemeente Amsterdam, 2019a). In addition, personal vehicle sharing P2P is offered in Amsterdam by individuals who rent their car through online platforms such as Snappcar (Gemeente Amsterdam, 2019a). Finally, the oldest form of carsharing, a personal vehicle sharing fractional ownership, where the car is shared with friends, family, and neighbors, is a developed concept in Amsterdam. Several concepts are emerging that focus on a fixed group of users, such as “Buurauto”, “Testrijdens”, WeDriveSolar, and Deelootoo (Gemeente Amsterdam, 2019a). There are 10 to 15 "Buurthubs" in Amsterdam, including electric carsharing (Gemeente Amsterdam, 2022).

In conclusion, in Amsterdam, the number of shared cars is high compared to the rest of the Netherlands. In Amsterdam, different carsharing models are available for the users; station-based one-way and round-trip, free-floating, personal vehicle sharing P2P, and fractional ownership. Additionally, citizens of Amsterdam share their cars with friends, family, and neighbors without the intervention of a business.

4.3.3. Role of Government

The municipality has a prominent role in the realization of shared cars in the city, as the municipality is the decision-making body and has the authority to grant licenses (D1, D2). Within the municipality, a program of shared mobility has been set up in 2020, just before the corona crisis (C1). This program was set up because shared mobility was already mentioned in several policy documents, but until then there was no cohesive program. The aim of the program is to ensure that everyone traveling to or from Amsterdam is familiar with the concept of shared mobility, and incorporates it into their travel decisions. The program focuses on raising awareness, and changing behavior among citizens about shared mobility, so people know what a shared car is, and they can consider using it (C1). In that context, the municipality held a large campaign last year, both via social media, and with boards throughout the city. Furthermore, the municipality held a physical event at three locations in the city in cooperation with the shared car providers (C1). This role of the municipality can be identified in the common areas; planning processes, where the municipality integrates the concept of shared cars into the general

plans within the transportation systems. Furthermore, signage and advertising, as the municipality advertise shared cars, and multimodal integration, because the municipality tries to integrate shared mobility with public transport and jointly advertises the concept.

However, the municipality of Amsterdam is facing the challenge of making carsharing inclusive. The municipality aims to make shared cars available to everyone, including people who are socially and economically disadvantaged, and this is a challenge (C1, C2). In collaboration with the providers, the municipality aims to stimulate the supply in neighboring municipalities in the region as defined in the covenant (Gemeente Amsterdam, 2021). Hereby the role of government can be identified in the common area; accessibility and equity issues.

Regional and provincial governments are involved in the realization of carsharing. The Metropolitan Region Amsterdam (hereafter: MRA), a partnership between the City of Amsterdam, the Amsterdam Transport Region, the Municipality of Almere and the Provinces of North Holland and Flevoland, is sharing data and knowledge and is looking into the possibility of a common policy (C2). The results of this collaboration include; sample texts from the *Algemene Plaatselijke Verordening* (APV), advice based on experience, and knowledge sharing (C1). In this way, shared cars are not just something for the city of Amsterdam, but for the entire region and ultimately the whole of the Netherlands (C1, C2). Hereby the government shares data with other municipalities. Partnerships work together to standardize data and policies and share data to ensure not every municipality has different rules regarding shared cars (C1, C2).

In conclusion, in the case of Amsterdam the role of governments does fulfill seven areas according to the literature of Shaheen et al. (2016); parking and access to right-of-way, signage and advertising, planning processes, multimodal integration, accessibility, and equity issues, data sharing privacy and standardization and taxation.

5. Analysis

In this section, the results are analyzed against the backdrop of the literature. Thereafter, the findings are aggregated and variances among the cities can be revealed. Finally, explanatory factors regarding urban governance are presented for these variances. Hereby addressing sub-questions IV and V.

5.1. Urban Network Governance Model

In this analysis section, an attempt is made to identify the urban governance model of the city in the context of carsharing. The urban governance models of Pierre (1999) are more broadly focused than only on a specific phenomenon, such as carsharing. Nevertheless, it is interesting to understand the form of public-private exchange in urban governance against the background of carsharing goals. The realization of carsharing is an area where public and private interests come together par excellence. The identification of the current model can reveal variances among governments in the realization of carsharing, and reveal explanatory factors for these. This analysis is consistently described using the four variables as in the literature of Pierre (1999).

5.1.1. Key participants

Key participants are a descriptive variable in the urban network governance models (Pierre, 1999). By analyzing the three cases the key participants can be identified. In all three cases, the business providers provide various carsharing models to the consumers. Consumers are essential for succeeding in carsharing in cities. The fact that businesses provide services, corresponds to the managerial model defined by Pierre (1999). However, the local government does not operate at arm's length from the elected officials, and their role is not limited to setting long-term goals for urban services (Pierre, 1999). In Tilburg, the local government assumes the director role and has the authority to grant licenses to market providers for shared cars. The municipality wants to achieve goals concerning shared cars, and the market providers have the means to achieve the goals (D2). In Rotterdam, the role of the local government in carsharing is not yet defined. Three interviews revealed that the role of the municipality is an organizational issue, and the internal process can be improved (B1, B2, D1). The role of the providers is decisive, and the local government is searching for the right role (B1, B3). And finally, in Amsterdam, the local government has a prominent role in the realization of carsharing concepts in the city. Five interviews revealed that Amsterdam is ahead in comparison to other municipalities, the municipality has sufficient capacity, and carsharing is high on the agenda (A3, B1, C1, D1, D2).

All in all, the participative character can be partly indicated in the managerial model, where the organizations offer shared cars to the consumers (Pierre, 1999). However, in all cases, the local government is not at an arm-length distance but has an active, involved role in the realization of shared cars.

5.1.2. Objectives of the municipal governance

The second variable is the overarching objectives that characterize local urban governance. In all the cases the results of the objectives are likely to be related to the managerial governance model. In the managerial model, the aim is to improve the efficiency of the production and delivery of public services and to provide real choices to service users (Pierre, 1999). In all cases, the aim is to realize carsharing and integrate it into the mobility system, with providers offering the vehicles to consumers.

In Tilburg, the governments formulated seven objectives in the licensing system focus on offering space to parties, allowing local players to enter the market, and offering providers a realistic chance of realizing a healthy business case in Tilburg (Gemeente Tilburg, 2021). This is in line with the distribution of interests of the organizations involved in shaping urban services as formulated in the corporatist model (Pierre, 1999). However, not all carsharing forms are currently offered in the city, and the supply is limited. The limited supply of business makes it challenging to realize objectives two and four of the municipal licensing system; achieving an inclusive and diverse supply of shared mobility and achieving efficient use of shared vehicles (Gemeente Tilburg, 2021). The municipality and its elected officials strive to sustainably create a comprehensive network of shared mobility. This is in line with objectives in the progrowth governance model as defined by Pierre (1999).

On the contrary, in Rotterdam, the objectives of the local government correspond to objectives in the corporatist model, because the local government sought to cooperate with market providers to realize shared cars in the city. The municipality of Rotterdam aims that in 2030 between 4% and 5% of all cars will be shared cars (Gemeente Rotterdam, 2020a). The focus is on sustainable use of space and greater choice for the traveler. However, the interests of the municipality can differ from those of the providers (C2). The municipality and the providers have sought cooperation with each other to bring the goals together (B1, D2). “This form of cooperation is still very much in its infancy. You can see on both sides that this is still a bit underdeveloped” (B1).

Finally, in Amsterdam, the municipality has formulated long-term objectives in the Monitor Autoluw, and Agenda Carsharing (Gemeente Amsterdam 2019; Gemeente Amsterdam, 2019a). In addition, ten common goals have been formulated, in collaboration with the market providers, in the Covenant Carsharing (Gemeente Amsterdam, 2021). This collaboration includes the interests of both organizations that shape the urban policy and services together, this is in line with the objectives of the corporatist model of Pierre (1999).

Taken together, in all cases characteristics of the managerial, corporatist, and progrowth governance model can be identified, although many factors do not link up. A combination of objectives from multiple models can be observed in the case studies.

5.1.3. Main instruments

Local governments can use different instruments to achieve objectives. In Tilburg, the municipality entered into consultation with market providers (A1). To this end, the municipality intends to develop partnerships that align with the commitment to a public-private partnership defined in the progrowth governance model (Pierre, 1999). Secondly, the provincial

government uses a financing program for experimentation with shared cars in neighborhoods (A3). The mobilization of resources from the regional and national governments is an instrument of progrowth governance (Pierre, 1999). The local government is searching for consultation structures, financing programs, and projects to realize shared cars. In addition, the municipality aims to encourage market parties to collaborate and create a collective MaaS application (A1).

Second, in Rotterdam, the municipality started with evaluation meetings with carsharing providers (B1, B2, D1, D2). The first evaluation meetings revealed an interaction with, and between the providers is important for shaping policy together (B1). This form of evaluation meetings can be identified in the corporatist governance model where the instrument is to deliberate with the involved parties (Pierre, 1999). However, the evaluation meetings are in their early stages and the municipality is still experimenting with the form (B1). The environment is changing and the amount providers are changing. “There are regular providers, but some companies emerge and move away again” (B1).

Lastly, in Amsterdam. The local government created the covenant on Carsharing. The local government and market providers agreed upon ten agreements in this covenant. This contract with for-profit organizations for providing selected public services, like shared cars is an instrument corresponding to managerial governance (Pierre, 1999). However, according to several interviews, the covenant can be seen as a result of successful public-private partnerships (C1, C2). In addition, the municipality has set up a regular consultation with the shared car providers in which the progress of business is discussed (C1). The deliberations with stakeholders are an instrument of the corporatist governance model (Pierre, 1999). However, this cooperation is shaped by a public-private partnership, which is in line with the characteristics of progrowth governance (Pierre, 1999). In short, this collaboration between the local government in Amsterdam and the market providers cannot be identified in the instruments defined in Pierre's models (1999).

All in all, according to these data, one can infer managerial, corporatist, and progrowth governance models can be identified in the current instruments used by local governments to realize carsharing.

5.1.4. Outcomes

As explained in the literature review, Pierre (1999) describes the most common outcomes of the different urban governance models. The intended outcomes of the carsharing concept in Tilburg are to increase the supply of shared cars and reduce private car use and ownership, resulting in fewer parking spaces and more public spaces. In this way, the shared car concept contributes to the city's densification (A1, A2). This result corresponds to the managerial model's most common outcome: an increase in service production efficiency and private-sector experience in the public sector (Pierre, 1999). However, this outcome is only possible with a sufficient supply and stimulation of the use of shared cars, which is related to the parking standards and accessibility of the city (A1, A2, A3).

In Rotterdam, the intended outcome is for carsharing to become part of the mobility system and contributes to the mobility transition of Rotterdam (Gemeente Rotterdam, 2021a). The intended outcome corresponds with the most common outcome in managerial governance;

increasing the experience of the private sector in the public sector (Pierre, 1999). However, scaling up carsharing in Rotterdam is challenging. A common view amongst interviewees was that this has to do with the parking costs, the influence of local politics, and a high percentage of car ownership in Rotterdam (B1, B2, B3, D1, D2).

Finally, in Amsterdam, the intended outcome of carsharing, as formulated in the policy goals of the municipality, is to facilitate more shared cars in the city. The vehicles of the private providers in the public transport sector can be identified in the managerial model (Pierre, 1999). However, as shortly mentioned, the concept of the shared car is not new in Amsterdam, and Amsterdam is further advanced than other cities in its policy regarding shared cars (A3, B1, C1, D1, D2). With 2,500 cars compared to 230,000 private cars, the carsharing concept in Amsterdam is a niche market. Carsharing is a relatively small market and the concept is in its infancy (C1, C2). The municipality of Amsterdam, like other municipalities, is in the experimental phase, looking for ways to stimulate the use of shared cars and the role of the municipality in this (C1, C2).

To come short, the intended outcomes of all three cases correspond to the most common outcomes of the managerial governance model. Local municipalities are searching for ways to cooperate with market participants, creating policies and using different instruments.

5.2. Variances between cities

The results obtained from the preliminary analysis are summarized in table 5. From this analysis, it is clear that there are variations among cities in terms of the policies that have been implemented regarding carsharing. Turning to the role of businesses, this shows private companies appear in various forms in Rotterdam and Amsterdam than in Tilburg. In addition, the role of local government also shows variation from municipality to municipality. Interestingly, there are also variations in the variables related to different urban governance models. In the sub-sections below, the variances are explained using urban governance theory.

Table 5: Overview of cases

Case:	Tilburg	Rotterdam	Amsterdam
Policy	4-track policy and licensing system	De Rotterdamse Mobiliteitsaanpak Nota beleid en vergunningen deelauto.	Agenda carsharing, Monitor Autoluw and, Covenant Carsharing
Role of business	3 models; 1. Station-based round-trip 2. Station-based one-way 3. Personal vehicle sharing P2P-carsharing	All 5 carsharing models	All 5 carsharing models + individuals share cars themselves

Role of government	5 areas: Taxation, parking and access to rights-of-way, planning processes, data sharing and accessibility and equity issues.	6 areas: Taxation, parking and access to right-of-way, signage, and advertising, planning processes, issues, data sharing privacy and standardization, and accessibility and equity issues.	7 areas: Taxation, parking and access to right-of-way, signage and advertising, multimodal integration, planning processes, data sharing privacy and standardization, and accessibility and equity issues.
Urban network governance model	Variables correspond with managerial, corporatist and progrowth governance models	Variables correspond with managerial and corporatist models	Variables correspond with managerial, corporatist and progrowth models

5.2.1. Capacity

The first variance; the municipality of Amsterdam is further developed in its policies on carsharing. In 2019 the municipality developed the Agenda Carsharing in October 2019, an agenda to make the city car-free, and in 2022 the municipality formulated the Covenant Carsharing in cooperation with the providers. In comparison, in Tilburg, there is no explicit policy for carsharing yet; there is only a licensing system (A1). Rotterdam has an overarching approach; the Rotterdam Mobility Approach (MRA) and a licensing system for shared cars (B1). Amsterdam is a highly urbanized area where public space is scarce, and it has massive issues in terms of housing. In Amsterdam, these issues have been relevant for a longer period of time because of the scarce space in the city (A2, B1, B3, C1, C2). Furthermore, the capacity of local government is a factor that explains this variation, which is related to urban governance (Pierre, 1999). According to Pierre (1999), understanding the capacity of local government is essential to understanding urban governance. Based on the interview data, more insight has been provided into the capacity of the local governments studied. Various interviews have indicated this to be the case: “The municipality of Amsterdam has more capacity and budget” (D2). “In Amsterdam, the team consists of 10 to 15 employees working on shared mobility” (C1). This can be compared with the cases of Tilburg and Rotterdam; “In Rotterdam, the team for shared cars consists of two people” (B1). In Tilburg and other small municipalities, this will probably be even lower (C1, B3). To conclude, the capacity of the local government is an explanatory factor for the variation among cities in their carsharing policies. This is related to urban network governance, because by understanding the capacity of local government, perhaps this can be strengthened through cooperation with the private sector.

5.2.2. Local politics and context

Another finding is the role of business is more prominent in Amsterdam compared to Rotterdam and Tilburg. One factor is the demand for shared cars, which is linked to parking fees. “Lower parking costs make people less inclined to give up their private cars and use shared cars” (B1, B2, D1). Local politics have a crucial role in this matter. The more right-wing parties advocate car freedom and do not want higher taxes for motorists. In contrast, more left-wing parties strive for car-free city centers, speed limits of 30 km/h, and fully electric transportation and often support higher taxes and parking fees. This is mentioned during the interviews: “It makes a huge difference whether a municipality has a greener (left) or red (right) coalition” (C2). Market parties notice this in cooperation with municipalities and the use of shared cars. During the interviews, the following was mentioned: “Higher parking costs and taxes result in higher use of shared cars, and people tend to give up their private cars earlier” (D1, D2). As mentioned, the municipality of Amsterdam creates preconditions for further growth through their parking policy through high parking fees aimed at deterring car ownership and use (Gemeente Amsterdam, 2019).

In short, the differences in parking costs in a city affect the demand for shared cars, making providers less likely to offer vehicles there. These results not only show insights regarding the role of business but relates to urban network governance. In the literature, Pierre (1999) argues that the local context can significantly influence national politics and traditions. The context of the three cases varies in several aspects, including the local context of Rotterdam. “Rotterdam is a harbor city and, in the harbor, one sees a completely different type of transportation than in the center of the city. This makes it complex for shared car providers because it is unclear what role shared mobility can play in the harbor” (B3). Furthermore, car ownership in Rotterdam is high; in 2019, 76% of the citizens of Rotterdam have a driving license, 57% own a car, and about 70% of the households have a car (Gemeente Rotterdam & de Graaf, 2019). This is high compared to Amsterdam, where the car ownership rate per inhabitant is 0.23 (Gemeente Amsterdam, 2021b). The interviewees expressed: “Look in Amsterdam, I think you have 68% or 69% of adults have a driving license and only 30% of that group have their car. Moreover, in Rotterdam, both those percentages are much higher. So that means it is harder to sell the shared car because that means people have to give up their own cars first” (D2). This makes scaling up carsharing in the city complicated (B2, D2). Furthermore, the local context of Tilburg. In North Brabant, including Tilburg, municipalities are located further apart, and the environment is less highly urbanized; therefore, having a car is more standard (A3). In addition, consumer awareness is of great importance for the success of shared cars. In Tilburg, the mentality of the user can be an explanatory factor for difficulties in realizing shared cars. As one interviewee said: “Yes, you may be able to create shared mobility, but you must realize that the Brabander is a realist. That is why they might be less open to it than if they lived in Amsterdam” (A3).

All in all, variations in the role of businesses can be explained by the influence of local politics on parking costs and taxes, and the local context in which the degree of urbanization and the mentality of consumers plays a fundamental role. More specifically, it is shown local politics and the context significantly influence urban network governance and thereby explain variations among cities regarding the realization of carsharing.

5.2.3. Nature of the carsharing phenomenon

Thirdly, variations in the roles of local governments concerning carsharing. In Amsterdam, the government has a more prominent role, which can be explained by the capacity of the local government, as mentioned earlier. However, municipalities are searching for the right "role" in establishing carsharing in the city (A1, B1, B2, B3, D1). None of the municipalities fulfill the government roles in the nine areas, as defined by Shaheen et al. (2016). One explanatory factor is that shared mobility is in its infancy and is a niche market compared to the total number of cars (A1, A2, A3, B1, B2, B3, C1, D1). The mobility transition, as the word indicates; mobility in the Netherlands is in transition. “Transition in mobility can take up to 20 to 30 years, during which consumers will have to change” (B2). Another mentioned factor is: “The discussion that is currently going on, and not only in the Netherlands; our mobility system is rather compartmentalized. We have public transport, which is a very clearer branch than we have cars, private cars, which is a branch. And then we have shared mobility, and the question is; what exactly is shared mobility?” (C2). It is challenging to place shared mobility on the public side at the moment; the system is not yet sufficiently designed for it. “The shared car concept has not yet been accepted as a common good, it is in the early stages” (C2). The concept is currently in development, affecting the realization of shared cars. This is visible in the group of users, at the moment, these are primarily the early adapters (B2, C2). This variation can partly be explained by the theory of urban network governance. The fact that the municipality of Amsterdam fulfills more tasks than the other two municipalities studied can be explained by the capacity of the local government, which is considered essential in the literature. However, the fact that local governments have not yet defined an exact role for carsharing because the phenomenon is still developing, cannot be explained by the current theoretical framework. Pierre's (1999) theory does not yet include anything about "transition or experimental phenomena".

5.2.4. Different urban governance models

Based on the analyzed variables of urban governance models defined by Pierre (1999), the characteristics of different models have been identified in the cases. The analysis revealed in the cities the composition of participants cannot be identified one-to-one as in the models, but it corresponds partly to the participants as in the managerial model. In addition, the case studies identified objectives and policy instruments corresponding to different urban governance models. Finally, the intended outcomes of all cases correspond most with the managerial governance model. Taken together, it can be concluded there is variation among cities with respect to key variables of different urban governance models. Based on the interview results, it can be concluded that this is because shared mobility, including carsharing, is in a state of transition, whereby objectives and main instruments to obtain these objectives are not yet completely defined. Building on the current literature, a fifth model was constructed which will be further elaborated on in the next section.

5.3. Experimental Governance

Based on the analysis, it can be concluded, that some factors are decisive for the variation among cities, which can be partially explained by the urban governance theory of Pierre (1999). Building on the current literature, and incorporating the interview data, a fifth model of urban governance can be constructed that is more experimental in nature (see table 6). In this new model of urban governance, the determining factors for the variations are addressed. The model can be seen as a descriptive ideal type for the realization of shared cars and not as an empirically exact model for urban governance in different policy sectors and countries. The model is specific to the urban mobility sector, which makes it an addition to existing models that are more relevant to other sectors. Experimental governance assumes sustainable cooperation between public and private actors, with the emphasis on an equal position for both parties. Whereby the private parties offer the services to users and local authorities integrate the services into existing structures. A variety of related perspectives were expressed: “And that comes together and I think you can channel it very well and make use of it” (B2). In addition, one provider indicated: “So yes, you have to do it as a team, and the municipalities have to realize that ultimately we have the means to achieve the goal they have in mind” (D2). This partly corresponds to characteristics of the managerial and corporatist models (Pierre, 1999).

In all cases, the informants reported that the overarching objective of carsharing is to reduce private car ownership and use, improve public space, reduce CO2 emissions, and keep the city livable and accessible in a sustainable way.

Another feature is the performance of experiments with shared mobility services in societies. One example of this is to make a street in a residential area car-free to show what less car ownership and use can do for the "livability" of a street or city. Data from experimental results, user data, surveys, and neighborhood information, and after that, making policy decisions based on these data. It is essential to monitor technological, ecological, and economic developments and retain space in the policy to adapt to these developments. Some interviewees argued that: “Ensure that you are on the edge of your organization and are open to all signals that you can pick up. And ensuring that you translate that into how we work on policy in the organization” (B1). “So, I think that is a very good development, to make policy much more data-driven. And I think that is a really big opportunity” (C2). And: “But I think that is the clue. To have space to be adaptive in your policy” (A3).

In sum, in experimental governance key variables from previous urban governance models have been canalized and new characteristics have been added to create uniformity in realizing carsharing at the local government level. Resulting in intended outcomes; cities can expand, both in terms of population and economically, in a sustainable way. These outcomes can be related to a number of statements from the interviews: “The trick is; growing in population, but not growing to the same extent in the number of owned cars” (A1). And: “Because ideally, you would like people to give up their cars and use shared cars, or make other choices and get rid of their private cars to free up public space” (B1) and finally: “The idea is that shared mobility contributes to that car-free and livable character because you can then also say that fewer people need a car. And that, ultimately, there will be more space on the streets and in the green areas” (C1).

Table 6: Experimental urban governance model. Based on Pierre (1999) and data obtained from interviews.

Model:	**Experimental governance:**
Variables:	
Participants	Business and governments in an equal position
Objectives	Increase carsharing and reduce private car ownership and -use
Instruments	Experiments and data-driven policies
Outcomes	Sustainable growth of cities in the long term

6. Conclusion and discussion

6.1. Conclusion

This present study aimed to investigate the variations among Dutch cities regarding the realization of carsharing services and how Pierre's (1999) model on urban network governance can help as an analysis method to explain these differences. For this purpose, this thesis attempts to answer the following research question: *To what extent can Urban Governance theory explain the variation among Dutch cities regarding the realization of carsharing services?*

In this thesis, carsharing is understood as; the temporary access to a vehicle without having to bear the costs and responsibilities of ownership (Shaheen et al., 2016). Carsharing has potential, given its advantages over private car ownership. Due to the nature of carsharing, with private companies operating in public areas, it is important to consider the role of local governments. By examining the differences in governance using the theory of urban network governance, it is possible to explain the variations among cities regarding the realization of carsharing. Through a series analysis of three case studies in a holistic view, supported by different theories, it has been discovered that there are variations among Dutch cities regarding carsharing. There are variations regarding the policies concerning carsharing, the role of businesses and local governments, and variables from different urban governance models that have been identified in cities. The main result is that the theory by Pierre (1999) helps to explain these variations by criticizing the capacity of the local government, taking into account the influence of local politics on parking costs and taxes, the context in which the degree of urbanization and the mentality of users, and the dynamic and experimental character of carsharing. However, based on the analysis, it can be concluded that some factors determine the variation between cities, not all of which can be explained by Pierre's (1999) theory. Pierre's theory (1999) is well established through descriptive research, but this study is more exploratory in nature. Building on the literature of Pierre (1999) and the interview data, a fifth urban governance model is constructed, wherein these determining factors are addressed. In this experimental urban governance model, public and private actors work together in an equal position, conducting experiments and using data-driven policies to increase the supply and usage of carsharing services.

From a scientific point of view, the present study provides valuable insights into the urban governance of local Dutch municipalities regarding carsharing and is a useful addition to the existing literature. From a societal perspective, useful insight can be derived by interested parties in the field, such as policymakers. In particular, future political decisions can be improved using the findings of the present research.

6.2. Discussion

6.2.1. Interpreting the results

The present study has provided insights into the variations among Dutch cities regarding the realization of carsharing services using urban network governance theory. Based on the collected policy documents and the interview results, the policy concerning carsharing in the cities was analyzed. Subsequently, consistent with the literature, the roles of private business (Machado et al., 2018), roles of local governments (Shaheen et al., 2016), and the characteristics of urban governance models (Pierre, 1999) were examined.

The results of this research show that there are variations in the policies concerning carsharing among municipalities. The results suggest that the policies concerning carsharing in Amsterdam are much more extensive than in Rotterdam and Tilburg. Secondly, the role of businesses and the supply of shared cars in Amsterdam is extensive, offering all modalities of carsharing. In Rotterdam, the five carsharing modalities are offered, but the supply is less. And in Tilburg, although three of the five carsharing modalities are offered, the supply and use are still nil. Thirdly, given the nature of carsharing where private businesses operate in the public domain, the role of local government is considered essential in realizing carsharing. The results of this research show that there are variations in the roles of local governments in the realization of carsharing. The most striking result is that although local governments want to stimulate carsharing, in none of the cases the local government fulfills all the government roles in the nine areas as defined in the literature of Shaheen et al. (2016).

Furthermore, given the nature of carsharing, the theory of urban network governance has been used to explain these above-mentioned variations. An explanation for the variation in policies concerning carsharing is presented by considering the capacity of the local government. This result may seem straightforward, but one cannot expect every municipality has the capacity to develop policies concerning specific modes of shared mobility. Nevertheless, cooperation with private parties can strengthen the governance capacity of local governments, which is also apparent in the managerial urban governance model. Second, an explanation for the variation in the role of businesses is given by factors of urban network governance; the influence of local politics on parking costs and taxes, and the local context of the city. This can be seen in the case of Amsterdam. An explanation for this was given in several interviews, namely that in Amsterdam the government is more left-oriented than in Rotterdam, and that therefore the realization of shared cars is higher on the agenda. This result explains why the supply and use of shared cars are higher in Amsterdam. Finally, the variation in the role of the local government can partly be explained by the capacity of the local government, as mentioned before. In addition, based on the interview results, another important explanatory factor for this variation has been identified, namely the transformative and dynamic nature of the carsharing phenomenon. The contribution of this present study is that the results show that this is due to the fact that carsharing is still in its infancy and not yet fully developed in the Netherlands.

Finally, variation is identified between cities in the characteristics of the different urban governance models defined by Pierre (1999). Based on the results, it is concluded that this is related to the fact that carsharing is in a transition phase, in which objectives, policy instruments, and outcomes are not yet fully defined. The variation may therefore not be fully

explained by the current theory of urban governance. This result seems somewhat self-evident, as the literature on urban governance was written around 20 years ago and carsharing is a phenomenon that emerged relatively recently. However, the results confirm that the theory as formulated by Pierre (1999) is still appropriate in the urban domain, as some results show clear correspondences with the characteristics of the governance models. In addition, in the real world, urban governance may resemble more than one of the four models, and different segments of urban governance may support different models (Pierre, 1999).

Connecting the current finding and building on the literature of Pierre (1999), a fifth model is constructed which is more experimental in nature and supports the mobility segment of the city government. This model relates to the other models of Pierre (1999) because it describes an ideal type of urban governance for a particular policy sector, namely shared mobility. Although the models of Pierre (1999) are not as specific, this model can be a valuable addition to aggravate governance challenges for the realization of shared mobility concepts in cities.

6.2.2. Methodological discussion

Furthermore, the present study also poses shortcomings. First, the findings may not present the entire Netherlands due to the sample size of three cities. The reader should remember that this study is based on three cases, and the results could differ if other cases with a different variety were examined. This makes it difficult to generalize the results, and the external validity is low (van Thiel, 2015). In an international comparative study, different variations between countries and cities can be identified. By increasing the sample size, the results can be tested among a more extensive and diverse sample (van Thiel, 2015). Further research is needed to make bold statements about the use of shared car concepts by consumers and how this is influenced by urban governance. A quantitative study can reveal this relationship, investigating urban governance as a moderating variable.

Moreover, it would be valuable for policymakers to conduct additional research on addressing the identified explanatory factors for the variances among Dutch cities. For example, it could be investigated how local municipalities can cooperate to organize shared mobility more on a regional or even (inter)national level.

Furthermore, this thesis provided new insights into the relationship between urban network governance and shared mobility. Building on previous theories and the data analysis of this present study a fifth urban network governance model is conducted; experimental governance. This model was reconstructed based on the data of this research, although the interviews were held with a selected group of eleven people. To increase the external validity of the study, more interviews could be conducted with stakeholders to increase the sample size (van Thiel, 2015). It is beyond the scope of this study to examine the model in practice. However, this would give policymakers in the field additional insights into how they can realize carsharing, and use it as an effective tool to create public space in urban areas. The experimental governance model that is developed in this study provides fertile ground for further research.

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Appendices

Appendix A: Overview of data source per case

Case:	Data source:
Tilburg	1. Policy rules: *Vergunningen en ontheffingen* (Gemeente Tilburg, 2022) 2. News article: N*ieuw beleid parkeren en deelmobiliteit* (Gemeente Tilburg, 2021) 3. Raadsvoorstel Actualisatie Beleid Parkeren en Deelmobiliteit (Gemeente Tilburg, 2021a) 4. News article: D*eelautosysteem Amber nu actief in Tilburg* (tilburg.com, 2022) 5. Vision document: *Gedeelde mobiliteit is maatwerk* (Provincie Noord-Brabant, 2018)
Rotterdam:	1. Report: *Rotterdamse Mobiliteits Aanpak* (Gemeente Rotterdam, 2020) 2. Policy notes: *Nota beleid en vergunningen deelauto's (*Gemeente Rotterdam, 2020a) 3. Rapport: *Deeltweewielers in Rotterdam* (Gemeente Rotterdam, 2021) 4. Website: Metropoolregio Rotterdam Den Haag; Deelmobiliteit (MRDH, n.d.). 5. News article: *Nieuwe Rotterdamse coalitie krijgt vorm* (Groenendijk & AD, 2022). 6. Survey results: *Rotterdammers over mobiliteit 2019* (Gemeente Rotterdam & de Graaf, 2019)
Amsterdam:	1. Report: *Amsterdam maakt ruimte, Agenda Autoluw* (Gemeente Amsterdam, 2019) 2. Report: *Agenda autodelen* (Gemeente Amsterdam, 2019a) 3. Policy report: *Convenant autodelen* (Gemeente Amsterdam, 2021) 4. Brochure: *Autodelen binnen de VvE*. (Gemeente Amsterdam, 2021a) 5. Report: Monitor Autoluw (Gemeente Amsterdam, 2021b) 6. Website: *Deelvervoer in Amsterdam* (Gemeente Amsterdam, 2022)

Appendix B: Interview Design

Dit interview vindt plaats in het kader van een onderzoek naar stedelijke netwerkmodellen in relatie tot het realiseren van deelauto's in verschillende Nederlandse steden. In mijn master thesis ga ik een case studie doen met drie cases: Tilburg, Rotterdam en Amsterdam. Ik ben hierin geïnteresseerd in rol van de lokale overheid, welke beleidsinstrumenten zijn ingezet, de samenwerking met private partners en eventueel verbeterpunten voor in de toekomst.

Voorafgaand aan het interview vraag ik u toestemming om dit interview op te nemen, dat ik het na afloop kan transcriberen en verwerken. De antwoorden en voorbeelden die u geeft zullen anoniem worden verwerkt in het interview. Mocht u het prettig vinden dan kan ik u na afloop het transcript toesturen en kunt u het lezen en opmerkingen plaatsen, alvorens het gebruikt wordt in de resultaten.

Inleidende vragen:

1. Wat is uw rol of de rol van uw organisatie?
2. Wat zijn de doelen in de stad/regio t.a.v. deelauto?

Het beleid:

3. Wie zijn er betrokken? Welke actoren? (Publiek-privaat)
4. Wat is de rol van de lokale politiek? Hoe merkt u die rol?
5. Wat zijn de (beleid)instrumenten/ welke (beleids)instrumenten zijn er ingezet?
6. Wat zijn de uitdagingen in de realisatie van deelauto?
7. Ziet u voordelen van deelmobiliteit/scooters?
8. Ziet u nadelen van deelmobiliteit/ scooters?

Uitdagingen en probleemfactoren:

9. Wat ging er goed in de realisatie/proces in de totstandkoming van deelmobiliteit in de stad?
10. Wat waren de verbeterpunten?
11. Hoe verliep het communicatieproces?
12. Waar zijn nog veel vragen over?

Controle vraag:

14. Als je het beleid opnieuw zou opstellen wat zou je dan anders doen?

Ik ben aan het einde gekomen van mijn vragen. Heeft u nog verdere toelichting of vragen voor mij?

Bedankt voor het afnemen van het interview.

Appendix B: Coding Scheme

Axial code:	Open codes:	Goal:
Policy	- Policy - Objectives - Outcomes - Effects - Policy instruments - Recommendations for new policy	Text part is coded when the speaker talks about the current policy of car sharing, what policy instruments have been used, what outcomes and effects it has had so far.
Role of government	- Role of government - Objectives - Policy - Examples	Text is coded when the role of local, regional or national government is mentioned, what the tasks and roles of this government are and certain examples mentioned.
Involved parties	- Participants - Collaborations - Communication - Politics - Role of organization - Role of government - PPP	The text is coded when referring to the involved actors, what this cooperation looks like, how the communication takes place, the role of local politics and public-private partnerships.
Problem factors	- Problem factor - Challenges - Questions - Problem - Recommendations for new policy - Risks - Examples - Research - Projects	Text is coded when discussing challenges and problems in the current policy of car sharing, collaboration with other parties, examples, outstanding questions, risks and so on.
Recommendations/ further research	- Research - Examples - Projects	Section of text is coded when referring to recommendations in future policies, research findings and projects.