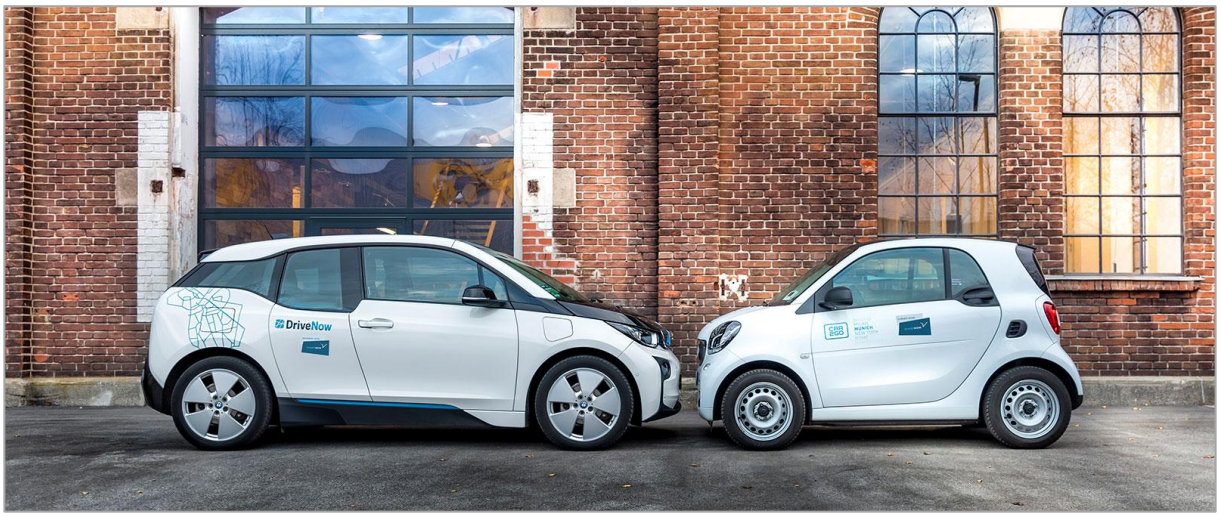

Master Thesis

Master in International Management/CEMS

The Future of Shared Mobility Services – A Case Study of How Cross-Sector Collaboration can Create More Sustainable Shared Mobility Services

Under the Direction of Dr. Ing. Martin de Bree

Co-Reader: Dr. Guido Berens

By: Jakob Schubert (Student ID: 412418js)

MSc Program: CEMS Master in International Management

Department: Business-Society Management

February 1st, 2020

CEMS
THE GLOBAL ALLIANCE IN MANAGEMENT EDUCATION

RSM Erasmus
ERASMUS UNIVERSITY

Preface

The study presents a snapshot of the shared mobility market in Amsterdam and Berlin around fall 2019. Therefore, due to the rapid development of the market and industry, regulations, companies and visions might have changed at the time of reading.
For any emerging questions, please contact me personally at jakob.schubert@icloud.com.

Acknowledgements

Being personally very interested into the topic of shared mobility, it was a pleasure to dive into the details and dynamics of the industry. I genuinely enjoyed setting out to better understand the industry's potential for sustainability, all the while linking it to existing academic theory. In this process, my thankfulness goes out to various people:

First, I would like to thank my supervisor Dr. Martin de Bree for his continuous advice and positivity. It was always incredibly helpful to discuss further procedures, implications of results or fine tune existing work. Second, my gratitude goes to my co-reader, Guido Berens, who has an impressive eye for the details and enormously helped me put structure to some lost line of thoughts. Third, a huge thank you to my family and friends for the constant support. The more than frequent Polak breaks would not have been that much fun without you and I would be far away from handing something in without our reciprocal progress exchanges. Finally, I want to acknowledge all the people I had the honor to interview for their incredibly interesting insights and the people that helped me get in touch with the participants. Without your commitment to free up some space in your busy schedules, this would not have been possible!

Key words: *Shared Urban Mobility; Car-Sharing; Scooter-Sharing; Bike-Sharing; Kick-e-Scooter-Sharing; Wicked Problem Theory; Sustainability*

Executive Summary

The present study uses a qualitative research approach to analyze cross-sector collaboration in the urban Shared Mobility Service (SMS)-industry. Due to – among other reasons – its infancy, the unclear responsibilities and unaligned solution approaches, the industry operates in a wicked problem environment. Wicked problems cannot be solved, but they can be tackled when approached in collaboration between the private and public sector. Today, cities – given the amount of people and the comparably small space they cover – have an immense power and responsibility to drive forward the fight against climate change. Thus, coordinating the emerging SMS-industry and its multiplicity of opinions depicts an opportunity to reduce a major reason for urban pollution: mobility. The (regulatory) development of SMS takes place at the interface of the public and private sector. Therefore, the present research develops a governance model that reduces the wickedness of cross-sector collaboration.

The emerging theory is based on a case study of two cities, Amsterdam and Berlin. In-depth interviews with a variety of stakeholders allow to fully explore the industry's dynamics. Interestingly, Amsterdam, known for its liberal stance, follows a much more regulative approach towards SMS than Berlin. In contrast, the German capital has only slightly regulated the shared mobility environment, providing operators with many liberties for development. The differences constitute an interesting context for analysis that generates unique insights. Consequently, a framework is sketched that portrays how an ideal cross-sector governance model could look like (see figure 5). The model's revelations can be summarized in three key takeaways.

First, the performance of the actors in the market must be strictly governed by the leading entity. The study's results underscore the importance of strict regulations to drive companies' sustainable development. Second, the regulations should incentivize collaboration – in the case of SMS, for example, via a Mobility as a Service initiative – and ensure that space for experimentation is not reduced. Therefore, private actors should proactively align with the leading public entity. Co-regulation, if built on transparency, not only ensures that opinions from private actors are incorporated in the design of regulations, but also that continuous monitoring of the operations is established. Third, since a system's vision sets the direction for all stakeholders, it needs to be ensured that the vision formulates an ambitious goal that all stakeholders agree with and can work towards. All actors will be held accountable by working

towards the achievement. If the dichotic interplay of regulation and experimentation can be safeguarded, the model is expected to successfully reduce a system's wickedness.

Since many of the world's major challenges, such as deforestation and climate change can be termed as wicked problems, the present study generates relevant insights in a more specific, smaller context. Precisely, complexity reduction can be assumed because the model incentivizes stakeholders to get together and orderly distribute responsibilities while aligning interests. Such an activity is predicted to generate agreements towards one sustainable urban mobility approach, reducing the interrelations with other wicked problems, for instance, the generation of urban emissions. Moreover, the close incorporation of private and public actors is expected to drive a common understanding of urban mobility's complexity. Ultimately, the model is judged by its impact on people's behavior: only a broad understanding of mobility's downsides can make people switch their current mobility habits. Trying to reduce the wickedness of the SMS-industry could be seen as a start for a broader mobility change.

Due to the fact that most cities design their own regulatory framework to coordinate SMS, the learnings are especially relevant for any municipality that is yet to develop or fine-tune its handling of the operators. While the model was designed in the realm of SMS, it is its ambition to be applicable to other wicked problem situations.

Table of Contents

List of Tables

List of Figures

1 Introduction

Rotterdam, The Hague and Amsterdam all face one common threat – the North Sea. More specifically, rising sea levels threaten the "low-lying country, in which 9 million people live below sea-level" (Mulder, Hommes, & Horstman, 2011, p. 888). Preventing the Netherlands from flooding can only be achieved in a global effort, in which all countries work together to reduce the effects of man-made climate change. In today's literature, climate change is classified as a super-wicked problem (Levin, Cashore, Bernstein, & Auld, 2012), a problem that is inter-connected with several other wicked problems. These are "issues that are difficult to define and can be assessed as either problems or opportunities" (The Partnerships Resource Centre, 2016). While humanity faces several challenges to combat climate change, reducing greenhouse gases (GHG) is one of the main obstacles. Although the ways to tackle this seemingly unsurmountable challenge are plentiful, transforming the transporting system is especially interesting because of the industry's high emissions of non-C02 greenhouse gases (e.g. nitrogen oxides), which are considered to have strong short-term consequences (Raf et.al, 2014). Already 25% percent of the European GHG are emitted by the transport sector, mainly driven by growing metropolitan areas (European Commission, 2019b) and it is the only "societal sector where C02 emissions are still rising" (Jeekel, 2016, p. 9).

Besides the polluting effect of urban mobility, increasing amounts of vehicles starkly add to congested traffic. In 2018, congestion alone led to 1.35 million road traffic injuries worldwide (WHO, 2018). While the EU 'only' registered 25'058 deaths in 2018, it is missing its reduction targets by more than 20% (ETSC, 2019). Additionally, congestion is a major cost factor for cities: Bouton, Hannon, Knupfer and Ramkumar (2017) discovered that urban congestion costs more than 1% of the global GDP. Thus, in order to increase urban safety and decrease costs, new mobility solutions can alleviate the problem.

Given that in 2030, approximately 80% of Europe's population will live in cities (European Environment Agency, 2013), cities offer a grand opportunity to change transporting behaviors and thereby reduce GHG. Only integrating various mobility forms into a seamless mobility system in 50 global metropolitan areas has the potential to positively affect 500m people, by reducing pollution and improving safety – benefits worth $600bn (Bouton, Hannon, Knupfer, & Ramkumar, 2017). This can be achieved if less vehicles that are used more efficiently, existed, and further emission-free mobility alternatives are offered. What sounds simple in

theory, requires a change in the mentalities of today's consumers and collaboration on various levels – from society to political decision makers.

Many urban areas already offer a range of mobility alternatives, numerous centered around sharing. Car-sharing, scooter-sharing and bike-sharing in its various forms start to become an accepted and frequently used transport choice of a citizen in the 21st century to quickly get from A to B (Drápela, 2015). While the quantity in Europe's metropoles seems to be sufficient to satisfy citizens' demand, sheer quantity does not create a more sustainable form of transport yet. On top of that, for a society-wide accepted solution, public transit needs to be included. Additionally, many people are still hesitant about the added value of some shared services (Nikitas, 2019), as current bike- and scooter-sharing offerings seem to appear at every corner of bigger cities, often congesting sidewalks and market places rather than reducing private means of transport (Schönberg, 2018). Hence, cities now have to develop governance capabilities to tackle the wicked problem of shared urban mobility and eventually harvest its benefits.

Developing a transition idea maximizes the return because many key mobility trends are interconnected (Bouton, Hannon, Knupfer, & Ramkumar, 2017). Growing shared mobility usage not only incentivizes a rise in public transport utilization, but also favors the electrification of vehicle fleets. The latter is due to the fact that "higher utilization [of vehicle fleets] favors the economics of electric vehicles" (Bouton, Hannon, Knupfer, & Ramkumar, 2017). Taking all of this together and linking it to the fact that cities face increasing urbanization, underlines the opportunity that comes with a governance system that is prepared for the mobility transition.

Similarly, the people-driven movement for a cleaner and more sustainable future, headed by today's youth, grows in numbers and powerful supporters (Sengupta, 2019). Society's interest in the future of the planet is greater than it has ever been: grassroot movements, through demonstrations and referendums have the power to affect politics. Politics and new policies impact products and the expansion plans of mobility companies. Thus, people address governments and municipalities to act in their interest in order to implement policies that drive GHG-reducing measures (Sengupta, 2019).

1.1 Research gap

It becomes visible that public and private sector are involved in a solution finding approach. Howard W. Buffet and William B. Eimicke (2018) claim that only the collaboration between companies, governments and community is the source of "more equitable and inclusive solutions" that can lead to social change in the field of urban mobility and beyond. Businesses need to provide sustainable products and services, governments need to regulate markets by, for example, setting incentives that drive behavioral changes. All the while, society is the power that forces the other players to act. Such cross-sectoral interaction delineates social challenges, which can – if notably difficult to tackle – be termed wicked problems. Knowing the importance of well-functioning cross-sector interactions, humanity needs to find ways to better understand and improve them.

Due to its infancy, the SMS-industry is still highly unregulated and scarcely studied with regard to its intra-industry's collaboration. Thus, it depicts an ideal context to explore from an academic and practical stance. Many regulations still have to be developed and implemented until a broadly accepted regulatory frame for a plurality of cities is established (Roland Berger, 2018). Currently, various cities in Europe notice that cooperation between public and private sector is required to regulate the emergence of novel services, such as bike-sharing and kick-e-scooter sharing. Therefore, cities provide interesting cases for cross-sector analyses. Since it can be assumed that the growth of SMS is undeniable (McKinsey, 2017), their urban development needs to be driven alongside a sustainable roadmap. The research gap is constituted by the little knowledge of how such a transformation in a wicked environment could be governed by cross-sector collaboration.

1.2 Research objective

In the realm of this thesis, four means of shared mobility are chosen and analyzed individually and in conjunction (see section 2.1 for the selection reasoning). Understanding what differences and similarities between the services' aspirations exist, helps draw a less fragmented picture of the business requirements, their motivations and opportunities to provide more sustainable urban mobility. Coupling such insights with the mobility plan of a local government and the demands of society uncovers the dynamics at the interface of public and private sectors. Therefore, a case study design with Berlin and Amsterdam as the entities of analysis is chosen

to reveal different settings of how public and private sectors can engage with each other and to finally delineate a governance model that supports successful cross-sector collaboration.

Through the use of a qualitative research approach with in depth-interviews, the research aims to fully explore the complex topic and generate new insights about wicked problems. It is the study's goal to generate new theory of how a governing system that drives sustainable organizational development should look like. Herewith, public and private management gain additional insights of how to deal with wicked problems. More precisely, the present study reveals an option about an ideal interaction of the actors in a complex environment and which structures are needed to successfully tackle wicked problems. As such, an application of the emerging framework is expected to generate broader alignment and understanding among stakeholders in their quest to tackle wicked problems. Therefore, the following research question is developed:

How can a cross-sectoral approach help organizations develop in a more sustainable way[2]?

This translates into the following sub-questions (SQ):

SQ1: What factors can motivate SMS-companies to engage in sustainability increasing partnerships with…

SQ1.1 … other SMS-companies?

SQ1.2 …municipalities?

SQ2: How can regulatory policies increase companies' efforts to transform towards more sustainable SMS?

SQ3: What effect does societal interest in sustainable, smart mobility have on the influence of regulatory policies on shared mobility services?

1.3 Relevance

Academic Relevance: The results of the research intend to deliver new insights into cross-sectoral collaboration within a wicked problem. Various articles have called for or seemed to lack an application of the theory to an example, looking precisely into the dynamics of the

[2] The definition of 'sustainable' is left to the respective system (city), recommended in the realm of this thesis: reduction in GHGs, traffic congestion and oversupply/ waste

different sectors (van Tulder & Keen, 2018; van Tulder & Pfisterer, 2013; Janasz, 2018). Urban SMS provide an extremely interesting application given the sector's novelty and importance. Thus, not only does the study provide new comprehensions for wicked problem theory, but also to its solution approaches. Additionally, due to its foundation in three Sustainable Development Goals (SDGs), Good Health and Wrell-being (Goal 3), Energy, Innovation and Infrastructure (Goal 9) and Sustainable Cities and Communities (Goal 11) (United Nations, 2019), it drives further understanding in the realm of climate change action in general (see section 2.3 for further explanation).

Practical Relevance: Car-, bike-, kick-e-scooter- and scooter-sharing services are on the rise. However, many of them are not synchronized with regulations from municipalities and their infrastructural design plans. Synching regulations with emission-free sharing services and fitting them to the existing infrastructure, convert cities to a more livable space, where its citizens and tourists feel more welcome and allow businesses to offer their services more profitably. Additionally, it is expected to be extremely valuable for cities that seek to increase their SMS to see how frontrunners in mobility concepts, such as Amsterdam, leverage the creativity coming from the private and public sector. Such a benchmark cannot only guide fellow cities, but also helps operators to coordinate collaboration decisions in their expansion processes to other cities. Moreover, Mobility as a Service (MaaS) providers gain additional insights into the motivations of their potential partners – shared mobility companies of all kinds.

1.4 Division of chapters

The study sheds light on the dynamics of cross-sector collaboration in the SMS-sector by analyzing how a cross-*sectoral approach can help SMS to develop in a more sustainable way.* It sets out to create a framework that portrays the dynamics between the three sectors and what options exist to collaborate successfully. Therefore, in chapter 2, the state of current literature is delineated, highlighting the theoretical model of wicked problems and diving into existing solution approaches. Chapter 3 outlines the methodology of the study, zooming into the research design. Subsequently, chapter 4 displays the findings of the interviews, underscoring similarities and differences between the two cases of analysis. Afterwards, chapter 5 discusses these findings, linking them to previously discussed theory and emerging concepts. Eventually, a framework materializes that synthesizes the interpreted information. Building on the framework, recommendations for the cities and the operators are given and limitations and future research delineated. Lastly, chapter 6 concludes the study.

2 Literature Review

The literature review provides a preliminary overview of academic literature and is divided into 5 sections. The first section delineates which mobility types are included in the study. The second section dives into the study's major theoretical concept of wicked problems and links it to the focus industry. The third section emphasizes the importance to understand wicked problems and their solution approaches in today's times. The fourth section describes existing theoretical solution approaches to wicked problems. Lastly, the current potential for cross-sector collaboration in the domain of urban shared mobility is portrayed.

2.1 Types of mobility services

In order to set a coherent scope, it needs to be clarified which SMS will be looked at in the span of this thesis. First and foremost, cars are included in the analysis. Among all SMS, the car-sharing market has the strongest growth potential, expanding at annual rates of 30% (Roland Berger, 2014). Additionally, road diesel and road gasoline are still the major source of transport energy consumption (European Environment Agency, 2013), therefore, a reduction in car-traffic provides large GHG savings. This is in line with the continuous electrification of cars and especially of car-sharing fleets (Dijk, Orsato, & Kemp, 2013).

Second, the paper looks at bike-sharing. Bike-sharing has seen an exponential increase in demand over the course of the last 15 years, being offered in 855 cities in 2014, compared to 14 in 2004 (Fishman, 2016). As studies in Barcelona, Lyon and Paris (and various other cities) showed, an average bike of a bike-sharing platform is used 6-8 times per day, mainly for commuting distances in the city (Fishman, 2016). Moreover, biking provides an emission-free source of commuting. Third, electric scooters and electric kick-e-scooters have developed as new means of transport, therefore, they are included in this study. Kick-e-scooter numbers tripled from 2017 to 2018, being used by an estimated 1.8 million users worldwide with individual firms, such as Lime, receiving investments of up to $765 millions of venture capital (Schellong, Sadek, Schaetzberger, & Barrack, 2019). Similar to bike-sharing, they are being used for shorter commutes of four to five kilometers (Howe, 2018). In order to grasp the entirety of the SMS-types, most variations offered to private consumers are included and no difference between free-floating and station-based services is made (see table 1).

While these three SMS are included, other services such as aviation mobility services and ride-hailing are excluded. The former is excluded due to its novelty. Most firms, such as Lilium

from Munich operate prototypes and have no customers yet, while still assessing where a pilot should be implemented (Perry, 2019). Additionally, their business model is similar to the characteristics of a taxi, which are by definition not a shared service. While ride-hailing services change that paradigm slightly, they do not provide the flexibility that car-sharing options offer, nor do they share the individuality that comes with driving a car, bike, or scooter yourself. Hence, to focus on similar services and in order to prevent colliding with varying responsibilities, when approaching NGOs and municipalities, they are excluded from the scope of this thesis.

	Car-sharing	**Scooter-Sharing**	**Bike-Sharing**	**Kick-e-scooter-Sharing**
Types (included)	Free floating, station based	Free floating	Free floating Hub-centric	Free floating
Speed	Depending on street limit	25-50 km/h depending on jurisdiction	Unregulated	~20 km/h depending on jurisdiction
Average distances	>5km	~4-6km	~3km	2-5km
Customer Requirement	Valid driving license (≥18 years)	Helmet and valid driving license (≥18 years)	≥16 years old (depending on jurisdiction)	≥18 years old (depending on jurisdiction)

Table 1: General differences among included types of SMS; Source: Howe (2018), Fishman (2016), ShareNow (2020), Felyx (2020)

2.2 Wicked problems

In order to arrive at the multiplicity of transport options a citizen has today, the mobility sector went through a long-ongoing transformation process; from the turning away from horses at the beginning of the 20th century to the mass introduction of the internal combustion engine (ICE), mainly due to Ford's Model T (Wells, 2013). Additionally, other forms of mobility were established, motorbikes and bikes became an ever-more present part of modern means of mobility. Not only did these means change the speed of commuting and the distance of vacation destinations, but they also established a form of freedom (Wells, 2013). New opportunities opened up for all kinds of people around the world: it helped people to look for jobs further away from their home town and therefore increased individuals' independence of local boundaries (Wells, 2013). Today, especially in urban areas, the entire variety of mobility means

becomes visible and cities face the grand challenge to reduce their emissions while increasing efficient mobility options. This challenge is extremely complex and can be defined as a wicked problem.

What are wicked problems in general? "From a change perspective, wicked problems are defined by dynamic, interconnected issues that influence and are influenced by complex systems in which institutions, such as nations, oil companies, and utilities, are important actors" (Waddock, Waddell, & Dentoni, 2015, p. 997). According to Rittel and Webber (1973), a wicked problem is "a planning problem [defined by a] plurality of objectives held by pluralities of politics [that] makes it impossible to pursue unitary aims" (p.160). Rittel and Webber (1973) continue by defining that wicked problems are never solved, but only constantly resolved. The challenge lies in the problem definition, as every problem definition provides a direction and therefore predicts a solution (Weber and Rittel, 1973). Thus, wicked problems can be approached from various angles, but not a single best one exists (Rittel & Webber, 1973). The Partnerships Resource Centre (2016) has depicted ten criteria to define a problem as wicked. Going through all ten criteria at the hand of the present context delineates how wicked problems are composed. Therefore, the following question is posed: How can an integrated urban mobility solution which transports large parts of society, while reducing congestion and urban transport's emissions, be developed?

First, urban mobility is highly symptomatic. Meaning it is a symptom of various other wicked problems. For instance, increasing amounts of (city) travels (Pulina & Cortés-Jiménez, 2010). Nowadays, travelling is accessible for growing amounts of people, leading to a rise in the number of people in cities that, not only want to get from A to B, but also choose different means of transport. Additionally, global markets increase the need of corporate personnel to travel between cities and countries, requiring urban options of commuting. However, higher urban mobility, in the current shape, also leads to a further increase in oil consumption to propel cars and resource exploitation to build cars.

Second, the problem is interrelated with other (wicked) problems. Several individual mobility problems lead to the entirety of the urban mobility challenge: What is the right amount spent on public transit? Can private transport providers supplement or substitute public transit? How can urban emissions be reduced? How can cities regain and recreate public space?

Third, it is a highly urgent issue. If we cannot reduce CO2 emissions in the very near future, emissions will continue rising which will eventually lead to a rise in sea levels by more than 0.9 meters by the end of the century (IPPC, 2019). Thus, urban mobility is highly continuous and cannot be abruptly stopped, signifying that society needs to act upon the increased emissions now before it is too late.

Fourth, various non-mutually exclusive, nor collectively exhaustive solutions exist. For instance, municipalities and governments can decide to regulate traffic via regulations and incentives (Haugneland & Hauge, 2015). They can decide to drastically subsidize and expand public transport, incentivizing citizens to abstain from private means of transport. Moreover, connected shared mobility from private organizations have the potential to solve increasing urban mobility pollution by collaboration.

Fifth, a high clarity of the consequences of not addressing the problem exists, as approximately 93% of European citizens are aware of the causes and effects of climate change (European Commission, 2019a). However, few cities act fast enough and decisively – a psychological barrier to change the proven infrastructure seems to exist (Stern, 2018). Therefore, denial of responsibility carves out to be more and more of a threat.

Sixth, the problem is relatively unique. While similar problems, as for example in the energy and aviation sector exist, both sectors are very different to road transport (European Environment Agency, 2018).

Seventh, the number of competing explanations for solutions is high. Today's literature is still controversial about the actual net effect of shared mobility services – especially car-sharing – for the environment. While Finkorn and Müller (2011) show, at the hand of Car2Go that a city's car usage is indeed reduced, Fox (2019) found opposing results, that point towards higher traffic congestion and therefore more GHG.

Eighth, there are plenty of approximations to assess the magnitude of the problem. For instance, Janasz (2018) tested in various simulations whether a reduction in the number of cars is possible and what the traffic's current effects on congestion and pollution are. While Jansaz (2018) found ways to decrease car ownership by a factor of ten, it does not depict an ultimate test,

since new ways need to be found to deal with the increasing streams of passengers or commuters with other means.

Ninth, a vast amount of different solution approaches exists and municipalities are open minded towards new approaches (Bouton, Knupfer, Mihov, & Swartz, 2015). While many cities are already deploying bike-sharing, car-sharing and scooter-sharing, in June, the German Bundestag additionally opened German cities to kick-e-scooters (Bundestag, 2019). It remains unclear how all these types of transport should be combined and what ends up being the most sustainable offer. Various papers of the European Commission illustrate the awareness of the problem and the debate of solutions (European Commission, 2019b; Franckx, 2016). In general, society seeks a large offer of efficient, low-cost commuting options (Willsher, 2018). However, as first analyses show, only small complementarity potential with public transport exists (Ceccato & Diana, 2018). Thus, many approaches exist, but no ideal solution prevails.

Tenth, given the previous explanations, there is a high willingness of stakeholders to become part of the solution. Businesses can profit, governments need to decrease pollution, and society is increasingly demanding better-connected transport options.

The Partnerships Resource Center (2016) proposes a scoring mechanism for wicked problems, classifying the individual characteristics from low (1) to high (5). Therefore, as displayed in table 2[3], the author scores the challenge of transforming urban transport, medium to high (3.9) on the wicked problem scale. In total, at the hand of the distinguished factors, the development of urban shared mobility within an integrated urban mobility solution can be defined as a wicked problem.

Basic Characteristic	Reasons	Score
1. Symptomatic	New mobility solutions are a symptom of: - Increased traveling to cities - Companies increasingly working globally - Increased resource exploitation (building material, oil consumption)	5
2. Interrelated	- The issue is interrelated with other wicked problems	4
3. Continuous	- Cities are major emitters of GHGs	5

[3] 1 indicates a low factor for a wicked problem; 5 indicates a high factor for a wicked problem. The score was reached by a personal assessment of the researcher.

	- New studies of the IPPC underline how devastatingly fast the planet moves towards an irreversible future	
4. No moral or optimal solution	Various solutions, neither being optimal, exist: - Subsidized (or free) public transport - Incentive-setting for different types of cars or bikes (tolls, parking, bus-lane usage) - …	4
5. Denial	- 93% of Europeans believe in climate change, thus, awareness of consequences is very clear - But many cities still do not act decisively enough	3
6. Unique	- Aviation- and shipping-sectors face similar challenges, but the context is much more complex	3
7. Understanding	- Several competing explanations environmental net-effect of sharing-solutions, especially car-sharing exist - In general, they are rather seen as advantageous	3
8. Ultimate Test	- No ultimate test, but several simulation and assessments of shared urban mobility-solutions exist, e.g. assessing whether a car-reduction by factor 10 in cities is possible (Janasz, 2018)	4
9. Approaches	- Plenty of solution approaches exist but it is difficult to impossible to depict which combination is ideal	4
10. Responsibilities	- Businesses emerge that can profit from the sharing-trend while offering environmentally friendly means of transport - Society expects cleaner cities and pressures governments - Governments are pressured by society and global standards and therefore need to change regulations	4
		Total: 39 | **Average Score:** 3.9

Table 2: Assessment of problem wickedness. Source: adapted from The Partnerships Resource Centre (2016)

2.3 The importance of wicked problems

When talking about today's major challenges, literature and politicians alike tend to reference the United Nation's (UN) SDGs that want to "meet the urgent environmental […] challenges facing our world" (United Nations Development Programme, 2019). Reaching these interrelated goals decide upon humanity's future and is closely related with finding a solution

to wicked problems. Looking at the previously given definition of wicked problems and their distinguishing complexity, it becomes apparent that many of today's climate-related problems can be considered wicked problems or super-wicked problems (Levin, Cashore, Bernstein, & Auld, 2012).

For instance, the deforestation of the rain forest is the result of a myriad of factors. Increasing meat consumption, leads to an increasing demand in animal-fed soy, which finds perfect growing conditions in the humid climate of the rain-forest (Spring, 2018). At the same time, special woods in the rain-forest (e.g. teakwood) are demanded mainly by Asian countries whose citizens join in the growing global wealth (Kukreti, 2017). While this only presents two reasons for the deforestation, it already shows that various actors and stakeholders with completely different ambitions are involved in the causation of a wicked problem. Although urban mobility also is a cross-sectoral problem, it does not necessarily span borders. Hence, a solution does not include an adaption to several jurisdictions or cultural differences. Thus, theoretically, regulating urban SMS could be coordinated more easily than deforestation. While the level of difficulty remains to be assessed in hindsight, it can be assumed that understandings in one, smaller wicked problem, provide large insights into potential solutions of another wicked problem, possibly even super-wicked problems, like deforestation. Therefore, the study at hand aims to increase the understanding among a specific wicked problem, generate a holistic learning and by that help tackle various other social challenges. This is in line with the topic's interrelation, as sustainable urban transport is directly linked to three SDGs: Good health and well-being (Goal 3), Energy, Innovation and Infrastructure (Goal 9) and Sustainable Cities and Communities (Goal 11) (United Nations, 2019).

2.4 Solution approaches to wicked problems

Having seen the importance of wicked problems and the difficulty to find a solution for them, existing solution approaches need to be evaluated. Looking at three concepts more in detail, rough solution approaches for wicked problems and their cross-sectoral relevance can be identified. Additionally, all three have pointed towards necessary supplementary research.

- *Cross-sector partnering spaces:* While per definition, a wicked problem is never solved, van Tulder and Pfisterer (2013) define a partnering space as an area where solution approaches can be developed. They delineate that making a sustainable development often requires a "trilateral relationship" (p. 1), between government, society and companies. While there is a limited amount of research analysis at the interface level (van Tulder & Pfisterer, 2013), they provide a taxonomy for the organizational fit in a partnering space.

Therefore, they establish a crucial holistic foundation of how to categorize collaboration between the three sectors. While their work is not essentially targeted at wicked problems, their specific focus can be seen as a well-defined proxy, as all wicked problems are situated at the interaction of all three players. According to them (2013), a full integration – "full trilateral fit (p. 18)" , where all parties act in the best interest of a common goal, is the space for the largest sustainable impact. In line with the majority of partnership literature, but contrarily to Wettenhall (2003) and Mintzberg (2015), the paper adopts the approach that cross-sector collaboration is a positive initiative that can bring upon immense change (Googins & Rochlin, 2000). Thus, in total, if executed correctly, van Tulder and Pfisterer (2013) point out that partnerships lead to value creation. However, they emphasize that the creation of well-functioning collaborations or partnerships is rare and that "more fine-grained governance studies" (p. 21), focusing on more detailed examples, are missing.

- *Complexity theory* is a theory that classifies challenging situations and how to deal with them (Snowden & Boone, 2007). More precisely, it roughly characterizes a complex situation as a setting where large numbers of "nonlinear […] interacting elements" (Snowden & Boone, 2007, p. 3) exist, no solutions can be imposed, the agents constrain one another over time and past history affects the present. Due to the plurality of agents, the strong path dependency of, for example, the automobile industry, and its unknown future, the development of urban SMS can be defined as a complex situation. In the following, three applications and solution approaches based on complexity theory are delineated.

  First, the theory emphasizes that even in complex environments, cause-effect relationships exist (Snowden and Boone, 2007). Thus, it is pointed out that large group methods, situations where the stakeholders of a whole system are involved to find a solution for change (Shmulyian, Bateman, Philpott, & Gulri, 2010), can provide answers and structure to challenging situations. Hence, in line with the previous solution approach, stakeholder engagement is proposed. A large group method, according to Shmulyian, Bateman, Philpott, and Gulri (2010), can for example follow a fourfold approach where, (1) the stakeholders have to discover "their organization's core competencies" (Shmulyian, Bateman, Philpott, & Gulri, 2010, p. 191). (2) They "envision opportunities for positive change" (Shmulyian et. al, 2010, p. 191). (3) They design the changes for the respective organization's systems, strategies and cultures and lastly, (4) "implement and sustain the

change" (Shmulyian et. al, 2010, p. 191). Seeing a complex situation as a wicked problem, a reason to analyze cause-and-effect relationships to envision opportunities for positive change at cross-sector interactions seems to emerge, providing a chance to facilitate the understanding between the sectors.

Second, while large group methods specifically deal with complexity among individual actors, factoring in complexity theory on a more holistic dimension can help prepare systems or entire organizations for complex environments or situations. Ruhl (1997), for instance, underlines the importance of thinking of environmental law as a complex adaptive system. Ruhl (1997) posits that our current "framework of environmental law […] is dictated by uniformitarianism" (p. 940), where causality is defined by linearity and decisions are based on a snapshot of the environment. Instead, complex environments and their conditions constantly change and laws that were designed only for a specific status quo will become outdated (Ruhl, 1997). Environmental Law can be revolutionized by adhering to three principles: designing policies based on *sustainable development*, building processes based on *adaptive management* and measuring performance based on *biological diversit*y (Ruhl, 1997). As such, environmental law should drive a process of change that balances "the exploitation of resources, the direction of investments, the orientation of technological development and institutional change to meet human needs" (Ruhl, 1997, p. 993). Therefore, an adaptive approach that strongly relies on the concept of experimentation and an evaluation metrics based on biological diversity complements the policy principle. According to Ruhl (1997), implementing such a non-linear, causal approach that relies on iterative evaluation, allows to account for complexity.

Third, not only the design of law can learn from complexity theory, also individual organizational entities can profit from the application of complexity theory. Schneider, Wickert and Marti (2017) describe how collaboration provides an opportunity to reduce environmental complexity. Specifically, forming collaborations that can range from industry roundtables to joint ventures build collaborative complexity (Schneider, Wickert, & Marti, 2017). As the amount of complexity increases with the number of actors, often increasing internal processes is not sufficient or is even redundant. According to Schneider, Wickert and Marti (2017), forming a cooperation exhibits upside potential for organizations in complex environments to gain a competitive advantage.

In sum, application 1 and 3 rely on collaboration. While application 1 specifically describes how actors should get together, application 3 specifies how long-term collaboration inhibits advantages. In contrast, application 2 is an example from the legal realm that underlines how static the design of current environmental law is and in turn proposes to incorporate constant adaption and clear performance evaluation in lawmaking for complex settings. Overall, to deep-dive into the complex SMS-environment, there emerges, not only a need to analyze the dynamics of and reasons for collaborative engagements between several parties, but also an urge to understand the power of experimentation and the necessity of evaluation.

- *Designing complexity-sensitive Theories of Change (ToC) for Cross Sector Partnerships (CSP):* The work by Van Tulder and Keen (2018) extends the existing insights about CSPs by establishing guidelines to make CSPs more sensitive for complexity and thus less prone to fail. Van Tulder and Keen (2018) underline the importance to provide stakeholders of a CSP with time to get used to each other and to understand the complexity of a wicked situation. From there on, the CSP needs to constantly configure the partnership and learn from experiences. The CSP's ease of development facilitates the type of ToCs that are set throughout the initiation of the partnership. Thereby, it is important for both partners to fully align on a common vision and mission. The more aligned the ToCs are with the complexity of the situation, the more likely the CSP is to succeed. Systemic change, also defined as a third-order change is required when building coalitions to combat climate change (van Tulder & Keen, 2018). Hence, the authors emphasize the importance of full goal alignment across all actors to tackle wicked situations like the sustainable development of urban SMS. As Van Tulder and Keen's (2018) work builds on a very conceptual argumentation, it misses out on a precise problem application. The present study sets out to shed light on the exact workings within a cross-sector collaboration that faces a systemic change.

Taking it all together, three solution approaches are considered specifically important in the scope of the study: first, partnering spaces; second, complexity reducing concepts such as large group methods, collaborative complexity and in the legal realm adaption of environmental lawmaking; third, complexity-sensitive ToC in CSP. All three approaches not only justify the importance of cross-sector partnerships and collaborations, they also underline that only a multi-stakeholder approach provides a solution in a climate-related problem. However, while

they will lend helpful categorizations and classifications for the holistic understanding of the research, they seem to lack a grounding in a relevant example. Thus, this study sets out to bring more light into the cause-effect relationship within a specific example that can then be taken to a more theoretical level.

2.5 Relation to urban shared mobility services

In order to understand the complexity of urban SMS, their major downsides and upsides need to be highlighted. Franckx (2016) defined those challenges as GHG-emissions and traffic congestion and since the upcoming of bike-sharing, resource exploitation or waste was added (Schönberg, 2018). Delineating each one individually, helps to position the individual SMS within the city landscape and provide a foundation for current cross-sectoral solution spaces.

2.5.1 Urban mobility challenges

GHG-emissions: Reducing GHG is a major challenge for urban areas all around the world. In the last years, multiple European cities, such as Stuttgart, had to limit personal transport in the city centers, due to dangerous levels of N0x emissions (City of Stuttgart, 2019). While SMS grow in demand, the current offer of car-sharing is not fully emission-free yet, nor does it reduce private car usage. A first step is to include more electric vehicles (EVs) into the current fleets of car-sharing companies. This comes with various advantages. First, in several European cities, such as Oslo, ICE-cars pay a fee for entering inner-city areas (Visit Oslo, 2019). Second, EVs are 3.5 times more efficient per kWh than ICE-cars, which is among other factors a manner of reducing their operating costs (Alhajii & Lewis, 2019). Third, and most importantly, they have zero N0x and C02 emissions (Alhajii & Lewis, 2019). While that does make them financially more viable and in in the short term more sustainable, the batteries' dependence on lithium and cobalt and the difficult recycling of batteries has other harming impacts on the earth's climate and can pose serious threats in the long-term (Campagnol, et al., 2018).

Congestion: Closely related to city pollution is the dramatic increase of congestion, caused by a rise in private car numbers, in today's metropoles. In Switzerland, 85-90% of all traffic jam hours are observed in urban areas (Credit Suisse, 2014). In his book Paradigm Shift of Urban Mobility, Janasz (2018) delineates how the average occupancy rate of a car for work traffic in Switzerland is 1.12, while an average car has 5 seats. He postulates that ride-sharing can hypothetically decrease the number of cars needed for work commuting by factor 4.5. However, at the moment cars don't only pollute but also require space for parking. Large amounts of urban space get lost for parking alongside the street and outdoor parking in front of, for instance,

supermarkets. Bike-sharing and scooter-sharing provide an alleviation to increasingly congested inner cities (Schellong, Sadek, Schaetzberger, & Barrack, 2019). The required space for both means of transport is significantly smaller than that of cars, and they are emission-free. Additionally, a mix of electric power and self-powered transport does not only help to target warmer cities, but also attracts different age groups (Anzilotti, 2019). Nevertheless, overly high numbers of e-scooters and bikes can lead to a different kind of congestion – on sidewalks (Schönberg, 2018). Therefore, integrating car-sharing, bike-sharing, scooter-sharing and kick-e-scooter sharing, in order to be aware of other companies' practices, might provide a solution that counteracts congestion. It requires a coordinating entity that regulates the expansion of the individual SMS and establishes a regulatory frame for the use of public parking space. Distinctly allocating space to SMS not only liberates public space from disorder, but also reveals opportunities to create green spaces (Bouton, Knupfer, Mihov, & Swartz, 2015).

Waste: Car-sharing offers, due to the products' size and value, do not need to expect strong forms of vandalism. Bike-sharing and kick-e-scooter, however, face significant amounts of vandalism, due to operators' oversupply (Roland Berger, 2018). A bike-sharing boom in European cities since 2017, ignited by Asian firms, led to extremely high numbers of sharing bikes and scooters on the streets of various European cities (Schönberg, 2018). This caused customers to maltreat these sharing offers, creating immense forms of waste. Not only were bikes and scooters broken, but also did the oversupply lead to a pollution of natural urban environments, such as rivers and lakes (Roland Berger, 2018). While the offerings' positive externalities cannot be denied, cities still require a definite concept of integration.

2.5.2 Current cross-sector understanding

Being aware of sustainable SMS' downsides and upsides provides an overview of the complexity of the industry. Although, literature has not taken such an application to look at wicked problems yet, other researchers, as for instance Jeekel (2016), navigate towards a cross-sector solution approach. They require companies and politics to take communities' opinions into account and work together in a tripartite fashion. On the pathway to a concrete MaaS solution, where all types of mobility, including public transport, can be accessed with one app, it is crucial to understand SMS-firms' complementarity potential and the power of regulatory policies. Ambrosino, Nelson, Boero, and Pettinelli (2016) delineate what a fully integrated mobility solution looks like, using Helsinki and the local firm Whim as an example.

While Ambrosino, Melson, Boero, and Pettinelli (2016) sketch a future, less emission-heavy solution, they do not fully outline the necessary steps to take for companies and governments to reach that final version. Current literature, in general, seems to lack a precise understanding of the cross-sector dynamics and a guide for how industry players can interact. While Docherty, Marsden and Anable (2018) analyze methods of governance that help transition to smart mobility and therefore provide great help to explore the role of regulatory policies, there is still no sufficient knowledge of what requirements the private sector has, and how the private and public sector can interact efficiently. Overall, three areas of action towards the development of a sustainable urban mobility concept and their current grounding in literature are looked at in detail.

First, looking at the challenge to reduce GHG, private sector complementarities are reviewed. In its report about the automotive revolution McKinsey (2017) underlined the importance of partnerships, specifically touching upon synergetic product offers, as a business model partnership, which helps capture additional value. Furthermore, the report pinpoints the difficulty in finding the right partner in an increasingly diverse mobility market, defining the exact partnership types among different business models and electing the right structure. Therefore, it is interesting to look across mobility services to analyze whether their business models offer complementarity potential and, if so, what a partnership could look like. For instance, Ceccato and Diana (2018) published a study that depicts strong complementarity factors between bike- and car-sharing in Switzerland.

Additionally, a Norwegian study by Julsrud and Uteng (2015) believes that car-sharing can, in the long-term, substitute private cars and go hand in hand with bike-sharing, which is expected to evolve to be responsible for a major part of inner-city transport. Less extreme, but with a similar notion, APTA (2016) depicts the results of their shared mobility research. Accordingly, shared mobility reduces private car ownership and complements public transit options, even incentivizing it while enhancing urban mobility in general. Additionally, APTA (2016) emphasizes the will of companies and municipalities alike to foster cross-sector collaboration. It remains to be seen whether kick-e-scooters and bikes can develop similar complementarities with other services and among themselves. Literature in the field does barely exist yet. One potential private sector solution seems to already carve itself out: Uber. Uber is on the way to offer a solution that integrates various modes of transport – ride-hailing, kick-e-scooters and bike-sharing (Hawkins, 2019).

Second, there is an increasing understanding that climate change fighting innovations can be incentivized by regulatory policies (Bumpus, Tansey, Pérez Henríquez, & Okereke, 2015). As regulatory policies are one of the three state powers, next to monetary and fiscal policies, they enable the decision maker to influence society's behavior (OECD, 2010). While regulatory policies are discussed controversially, often considered a barrier to competition, they are also, in line with the theory on wicked problems, expected to play an important role towards a more sustainable future (OECD, 2010). Regulatory policies "help to shape the relation between the state, citizens and businesses" (OECD, 2010) and are therefore a crucial aspect to consider when analyzing the future potential of shared mobility services. Additionally, the OECD (2010) underlines the importance of regulations to achieve sustainable growth.

Among the various means of transportations, Pankratz, Nuttall, Eggers, & Turley (2018) consider the government to be the responsible player to guard sharing mobility and individual transport in general towards a more sustainable future. Therefore, the scope of the thesis requires to understand the current impact that policies already have on individual businesses and which changes might be needed. Julsrud and Uteng (2015) expect municipalities (as the government) to use their fiscal regulatory power to successfully implement congestion charges. Thus, incentivization in the form of prizing can be even further developed to push mobility in a certain direction. Additionally, it is hypothesized that municipalities could establish themselves as a flexible transport agency (FTA), bringing together all local (and global) SMS under one digital roof to offer a MaaS-solution (Ambrosino, Nelson, Boero, & Pettinelli, 2016). Eventually, customers will decide whether a local, municipality-driven MaaS-solution wins over a global one. Nonetheless, all regulatory changes and product advancements need to be synchronized, requiring collaboration at the public-private interface.

Third, in today's western world – in theory – policies are mainly a result of the people's demands towards the government (Parvin, 2018). Therefore, it is crucial to understand what means of mobility citizens desire and whether they organize in grassroot movements to affect decision making. Thus, did the government create or change regulatory policies due to the pressure of the people? Patashnik (2003) explains that the citizens' general interest affects policymaking. The more people are affected by the topic in question, the higher their involvement. It is only when general society's interest deteriorates that smaller interest groups gain influence. Patashnik (2003) elaborates that this can potentially lead to socially less optimal

results. Thus, it needs to be evaluated whether the decision making that affects shared mobility services generates more sustainable SMS when society's interest is maintained. Looking at the complex matter of, for example, bike sharing, early studies show that local societies, despite dumping behavior and vandalism, still favor the service's expansion (Nikitas, 2019). They request better complementarity between services and infrastructure (Nikitas, 2019). Such societal interest depicts the importance of including both sectors into the solution-approach of a wicked problem. Understanding whether a bottom-up (society to government/ municipalities) funnel exists and if it does, how it works, is an important aspect in shedding light on the cross-sectoral dynamics.

2.6 Shared Mobility Services – a novel application to wicked problems

The theory of wicked problems has been extensively developed and started to be taken as a lens to look at specific problems, such as food security (Candel, 2016), urban transportation systems (Noto & Bianchi, 2015), and climate change adaption (Perry, 2015). The theory contains several new insights when looking at it from the urban shared mobility sector. First of all, the described industry sets itself apart from other industries. Mobility is a social good that should be available to every citizen. Therefore, on the one hand, governments have a strong interest and say in the industry's improvement. On the other hand, a multiplicity of private players already exists and is still entering the market. Not only newly founded shared services, ranging from buses, to cars, bikes and scooters all the way to trains, but also original equipment manufacturers (OEM), the suppliers of the technology and their suppliers, all want to have a say in the market's development. And if it was not enough, all of these players come together within different countries and cities, encountering different legal frameworks from one city to another. Therefore, establishing new mobility solutions that decarbonize transport while synchronizing them with each other and public transport can be termed a wicked problem, which should be tackled in a joint effort, according to most researchers (Waddock, Waddell, & Dentoni, 2015; The Partnerships Resource Centre, 2016).

Noto and Bianchi (2015) took a similar approach looking at urban transportation governance and wicked problems from a performance management perspective. Noto and Bianchi (2015) specifically identified governing players and roles on the multifaceted public side, taking the Italian city Palermo as an example. In comparison, this study rather looks at collaboration factors between the actors to decrease wickedness, incorporating insights from the emerging micro-mobility industry, which only exists in Europe in its current form since the fall of 2017

(Hawkins, 2018). While, the Partnerships Resource Centre (2016) has already developed principles for a collaborative exchange between the private and public sector, this study adds two perspectives. First, what are the expectations between the players before an actual stakeholder meeting? What behavior do the actors expect from each other? Second, what collaborative engagement works best? Understanding which one works best in a multifaceted environment and what are the specific criteria for it, extends wicked problem theory and sheds further light on problem solving techniques. Additionally, it builds upon Schneider, Wickert and Marti (2017), adding a case-example to their work on complexity reduction in the environment through cross-sector collaboration. Thus, the Partnerships Resource Centre (2016) defines what principles govern the interaction between actors of a wicked problem and how their discussion can be facilitated, while this study delineates how the actors' standpoints look like before an actual engagement and how an ideal governance model could look like.

Taking all aspects together, the previously elaborated research question "*How can a cross-sectoral approach help organizations develop in a more sustainable way*?" summarizes the research ambition on an industry-independent level. Thus, the results can potentially be extrapolated across the boundaries of the SMS-industry, providing insights in a multiplicity of scenarios. Nonetheless, in order to zoom into the details of the SMS-industry, the sub-questions ensure to set a focus on the motivations behind cross-sector partnerships, regulations' effects for shared mobility and the impact of societal interest.

3 Research Methodology

The methodology chapter is subdivided into six sections. First, the research's design is described. Second, the reasons why a case-study design is chosen are displayed and subsequently the selection of the cases are explained. Third and fourth, the information sources are depicted and the information collection from the sources presented. Fifth, the data analysis methods are explained and in section six the adaptive approach is underlined.

3.1 Research design

In an attempt to shed light on the dynamics of the nascent SMS-industry, a qualitative research design is chosen. This approach allows to explore the actors' "hidden interpretation's, understandings, and motivations" (Cooper & Schindler, 2014, p. 144) of their actions and engagements in order to draw an "in-depth understanding of a situation" (Cooper & Schindler, 2014, p. 144). How and why questions perfectly fit the present research, helping to develop insights into processes and meanings of policy (public side) and business decisions (private side) (Cooper & Schindler, 2014). Through various interpretative techniques that permit the researcher to closely interact with professionals from the focus industry, the researcher can make sense of vague ideas, sector-specific opinions and complex stakeholder dependencies. In the case at hand, few cities have developed an established process on how to incorporate shared mobility into their urban transport scheme. Additionally, the modern application and complex nature of wicked problems defines a poorly understood realm. Thus, not only because of the industry's age, but also because of the desire to seek an understanding of a socially complex phenomena, the qualitative approach provides numerous advantages over a quantitative research design.

Qualitative research is seen as a way to uncover relationships and dependencies that were not necessarily expected in advance. Therefore, the present research does not set out to test previously seen relations, but rather to inductively generate a framework. The framework comprises "conclusions drawn […] from pieces of evidence" (Cooper & Schindler, 2014, p. 658) that were uncovered by an active involvement of the researcher and therefore might reflect specific beliefs and expertise. The framework aggregates the insights to create theory that can subsequently be validated in a quantitative approach. The emergent theory should support scholars and practitioners alike to understand potential areas of symbiosis and conflict between the different sectors in the SMS-industry. Creating a perception of how the industry could move towards more sustainable solutions is strongly demanded by society but often only slightly

understood. In the meantime, the thesis seeks to elaborate on the existing theory of wicked problems, providing new insights into how problem solving for wicked problems can be tackled.

The present research design provides a choice to select between various types of qualitative research, such as ethnography, critical incident technique and grounded theory among many more (Cooper & Schindler, 2014). Given the desire to "develop theory from empirical data" (Glaser & Strauss, 1967, p. 364) provided by the participants, grounded theory is chosen. Grounded theory was developed by Glaser and Strauss in 1967 and is often considered the central form of analysis for qualitative research (Eisenhardt & Graebner, 2007). Various adaptations with different philosophies and data analyses, such as the Straussian and Constructivist methods have been developed (Kenny & Fourie, 2015). The present research uses the Gioia Method, first applied by Gioia & Chiitipeddi (1991). It abstains from previous hypothesis making and instead allows the researcher to understand the research domain from the point of view of the research participants, being exposed to their socially constructed reality (Gioia and Chittipeddi, 1991). Thus, grounded theory usually abstains from an exhaustive literature review in order to avoid a preconceived opinion (Kenny & Fourie, 2015). The present research's literature review is comparably long in order to clarify the depth of the nascent industry and the applied theories. Regarding the participants as "knowledgeable agents" (p. 17) while refraining from affirming existing concepts allows to explore deeply rooted dynamics in the context of analysis (Gioia, Corley & Hamilton, 2012). Thus, the Gioia Methodology is seen to get to the core of the empirical data in order to generate revelatory insights.

3.2 Case study

Although the SMS-industry is still very young, it is highly diverse, showing differences in regulations, numbers of operators, types of operators, usage behaviors and much more from one city to another. In order to control for the multiplicity of differences, two case studies were conducted that allowed to focus on a specific context, while "retaining a realistic and real-world perspective" (Yin, 2014, p. 67). Case studies are regarded as one of the "best ways to build bridges from qualitative to mainstream deductive research" (Eisenhardt & Graebner, 2007, p. 25). Additionally, they are likely "to produce theory that is accurate, interesting and testable" (Eisenhardt & Graebner, 2007, p. 26), while allowing the researcher to remain highly objective. Multiple case studies have the advantage over a single-case study to reveal patterns that are not unique to one unit of analysis and, therefore, increase the analytic generalizability, allowing for

wider applicability than the case at hand (Yin, 2014). Additionally, relatively polar types can increase the chance of theoretical replication, meaning the delineation of contrasting results (Yin, 2014). Thus, building on theoretical sampling, two cities that depict different approaches towards the development of shared mobility were chosen. Amsterdam and Berlin (see chapter 3.2.1 for selection explanation) fit the requirements. Research was conducted under the premise that highly similar results between the cities would require the selection of a third case that could lead to theoretical replication.

3.2.1 Case selection: geographic focus

While North America's and Asia's shared mobility markets are much higher valued compared to Europe's, $23bn vs $24bn vs $6bn respectively, both markets are dominated by e-hailing (Grosse-Ophoff, Hausler, Heineke, & Möller, 2017). Additionally, car sharing and bike-sharing are further developed in European cities than in US-American cities. While China has the biggest bike sharing market, the European market offers more integrated solutions, such as Moowel and Whim, which already combine car-sharing and bike-sharing in one application (Roland Berger, 2018). Looking at scooter sharing, Europe emerges as the market with the highest growth potential (Schellong, Sadek, Schaetzberger, & Barrack, 2019). Moreover, in many European countries, cities regulate mobility sharing individually (Grosse-Ophoff, Hausler, Heineke, & Möller, 2017). This allows to pick one city as one unit of analysis. Lastly, looking at Arthur D. Little's (ADL) urban mobility index 3.0 (2018) (see figure 1) eight out of ten above average cities are European. Thus, it becomes clear that European cities currently set the benchmark for integrated mobility solutions. In sum, Europe is an interesting continent of analysis, that still provides cross-cultural differences and offers locally unique insides from city to city. On top of that, out of a convenience argument, Europe offers better access to potential cities of analysis for the author.

In order to bound the cases properly within Europe, two cities, as focus points for case studies, were selected. In order to have a positive extreme, Amsterdam (above average; no. 3 in ADL's ranking, figure 1) was chosen. Due to its convenient location for the researcher it was preferred over Stockholm, which would have been the only European City with a higher ranking. In an urge to draw relevant patterns between the cases and to help progress urban mobility research, cities with a red dot are excluded, since they have not yet made investments into sustainable mobility (Arthur D. Little, 2018). Among the yellow dots, another relatively advanced city, Berlin, was chosen.

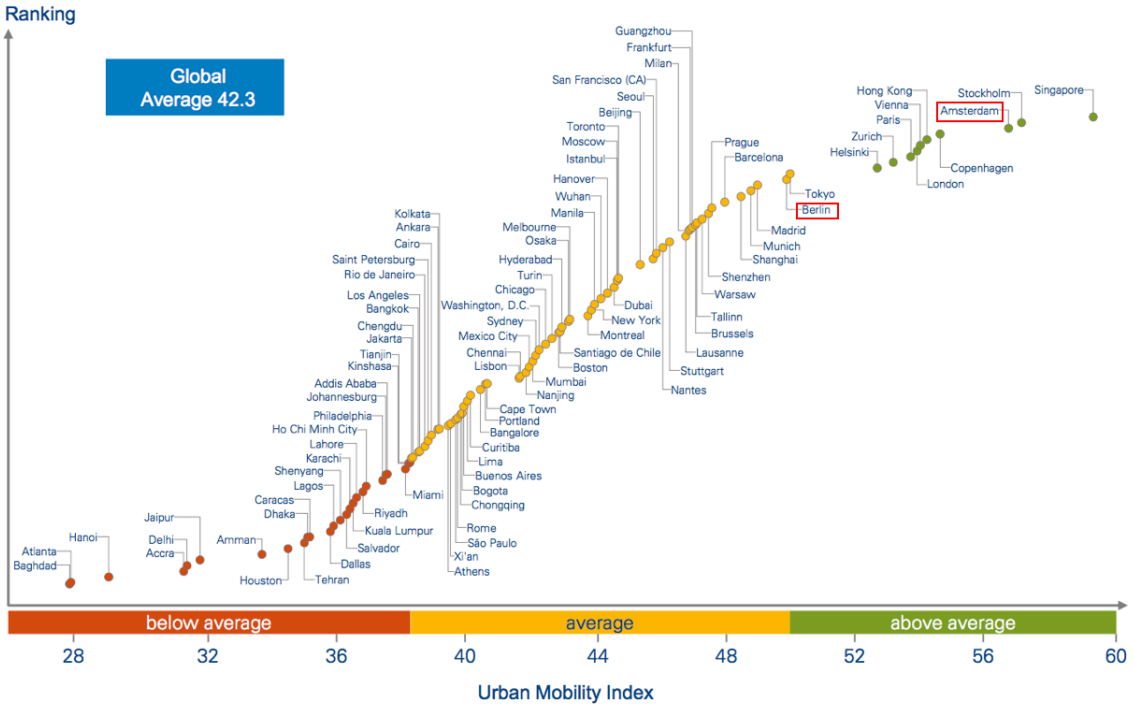

Figure 1: Urban Mobility Index 2018; Source: adapted from Arthur D. Little (2018)

3.2.2 Case selection: differences between Amsterdam and Berlin

The decision against a complete polar opposite (red-dotted city; see figure 1) stems from the assumption that a city without any defined shared mobility program could only generate reduced learnings. It would not help to develop an emergent framework about cross-sector dynamics. However, Amsterdam and Berlin still differ significantly based on various factors. First, Amsterdam is one of the few cities that achieved a score above 50. However, since the upper end of the depicted scale (see Figure 1) is 100, Berlin (49) and Amsterdam (57) both still have vast improvement potential. Second, the cities differ in population. While they are both considered major European cities and the biggest cities of their countries, Amsterdam inhibits 0.8 million citizens and Berlin 3.4 million. It is interesting to see whether population size difference affects the SMS-market. Third, the cities differ structurally. Amsterdam is not only more densely populated than Berlin (Gemeente Amsterdam, 2018; Statistik Berlin Brandenburg, 2018), but also sees 32% of urban trips being undertaken by bike (Dixon, Irshad, & Teuben, 2019a). In comparison, in Berlin, people use bikes for only 13% of their trips (Dixon, Irshad, & Teuben, 2019b). Fourth, and most importantly, Amsterdam and Berlin have different mobility visions. Amsterdam wants to have an emission-free inner-city zone by 2030, only allowing means of transport with zero-emission, such as electric scooters, mopeds, public transport, delivery vehicles and pleasure vessels (City of Amsterdam, 2019). Berlin does not

display similar ambitions yet: their timeline is much longer, seeking CO2 neutrality by 2050 (Bath, Fahrun, & Jürgens, 2019). Moreover, Amsterdam still prohibits the use of kick-e-scooters, while Berlin allows the usage of them since June 2019 (Bundestag, 2019). Taking it all together, Berlin and Amsterdam offer two different geographic and political environments. Although Amsterdam can be considered a frontrunner in its urban mobility approach, it does not yet allow micro-mobility types, such as the kick-e-scooter. Analyzing these two cases therefore, inhibits reciprocal learning potential, where some similarities and various differences are expected to be found.

3.3 Information sources

For the conduct of the present study, data from the interviews were used as primary data sources. Moreover, secondary sources, such as government reports, local municipality guidelines, firm reports, consulting reports and newspaper articles were analyzed and complemented with academic papers on urban mobility and cross-sector theories from common databanks, like EBSCO. The holistic approach increases understanding and accuracy of the research.

3.3.1 Study population

In order to fully explore the SMS-industry's complexity, the voices of as many different actors as possible have to be considered. The study population defines the totality of people that fulfill the requirements to be considered a subject of study for this research. First, in accordance with chapter 2.1, on the private-sector side all bike-sharing, car-sharing, scooter-sharing and kick-e-scooter sharing companies, operating in Berlin and/ or Amsterdam were eligible for the study. Due to Car2Go's or Donkey Republic's market presence in both cities, they were considered specifically interesting, containing potential cross-geographic insights that could help to find patterns and pinpoint differences between Amsterdam and Berlin. For the emphasis of the study, professionals with a focus on Business Development and Public Affairs were considered to have the most precise insights. However, also high-level strategic jobs, such as Country Manager or Head of "Location" were regarded as insightful for the topic. Employees in these lines of profession had the highest likelihood to be involved with municipalities to discuss the local regulatory environment, debate the introduction of new features and propose new policies. Second, on the municipality side in Amsterdam, managers from the department Mobility and Public Space, and in Berlin, professionals from the Senate Department for the Environment, Transport and Climate Protection were considered ideal. As the departments in either city are

rather large, the researcher was mainly looking for someone with a responsibility for shared mobility services. Third, to proxy the opinion of society, members of local mobility-focused NGOs were regarded to be part of the study population. Last, general experts in the field of shared mobility services and/or local cross-sector collaboration were considered a relevant part of the study population. They were considered crucial to increase the objectivity and to gain a holistic idea of the aspects that define the SMS-market. The composition of the study population portrays representatives from the public and private sector and therefore is expected to answer the research- and sub-question(s). Additionally, the population shows the variety of opinions that the municipality potentially has to align to.

3.3.2 Sample selection

The sample selection describes the professionals that were eventually chosen to participate from the study population. The sampling method shows how the participants were recruited. Due to the exploratory nature of the study, based on grounded theory, no statistically sufficient sample sizes, in line with the statistical power analysis had to be abided by. Instead non-probability sampling was used, where participants were chosen based on purposive sampling. More specifically, theoretical sampling, a type of purposive sampling, was used (Cooper & Schindler, 2014). As such, participants were selected based on their experience, positions, and company or municipality affiliation, keeping in mind the potential contribution to the study. Additionally, throughout the research's conduct, snowball sampling became a successful means of reaching out to potential participants. Thus, previous participants referred the researcher to other participants that were considered valuable in the pursuit of the study (Cooper & Schindler, 2014). All interview partners were carefully chosen in order to display existing knowledge about the intra- and inter-sector collaborations or partnerships. While it was aimed to talk to approximately two companies per mobility service – if existing – from both cities (e.g. 2 car-sharing-, 2 bike-sharing-, 2 electric scooter-companies), the availability of the interviewees slightly limited that endeavor. Thus, in line with grounded theory, the researcher kept on interviewing participants from both cities until a certain level of saturation was reached (Gioia, Corley & Hamilton, 2012). Saturation is a critical concept within grounded theory as it defines the point where no further data conduct is required, it is said that the "analysis is exhausted and no new data are emerging" (Kenny & Fourie, 2015, p. 1271)

Primary contacts with potential participants were made at "Autonomy & the Urban Mobility Summit" on the 16th and 17th of October 2019 in Paris, a mobility event focusing on new modes

and businesses of urban transport, such as shared and autonomous mobility services. Professionals that fit among the study population were approached after roundtable discussions and industry panels. Many contacts were able to refer the researcher to colleagues or other relevant participants. The contact was either kept via e-mail or LinkedIn. Additionally, further participants were approached via LinkedIn, through personal contacts or through cold-calling.

In total, approximately 50 people were reached out to and asked to participate in in-depth interviews. Out of that pool, 16 in-depth interviews took place. Roughly a third of the people in the pool could not participate due to time constraints and another third did not answer to the researcher's contacting endeavors. Three out of the 16 interviews were performed in person in Amsterdam or Delft. The other 13 were conducted via a telephone call or via Skype. The average interview lasted 38 minutes and it took roughly 1.5 months, from November 7th to December 12th 2019, to conduct all interviews. At one of the interviews two participants were present. Moreover, the researcher used an opportunity to join students with similar theses' focus from the University Delft half-way through the interviews to discuss initial findings and integrate objective feedback from an early point onwards. The exact overview of the participants and their category-belonging can be seen in table 3 below. Partial saturation was reached after 16 interviews (see limitations in section 5.7).

No.	Company	Category	Location[4]	Language of interview
1	ICLEI	Expert	Bonn	English
2	Daimler Mobility	Expert	Stuttgart	English
3	Advier	NGO	Delft	English
4	Felyx	Company	Amsterdam	English
5	Berlin Senate for Environment, Traffic and Climate (SenUVK)	Municipality	Berlin	German
6	Circ	Company	Berlin	German
7	Scooter-sharing Company	Company	Berlin	German
8	Gemeente Amsterdam (GA) #1	Municipality	Amsterdam	English
9	Miles	Company	Berlin	English
10	Bundesverband Car-sharing	Industry Association	Berlin	German
11	Changing Cities	NGO	Berlin	English
12	Donkey Republic GER	Company	Berlin	German

[4] 3 organizations deviate from the case locations: Industry experts provided relevant insights on a more global perspective and the NGO Advier considered itself to speak for society in large (also Amsterdam's)

13	Spiekermann	Expert and advisor for SenUVK	Berlin	German
14	Gemeente Amsterdam (GA) #2	Municipality	Amsterdam	English
15	Bike-sharing Company	Company	Amsterdam	English
16	Share Now	Company	Berlin	German

Table 3: Overview of study's participants, Source: this study

3.4 Information collection

The present study relies on a single approach design, thus, only a qualitative approach with in-depth interviews as a form of data collection was used. However, field work at one of the SMS-industry's biggest fairs "Autonomy & the Urban Mobility Summit" preceded the conduct of interviews. Over the course of two days, the researcher had the chance to attend panel discussions and industry roundtables about topics such as "How does mobility transform cities?" and "Are electric scooter start-ups an opportunity for cities?". The insights provided an in-detail understanding of the industry's major players, its challenges and trends. Given the timing of the event, the acumens also proved to be valuable in the development of the interview guidelines and to classify many of the participants' answers. The learnings will directly or indirectly flow into the findings, discussion and recommendation part of the research. Overall, all information was gathered in a defined time period and can therefore be considered cross-sectional. The combination of field work and in-depth interviews proved to be highly complementary.

3.4.1.1 In-depth interviews

While in-depth interviews (IDIs) are considered to be the most common means of data collection in qualitative research (Eisenhardt & Graebner, 2007), the researcher is also supposed to be cautious. On the one hand, IDIs provide a safe space for a close interaction with the participant, allowing for instance for clarification questions and exploration discussion (Cooper & Schindler, 2014). On the other hand, the intimate setting can lead to "mutual and subtle influences between [the researcher] and the interviewee" – called reflexivity (Yin, 2014, p. 345).

All interviews were semi-structured to fully explore and holistically understand the relationships and dynamics between the sectors, without restraining the interviewees in their answer choices (Cooper & Schindler, 2014). This helped gain a holistic, rather than an embedded understanding, driving more replicable theory building. Moreover, it allowed to

integrate new learnings from one interview to another, confronting participants with emerging questions. The interview guidelines were adapted to the audience. Thus, members of NGOs who represent the society, firm representatives, municipality representatives and the experts, all received slightly different guidelines in order to find answers to all sub-questions. Additionally, due to the important role of the municipality in creating a regulatory environment for SMS, the researcher conducted interviews with two professionals from both municipalities. On Berlin's side, an expert from an engineering consultancy for mobility was named from the first city representative for further objective information. Conversely, the multiplicity of operators from different mobility types, some even with a market presence in both cities (counts for Donkey Republic) allowed to get to the bottom of the operators' similarities and differences in their requests towards the municipality. In total, three associations were interviewed. Two of those consider themselves as representatives of the society. While the Berlin-based association 'Changing Cities' is a non-profit organization, Advier is a Dutch for-profit consultancy, that works on public mobility affairs in the name of the society. Both organizations helped grasp the city-specific societal opinions about urban mobility. Lastly, the "Bundesverband Car-sharing" (national association for car-sharing) represents mainly stationary car-sharing companies in Germany and was therefore seen to be a very relevant interview partner to understand the dynamics between stationary and free-floating car-sharing operators.

In total, eight interviews were conducted in German and eight in English. All participants received a guideline of the questions (via e-mail) and some background information (verbally), upfront, before the interview. The interview guideline (company version) was piloted and slightly adapted, in advance of the relevant interviews, with an assistant manager from KPMG who had conducted projects in the shared mobility environment before. The semi-structured interview approach allowed to not only clarify the necessary questions, but also follow-up on the interviewees insights and focus on their specific contribution. (See interview guidelines in Appendix 2-5)

3.5 Data analysis

Due to the strong involvement of the researcher, the data analysis is particularly important within the conduct of a qualitative study. The qualitative data analysis tool Atlas.ti was used to analyze the textual information from the interviewees. In the preparation of the data analysis, all interviews were audiotaped with Apple's "Voice Memo" program or with QuickTime Player. Subsequently, the researcher transcribed the information verbatim. In total 599 minutes

of interviews were recorded and transcribed. First, all interviews were transcribed in the language of conduct. Afterwards, the eight German interviews were translated to English, using the help of the software "DeepL". In order to prevent confusion between Dutch, German and English technical terms, only the transcribed English versions were used to code the data in Atlas.ti.

The Gioia method was used to code and analyze the interviews. Thus, open coding and in-vivo coding were used to create first-order codes from the data (Gioia, Corley & Hamilton, 2012). An in-vivo code is distinguished by using the language of the interviewee, whereas open coding describes what is said by the interviewee (Saldańa, 2009). As previously mentioned, analyzing the interviews, while still conducting further interviews helps explore emerging concepts and patterns (Gioia, Corley & Hamilton, 2012). Such 'gestalt analysis' was used to get to the core of the data. Thus, codes were continuously compared with each other to find similarities and differences in order to help grasp the underlying dynamics of the industry (Glaser & Holton, 2004). In total, to remain open to as many ideas as possible, 278 unique first-order codes were created. This was supported by memo-writing, a key concept of grounded theory – ideas and opinions were noted down over the course of the interview conduct to "highlight determining conditions and trace progression and consequences" (Kenny & Fourie, 2015, p. 1279).

In line with the Gioia method, the initial codes were grouped to create second-order categories. These categories highlighted key concepts and described emerging patterns that developed from code-to-code comparison. Thus, first-order codes where compared with each other, with arising categories and the categories were cross-compared as well. The process ensures theoretical elaboration, fitting the codes as precisely as possible to higher level categories (Glaser & Holton, 2004). Ultimately, 25 categories emerged, of those a large part (approximately 20%) could be attributed to collaboration and regulation. Grasping this, underlined the dichotic interplay between control and cooperation. The researcher realized that the other categories positioned around or emerged from this dichotomy, forming a supporting system that creates stability. Such realization helped to comprehend the broader dynamics and allowed to classify the other aggregates.

The creation of aggregates was supported by the graphical display of the second-order categories in the form of networks. Again, categories were compared and linked to or separated from each other in order to form core groups which accounted for as many second-order

categories as possible (Glaser & Holton, 2004). While the core-groups or aggregates fitted together nicely, they first appeared to form an ecosystem of an existing system. While literature should not guide the creation of first- and second-order codes, its use can provide clarity in the final step (Glaser & Holton, 2004). Thus, by taking a step back and relating the aggregates to literature, the researcher realized that an ecosystem is rather about the actors involved. The aggregates, however, clearly outlined the requirements needed for a system to function – a governance model. The aggregates synthesized relationships between the private and public sector and helped to conceptually develop an understanding of the dynamics between the stakeholders and their opinions about and procedures within SMS' sustainable development. In total, 7 aggregates emerged from the second-order categories: *Change, Collaboration, Enforcement, Experimentation, Leadership, Regulation and Transparency*. An overview of the aggregates and second-order codes, plus an exemplary subset of first-order codes can be found in table 4.

While the simultaneous data analysis was crucial for the continuous conduct of the interview, aggregates were only created at a later point in time, when all interviews were conducted. Following such procedure allowed to keep a holistic perspective to find patterns across the different interviews and different sectors. Additionally, the procedure not only provided a perception of each case individually and how the sectors collaborate, but also allowed for a pattern-matching across the two cases, Berlin and Amsterdam. (See Appendix 1 for all codes, categories and aggregates)

First-order codes	**Second-order codes**	**Aggregates**
Berlin - Open attitude Berlin - patient Reluctant municipality - Amsterdam	Attitude	Change
Berlin - Austerity and old public sector Municipality Berlin - bureaucratic System	Behaviour Challenge	
Car-sharing as a means to replace car-ownership Difficult to reduce car ownership German car industry hindering	Car related	
Geography influences urban mobility Historic infrastructure	Infrastructure	
Include citizens People mind using several apps Regulation - Kick scooter off the sidewalk	Society Requirements	
Collaboration - Stakeholder meetings Collaborative legislation building Contact person missing Listening to each other Public sector participation	Collaboration	Collaboration

Complement public transit Complementarity among operators Complementarity by distance	Complementarity	
Amsterdam - Live Data API interface Data connectivity Data protection	Data interface	
MaaS - skeptical MaaS to create complementarity MaaS to decrease private car ownership	MaaS	
Influence Taking NGO Berlin - Requires stakeholder meetings Tool - Power of the people	NGO Requirements	
Operator - want open conversations Operators - want collaboration Proactively show data to Berlin	Operators' requirements	
Amsterdam - top down approach Streamline data formats	Enforcement	Enforcement
Shared mobility competition reduces space Shared services are fun	Effects of Shared Mobility	Experimentation
A/B testing Amsterdam - mobility hubs experiment Balance of experimentation and control	Experimentation	
Free-floating for inner cities Station based car-sharing - traffic relieving	Free floating vs station based	
Kick-Scooter - young industry Kick-scooter for tourist	Kick-e-Scooter	
Best case example - Bremen Best case example - Hong Kong	Case Examples	Leadership
Congestion Greenhouse gases SPLIT	Measurement of Sustainability	
Emission free by 2030 Municipality sets direction Operator - need contact person Who maintains the infrastructure?	Vision and Leadership	
Amsterdam - no private parking Parking reduces space Policy - Price of Parking	Parking Issue	Regulation
Commuting Time line is very long when regarding public transport	Public Transport	
Berlin - Common Use (Gemeingebrauch) Forbid kick-scooter Policy - Road taxes Regulation - Permit scheme	Regulation	
One type streets Recreate space	Space	
Amsterdam - Subsidize electric cars Subsidize public transport	Subsidies	

Invited discussions Only anonymous data	Transparency	Transparency

Table 4: Data structure; Source: this study

3.6 Adaptive approach

Following Yin (2014), the study stayed adaptive throughout the actual conduct of the case analysis. As case studies are susceptible to minor or major changes over the course of the writing, the author was always prepared to make potential adaptions, such as including a third case or revising the research question to realign it with the research's purpose. Therefore, the research's progress was iteratively questioned and tested to see whether the purpose of the study remained the same and whether current data analysis delivered the high-quality results required. Balancing such adaptability with rigor towards the interview partners was a challenge that the researcher was aware of.

4 Findings

The literature review highlighted the importance of the urban mobility development and forecasted high market growth numbers for the coming decades. In order for this to be a reality it is crucial to understand current dynamics in different markets. The city, as a unit of analysis where all sectors come together in a close environment and the effects of the regulatory framework become visible, offers a unique opportunity to deep-dive into cross-sector interaction. Whilst it cannot be assumed that a successful approach of one or two cities can become a one-size-fits-all scheme, the insights can still be leveraged to identify best practices. In the following, the findings for both cases are first delineated separately and then analyzed in conjunction. Bracketed information following a citation or summary state the name of the organization the participant was representing. Citations are depicted in italic.

4.1 Berlin-specific findings

Talking to the actors active in Berlin, one common highlight was universally made at the beginning of the individual conversations: mobility sharing services make use of Germany's 'Gemeingebrauchrecht' (right of common use). *"And common use is not subject to authorization"* (SenUVK). The right basically details that scooters, bikes and kick-e-scooters can be parked everywhere in the public realm, such as sidewalks, as long as not more than four are located at the same spot. Berlin's representative described: *"if you put 1000 bikes here now and distribute them in the city and they are not all in one pile, then a bicycle is a means of transport and in that respect, it is then common use and therefore not subject to approval"* (SenUVK). Knowing this, there are not many modes of regulation that can also potentially incentivize a certain behavior left. The major control possibility according to Berlin's Senate is area use, more specifically the regulation of parking. This not only includes the creation of shared vehicle specific parking, but also the prohibition of free parking for bikes, kick-e-scooters and scooters. While other means, like the subsidization of companies to incentivize behavior change do exist, they do not seem to be considered as an option (Scooter-sharing company; SenUVK).

Therefore, within the options of the regulatory frame, according to the representative of the SenUVK, the development of a shared mobility street sign that highlights parking areas for shared mobility vehicles, is currently in process by Berlin's municipality. Especially for car-sharing companies such a sign can prove important for the acceptance of the vehicles (Miles).

While the regulatory challenges are obvious, many coordinated solutions, developed by the municipality, are still in process or non-existent; the right for common use provides the opportunity for experimentation. A manager from the Bundesverband Car-sharing (association for car-sharing, from now bcs) posited: *"There is a great deal of interest in looking at what triggers a sharing offer in the mobility mix of the population. And it is only after these experiments have been carried out and the findings gained that it makes sense to say that we are now regulating the market in such a way that those services that do not contribute to strengthening the environmental network are actually removed from the city center."* He continued to elaborate *"that only the large-scale experiments provided the insight that certain product characteristics of [free floating car-sharing] inevitably lead to the fact that it does not unfold any traffic-relieving effect at all" (*bcs). Thus, looking beyond regulatory challenges, it becomes apparent that a unique situation for shared mobility experimentations exists in Berlin. The liberal environment where all SMS are generally welcome and unhindered expansion is allowed, is rarely seen in European metropolitan areas. Municipalities oftentimes developed a stricter regulatory frame quickly after SMS' introduction.

Nevertheless, Berlin's municipality offers spaces for citizens to make their voices heard and to participate in the design of Berlin's future mobility. The representative (SenUVK) elaborated that the city has a variety of participatory events. For example, forums where 600 people come together to *"sit in different working groups and discuss"* for instance topics like *"the design of areas"* (SenUVK). Additionally, a 'Round Table on Mobility Transport' exists and a 'Mobility Advisory Board' was created. In the latter *"50-60 different representatives from senior citizen- and pedestrian-, to bicycle-, car- and commercial transport- associations come together and discuss"* (SenUVK). The inclusion of society also takes shape in different examples. According to 'Changing Cities', the creation of Berlin's bicycle law was initiated by their association's endeavor to bring a bicycle law to a referendum. However, the strong support that was raised convinced the municipality to adapt a bicycle law even before the referendum. The law's goal is to increase the share of people taking the bike compared to the total trips taken in Berlin by detailing investment efforts into the bike infrastructure that increase cyclists' safety (SenUVK, 2018). While an open mindedness does appear to be present, the NGO's chairman posited that: *"Berlin now [still] looks quite similar to the way it looked before the law was passed"* (Changing Cities).

Looking at the broad dynamics, a city emerges that has given space to various people to raise their opinion, but does not actively engage in setting a tighter regulatory frame. This development can either be seen as a large experiment that generates unique insights *or* as a lack of realization among the municipality and district officials that climate change can be tackled on a city-level. Thus, the following outlining of the experience and insights of the operators is expected to highlight the subtler dynamics of the industry in Berlin. Starting with the service that exists the longest – car-sharing – all the way to the kick-e-scooters which were introduced only in June 2019.

4.1.1 Car-sharing

In the conduct of this study, managers from one of the oldest (since 2008) free-floating car-sharing companies, Car2Go and DriveNow who merged in 2019 to become ShareNow, and managers from the relatively young start-up Miles (founded in 2017) were interviewed. Car-sharing is unique in comparison to other sharing services, in terms of the amount of space that is required. Unlike scooters or bikes, cars always require a designated parking spot. Thus, a major point of discussion for car-sharing is the use of public parking spaces. Besides parking, various other factors were carved out to differentiate car-sharing.

First, both car-sharing companies shared the vision to reduce private car-usage. This is based on the belief that cars, *"especially private cars destroy land and emit exhaust fumes."* (Anonymous). ShareNow's representative posited that the *"answer to [the latter] is on the one hand, electric vehicles and [on the other hand] the latest generation of cars that can currently be bought"* (ShareNow). However, the fleets of both operators are still to a large degree (ShareNow) or fully (Miles) operating with combustion engines. In reply to the question on why the propulsion could not be changed, the researcher was told that the answer lied within advantageous economic viability of the combustion engine and a lack of infrastructure in Berlin. Explaining the former aspect in other words: *"if you're not profitable at some point, then it doesn't really matter what you do, it's not sustainable"* (ShareNow).

Second, a manager elaborated on the latter aspect, saying that *"the challenging infrastructure is something which is one of the most important points. While it's a big topic nowadays to increase the number of charging points, […] the development is quite slow and here in Berlin for example, it's really hard to find an empty spot to charge your car"* (Miles). The participant from ShareNow dove deeper and explained: *"that [in cities with electric fleets] always*

appropriate incentives [exist]. So, in Paris it was a tender before and the previous provider was also purely electric, there is a suitable exclusive or at least partially exclusive charging infrastructure, which then also has parking spaces ready and that already creates a strong argument" (ShareNow). Additionally, it is expanded on the contractual situation for parking spaces. As an example, ShareNow named Düsseldorf, *"which allows [them] to use the public parking areas and also the parking areas for residents, because you […] [want to] clear [private car parking space] for it. Additionally, [ShareNow] can also exceed maximum parking durations, so that [one] can fully operate this concept and not generate additional traffic by having to get there and repark"* (ShareNow). In the light of Berlin, a Miles manager depicted that *"Berlin has a lot of people who are talking about [parking contracts], [but they don't] really [do] enough. There is no contract for example, for the parking situation"* (Miles).

Third, as touched upon in the section's introduction, stationary car-sharing options and free-floating ones differ in their business model and in the effect they have on traffic. The bcs pointed out: *"station-based provider, as investigated in a study [throughout] the last two years, have a much higher traffic-relieving function than the free-floating systems"* (bcs) in terms of replacing private car-rides. It was countered: *"Yes, they (bcs) are right. You have to look at it objectively. But if you take a look at the total number of customers and that would be transferred to the [absolute numbers of] cars, then we are worlds better. We have probably replaced thousands of cars in the absolute numbers, because we simply look at a much larger total"* (Anonymous). Additionally, ShareNow posited that *"the person who uses one-way car sharing also has a tendency to use other means of transport".* The ShareNow representative argued that free floating in *"connection to public transport [is] more suitable",* which is underlined by the fact that *"we are most successful in cities where public transport is good"* (ShareNow).

Lastly, towards the question regarding what kind of regulation is necessary in Berlin, another argument about the total size of the market was raised. *"[Berlin has] 5200 free-floating car-sharing vehicles, which is comparatively (to 1000 station-based cars) much, but [Berlin has] 1.2 million private cars. This means that the number of cars does not come from car sharing, but from the private sector"* (bcs). Thus, while it is important to remember that the total market is relatively small, it also turns out that a change in the car-sharing market can mainly come from infrastructure changes. On the one hand, the regulated parking options are a major factor. On the other hand, the creation and subsequent exclusive use of charging spots for car-sharing can incentivize operators to restructure their fleet (Miles).

4.1.2 Scooter-sharing

Scooters can exploit the common use right: they can be parked everywhere on the sidewalks and do not need to be parked at a designated parking location, as long as not more than four are located at the same spot. However, since *"it's a legal grey area, I wouldn't be surprised if Berlin ended this policy of tolerance at some point." (Scooter-sharing Company).* Thus, the communication effort about regulatory developments in the realm of scooter-sharing is rather low. Towards the question whether certain data needs to be reported, the passivity of Berlin's municipality was specifically underlined: *"In Berlin, there is actually no exchange at all with the city. So, for certain legal issues, we sometimes approach the Senate Administration, but on the one hand there are no requests from the city to disclose data, and on the other hand there is no regular exchange with the city of Berlin"* (Scooter-sharing company).

The participant primarily highlighted the lack of infrastructure. To further reduce emissions in the operations, infrastructural changes are needed. *"At the moment, battery swap is [the company's] most costly and largest process in operations. So [we] drive to every scooter that reports that it has a 'low-battery' and replace the batteries on site"* (Scooter-sharing company). Charging stations could be an option to reduce the operational costs and involve the customers more strongly: *"So I would see the city of Berlin as responsible if we wanted to set up a charging station, that they might provide urban space or speed up the building permit and so on. I think the cities already have a responsibility here"* (Scooter-sharing company).

One of the reasons why the development is so slow, is a missing vision: *"What I would find much better, however, would be if Berlin were to develop a general vision of how they see mobility in the future. There are other cities, at least with my subjective point of view, that are much further along"* (Scooter-sharing company). The participant identified Germany's general reliance on the car industry as a hindering factor: *"Germany is still very believing in cars. The Germans themselves and also the politicians support the car industry, which is understandable, because there are many jobs coming with it. But whether this is so opportune in the long run, because in the cities in general, and also among young people, there is a certain trend towards cars no longer having the status they used to have, remains to be seen"* (Scooter-sharing company).

4.1.3 Bike-sharing

Donkey Republic (DR) is representing bike-sharing operators. While they are also positively affected by the common use right, their business model is built on a hub-centric system. Thus, *"geo-locations [indicate where] vehicles can be parked. These geo-locations can be found every 200 meters."* Their underlying thought is *"that everyone should have the same right to be on the street and while [they] want to offer bicycles everywhere, [there should not be] too many bicycles at one corner"* (DR). In order to communicate their business model, DR underlined the importance of introductory meetings with a municipality before launching their service*: "We make appointments with them, meetings with them and always have a dashboard where they can track the data. It's not user-specific data, it's data that represents overall usage behavior. This allows them to see where our bikes are used. In the same conversation, the politicians then learn [according to what] rules we work and we can ask whether there are certain rules of the city that we should follow"* (DR).

Zooming in on the interaction with the municipality, the city's allowance for experimentation stands out. *"Berlin is very open. They also follow the principle that everyone can come to the playground and let off steam and then we'll see how it goes and then it's adapted"* (DR). Interestingly, DR considered an open market destructive for business: *"So what I would wish for, generally in cities: That you limit the competition in cities to 2-4 players. So, a bit of competition is important, but a certain limitation is also quite good so that the players can spread. If there are too many offers, then this is also 'confusion' for the users, i.e. the inhabitants of the city. For example, if you have three providers who have a permit, this is also a security for them, so that they can invest more in the city in the long run. Then you also know that you have a long-term license and are therefore not threatened in the long run"* (DR).

Besides requiring control in the number of operators, DR saw Berlin lacking the infrastructure for further mass adoption of the bicycle: *"it is of course very desirable to expand the bicycle trails"* (DR). It became clearer, when responding to the question on what Berlin can learn from other cities: *"it's [especially in the realm of] safety. And safety is connected with cycle paths, different traffic lights, more space for bicycles, less space for cars. You might even have to take countermeasures and provide parking space free of charge. Limit parking space a little more and make it more unnatural to have your own car. The parking key, i.e. how many parking units are built per housing unit, is already being strongly adapted in newly built quarters. In*

Copenhagen, the bicycle is the fastest form of transportation and with the car you are simply slower" (DR).

In sum, not only should space be given from the car to the bike, but also a mindset shift is required, where an entire urban infrastructure deprioritizes a car. While this can be considered as a difficult challenge, DR underlined Berlin's willingness to change: *"I think Berlin is already doing a lot – especially when it comes to bicycle paths"* (DR). However, the difference to other countries is precisely pointed out: *"[Berlin] has it very difficult because Germany is a car country, the car is the living room of the Germans. That's a bit different in other countries"* (DR). Finally, similarly to ShareNow, DR highlighted the complementarity to public transport as a crucial aspect to make the bike a mobility alternative: *"there are several hubs in Berlin, for example around the underground stations"* and *"when we open new cities, we often cooperate with the public transport companies and the rail providers"* (DR).

4.1.4 Kick-e-scooter-sharing

The newest addition to the offer of sharing services was just allowed in Berlin in June 2019. Therefore, it is maybe the most unclear on what exactly the task of the kick-e-scooters is in the spectrum of urban transport possibilities. For now, the same rules as for free-floating bikes apply for the kick-e-scooters (Circ). Circ was only created in 2018 and has grown to 2000 employees until the end of 2019. Due to the infancy of the industry, Circ already initially postulated that they *"don't think the scooter companies have the ambition to drive the mobility turnaround forward. Neither do [they] have the claim to replace the car. In the end, it is about replacing the car together with all the other services that already exist and that may come in the near future, satisfying the mobility needs of people in urban areas. And it is only through a sufficient offer that you manage to eliminate the need for a private car, because the user in the city actually finds a different vehicle for every application*" (Circ).

Despite the postulation of solely being one of many mobility options that can together lead to a reduction in car-usage, Circ encountered itself in a tough competition and in an unregulated market. *"Berlin is certainly the largest kick-e-scooter market in Europe today, if not worldwide*" (Circ). While, not more than four vehicles are allowed to be deployed in one place, the sheer quantity of kick-e-scooters often leads *"providers [to] place 10 vehicles in one place"* (Circ). According to Circ, such rule breaking is not accounted for properly, especially because of the unclear distribution of penalty fees. In order to establish a reasonable handling of kick-

e-scooter, Circ said: *"We help the city, give it data, e.g. fleet data, heatmaps etc. and show where parking spaces should actually be created. We have also offered to make live fleet data available, so that the city can see how fleets move etc."* (Circ).

However, next to observing a reactive regulation, Circ shared a similar opinion as DR. While they are against capping the quantity of vehicles, the operators should be working in line with certain rules: *"We actually prefer solutions where there are also qualitative criteria. For example, that no [individuals who are paid to charge kick-e-scooters, called juicers] should be used in a city or that only vehicles with swappable batteries should be used in order to advance the ecological aspect. If you have such criteria, you sort out a few operators per se and then you are with 2-3 suppliers and can adjust to a market equilibrium. The situation in Berlin, with meanwhile 6 suppliers and everyone has almost a 5-digit offer of scooters on the road, is not optimal"* (Circ). The kick-e-scooter's representative (Circ) elaborated that Marseille should be taken as an example, where a tender was made and only a few operators were allowed to operate, depending on certain qualitative criteria.

Therefore, putting it all together, the question on parking regulation was also a crucial aspect for kick-e-scooters. *"The hybrid system or orderly free-floating, i.e. free-floating in combination with no-parking zones, plus parking spaces"* (Circ) described Circ's approach. A general code-of-conduct is not yet developed. While this might be one of the city's next tasks, a primary finding is that there were dominant calls for a more drastic regulation of the operators.

4.1.5 MaaS ambitions

Discussing SMS-solutions often leads or ends in a discussion about MaaS. By design the free-floating nature of many of the services allows the user to switch vehicles after using them. Therefore, the integration of various modes of transport is a crucial topic for the municipality of Berlin, the operators and emerging private companies, called aggregators (of other services).

The reason behind a MaaS development is not solely for a complementarity of modes, but especially for the potential results of complementarity leading to car replacement. Various participants shared a similar opinion*: "And for us it just doesn't make sense to see everything as a substitute, because it's not just going from A to B, it's always use case related and the mobility mix in the end is the most important thing here. Because this mobility mix – if you really see the private car ownership as the common enemy – […] can really enhance all of [our*

mobility needs] basically" (Miles). While the hope of MaaS to fight car ownership is high. Other participants shared a different opinion. The bcs objected: *"I don't think digitalization has much impact on the question of car ownership. For the question of car ownership, the decisive factor is whether the alternative to car ownership, i.e. car sharing, is actually within 400 meter (at most) walking distance of the place of residence. This clarifies the question whether I will abolish my car"* (bcs). Another participant saw the entire effect of MaaS apps, at least for his company's sharing service, as doubtable: *"So even if we look at our deeplink, the majority of bookings doesn't take place there. This has a marketing effect, but is totally overestimated in my opinion. So, the marketing effect is important and I think it's enormous, but I don't think it's relevant for the actual bookings" (Anonymous).*

Hence, opinions about the advantages of a MaaS-solution vary and operators often pointed towards the level of integration into another app. *"There are different aspects that you look at in the end. First there is the classic integration into the app. There are different levels from 1-3, where it is about how deeply our service is integrated into the app of the other"* (Circ). DR followed a similar approach and opinion: *"We are already integrated in several aggregators. We are very open to the matter […] and believe that this is the future. There are different levels and each company defines it a bit differently. At the moment, to put it simply, we don't have deep integration[2]. That means we are in another app and you can see our bikes and the hubs in another app, but if you want to book the bike and unlock it, then you will be linked to our app"* (DR).

Another hurdle exists especially for car-sharing companies: *[While] it's relatively easy to integrate a kick-e-scooter or a bicycle or another [mode of transport], [but] it's more complex if you want to integrate the car. The problem isn't technical, it's legal. On the one hand, the car owner has a holding liability, which means that he wants to know who is sitting in his car because he is liable at the end by law. And secondly, let's not kid ourselves, we also have an embezzlement issue. And here the question is quite crucial, who should pay for it in the end? If that's our customer, then it's obvious. But if it's an aggregator app that doesn't want to share data with us, then it gets complex because they think we're still liable, but we say they told us that and they know the driver. As a result, we can't even blacklist the driver and maybe he's already misappropriated a car and we don't want to have it again. So that actually makes the car case for an integration very difficult"* (ShareNow).

[2] deep (or full) integration essentially means that a payment within the aggregators app is possible

More participants agreed, adding a second legal challenge and raising the question of reduced competition: *"The other question is, if you really want to do deep integration now, i.e. if you want to book through an app, then such an app becomes extremely complex, depending on the number of vendors you want to integrate. And not only from the technical requirements, but above all from the agreements that have to run in the background. For example, car sharing requires that the user who logs in, registers his driving license. This is because if you have an accident with the car, then the owner of the vehicle is responsible for it. This means, for example, that the BVG would have to take over the control of the driver's license for Cambio and if the person then has an accident, the BVG would be liable to Cambio. It becomes as complex as you want, the deeper you want to go into it, and it also takes time for you to have achieved such a deep integration, and you quickly become so clogged up that you can no longer take on any new providers, and then you have prevented competition again."* (Spiekermann).

In total, some participants assumed MaaS to play a crucial role in the future of urban mobility, while others not only questioned the advantage of aggregators in general, but also highlighted the challenging integration of the car-sharing case. The conflictive opinions are also portrayed in the acceptance of Berlin's public transport provider – BVG's – own MaaS pilot. The so called Jelbi project has been happily welcomed by firms like Miles, but rejected by others, such as ShareNow. A major concern about the multiplicity of the challenge comes from the question whether every city requires a unique deep integration or whether a global solution can be developed.

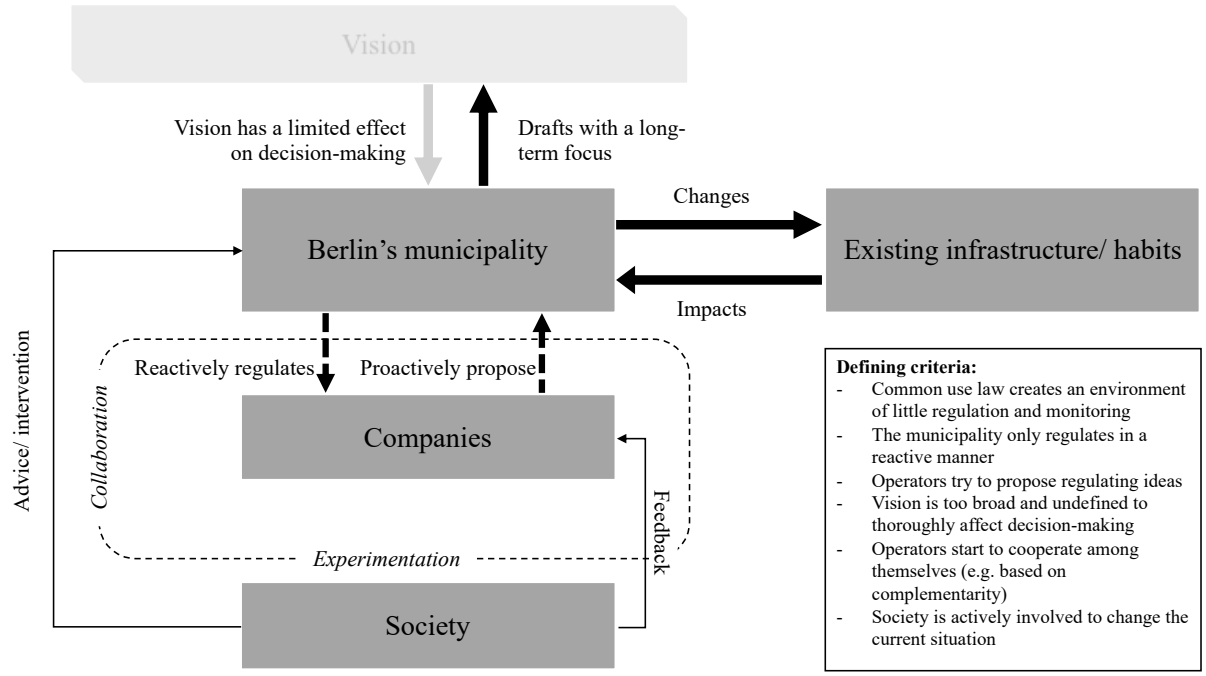

Figure 2: Visualization of Berlin's mobility environment; Source: this study

Figure 2 presents the findings concisely. First, the framework underscores the limited influence of Berlin's mobility vision. The distant time scope barely affects the municipality's decision and thereby also has a limiting impact on the companies' operations. This is emphasized by the city's common use law which grants the firms an extraordinary amount of operating freedom. Second, while it should be the municipality's task to change existing habits and improve the infrastructure, the reactive effort to regulate the market and the non-consideration of operators' proposals for regulations, such as operating permits, leads to little change of the status quo. Third, a tendency is evident, showing that companies start to collaborate and use the free regulatory space to experiment and expand, making Berlin one of the biggest kick-e-scooter markets in the world. Lastly, a strong amount of social interest and intervention is noticeable, affecting not only the lawmaking but also, due to the consideration of feedback, companies' activities.

4.2 Amsterdam-specific findings

Gemeente Amsterdam's (GA) approach towards SMS has drastically changed since 2016. After the introduction of Asian shared bikes *"from one day to the other, companies just spread out their stuff"* (GA). Therefore, Amsterdam amended the existing General Local Regulations (APV=Algemene Plaatselijke Verordening) in August 2016 (Gemeente Amsterdam, 2019). The city's Innovation Manager positively commented on it: *"So we can control what kind of*

shared mobility comes into the city, [now we are able to tell companies like] Lime, [and other] scooter companies, 'no', unless you fulfill [certain] requirements [and] if you are not willing to get there, then we can stop talking. So, this is really one of our most successful things" (GA). Now SMS cannot just enter the city but instead have to *"have a permit"* (GA). Additionally, this incorporates a certain level of collaboration so that existing SMS' operators are monitored and act in the city's best interest. *"We are trying to [create] standards, because now we […] just receive excel files. […] We are developing an API in which we can get the real-time data from the mobility providers"* (GA). Thus, currently only one scooter-sharing company and various stationary and electric free-floating car-sharing companies are present in Amsterdam.

GA especially highlighted the collaborative approach: *"A good collaboration is […] if they think together with you, so for example that, when we first started with Felyx, we said that we don't want drunk people driving the scooters, how are we going to solve this? And they said 'well we can close the app between one in the morning and six in the morning because then there are the most drunk people. Is that ok with you?' Ok that's fine. So, then you can brainstorm together about how you can tackle certain things. It's really about solving problems together […] and if they think together with you, that's nice"* (GA). The close collaboration might also stem from the caution to not replace active mobility, but car usage. *"The city already sees low car usage in Amsterdam's city center. Of all trips in the center, only "10 % are done by car"* (GA).

The municipality wants to make sure, by exercising a certain control, that the services that are integrated align with their vision of replacing the car usage as much as possible. Interestingly, the municipality already considered the bike *as "the [city's urban mobility] backbone […] and public transport [only] comes second"* (GA). This mindset is eventually required to achieve the city's ambitious goals: *"In 2030 we want to be emission free in the greater Amsterdam area, also for passenger cars and motor bikes, all [forms of] transport"* (GA). To accomplish this, a *"dynamic access"* system is developed: *"we are going to put up cameras […] because we don't want to have fences, which can scan license plates and if you enter with a 'dirty' vehicle […] you will get fined"* (GA). Additionally, the city is considering subsidies for different occasions. First, one idea was to *"give people mobility budgets to experiment in shared mobility"* and another option was to "*subsidize people with lower income[s] to get an electric car"* (GA). All forms clearly underline that the municipality sees itself in a leading role to incentivize change if it desires to see it.

Further measures have been taken in the realm of parking*: "You can get a permit to put your car [in the city center] if you live there. We have a low rate of parking spaces per apartment; we do 0.3 in the city center and in new developed areas we have 0.1 or 0.0. and then we ask the project developers to make it in-house [or] the parking garage under the house"* (GA). Thus, further disincentivizing the purchase of a car. However, the ambition to reduce parking spots can also conflict with certain jobs. Some of Amsterdam's teachers were complaining because several parking permits for schools were cancelled. Consequently*, "we did a project with teachers who work in Amsterdam and live around the city, [giving] them the use of free electric bikes in the summer. Depending on their usage, we can have a subsidy by the beginning of next school year to get them on electric bikes"* (GA).

Various other small-scale experiments already exist. For instance, Amsterdam experiments with *"mobility hubs"*, a concept where *"different modes of transport are clustered"* (GA). Thus, within a neighborhood a mobility hub, easily accessible for the residents and in the best case close to public transport, is built up. It includes parking spots for car-sharing, other SMS and bike storage, providing citizens with an incentive to reduce private car usage (MobiPunt, 2020). For instance, Amsterdam is experimenting with at least 50 residents of one neighborhood, to understand how a car-less life in the proximity of a mobility hub could look like if they sell their cars (GA). However, in general, the APV amendment has increased the city's reluctance towards experimentation: *"People in the municipality and the politics, could get too scared to really experiment with new modes of transport, so that [is] why we get quite conservative welcoming new companies. On the small scale, you could really do more experiments and really start learning what type of citizen we have in Amsterdam or which shared mobility mode fits in best. So, this is also the backlash of this policy"* (GA).

In summary, Amsterdam's SMS-market is a tightly controlled environment where operators can develop their service in collaboration with the municipality. The city has a clearly defined vision that sets out to be emission free by 2030, replace car ownership and create more livable space. All these considerations seem to play a crucial role in the development of the operators' rights. In order to achieve a more holistic understanding the scooter- and a bike-sharing companies' perspectives are displayed.

4.2.1 Scooter-sharing

Felyx is the only scooter-sharing company that is currently operating in Amsterdam. They provide 350 free-floating scooters that can be rented by app. After the amendment of the APV law *"Felyx would have [needed] to stop as well. So, then the founders […] got into contact with the municipality and showed them that because [they] have far fewer vehicles [than the Asian bike offers], they are actually used by residents and not by tourists, and they are actually used in general. Thus, the municipality allowed them to stay. Only in 2019, the city [started] developing an official permit scheme, which is currently open, so if you want to start your own scooter company, you can apply in Amsterdam. And that means that we can now get a permit for [our existing] 350 vehicles"* (Felyx).

Hence, since the beginning, a close collaboration with the government was key to stay in business. This interaction is ongoing and Felyx regularly *"shares [all kinds of] data with [the municipality]: number of rides per scooter, distances travelled, heatmaps, everything"* (Felyx). Such data reporting is not only considered as a means of *"showing your worth"*, but also depicts that no walking or cycling trips are replaced with the scooter (Felyx). The sustainable results are in line with Felyx´s own ambition: *"we want to make the future of urban mobility more clean, more sustainable, more efficient, and that is why we chose to place our shared scooter model in as many cities as we possibly can: to replace car travel and make the life of the inhabitants, more easy I guess"* (Felyx).

The public affairs manager further posited that their battery-replacement operations are fully electric: *"We replace the batteries; [that are] charged at a central location, with green power, driven around by electric vans also charged with green power. So, it's an entire CO2 neutral and zero emission logistical chain, the other companies could learn something from that"* (Felyx). Thus, according to their manager, sustainability is an integral part of the company. It is underlined by the company's ambition to "*focus heavily on complementing public transport"* (Felyx).

While it is not entirely certain whether the strong focus on sustainable operations is linked to the city's mobility vision, the city's conservative and controlled handling of shared vehicle numbers does have an effect on Felyx. *"[Amsterdam] doesn't allow us to be active here at the degree or level that we would like or with a larger number of vehicles. It would be good if the city would […] offer plenty of room for experimentations. [Currently] you cannot develop new*

service areas and entice other people to use the system" (Felyx). Thus, the amendment of the law does apparently not incentivize companies to organically innovate in the city since most expansions have to be agreed upon by the municipality. However, Felyx's public affairs manager also delineated the counter argument to it: *"I think in the long run – of course it can be a bit cumbersome […] to get a permit and of course you can be left out quite easily if you do not get the permit – […] limiting the number of companies that are active makes sense, because the demand for this type of mobility is slowly growing. [Thus], if you have [overly] large supply […] it means [that] either prices drop or [the service] is not used that often"* (Felyx).

4.2.2 Bike-sharing

Since the inner city's congestion caused by Asian bike-sharing systems in 2016, Amsterdam does not yet allow bike-sharing. However, the city is currently developing the criteria for a new bike-sharing environment and deciding upon the dynamic in which they will let the system enter the market, for instance whether it involves a tender process. The interviewed bike-sharer has been in the market before the prohibition of the bike-sharing systems in 2016 and is currently – in a collaborative manner with Amsterdam's municipality – involved in the design of the new system: *"[Now] they want to make an exception and try with experiments to see if we can do it in a more controlled way. So, we have been talking since summer with them (Amsterdam's municipality). They invited us and they are trying to develop some experiments to see what can work and what fits to Amsterdam. [In total] they are talking to around 4-6 operators, I believe, and they want to see and allocate them to certain areas in the city"* (Bike-sharing company). However, the exchange went both ways and the municipality was interested in the operators' opinion: *"They asked our input, so they invited us for meetings to give our inputs for their thoughts and also share our ways of operating. We advised them to use less operators and we had an open discussion with them about it and we could challenge them, but we have to see what comes out of it"* (Bike-sharing company).

The bike-sharing company saw the case very similar to the German branch of DR: "*We like to have regulations because we think it's good to regulate the markets to make sure that what is offered to the people is a good and sustainable product, not a short-term solution but a long term thing. However, what you see now in some markets or some cities is that cities are asking more and more from the operators than before"* (Bike-sharing company). While previously a lack of experimentation was often raised as a concern, the manager encountered the threat of

overregulation as a very present reality as well. For instance, she said that *"in Antwerp [the municipality] is asking that we should redistribute bikes three times a day, […] which is creating more congestion […] by redistribution."* Additionally, she postulated that the regulation should "*at least [allow] for 500 bikes [per operator], then you have a good competition and a good amount of bikes where people can really share"* (Bike-sharing company).

While Amsterdam can still decide on its bike-sharing system, the bike-sharing company already appreciated the city's collaboration behavior: *"I think it's good to have a couple of meetings before we are about to ask permission from the municipality. You should also really try to understand how systems work and look at other cities"* (Bike-sharing company). Ideally, the business development manager elaborated, cities should *"have a checklist that they give [to the operators]. [First], you need to score at least 60% – the baseline – otherwise you are not going to operate anyway. [In the end a] percentage comes out and the ones with the highest percentage and the ones that fit the best to [the] city [are chosen]"* (Bike-sharing company).

If the developed system includes data reporting on a continuous level, the manager underlined the importance to keep data anonymous: *"We are happy to share data as long as it is anonymous. […] When somebody is moving from A to B every day, you know where they work almost and you know a lot more than this, like where they live and all sort of things. […] For us, it gets a bit on the edge of should we still share, because we try to protect the data"* (Bike-sharing company). Thus, the issue of data security (in line with the General Data Protection Regulation) and whether the city is a trustworthy protector of the data is raised. In total, the bike-sharing company highlighted the awareness of overregulation and how it is connected to a city's broader vision: "*the vision should be the big lines and specifying that vision with a plan that works for different operators"* (Bike-sharing company). According to the bike-sharing company this does not only relate to a city's handling of the operators but also towards MaaS aggregators.

4.2.3 MaaS ambitions

Since Amsterdam believes in the positive environmental effects a MaaS-solution has for urban mobility, the city developed a precise MaaS-plan in 2019: *"I really believe in different modes, in a seamless journey within a MaaS-solution. So, what we did in the business district, we had a big tender for a mobility services platform. There was a consortium of partners, commercial*

partners, who won the tender. It is called Amaze [and was announced only] two weeks ago. It's a newly formed platform, [built by] different commercial partners. So, we have Translink, Amber mobility, Morgen working together to provide us with this platform – […] a concept. They are going to launch in May 2020, and I think, if they can deliver what they promise, it can be a changer for Amsterdam" (GA).

In the development of this platform, the city relies on various regulatory options they have at hand. Not only does the city support the platform financially, but also they enforce all SMS to connect to the emerging platform: *"It's a commercial platform, so we don't own the platform, we give money to them to develop the platform as some kind of prize they won with their bid. Together with our ministry of infrastructure and water management they designed mass APIs for the mobility providers and we are going to, together with the ministry, enforce in our policy that all the different mobility providers should have this API. So, all the Felyxes and Car2Gos (now ShareNow) and Donkey Republics"* (GA).

It is precisely those operators, especially the bike-sharing company, that warned of too much enforcement: *"if you integrate fully in these kind of apps, we lose the connection with the user, and we don't know what they want or what they need, so we can't provide them the service […] that they want. So, the MaaS applications are becoming super powerful and […] you have no saying because you are one of the many mobility providers. It's a bit like a supermarket: we provide a product […], but they determine the pricing and how its positioned and how its put on the shelf [or…] at the bottom of the list of options. And they put [something] which might not even be the best choice for the city. Like what you see now in Google, instead of walking you can take a Lime scooter, well, walking is always better than [taking a] scooter. […] It gets really tricky and municipalities can play a role in that, but they shouldn't push us to fully do that, because they don't know actually what the effect of being fully integrated is"* (Bike-sharing company). In response to the fear of losing oversight over its own service, Amsterdam builds on competition of MaaS platforms: "*We don't want to have vertical MaaS platforms, so we break it open at the bottom and we say, 'all mobility providers should have this API'. [Thus,] there is a MaaS platform that all the mobility providers can be connected to. […] If you start a MaaS platform you can also incorporate Uber into your MaaS for example. So, Uber can have their own vertical app, but still it [does not remain] the only way to book an Uber through the MaaS app. […] We believe, that is the only way it's going to work. We need to have as many modes and as many different mobility providers as possible to really get the best availability*

and the best customer service. And then they (the MaaS-platforms) can compete with each other on price, view of the app, customer service, things like this, but not on which one has the most modes available. Because then you have the big companies such as Google and Uber and they just buy their way in." (GA).

While operators might consider an increased MaaS-competition as beneficial for their business, in the context of enforcing a frame on the operators, data format alignment becomes a crucial topic of discussion. While a general data format was developed in the US and adopted by various European cities, other cities started to generate their own, specific data format. Interestingly the anonymity of the data also varies per format: "*In Belgium there are talks about having MDS (a specific data format) and that will [get] closer to getting not anonymous anymore. So, for us it gets really tricky […] because we would like to get a format that's anonymous and we want to make sure our data is safe"* (Bike-sharing company). Although several arguments point in the direction that data sharing can be detrimental, some operators also assured: "*There are a lot of operators that don't even want to share, and we think that is really bad"* (Bike-sharing company).

In total, all actors had strong opinions on the way they themselves or others should interact with MaaS-platforms. Nevertheless, the general trend seemed to indicate that MaaS is expected to stay and if implemented correctly also expected to be beneficial for cities. Yet, many factors are still in development, and the aversion of operators such as ShareNow towards a deep integration (at least in Berlin) and the fears of other operators like DR about data security and customer engagement are prevalent. Listening to each other and collaborating in the creation of solutions is highlighted as one potential way to go. Thus, marking out differences and similarities between cities can lead to more in-depth insights.

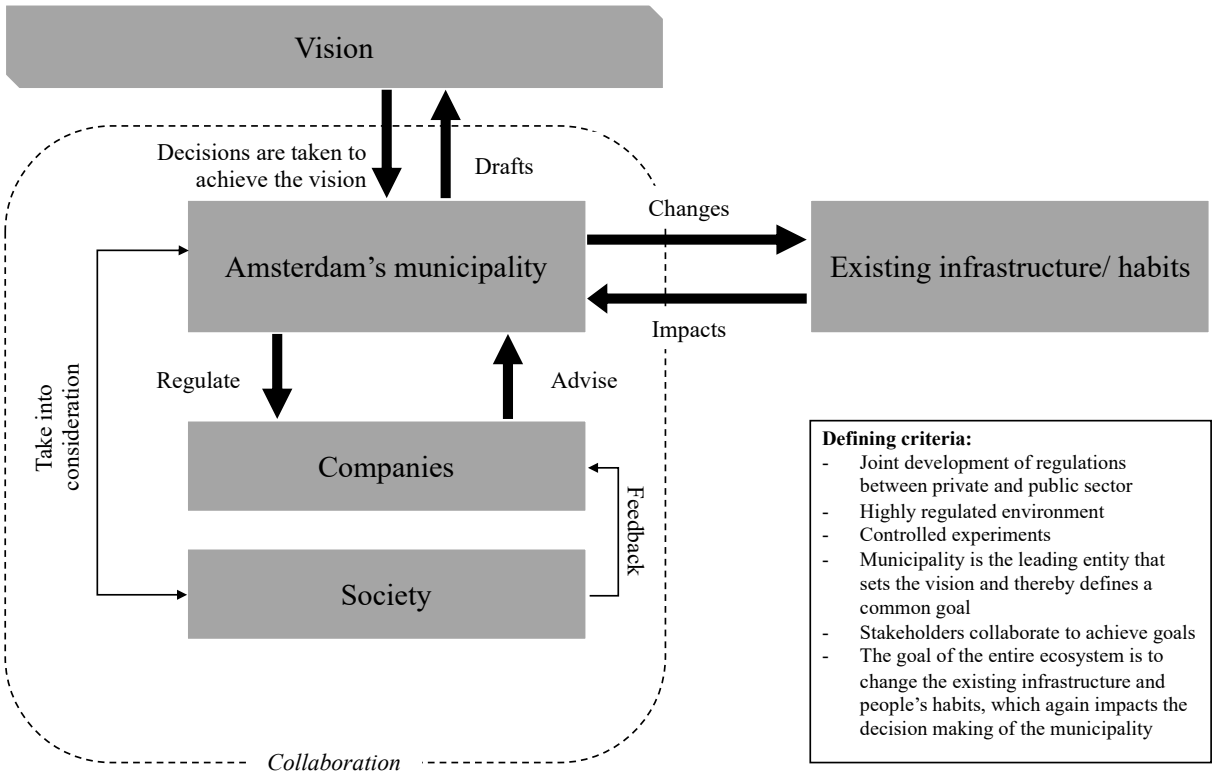

Figure 3: Visualization of Amsterdam's mobility environment; Source: this study

Figure 3 depicts the prominent factors of Amsterdam's mobility environment. First, a demanding vision shapes the municipality's decision-making process. This also has an effect on the implementation of the regulatory framework. Second, although firms have to adapt to the government's rules, they still have the chance to put forward their own ideas and advice the municipality based on those. An environment of – to a certain degree forced – collaboration is created. Third, the municipality progressively accepts its role as coordinating entity, ensuring that the existing infrastructure and the resident's mindsets are continuously impacted.

4.3 Similarities and differences (at the hand of aggregates)

In order for the two cities to have reached their respective situations, certain factors were mentioned repetitively by the participants. Having grouped them and subsequently created aggregators allowed the researcher to gain an understanding of the overarching concepts that described the dynamics in both cities. The holistic perspective provided a structure that can be used for cross-case comparisons. First, the two cities are compared based on the contextual amount of change that is required. Second, Berlin and Amsterdam's differing leadership styles that strongly account for the difference in mobility visions, are related. Those two pillars emerged as major obstacles or initiators of change. They build on a general environment that either allows for a destructive or beneficial interaction between all actors. Third, the comparison

of the corresponding environments zooms in on factors such as collaboration, regulation, experimentation, transparency and enforcement. All those aspects emerged from the analysis as criteria that define the interface between municipality, companies and to a slight degree the society (see section see 3.5 and Appendix 1).

4.3.1 Achieving a behavioral change

The reason for the wickedness of the situation is that the status quo is not sustainable. In both cities, the current version of urban mobility is identified as a polluting system. Past and present behavior has led to such a situation. In the conversations with the individual actors, all have recognized that a need for change exists because of wrong prioritization. This is partly due to previous decisions and actions, but also due to the context. The historic and geographic development of the buildings strongly influenced both cities. People have gotten used to the environment and have developed a reluctance towards changing it. The representative of Berlin's department for environment and traffic posited it accordingly: *"So one of the core challenges: our cities have been built over centuries. None of our cities are like [certain Chinese cities that are built from scratch]. We always live in consistent structures, where basic elements are present and you start to redistribute something"* (SenUVK).

However, the findings also depict that Amsterdam's citizens have already adopted certain behaviors that are considered beneficial in the future of urban mobility. The share of bike trips in the city center is the largest of all means of transport. Still, the city representative postulated: *"A car equals freedom and liberty and a status symbol. And [it is considered a] hassle to not own a car. All these ideas are so deep within the human being. I think this is the biggest challenge"* (GA). Some representatives of the society go further saying: *"Cities are made for living and trade. Assume you cannot trade anymore because [there are] too many cars [and] too many bikes"* (Advier).

Similarly, in Berlin the interviews highlighted existing behavioral and infrastructural patterns that require change. The influence of the car-industry is considered to be a dominant factor. Not only, were many of the 3.4 million people born into a car-culture, but also is the city designed to accommodate cars. "Changing Cities" and "DR" additionally pointed the insufficient design and development of the bicycle network out.

In total, although both cities face similar mobility challenges, they engage in different approaches to solve them.

4.3.2 Establishing vision and leadership

Two contrary leadership styles were depicted by the two cases of focus. The case of Amsterdam displays how a tightly controlled environment can develop and what the operators think about it. In comparison Berlin, is a biotope of experimentation where few regulations exist. The operators present in the market also expect differently from the governing municipality.

Solely looking at the leadership situation, it becomes apparent that Amsterdam follows a medium-term vision. Until 2030 it is the city's goal to be emission-free. Therefore, sub-goals for 2025 are defined and incentives are developed that all take the timeline into account. To be able to achieve this goal, Amsterdam is aware that their mobility situation has to change and they make sure to properly screen all the services they allow to enter the market. Specifically, for this, standards and points of contacts exist. The operators know precisely what they are and are not allowed to do and they are aware that they need to prove their worth continuously. While many operators seem to want a little more freedom, they also praise the existing code of conduct.

Berlin's unregulated approach seems to be bound by a large degree to the German common-use law. Not only does that reduce the city's scope to intervene, but it also attracts a myriad of different national and international actors. The responsible authority, the Senate's department for environment, traffic and climate of Berlin, additionally found itself in a restructuring situation: *"The houses Senate Department for Urban Planning and Transport were separated. In this respect, the SenUVK had to deal with very big issues"* (Spiekermann). All of this, plus the knowledge that Berlin's mobility vision is focused on an emission-free city for 2050, creates a very liberal environment. A precisely communicated agenda to achieve the vision's goal, people of contact and standards for the operators are missing.

4.3.3 Creating a suiting environment to develop a sustainable urban mobility concept

While both cities try to achieve almost the same goal. The means and timelines to achieve it are different. Thus, the environments that were constructed or that grew naturally also differ drastically. While the broad differences, such as existing context and leadership are already holistically delineated, their effects are not. They have an impact on which regulations exist,

how they are enforced, what collaborative relationships develop in between operators and municipality, and how transparent the market operates. Looking into each one individually allows to further distinguish the two cases and generates answers to the sub-questions.

4.3.3.1 Regulatory framework and enforcement

Amsterdam's amendment of the APV-law permits the municipality a complete control of the market. No service enters the market without being screened by the municipality and no operating service develops in a free manner. Thus, enforcement plays a crucial role in Amsterdam's current mobility environment. By the means of constant data control through the development of an API for live-data monitoring, the municipality ensures to always be up to date. Where shared cars can park is regulated and the according infrastructure (for the electric free-floating cars) was developed in unison.

In Berlin, quite the opposite dynamics are observed. The common use law only regulates the number of vehicles standing together in public space (regards free-floating vehicles that can be parked in public space on the sidewalks). Whilst the development of a shared mobility sign to better coordinate the operators, is in progress, no further parking regulation is currently made. Similarly, stricter parking regulations are in discussions, but have not yet been pursued. For car-sharing a comparable situation is present. While the city does allow mobile phone parking[5], this agreement is seen as the smallest common denominator, positively phrased: "*Well, they at least supported the fact that mobile phone parking was allowed and that's something. Of course, that's not, as is possible today with the Car-sharing Act – a discount or another goodie or a permit for local parking – but at least they found a way to make the business possible for us"* (ShareNow). Concisely, regulating the urban mobility market is not Berlin's priority and it will depend on the introduction of the regulations in development whether their ideas will lead to a more regulated environment.

Comparably, Berlin's enforcement is not aligned either. According to the provider Circ, not all violations of the law are properly penalized: "*For example, we are only allowed to deploy four vehicles in one place, but there are providers who place 10 vehicles in one place. Theoretically the public order office could write a letter, [signaling] special use and then demand a penalty fee. But Berlin does not do that. How do we solve the whole thing? First, we talk to the districts.*

[5] Mobile phone parking means that the car automatically realizes that and where it is parked and starts, if needed, to pay an according fee

We try to create parking space to get the kick-e-scooters off the sidewalks. We don't want a regular overreaction, e.g. the prohibition of scooters on the sidewalks, as in Paris, but we see it on the horizon. That's why we want to create solutions with the city" (Circ). Collaboration could be an initiating spark for an accepted regulatory policy.

4.3.3.2 Collaboration

In Amsterdam, the terms of collaboration have already been partly delineated in section 4.2.2. Collaboration is considered key in Amsterdam's introduction and development of mobility services. While it is yet unclear to which degree the opinions of the operators are taken into account in the upcoming bike-sharing regulation, the operators that are in touch with the municipality underlined mutual listening and acceptance as a key to success. Additionally, for the introduction of experiments or pilots, the city's innovation manager underscored the importance but also the difficulty of collaborating with the society: "*We are trying* a *bottom-up approach, talking to the people. We see it takes a lot more time than we expected, because people are stubborn, and they want their own thing. [But] in the end, we have some KPIs listed which [allow us to] see if it's working"* (GA).

Meanwhile in Berlin collaboration is rather an optionality for most SMS. While the car-sharing case is slightly different because the parking situation of cars requires an agreement with the city, all other, smaller SMS engage in a rather one-sided information exchange, where they proactively approach the municipality. As displayed in Section 4.1.4, Circ provides data and insights to the city because they think it can help in the endeavor to drive solutions collaboratively. Thus, only car-sharing companies seem to have a defined single point of contact in Berlin. Inter-company collaboration, however, is especially present in Berlin. Two factors seem to drive that behavior. First, because two SMS-companies can make use of each other's services. Second, because some services share the same founder. Both behaviors have not been observed in Amsterdam upon conducting the study.

Looking at Amsterdam's MaaS plans or Berlin's Jelbi pilot, MaaS initiatives can also be seen as an incentive to make companies collaborate with each other. While aggregators already combine businesses from different SMS, based on the operators' initiative, a few also collaborate to exploit the complementarity of their business models, like DR in Berlin: "*So for example with Miles we had a cooperation for the collection of bicycles that have been parked [outside the geofence] or wrongly. We then book a transporter from Miles to collect them again.*

We like to exchange ideas with other providers and see what the different use cases are, where you can learn from both sides: What do we need and what do the other companies need?" (DR).

Interestingly, although the two cities provide different mobility environments, both cities notice that the operators urge to engage in collaborations. While, a facilitation from the city can streamline the processes, it cannot be said yet whether Berlin's unregulated approach might deliver more innovative approaches in the long-term. Overall, it has to be taken into account that some SMS are present in both markets and it can be assumed that their collaborative behavior stems from routines from other markets.

4.3.3.3 Transparency

Overall in both markets, the examples highlight one crucial dimension: transparency between the private and public sector. Uncertainty about future business decision often stems from opacity. The fact that operators in Berlin are displaying a progressive attitude potentially can be seen as a chance to avoid that their business model needs to be adapted if parking on sidewalks is prohibited. Being involved from an early point onwards allows operators to design timely answers to upcoming business challenges. Similarly, a well-defined vision, rules and policies can help mark a path for the operators. Consequently, investments can be made based on a longer time-horizon, which in turn is expected to provide certainty for cities and operators leading to more sustainable decision making.

5 Discussion

The findings clearly underlined that Amsterdam and Berlin have two different urban mobility environments and generated insights that can be illuminated in a variety of ways in the discussion. First, finding answers to the sub-questions helps disentangle the differences in collaboration and regulation. Second, synching the observations from both cases and comparing them with the literature review enhances wicked problem and complexity theory. Third, the insights point towards further theory that acts complementarily. Finally, the research question is answered, and all the insights are taken together to create a general visual overview (see figure 5) of how cross-sector collaboration could drive a system's (in this case a city's) reduction of wickedness.

5.1 Elaboration on sub-questions

Taking all of the findings from both cases together provides a foundation from where the sub-questions can be answered. Sub-question 1 is divided into two parts; first, what factors can motivate SMS-companies to engage in sustainability-increasing partnerships – with other SMS-companies and second, – with municipalities?

As touched upon in advance, the motivation to cooperate with other companies mostly stems from an opportunity that can lead to lower costs or higher sales. Thus, two main factors can be highlighted. First, the complementarity of needs and supply. An example is a cost-reducing partnership, like DR and Miles, where the service of one SMS-company is used by the other. Second, the complementarity of the service offer. Many services complement each other by the ease they give the user to bridge different distances: *"They could supplement each other for different distances"* (ICLEI). This can specifically be the case when a MaaS-company (aggregator) combines two offers in such a way that the seamless offer incentivizes the MaaS-user to reduce car-usage. Otherwise, complementarity in distance could only lead to a potential business increasing partnership, which in turn might be negative for sustainability if car usage is even increased.

Looking at the second part of the sub-question, transparency is a factor that can motivate firm-to-municipality cooperation. It is assumed that transparency incentivizes commitment of the operators to the city. Such commitment allows companies to engage in long-term decision-making, leading to sustainable investments which might amortize only over a longer period of operation. Consequently, the city can benefit from the private sector commitments. Moreover,

the findings show that collaboration and regulations lead to companies being more sustainable. In Amsterdam, for example, reciprocal information exchange made Felyx adapt the usage times of their scooter to decrease the number of drunk people using the vehicles, raising safety standards (GA) – a different form of sustainability. Another example is the high number of residents using Felyx scooters, underlining the local value created, which in the long-term is expected to reduce car-usage.

Regulations do not require the willingness of both actors towards a common goal, like a collaboration, but instead are one-sided, enforcing cooperation. They are highly successful, since they can be very effective in a short amount of time. One example is the APV-amendment which stopped Amsterdam's congestion caused by bike-sharing systems.

The latter leads to – and already partly answers – sub-question two: how can regulatory policies increase companies' efforts to transform towards more sustainable SMS? Regulations allow municipalities to control what type of SMS enter the city. While Berlin does not provide that many examples for regulatory policies, the effect of Amsterdam's policies can be seen. By reducing the amount of SMS in the city, congestion and public space reduction is combatted. Enforcing collaboration with operators potentially ensures to takeover benchmarks from operators' learnings in other cities. Additionally, freeing up public space by reducing the amounts of parking permits per apartment opens up more space for active mobility. While this does explain how regulations transform the city to get more sustainable, it does not directly answer the sub-question yet.

However, looking at it from a holistic perspective leads to the understanding that broad measures, that create a more sustainable city – such as a city's goal to be climate-neutral by 2030 – also incentivize companies to offer solutions that fight GHG emission, congestion and waste. Felyx proves this, by explaining that their use of electric vans for the battery swap partly stems from the city's medium-term plans to become emission-free (Felyx).

On top of that, some regulatory policies directly increase companies' efforts to transform towards more sustainable SMS. For example, by only allowing electric free-floating car-sharing, companies that want to operate in Amsterdam have to develop a competitive electric car-sharing fleet. This form of regulation shows the positive direct effects regulatory means can

provide. Adding the indirect effects of investments in the infrastructure, such as the expansion of charging stations, the positive effects of regulations become visible.

Lastly, the third sub-question asking "what effect societal interest in sustainable, smart mobility has on the influence of regulatory policies on shared mobility services?", is harder to answer. While several participants have indicated that societal interest helps drive sustainable policymaking, the effect on policymaking in the realm of shared mobility was less prevalent. 'Changing Cities' saw the role of the government to implement stronger rules for the distribution of space between shared services: "*I see, things like bike-sharing, e-scooter […] or perhaps even shared taxis […] in the future but I would expect the state to play a stronger role in the provision of these services. […] We have a bunch of different providers of these shared mobility services, that are unfortunately however not always so linked up, [but instead] are in competition with one another. Which [...] leads to the situation we currently have: resources are not used efficiently or effectively enough"* (Changing Cities)

The mobility expert from Spiekermann added that Berlin is currently only thinking about it vaguely: "*The Sharing theme is simply so new that there is no administrative structure that could play on this theme. In this respect, there have been [discussion] rounds every now and then where representatives of SenUVK have participated benevolently and there have been several individual discussions with different sharing providers, but there is not a big consensus and desire to bring the sharing-topic forward"* (Spiekermann). In conclusion, it might be assumed that the voice of NGOs affects shared mobility policymaking in the long-term, but more evidence would be needed to answer the sub-question explicitly and also evaluate causation and correlation. At least for Berlin, the results are disillusioning, especially considering that *"Berlin has just drawn up a local transport plan and commissioned a cycle transport plan and sharing does not appear in it either"* (Spiekermann).

5.2 Insights for wicked problem and complexity theory

The specific learnings from the SMS-industry lead to higher-level insights for wicked problem and complexity theory. While it is already established in section 3.2 that the quest to develop shared urban mobility solutions in a more sustainable way can be identified as a wicked problem, the insights generated throughout the data collection confirm the literature review. In every major European city, various shared mobility services enter the market. Not only does every company have a different expansion strategy, but also different cities have diverse

mobility strategies. Situated in the center of the mobility transformation are the municipalities, who realize that their current regulatory frame and infrastructure do not meet the new expectations and therefore, have to adapt the legal environment (Daimler Mobility).

Thus, both cases face a similar situation, where the municipalities constantly need to resolve arising issues that come with the aging of the cities' mobility plan – constant resolving is identified as a common criterion for wicked problems (Rittel & Webber, 1973). However, Amsterdam's decision to radically ban all sharing services reduced the wickedness slightly. The absence of sharing services and an overhaul of the regulatory frame logically diminished the plurality of actors and their solution approaches. In comparison, Berlin is following a reactive policy approach, where many issues raised by the operators are not taken care of or are postponed, retaining the wickedness by fostering uncertainty. An example is the sole toleration of car-sharing. Not developing an infrastructure or committing to a long-term strategy, is not only a denial of the overarching problem of climate change, but also does not reduce the solution approaches. It leads to increasing numbers of private cars entering the cities and does not incentivize emission-free types of car-sharing fleets, further driving the polluting effect of mobility.

As delineated in the literature review, cross-sector partnering spaces form a solution approach to untangle the web of interests between sectors in scenarios of wicked problems (van Tulder & Pfisterer, 2013). In order to better understand the cross-sector collaboration, van Tulder and Pfisterer (2013) propose to classify partnerships between sectors. Looking at Berlin, the interaction between state, market and civil society can either be interpreted as *partial trilateral fit* or *weak trilateral fit*, depending on the definition of market players. In this context, change is most likely achieved by an interdependent agreement between the three spheres. Thus, the fit not only describes to what degree market, government and civil society are aligned but also how likely it brings about change (van Tulder & Pfisterer, 2013). Looking at the partnership sphere from the perspective of the shared mobility services companies, that are directly involved in offering services such as bike and kick-e-scooter sharing, a *partial trilateral fit* exists (see figure 4, Berlin 1st interpretation). This can be explained due to the strong desire of the companies to engage in partnerships with the state (municipality) and civil society. Similarly, the civil society is strongly engaged to drive the topic of urban shared mobility and the necessary infrastructure. However, the municipality is, so far, not ready "to become interdependent in their approach with the issue" (van Tulder & Pfisterer, 2013, p. 18).

Extending the scope to a broader market of players who are needed to be aligned to rapidly drive urban mobility, such as the transport cooperative or local employers, only a *weak trilateral fit* is identified (see figure 4, Berlin 2nd interpretation). While the transport cooperative engages into, for example mobility hub discussions, local employers are not yet a part of any mobility strategy. Hence, with a broader market definition, not only the municipality lacks a clear approach for the future of urban mobility, but also the market.

In Amsterdam, a more consolidated approach between the sectors is observed: the municipality is willing to partner with market and civil society. While the same willingness accounts for the civil society, it is hard to classify the market's willingness. Although only few players exist, they are – due to the limited room for maneuvering the tight regulatory frame provides – inclined to cooperate as well. However, it will be interesting to see whether the market's willingness to cooperate remains equally high once the number of operators and thereby their bargaining power increases. For now Amsterdam's cross-sector partnership space demonstrates a *full trilateral fit.* All spheres seem to align in their approach to SMS, meeting in point 4 (see figure 4).

Previously – to the researcher's knowledge – urban mobility cases have not been classified in line with the taxonomy of van Tulder and Pfisterer (2013). However, the application helps to see how the three societal spheres, market, government and civil society agree in their approach towards the development of SMS in the distinct cases of Berlin and Amsterdam. Therefore, the present study enhances the literature of cross-sector partnering spaces with a clear example. Additionally, it becomes apparent that the final emerging framework (figure 5) that is inspired by the case insights, provides a framework that helps move entire cross-sector systems towards a stronger (eventually full) trilateral fit. Following the assumption of the literature review that a full trilateral fit is required to tackle wicked problems, the general applicability of the framework is underlined. However, it also shows that systems, such as Berlin, can develop theoretically sustainable services in a weak or partial trilateral fit. While the amount of services together does not seem to be sustainable in the short-term, their long-term results have to be analyzed. This is a crucial addition to Van Tulder and Pfisterer's (2013) theory, not only providing an example for the applicability of the classification, but also beginning to distinguish their delineated types of partnerships in real life examples.

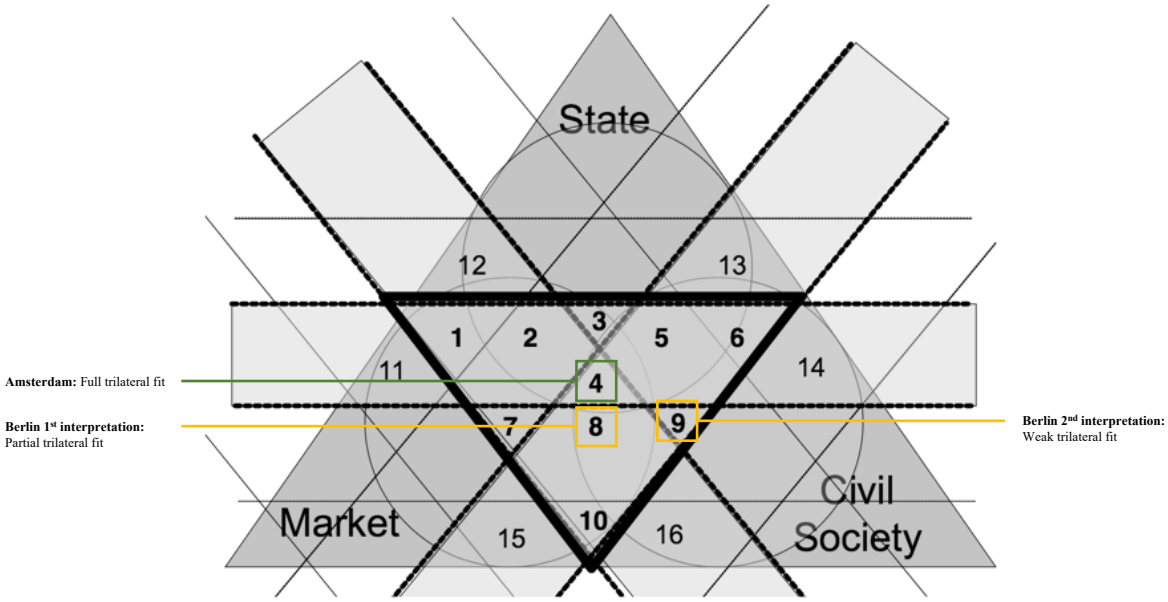

Figure 4: Amsterdam and Berlins current position in partnering space; Source: adapted from Van Tulder & Pfisterer (2013)

Overall, it is crucial to mention that most likely urban mobility itself could not develop to its current shape if all cities would follow Amsterdam's strict regulatory approach. While it is an option to slowly get the city adjusted to existing services, these services were developed in cities that allow for experimentation and only adjust the infrastructure reactively. Services and products have a better chance to be more sustainable when based on growing, profitable operations. Thus, they require both environments for the initial development of the technology; one that provides scope for experimentation and expansion, and the other that incentivizes sustainable operations.

Complexity theory is the second major theory highlighted in the literature review. The complexity of the shared urban mobility environment is to a large part explained by the multiplicity of actors who constrain one another and their strong path dependency; past decisions highly affect present decisions, for example, regarding the investment scope of infrastructure decisions. Three opportunities of how to deal with complexity were delineated in the literature review. All three are applied and distinct learnings are highlighted in the following:

First, large group methods – similar to the proposed approach of the Partnerships Resource Centre (2016) – incentivize stakeholders to work in collaboration (Shmulyian, Bateman, Philpott, & Gulri, 2010). All parties involved should get together to theoretically design the change that is needed and subsequently develop a fitting implementation plan. Jointly

discussing the complexity and drawing up solutions is expected to foster a reciprocal understanding of the difficulty of the parties' situations (Shmulyian, Bateman, Philpott, & Gulri, 2010). Looking at the two cases at hand, both cities try to bring opinions from all stakeholders together. Nevertheless, due to the unregulated situation in Berlin, no joint strategy for all actors has been drawn up. In comparison, due to the APV regulation, Amsterdam developed a clear roadmap for existing sharing services reducing complexity strongly. Overall, the complexity of the situation requires large group methods that incentivize the actors to get together on a frequent basis. Additionally, inter-firm methods exist that help to create structures to keep complexity in check.

Collaborative complexity can take similar shapes as the delineated large group methods, but is designed to be ongoing. As such more than two of the organizations involved get together to complement each other to reduce environmental complexity (Schneider, Wickert, & Marti, 2017). For instance, in Berlin, the investment structure of companies such as Miles and Circ, leads to collaborative advantages. Sharing a founder was underlined in the data collection as a unique factor to face the competition of the market. Besides that, other collaborations were based on use-case complementarity. According to the analysis, the researcher did not encounter such inter-firm collaborations in Amsterdam. Either the companies in Amsterdam do not require complexity reducing mechanisms or the strict governance complicates these measures. Vice versa, it can be assumed that Berlin's urban mobility environment is less predictable, leading to higher levels of complexity that require strong collaborative engagements. To fully understand the differences between Amsterdam and Berlin, the cities' lawmaking efforts are holistically compared.

Already in the 1990s, Ruhl (1997) called for a new approach to environmental lawmaking. *Sustainable development*, *adaptive management* and *biological diversity as a performance metrics* are proposed as guiding principles for environmental lawmaking (Ruhl, 1997). The underlying belief of the proposition is the thought that legal decisions should not be static but adaptable. Continuous experimentation in the pursuit of sustainable change that can be tracked by a metric that coherently accounts for sustainability, should create such adaptability. Many aspects of the description are visible in the two cases. Berlin's reactive behavior could be interpreted as a highly adaptive policymaking, seeing the current expansions of the operators as a large scale form of experimentation. Similarly, Berlin does follow a broader roadmap to be climate neutral by 2050 and measures crucial data like air quality (berlin.de, 2020).

Nevertheless, a different perspective could consider the long time-frame as non-sustainable and the city's reactivity as a result of the failure of the legal frame, which grants operation sovereignty to services in the public realm. The roadmap is bolder in Amsterdam, metrics stricter and lawmaking truly adaptive, since the municipality is not only using a permit system to decide which SMS enter the city, but also a continuous monitoring system to evaluate SMS' performances.

In total, the interventions observed in Amsterdam are in line with various of the tools that are proposed to manage complex contexts. First, the amendment of the APV law is equal to setting a barrier (Snowden & Boone, 2007). It helped government officials to take a step back and regulate the environment from ground up. Second, in Amsterdam stakeholders get together and enter discussions about potential service improvements and broader changes to the regulatory frame. Third, while the initial interventions were orchestrated in a top-down manner, it created an "environment where good things can emerge" (Snowden & Boone, 2007, p. 10). Thereby, the present study is unique, delineating which factors help contain the complexity of the urban expansion of SMS.

5.3 Making sense of the findings: emerging theory

The discussion continuously goes back to Amsterdam's adjustment of the APV law, a change to the city's legal frame in 2017 forbidding shared mobility services in public space. Considering the APV law and its impact on shared mobility as a form of an innovation tool, the APV change could be considered meta-innovation, which is described as "changing the institutional context in which the innovator is operating" (Møller, 2008, p. 146). Meta innovations are usually driven by one of the following forces: pressure from outside, internal problems, motivation for improvement or coincidence (Møller, 2008). In the case of Amsterdam, pressure from outside – the strong influx of Asian bike schemes – was most likely the initiating force. It not only helped the city to take full control over the development of the urban mobility plan, but also brought the opportunity to engage into structured conversations with the operators and civil society. The bargaining power moved to the municipalities, who are now in charge to decide whether and on what ground sharing services can flourish in Amsterdam. From there onwards, motivation for improvement seems to have driven the design of the general regulatory urban mobility framework. This motivation, however, does not solely come from the leading entity, but also from including the operators into the decision making.

A joint approach towards regulation between private and public parties is termed co-regulation: a "mechanism whereby a Community legislative act entrusts attainment of the objectives defined by the legislative authority to parties which are recognized in the field" (European Union, 2003, p. 3). Operators are not asked to substitute municipality services, but for instance in the case of the emerging bike-sharing system, their insights are used to design the system's structure. Additionally, existing SMS, such as scooter-sharing, have to continuously share data that is then used to assess the services' value in the provision of the social good – mobility. Control and design of the service is therefore tied between public actor and private operator. Co-regulation is deemed to be specifically successful for environmental policy, since regulatory budgets and administrative capacities in that field are usually minimal (Balleisen & Eisner, 2009). Thus, co-regulation can lead to more sustainable regulations (Balleisen & Eisner, 2009). Similarly, the results from the data collection prove that various operators want the market to be regulated, not only in the number of players, but also in the sustainable requirements that need to be fulfilled.

Nevertheless, transmitting power to private parties always comes at a risk. Companies might exploit their privileged position to design the regulatory frame in such a way that their products enjoy a competitive edge. Permits that only last for a year could be a method to keep the power of the private parties in balance. Herewith, operators would need to prove themselves every year again. In order for the yearly permits to work, the leading entity requires an unbiased method to assess year-round performance and the constant re-proving need not create uncertainty for companies' investment scope. While it is crucial to install checks and balances for private operators, their economic room for maneuver should not be compromised.

Hence, for co-regulation to function and stimulate change in a complex environment, a balanced partnership is required. Therefore, van Tulder and Keen (2018) propose a guide towards a complexity-sensitive CSP approach. Interestingly, the findings of the present study provide the chance to compare theory and reality. While the results agree with van Tulder and Keen (2018) in many aspects, for example, that complexity-sensitive CSP require a configuration of the partnership dynamics and a strong alignment to be willing to work towards a common vision, one proposition seems less viable when analyzing present data. Van Tulder and Keen (2018) suggest that detailed monitoring and evaluation during the initiation of a partnership could compromise mutual trust-building and the willingness to "share dilemmas" (p. 327). The present study only provides a snapshot into a still evolving CSP, thus, dilemmas might not have

arisen yet. Nevertheless, private actors currently proactively propose monitoring, in the form of data-sharing. It will be interesting to see, especially over the long-haul, whether and to what degree monitoring affects the CSP's stability and how many concessions operators want to make to operate in a regulated environment.

It seems, specifically when regarding Amsterdam's case, that strict regulation can incentivize companies to act sustainably. As such, the municipality seems to be guided alongside Porter's Hypothesis: "stringent regulation […] can produce greater innovation [and reduced costs]" (Porter & Van der Linde, 1995, p. 100). Since no results of a fully integrated SMS-industry exist yet, it is too early to evaluate Amsterdam's approach. However, it becomes obvious that certain measures were taken that are in line with Porter and Van der Linde's (1995) suggestions for good lawmaking: the "regulations foster continuous improvement" (p. 110) by binding the operators to agree to data sharing methods and the "regulatory process leaves as little room as possible for uncertainty" (p. 110). At the same time, it can be argued whether, as proposed by Porter and van der Linde (1995), the approach to innovation is still left to the industry, since the municipality strongly caps the numbers of vehicles and strongly incentivizes shared electric vehicle use. While the former might reduce innovation means by jeopardizing profitability, incentives for electric mobility only limit the type of propulsion. Looking at Berlin, stringent environmental regulation is in many aspects still unconsidered. Fleets are uncapped, number of competitors are unregulated, choice of propulsion is free and space of private vehicles is only marginally reduced. Still, many operators in Berlin proactively build their operations on the use of renewable energies, durable materials and emission free logistics. Thus, private actors seem to see the advantages of resource productivity, acting contradictorily to the general trade-off between environment and competition – defended by various economists (Schmalensee, 1993). Should the municipality of Berlin also be stricter?

Looking at Amsterdam's positive advances in its urban mobility plan, the answer should be 'yes'. However, the argumentation disregards an important aspect in the governance of countries, states or municipalities: political parties play a major role in their strategic development. Political systems are subject to recurring elections, which have the potential to bring interest groups to power that want to fully change a previous party's political agenda. Thus, stringent regulations under one political system can also lead to a dangerous lock-in effect for companies that fully adapt their business model and are then exposed to a changing environment. While, this risk is always present, previously touched upon concepts, such as

collaborative complexity, can help companies see environmental change coming. In total, while the present example shows that ambitious regulations seem to be needed to combat climate change, private actors need to be aware of stringent regulations' risks.

Regarding Berlin's results, it seems that minimal regulatory measures have been taken so far. Herbst termed the approach as *minimum critical specification (MCS)* (Flynn, 1976). It can be separated into two parts. First, "no more should be specified than is absolutely essential" (Cherns, 1976, p. 786). Second, the leading entity "identifies what is essential" (Cherns, 1976, p. 786). As such, specifying too much can be seen as closing options (Cherns, 1976). The SMS' solutions in Berlin, measured by the number of vehicles, flourish. Some participants consider Berlin as one of the biggest kick-e-scooter markets in the world. While it is unclear whether the market's size also drives sustainability, the minimal amount of regulations helped the companies to grow and assumedly to consider the city as a critical factor in the young companies' pursuit of profitability. The skills acquired to manage large fleets are expected to be invaluable and could not have been that easily developed in a more regulated environment. Nevertheless, the calls for more essential specifications are rising. Thus, the city either needs to adjust previous specifications or does not willfully act in line with the minimum critical specification.

If the latter is the case, and according to the study's participants it sounds like it, then one could call Berlin's approach to SMS, a *laissez-faire* government. The concept, famously termed by Milton Friedman, sees the market as the solution to all economic challenges (Palley, 2006). While a *laissez-faire* attitude drives towards a similar direction as the MCS, it depicts a more extreme scope, disregarding any minimum specifications. It is surprising that forms of *laissez-faire* government can be found in a country like Germany, known for its strict regulations. Nevertheless, Berlin attracts a myriad of shared mobility companies and the interviews with the operators show that a strong urge to innovate and cooperate exists. Although Amsterdam attracts companies to operate in its market (e.g. charging infrastructure), it does not compete with the size of Berlin's SMS-market. Thus, despite the fact that Berlin's SMS-environment shares certain non-interventionism dynamics, operators adapted to the situation. They engaged into a learning process, making sense of the realities and created their own answers. Klemsdal (2012) terms this process as sensemaking with a minimum amount of specifications. Thus, following Klemsdal's (2012) theory, Berlin's mobility environment could ultimately be connected to MCS. Moreover, Klemsdal (2012) discovered that only real experiences lead to a

learning process. While the original MCS theory is only applicable to organizations, the present study shows that also larger systems can employ a sensemaking process. Therefore, the truth, about developing sustainable SMS that can be scaled, potentially lies somewhere at the conjunction of strict regulation and MCS and it seems to become imperative to look for benchmarks, such as Amsterdam, when designing an ideal governance system.

An approach to lawmaking based on continuous benchmarking, by reviewing or monitoring "experiences of different jurisdictions" (p.7), is called experimental governance (Wolfe, 2018). The approach originally comes from the policymaking realm of the European Union. A specific form of experimental governance is termed open method of coordination (OMC) (Szyszczak, 2006). It stems from the idea to compare different European countries and changing behaviors without implementing a new regulation. Thus, it can also be seen as a form of comparison between jurisdictions to understand where differences exist and which jurisdictions can be considered frontrunners or laggards (Szyszczak, 2006). Such revelations should create pressure and feelings of shame that ideally incentivize change (Szyszczak, 2006). Performance is evaluated based on – amongst others – common guidelines, common indicators and setting goals or benchmarks (Szyszczak, 2006). The evaluation metrics are often not drawn up by the government alone but in cooperation with civil society (Szyszczak, 2006). Due to all the named factors, OMC offers a unique approach to regulation.

Especially in the SMS-industry it could be an interesting tool to account for the stark differences between municipalities. While cities with clear guidelines who decided to already implement rules and enforcement measures, would be highly ranked in the comparison, others who lag behind could be incentivized to act upon their position in the rankings. Thus, cities who already act are not obliged to establish a standard regulatory system, but instead earn a reputation bonus, highlighting them as a benchmark for other cities. Successful policies could then be transferred from one jurisdiction to another, fulfilling OMC's goal of "institutionalizing new forms of economic governance" (Szyszczak, 2006, p. 488). This line of thought opens up whole new dimensions of cross-jurisdictional cooperation, incentivizing mobility frontrunners to enact change across the border of their municipality.

5.4 Matching emerging, complimentary theories with wicked problem theory

Cross sector collaboration is seen as a major chance to reduce wickedness and many of the cross-sector solutions delineated in the literature prove to be valuable in the wicked mobility

environment of cities. Additionally, the findings point towards further literature that helps make sense of the observed interactions. Three theories seem to perfectly fit to complex environments and might be applicable in the field of cross-sector collaboration. Meta-innovations, among other definitions, means changing the legal framework in order to "regenerate sources of productivity" (Etzkowitz, 2005, p.66). Adapting the APV-law, was Amsterdam's key to regain control over the chaos of public spaces, caused by bike-sharing systems. Thus, a meta-innovation initially stopped the emergence of an entire market. In the long-run, however, the adaption positions the municipality as the decision maker in the innovative SMS-industry. From there, it has the chance to drive more sustainable innovations (Lee, 2018). Changing the institutional context is not always easily possible, but if it is, it is an option to close loopholes in the system that lead to, for instance, public disturbance. Often rules are developed incrementally, slowly changing organization's behavior. To fully adapt the regulatory frame, banning companies from existence, is a decision with far-reaching implications. It is assumed that the infancy of the industry that was affected, played a significant role. A more established industry with more employees could not have been altered that radically. However, the meta innovation allowed to drastically decrease the number of approaches that new SMS offered towards a sustainable mobility. Thus, it temporarily reduced the wickedness of the situation to – in the long-run – develop a system that would help all actors be more aligned.

The chaos of the unregulated Amsterdam before 2017 also shows the need for stark regulations that would be needed upon a renewed opening of the market. Co-regulation is identified to be a major tool for Amsterdam's municipality. The operators reacted very positively towards the chance to participate in the design of the regulations. Continuous interaction between municipality and operators shall be secured by ensuring live-data control. Such a form of transparency makes the operators more accountable, but also allows them to highlight incidents that need further regulations from the municipality. Therefore, this form of co-regulation drastically reduces the wickedness of the market. It allows all players to be involved in the decision making and clearly communicates what is expected from the coordinating entity.

Lastly, a general tendency becomes apparent: stringent regulations drive sustainability. While two cases do not render unbiased results and further evidence would be necessary, Amsterdam's sustainable roadmap, in regard of GHG and space design, shows that the city is on the right track. Thus, Porter's Hypothesis, that regulations can lead to innovations and cost-reductions, seems to be applicable in the SMS-domain. Operators are willing to adapt their business

models, for instance, offering solely electric car-sharing. Nevertheless, a long-term study about the effects of Amsterdam's stringent regulations is still missing. It is very likely that many of the operators' innovations were stimulated by the expansion in unregulated cities, such as Berlin. In total, Porter's Hypothesis could be seen as another wickedness reducing factor, when the resulting cost-reductions and innovations improve urban mobility by making SMS more socially inclusive and less environmentally harmful.

On the other hand, a *laissez-faire* government that does not regulate the way organizations operate and neither supports (e.g. electric car-sharing fleets) nor constrains (e.g. number of kick-e-scooter competitors) certain activities, solely building on the power of the market, does not seem suitable for the SMS-market. Leaving the industry to a large extent to itself, increases the wickedness of the situation. Only looking at two characteristics of wickedness underlines this. First, an unregulated development advances the interrelation of wicked problems. It leads to more shared vehicles in the city than eventually necessary for an efficient transport, further interrelating the challenge to design sustainable SMS with the development of green urban space. Second, allowing uncontrolled amounts of operators into the cities without a clear roadmap further tangles up responsibilities. In total, absence of leadership could in the long run lead to an even more chaotic SMS landscape.

Companies rarely call for more regulations, therefore it should be considered a crucial step to listen to such demands. Calling Berlin's SMS-market *laissez-faire* would do the municipality wrong. Although a certain inertia is visible, regulatory steps are being taken to outline the playing field. Therefore, the market tends to slowly adapt a MCS-method. The question remains, why do Berlin and Amsterdam differ so strongly? Staying in light of the MCS theory, one might argue that the differences arise from different needs. Maybe both cities try to solely set necessary regulations, however, the requirements and the context are very different between the cities. On the one hand, Amsterdam saw an existential threat to the small streets of the city in the unregulated emergence of bike-share schemes. Berlin on the other hand, is much larger and actually has the space for SMS to evolve. The minimum critical specifications needed are therefore less extreme. Germany's capital might endure an organic development of the SMS without harming the functionality of the urban mobility design.

Nevertheless, one should pose the question: can an organic development, with slight regulatory adaptions to set a minimum frame of rules, lead to a sustainable urban mobility design? In the

light of a looming global climate crisis, Berlin's approach might need to be rethought. Sole functioning of a system could be insufficient giving the exponentially increasing threat of climate change. Therefore, looking at the discussion in a holistic manner allows to develop an ideal governance system and provides an elaborate foundation to answer the research question of the study: How can a cross-sectoral approach help organizations develop in a more sustainable way?

5.5 How can a cross-sectoral approach help organizations develop in a more sustainable way?

A cross-sectoral approach that facilitates sustainable organizational development is founded on reciprocal understanding and inclusion between the private and public sectors. Therefore, to answer the RQ, a regulatory frame that marks the boundaries of the actors' business environment, is developed that leads to an understanding between the sectors and incentivizes sustainable policymaking. Herewith companies can be transformed towards more sustainable operations. Sustainable is a broad word that can be defined as "able to continue over a period of time" (Cambridge Dictionary, 2020); or in an environmental context, it means "causing little or no damage to the environment and therefore able to continue for a long time" (Cambridge Dictionary, 2020). The specific metrics to measure sustainability should then be set by every system (e.g. municipality) individually. Nevertheless, in the realm of urban mobility, reduction of GHG, congestion and waste and the simultaneous rise of green spaces are deemed suitable measures. The present study outlines a way of governance that helps governmental institutions to combat the complex dynamics of wicked problems and facilitates organizational, (environmental) sustainable development.

Throughout the discussion, co-regulation and experimental governance emerged as options to jointly drive regulatory changes. While co-regulation ensures that the private sector is not only closely monitored but also fully involved in rules' development, experimental government leads to best-practice comparisons across jurisdictions including civil society's sentiments. Thus, both concepts strengthen cross-sector collaboration and seem to emerge as tools to maneuver in wicked environments. Additionally, on the one hand, the analysis of complexity theory in environmental lawmaking highlighted the need for continuous adaption, experimentation and the importance of a metric for sustainability measurement. On the other hand, it demonstrated the power of collaborative complexity. Thus, a system that makes use of

cross-sector collaboration to steer sustainable organizational development ideally incorporates all of the above.

In short, the requirements for the system are very similar to the aggregates generated in the data analysis. While the aggregation of terms was previously used to summarize differences between Amsterdam and Berlin, they also assist in describing how ideally complex (urban shared mobility) situations at the interface of the public and private sector can be steered (see figure 5 for a visualization): a common vision should depict the overcharging direction. Without a long-term goal, that is preferably subdivided into smaller, actionable steps all players miss a guide that helps to make long-term investments. A vision is the foundation for a stable business environment. However, in order for the vision to transpire to the market, the leading entity (in SMS environment, the municipality) needs to ensure its proper communication and develop a supportive regulatory framework. Regulation should enhance three factors: collaboration (e.g. round tables), transparency (e.g. data-sharing) and experimentation.

Collaboration can mean many things, industry round tables (lose form of collaboration) or joint ventures (strong form of collaboration, where two organizational entities merge) are two extremes on the spectrum (Schneider, Wickert, & Marti, 2017). However, collaboration incentivized by the municipality is specifically about creating spaces where actors can get together to discuss strategies – organizing round tables is one option. It is crucial that the representatives of the municipality attend regular meetings to communicate changes to the overarching vision and align all actors from an information perspective. Other forms of collaboration, for instance based on complementary services, can arise from such a starting point. In the SMS-industry, collaboration is also about the communication between the actors in the market and the municipality. The municipality cannot gain acceptance for future policies and ideas by itself, but also must include relevant insights from market players' day-to-day behavior by consulting them for the creation of laws. This leads back to co-regulation. Hereby, it is important to consider society and its representatives, such as NGOs, as a unique market force. A mutual exchange with this side of the public-sector is crucial to lead in the name of society and not rule past them. Spaces for society to intervene, such as a defined contact person or a round-table, should be created proactively from the leading entity in order to consider arising issues as early as possible.

In order to monitor private-sector operations, two aspects are required. On the one hand, the leading entity needs to trust the private-actors. On the other hand, the system needs to be built on transparency. Live data-sharing of anonymous user data is seen as an ideal option to ensure transparency. It allows for a continuous comparison between as-is, and ideal situations, and a subsequent flexible adaption of the regulatory frame to steer the market actors in the most sustainable way possible. By jointly agreeing on the terms of transparency, such as data format and scope, all actors know which rules they have to adhere to. Transparency also means that not all actors are by default allowed to participate in the public realm of the municipality. Mobility is a social good and the findings of the present study have shown that private and public actors alike seek a regulation of the operating actors. A qualitative assessment of all actors who applied for operation leads to a transparent comparison that eventually results in a predetermined number of operators.

Lastly, the municipality should be aware to also stimulate experimentation. A strict form of regulation might suppress sufficient space for experimentation. It is the municipality's task to ensure a balanced control of the dichotic interplay of experimentation and regulation. Giving the operators space to experiment – in the case of SMS, with the number of vehicles or the type of suppliers – is a method to provide space for innovation. Innovation can be seen as the private sectors' opportunity to drive sustainability.

As long as the regulatory framework is able to keep those three factors of collaboration, transparency and experimentation in balance, the system provides a chance to reduce uncertainty in wicked situations. However, certain measures most likely need to be enforced upon the market. In line with Porter's Hypothesis, promoting outcomes that help organizations operate more sustainably could be an option. The creation of market incentives such as pollution taxes or Amsterdam's dynamic city center access system which fines polluting cars could be a tool to bring change to the people's mindset. In the end, the system will be judged by its power to change people's habits. Many wicked problems emerge out of misguided habits that are bad for the environment (Waddock, Waddell, & Dentoni, 2015). Due to its transparent and collaborative nature, the emerging framework (figure 5) is supposed to help convince people to adapt or change certain habits without imposing a new system. Organizations that change to be more sustainable are necessary, but the demand of the people ultimately decides whether the new system can stay.

Figure 5 displays the elaborated dynamics visually. The system's direction is determined by the vision, which in turn is set by some form of leadership. Leadership could be any entity that defines a system's vision. Most likely, however, it is a municipality, state or national government. It has oversight of the market, where private companies and public associations meet. By balancing regulation and experimentation, the leading entity provides a breeding ground for collaboration. Thus, regulations should ensure that private companies provide feedback or even co-regulate to influence the direction of the vision and keep the leading entity sensitive to the market's dynamics. Similarly, intervention spaces for society should be created. Collaboration between the private actors and the leading entity can only be ensured if all activities are transparent and accountable towards the achievement of the vision. The latter needs to be quantitatively measured and monitored by the leading entity.

Looking at SMS specifically, it is expected that an adoption of the described governance system provides an opportunity for city municipalities to help drive shared mobility services towards a more sustainable development, that reduces GHGs, congestion and waste in the long term. Provided that other sustainability metrics, for instance the city's air quality and public space design, are aligned with the mobility strategy. It is revelatory to see that these regulations are demanded not only from civil society, but also from the companies. In return, the governing body expects transparency from the private sector so that an objective evaluation can take place. Moreover, the SMS-industry depicts an interesting case where a close-knit collaboration between public and private actors could lead to a continuous reflection and if needed adaption of the regulatory frame. Nevertheless, it is the study's ambition to not only be applicable to the solving of shared mobility issues but also to other wicked problems.

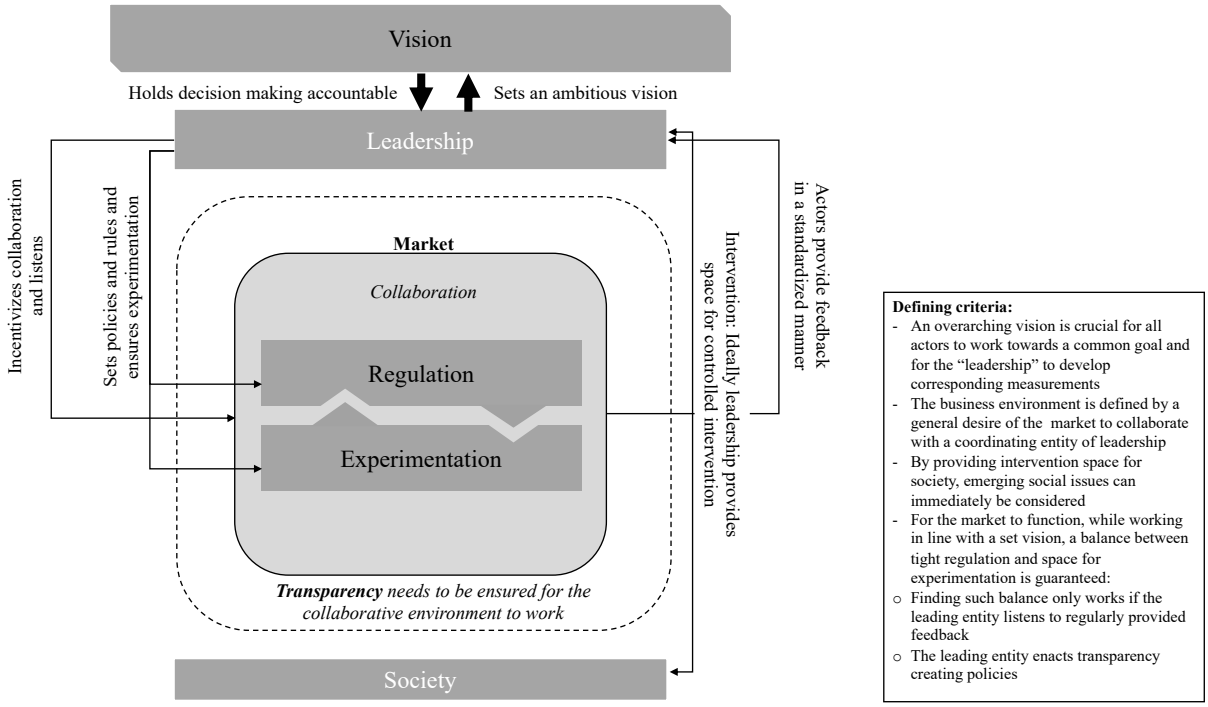

Figure 5: An approach to create cross-sector collaboration that reduces system's wickedness; Source: this study

5.6 Implications for management

Academically speaking, the research has extended wicked problem theory by drawing up factors that support cross-sector collaboration in its pursuit of solving wicked problems. A detailed case study delineated the dynamics between public and private sector and what to learn from it. Therefore, taking the proposed governance model (figure 5) as an ideal version that cities can work towards, various management implications for municipalities arise from the present research. Due to the fact that the study is set in Berlin and Amsterdam, specific recommendations for the two cases are delineated. Moreover, various options of actions for the operators are described.

5.6.1 Berlin

Although Berlin is very advanced in certain areas, – the public transport provider has already implemented a MaaS pilot – the city seems to lack a clear strategy on how to deal with SMS. This is not only explained by missing guidelines for SMS, but also by the slightly less ambitious timeframe to become climate neutral that creates scarce incentives for people or companies to overthink their habits. Nevertheless, it needs to be kept in mind that Berlin's governing structure is unique in the sense that Berlin is composed of 12 districts. Thus, the municipality itself often does not implement planned local regulatory changes. Moreover, the current structure helped develop the city into one of the biggest SMS-markets in the world. Taking that in mind and

knowing how difficult certain suggestions can be realized, the researcher proposes various ideas of change:

First, the city's vision should be more ambitious, guiding the general actions and decisions of the responsible municipality's personnel. Second, collaboration with private partners is suggested to be standardized. A routine meeting should be implemented where developments of the industry can be discussed regularly and firms attain an option to propose relevant regulatory changes to the market. This form of collaboration should be taken as a foundation for stricter regulations, among others, in the realm of parking, infrastructural extensions (e.g. bike lanes) and competition. The latter leads to the advice to consider permits based on qualitative factors for sharing services. It allows to regulate the number of competitors, provide stability for the firm's investment decisions and homogenizes the market for the customers. Third, in order to remain in control of the city's mobility, live data interfaces are needed. It not only allows to stay in touch with the operators, but also helps to synchronize public transport. Given increased transparency, the municipality can act as a coordinating entity to further drive MaaS efforts. In total, all suggestions are expected to come at a certain price. The city needs to decide how important SMS are considered in the transformation of the urban mobility. While the delineated suggestions are expected to lead to an environmentally sustainable mobility landscape, it could also be that the current, rather unregulated, market turns out to be a breeding ground for the most innovative mobility solutions yet to come. It most certainly would be an expensive decision to redesign the regulatory frame of the city's SMS, however, not acting will most likely not come with a cheaper price tag in the long-term.

5.6.2 Amsterdam

Over the conduct of the thesis, Amsterdam has often acted as the best-practice example. Nevertheless, the city still is a very small SMS-market. While sustainable governing structures already exist to a large degree, services like bike-sharing and kick-e-scooter sharing are not yet allowed at all. In that regard, Amsterdam also still has strong learning potential. First of all, it is suggested to further look at other cities throughout the design and implementation of its sharing structure. As a frontrunner within SMS, actively proposing experimental governance that leads to benchmarking and comparison of various jurisdictions is a way to control its own position in international comparison and eventually transfer policies to other cities. Throughout the information collection, many other cities were named as positive examples. Getting inspiration from London for its dynamic access system, from Hong Kong for its public transport

or from Bremen for its advanced development of their mobility hubs is crucial to stay ahead in the urban mobility planning. Second of all, the city should allow the operators some space for experimentation. If operators realize that they cannot achieve a positive business case in Amsterdam in the long-term, they might be disincentivized to offer their services in the city. Therefore, numbers of vehicles, size of the geofence and number of competitors are regarded as mechanisms to allow for experimentation. It will be crucial to analyze how Amsterdam's mobility design evolves when various other SMS have launched.

5.6.3 Operators

While some regulatory aspects are equally relevant for all operators, others affect each operator differently. Therefore, general recommendations should not be seen as perfectly applicable for all SMS, rather as a broad suggestion for the industry. First, it became evident throughout the study that the infancy of the industry urgently requires the input of the operators to draft the regulatory frame. Hence, all operators should see the governing bodies (the municipalities) as partners in the pursuit of a new mobility system. In order to better advise cities, it is recommended to transfer regulatory knowledge of different jurisdictions within and across companies, benchmarking which regulations have advantageous effects for a majority of operators. Proactivity and transparency is required to establish joint spaces for information exchange. Thus, a company's policy insights between operations in France and Sweden, for example, should not only be shared internally, but also with other operators.

Transparency is emphasized by being willing to share data. It is crucial for municipalities to have live-insights into the SMS' effect on the mobility system. Second, in order to avoid changing data formats from city to city, SMS of all types should get together and agree on one data format. Collaboration between operators is seen as an important aspect to advance the development of local urban mobility systems. For instance, often several operators require similar infrastructure changes (e.g. the expansion of a charging structure). Getting together and agreeing on a joint strategy, helps to be heard by the municipality. Third, operators should be aware of cities' long-term environmental visions to avoid stark changes to vehicle fleets. If cities' advocate climate neutrality in the coming decade and the company has an interest in its going concern, then firms are advised to establish zero emission logistics and adapt the propulsion of their vehicles accordingly. Many aspects of the industry still have to be regulated and it is the first movers' task to avidly drive the coming developments in the light of sustainability.

5.7 Limitations

With the choice of a qualitative research design inherently come various limitations. Not only in-depth interviews, but also their analysis, the choice of participants, the size of the sample size and various other methodological factors limit the generalizability of the study. In this section, these limitations will be looked at in detail.

There are five major methodological issues and three content-related limitations identified. First, it was decided to look at a small number of two cases. While a qualitative study does not have the probabilistic sampling rigor of quantitative research, looking at more cases might increase the study's internal validity. Moreover, it needs to be taken into account that the chosen cases still provide different contextual foundations, as the size and the geography of the two cities are quite dissimilar. Thus, the transferability of the case studies' insights to other cities might be reduced. However, incorporating external experts into the study and interviewing people from companies who are exposed to many other cities than just Amsterdam or Berlin controls for the cases' potential idiosyncrasy.

Second, theoretical sampling was chosen to identify participants. While this was the most convenient way, it could – according to Cooper and Schindler (2014) – lead to biased results. Snowball sampling, the referral from one participant to another, reinforces this limitation. Thus, accidentally various interviewees could represent the same line of thought and potentially more diverse areas of relevance could have been omitted. Nevertheless, since many contacts arose spontaneously in connection with the Urban Mobility Summit in Paris and the researcher already possessed a strong knowledge of the industry to objectively choose interviewees, the effect on the study is considered to be marginally.

Third, the number of participants was slightly imbalanced between Amsterdam and Berlin. While only five participants with specific insights about Amsterdam were interviewed, eleven participants for Berlin were interviewed. The difference is not considered to be problematic, since a lot of material about the work of the municipality Amsterdam is available online. While the researcher is convinced that theoretical saturation was achieved for the answer of the RQ, and sub-question 1 and 2, to fully explore sub-question 3, the researcher would have required to interview one more representative of Amsterdam's society. Moreover, only two representatives (more specifically, in Berlin one city representative and one objective expert)

per city municipality were interviewed. While their input was relatively similar, it needs to be remarked that bureaucratic organizations, like a municipality, might demonstrate differing opinions throughout the organization. Hence, to encompass the entire spectrum of opinions in the municipality, with more time, further participants could have been approached.

Fifth, a common danger of qualitative research is retrospective sensemaking (Eisenhardt & Graebner, 2007). The author needs to objectively go through the results of the primary and secondary data analysis in order to uncover patterns, without fitting them to the research's purpose. The researcher tried to account for retrospective sensemaking by engaging into a feedback circle to double check mid-term results with master students from the TU Delft who had a similar research topic. Nonetheless, it is almost impossible to avoid subtle influences of the researcher's value system. Similarly, as previously mentioned, the interviewees can influence the researcher. This phenomenon is called reflexivity (Yin, 2014). However, as the researcher's awareness led to sensitivity (Yin, 2014), the impact on the study is considered marginal.

Apart from methodological limitations, the study might be limited by the researcher's focus on four different SMS. Mixing these sub-industries of the broad mobility sharing industry could distort the results and prohibit that any of the individual SMS is analyzed in detail. Nevertheless, the broader scope allows to formulate takeaways that effect a much larger share of companies in the industry and generates strong holistic advice for municipalities.

While the focus could be set smaller, it could have also incorporated a larger subset of the future urban mobility market, generating insights with a longer applicability. Ridesharing of autonomously operating vehicles, such as cars and helicopters potentially mark urban mobility's future. However, they were disregarded for the study, since autonomously operating vehicles do not provide SMS yet. Nevertheless, cities have to expect their introduction in the coming years. Although future governance studies are required, the present study does provide initial insights into cross-sector collaboration requirements and is therefore expected to also provide initial help to adapt the regulatory frame for autonomously operating ridesharing services.

Lastly, the broad definition of sustainability limits the research's precision. Often certain regulations or activities could be better classified as successful or effective if the direct

implication for a defined metrics of sustainability were known. This would have a required a triangulation of methods, expanding qualitative research by a quantitative test. Unfortunately, such an effort was not within the study's scope. Consequently, various tasks for future research emerge.

5.8 Future research

It was the study's goal to develop new theory. Due to the explorative nature, future research should not only focus on further theory-generating studies in the field, but also on the validation of the study's insights. Therefore, future research is delineated alongside 5 dimensions.

First, future research needs to validate whether similar results arise when other cities are analyzed. While many of the companies operate globally and similar results can be expected, it is still deemed necessary to extend the sample size. Other city municipalities use different approaches that could shed light on how to best govern the nascent industry. Moreover, this could lead to further insights into how wicked problem environments can be tackled. Additionally, the generalizability of the framework should be tested in a different industry. If other industries, for example more established ones, tend to see similar dynamics, the framework might be applicable in various wicked problem scenarios.

Second, the truthfulness of the results needs to be evaluated. The framework (figure 5) proposes several steps that should reduce the wickedness of a system, especially in a shared urban mobility environment. This should be quantitatively tested. Therefore, in two systems, one that implements such a governing structure, and one that does not, for example, Amsterdam and Berlin, data about the sustainability of services needs to be collected over a longer period of time. A metric could potentially be the reduction of GHG. At the same time, all cross-sector and non-cross-sector decisions in the city that impact the urban mobility system need to be tracked. Ideally this procedure validates the applicability of the framework, achieving a stronger reduction in GHG in the city that follows the proposed governance steps than the control city. Moreover, the same method with a slightly different choice of variables provides a chance to evaluate the conflicting propositions about the necessity of monitoring in a CSP's initiation phase made by van Tulder and Keen (2018).

While the previous suggestion would prove the validity of the present study's research question, further research could evaluate whether a system's wickedness is reduced. Therefore,

quantitative criteria as proxies of wickedness need to be developed and tested in a similar fashion as the framework's impact on GHG. Thus, two cities, one that has implemented a structure similar to the proposed framework, and a control city that has not, need to be compared based on the results of the proxies of wickedness. An example for a proxy could be the time it takes municipality officials to execute a new mobility-connected regulation. In both cases, the infancy of the industry might currently complicate quantitative data collection.

Third, the present study has looked at many SMS grouped together. In order for a governing body to know how to address each service individually, it might be crucial to zoom into one SMS, such as car-sharing. The cross-sector dynamics of car-sharing are expected to, and already in this study have proven to, be different compared to other SMS. In the scope of this thesis, it was decided that a generalization of the services leads to stronger insights.

Fourth, the findings have shown that further research is missing regarding the role of society. While it was this study's ambition to approximate society by, for example NGOs, only limited insights, especially for Amsterdam, were generated. It is recommended to analyze the impact society has in the triangle of government, market and civil society. While it is assumed that society demanding stronger SMS-initiatives from the municipality also leads to the like, it is not yet proven. Furthermore, the other direction identifies an interesting case of analysis. To what degree does society want to adapt to new SMS and what other forms of transports are being substituted? One could expand that towards the difficulty of habit change in mobility choices.

Lastly, throughout the discussion the power of co-regulation, experimental governance and Porter's Hypothesis in the realm of wicked problems emerged. Since it can only be considered an assumption for now, further research is encouraged to test whether these regulatory concepts can reduce the complexity in such situations. While it would be specifically interesting to see it in the realm of SMS, the applicability should not be bound to it and other contexts are deemed appropriate as well.

6 Conclusion

The present study set out to understand how a cross-sectoral approach could help organizations develop in a more sustainable way. Specifically, it is the thesis' ambition to use these insights to develop new ways of how to tackle wicked problems. Therefore, the realm of urban mobility and more precisely SMS was chosen. The SMS-industry can be defined as wicked or complex due to its multiplicity of unaligned actors, its few regulations that lead to a myriad of responsibilities, and its interrelations with other wicked problems. All the while, the industry provides a chance to reduce GHG in urban areas and open up space for healthy activities. Due to the industry's young age and the explorative nature of the topic, a qualitative research design building on in-depth interviews was chosen. Nevertheless, since most cities drive a different approach towards the handling of SMS, the complexity of the industry highly differs between cities. A case study design, choosing Amsterdam and Berlin as entities of analysis, was considered as most insightful.

While the study followed the intention to analyze one environment that is regarded as a frontrunner in the international comparison, Amsterdam, and another that rather lags behind, Berlin, the specific dynamics were quite surprising. Amsterdam, a city which is usually known for its liberal attitude, turned out to follow a rigid approach with strong oversight in the case of SMS. On the other hand, Berlin, the capital of Germany, a country that is known for its tendency for overregulation in international comparison (Ewing, 2012), displays lax controls and barely any regulation. These differences built the foundation to carve out the detailed alterations between the municipalities. Understanding the dynamics of the operators and the city personnel allowed to draw a framework that is expected to reduce wickedness by building on cross-sector collaboration.

Based on the framework a set of guidelines on how to tackle wicked problems can be formulated. First, a stricter form of regulation is needed. Especially in the nascent SMS-industry many aspects are still only loosely defined. However, the regulatory frame should be developed in conjunction with the public and private sector. Thus, second, co-regulation is seen as a basis to stimulate frequent exchange between relevant public and private parties, ensuring that a balance between regulation and experimentation is kept. In order for this to work, transparency is considered key. Both parties need to be able to foresee the other's activities. It is expected to sustain trust between the public and private stakeholders and stability in the market.

Third, only an ambitious vision and a leading entity that sees itself accountable to work towards the implementation of such a vision, drives a sustainable development of the organizations involved. The more precise and less ambiguous the vision is formulated, the easier a leading entity can transform statements into action and society can hold it accountable for potentially missing progress. Furthermore, the vision should be the foundation to develop metrics that measure the sustainability of the actors involved. The proposed framework is expected to guide towards change only if the system is monitored by the achievement of quantitative goals.

The symbiosis of all three factors is expected to reduce situations' wickedness. In the realm of SMS, adhering to these factors leads to four implications. First, the close-knit collaboration between private and public actors consolidates existing approaches towards the future of urban mobility and forges a united front. Similarly, it leads to a generally accepted understanding of the source of the problem's wickedness. Second, the frequent interaction sets out to align stakeholders towards a common goal and therefore is expected to – in line with criteria five of the wicked problem definition (The Partnerships Resource Centre, 2016) – further reduce the denial of climate change and eventually also the denial of its urgency. Third, it reduces the divergence of interests and aligns the responsibilities of all actors. In case of ambiguity, the frequent feedback rounds should again clarify responsibilities. Lastly, the interrelation with other wicked problems is slightly reduced, for example, if a parking strategy for shared mobility vehicles is implemented, conflicts with private vehicle parking are expected to be reduced.

Taking it all together, the newly developed framework adds highly relevant insights to overall wicked problem theory. Although – as defined by theory – it will not solve a wicked problem fully, it provides systems, such as a municipality, with a clearly defined governance model that facilitates the solution finding.

Bibliography

Alhajii, A., & Lewis, M. (2019, October 2). *Going head to head over electric vehicles Differing views over future uptake of battery-run cars.* Retrieved from ft.com: https://www.ft.com/content/bf083d92-e43e-11e9-b112-9624ec9edc59?accessToken=zwAAAW2S213okdO_CD2S5D4R6dOxEpYk7J7cWQ.MEUCIQDLwHWghWjbiq3h39y_dgJz7YotdRUgks2nZKmiteXFrgIgVRe7ZiMFXsZrxdWvYGiGi0kXeyMU0DtstKnaygZxrdM&sharetype=gift?token=485d693f-0549-49d0-b24e

Ambrosino, G., Nelson, J. D., Boero, M., & Pettinelli, I. (2016). Enabling intermodal urban transport through complementary services: From Flexible Mobility Services to the Shared Use Mobility Agency. *Research in Transportation Economics*, 179-184.

Anzilotti, E. (2019, September 5). *The unlikely way e-bikes could transform how we age*. Retrieved from fastcompany.com: https://www.fastcompany.com/90341686/the-unlikely-way-e-bikes-could-transform-how-we-age

APTA. (2016). *Shared Mobility and the Transformation of Public Transit.* Chicago: American Public transport Association.

Arthur D. Little. (2018). *Future of mobility 3.0: Reinventing mobility in the era of disruption and creativity.* Brussels: Arthur D. Little future lab.

Balleisen, E. J., & Eisner, M. (2009). The Promise and Pitfalls of Co-Regulation: How Governments Can Draw on Private Governance for Public Purpose. *New perspectives on regulation*, pp. 127-149.

Bath, D., Fahrun, J., & Jürgens, I. (2019, October 6). *Berlins langer Weg zur klimaneutralen Stadt [Berlin's long way to becoming a climate-neutral city]*. Retrieved from morgenpost.de: https://www.morgenpost.de/berlin/article227285783/Berlins-langer-Weg-zur-klimaneutralen-Stadt.html

berlin.de. (2020, January 17). *Aktueller Luftqualitätsindex*. Retrieved from Berlin.de: https://luftdaten.berlin.de/lqi

Bouton, S., Hannon, E., Knupfer, S., & Ramkumar, S. (2017, June). *The future(s) of mobility: How cities can benefit*. Retrieved from McKinsey.com: https://www.mckinsey.com/business-functions/sustainability/our-insights/the-futures-of-mobility-how-cities-can-benefit

Bouton, S., Knupfer, S. M., Mihov, I., & Swartz, S. (2015, September). *Urban mobility at a tipping point*. Retrieved from mckinsey.com: https://www.mckinsey.com/business-functions/sustainability/our-insights/urban-mobility-at-a-tipping-point

Buffet, W. H., & Eimicke, B. W. (2018, May 31). How Companies, Governments, and Nonprofits Can Create Social Change Together. *Harvard Business Review*.

Bumpus, A., Tansey, J., Pérez Henríquez, L. B., & Okereke, C. (2015). *Carbon Governance, Climate Change and Business Transformation.* New York: Routledge Taylor & Francis Group.

Bundestag. (2019, March13). *Regierung macht Weg frei für E-Scooter [Government creates path for e-scooter].* Retrieved from bundestag.de: https://www.bundestag.de/presse/hib/628592-628592

Cambridge Dictionary. (2020, January 14). *Sustainable*. Retrieved from dictionary.cambridge.org: https://dictionary.cambridge.org/dictionary/english/sustainable

Campagnol, N., Eddy, J., Hagenbruch, T., Klip, D., Mulligan, C., & van de Staaij, J. (2018, April). *Metal mining constraints on the electric mobility horizon*. Retrieved from mckinsey.com: https://www.mckinsey.com/industries/oil-and-gas/our-insights/metal-mining-constraints-on-the-electric-mobility-horizon

Candel, J. J. (2016). *Putting food on the table: The European Union governance of the wicked problem of food security.* Wageningen: Wageningen University.

Ceccato, R., & Diana, M. (2018). Substitution and complementarity patterns between traditional transport means and car sharing: a person and trip level analysis. *Transport*, 1-18. doi:10.1007/s11116-018-9901-8.

Cherns, A. (1976). The Principles of Sociotechnical Design. *Human Relations*, 783-792.

City of Amsterdam. (2019). *Policy: Clean Air*. Retrieved from amsterdam.nl: https://www.amsterdam.nl/en/policy/sustainability/clean-air/

City of Stuttgart. (2019). *Information on the traffic ban for diesel vehicles*. Retrieved from stuttgart.de: https://www.stuttgart.de/en/diesel-ban

Cooper, D. R., & Schindler, P. S. (2014). *Business research methods.* New York: McGraw-Hill Irwin.

Credit Suisse. (2014). *Monitor Schweiz mit «Spezial Inflation»: Die Schweiz steht im Stau [Monitor Switzerland with "Special Inflation": Switzerland in a traffic jam.* Zürich: Credit Suisse Economic research.

Dijk, M., Orsato, J. R., & Kemp, R. (2013). The emergence of an electric mobility trajectory. *Energy Policy*, 135-145.

Dixon, S., Irshad, H., & Teuben, H. (2019). *Deloitte City Mobility Index Berlin*. Retrieved from deloitte.com: https://www2.deloitte.com/content/dam/insights/us/articles/4331_Deloitte-City-Mobility-Index/city-mobility-index_BERLIN_FINAL.pdf

Dixon, S., Irshad, H., & Teuben, H. (2019). *Deloitte City Mobility Index: Amsterdam*. Retrieved from deloitte.com: https://www2.deloitte.com/content/dam/insights/us/articles/4331_Deloitte-City-Mobility-Index/Amsterdam_GlobalCityMobility_WEB.pdf

Docherty, I., Marsden, G., & Anable, J. (2018). The governance of smart mobility. *Transportation Research Part A*, 114-125.

Drápela, E. (2015). Changing Attitudes Towards Car Sharing: A big chance for urban ecology? *15th International SGEM GeoConference* (pp. 1-9). Liberec: Technical University of Liberec.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory Building From Cases: Opportunities And Challenges. *Academy of Management Journal*, 25-32.

ETSC. (2019). *European Transport Saftey Council - latest data*. Retrieved from etsc.eu: https://etsc.eu/euroadsafetydata/

Etzkowitz, H. (2005). Meta-Innovation: The Optimum Role of the State in the Triple Helix. In M. Lengwiler, & D. Simon, *New Governance Arrangements in Science Policy* (pp. 64-80). Berlin: Social Science Research Center Berlin.

European Commission. (2019a). *Citizen support for climate action.* Retrieved from ec.europa.eu: https://ec.europa.eu/clima/citizens/support_en

European Commission. (2019b). *Transport emissions*. Retrieved from A European Strategy for low-emission mobility: https://ec.europa.eu/clima/policies/transport_en

European Environment Agency. (2013). *A closer look at urban transport. TERM 2013: transport indicators tracking progress towards environmental targets in Europe.* Copenhagen: European Environment Agency.

European Environment Agency. (2018, January 31). *Europe's transport sector: Aviation and shipping face big challenges in reducing environmental impacts.* Retrieved from eea.europa.eu: https://www.eea.europa.eu/highlights/europe2019s-transport-sector-aviation-and

European Union. (2003). *Interinstitutional agreement on better law-making.* Strasbourg: Official Journal of the European Union.

Ewing, J. (2012, February 22). *In Germany, a Limp Domestic Economy Stifled by Regulation.* Retrieved from nytimes.com: https://www.nytimes.com/2012/02/23/business/global/in-germany-a-limp-domestic-economy-stifled-by-regulation.html

Felyx. (2020). *How it works*. Retrieved from felyx.com: felyx.com

Finkorn, J., & Müller, M. (2011). What will be the environmental effects of new free-floating car-sharing systems? The case of car2go in Ulm. *Ecological Economics*, 1519-1528.

Fishman, E. (2016). Bikeshare: A Review of Recent Literature. *Transport Review*, 92-113.

Flynn, M. S. (1976, July). Reviewed Work(s): Socio-Technical Design: Strategies in Multidisciplinary Research. by P. G. Herbst. *American Journal of Sociology*, pp. 273-275.

Fox, A. (2019). Uber and Lyft may be making San Francisco's traffic worse. *Science*, doi:10.1126/science.aax9717.

Franckx, L. (2016). *Future trends in mobility: challenges for transport planning tools and related decision-making on mobility product and service development.* European Union - Horizon Project 2020.

Gemeente Amsterdam [Municipality Amsterdam]. (2019, March 23). *Verordening van de gemeente Amsterdam op het gebied van openbare orde en veiligheid Algemene Plaatselijke Verordening 2008 [Ordinance of the Municipality of Amsterdam on public order and safety General Local Ordinance 2008]*. Retrieved from amsterdam.nl: http://decentrale.regelgeving.overheid.nl/cvdr/xhtmloutput/Historie/Amsterdam/CVDR72510/CVDR72510_32.html

Gemeente Amsterdam. (2018). *Amsterdam in cijfers 2018 [Amsterdam in numbers 2018].* Amsterdam: Municipality Amsterdam.

Gioia, D. A., & Chiitipeddi, K. (1991). Sensemaking and sensegiving in strategic change inititaion. *Strategic Management Journal*, 433-448.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods*, 15-31.

Glaser, B. G., & Holton, J. (2004). Remodeling Grounded Theory. *Forum: Qualitative Social Research Sozialforschung*.

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies in qualitative re search.* London: Wiedenfeld and Nicholson.

Googins, B. K., & Rochlin, S. A. (2000). Creating the Partnership Society: Understanding the Rhetoric and Reality of Cross-Sectoral Partnerships. *Business and Society Review*, 127-144.

Grosse-Ophoff, A., Hausler, S., Heineke, K., & Möller, T. (2017, April). *How shared mobility will change the automotive industry*. Retrieved from McKinsey.com: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/how-shared-mobility-will-change-the-automotive-industry

Haugneland, P., & Hauge, E. (2015). Norwegian electric car user experiences 2014. *World Electric Vehicle Journal*, 650-658.

Hawkins, A. J. (2018, September 20). *The electric scooter craze is officially one year old — what's next?* Retrieved from theverge.com: https://www.theverge.com/2018/9/20/17878676/electric-scooter-bird-lime-uber-lyft

Hawkins, A. J. (2019, September 26). *Inside Uber's plan to take over city llfe with CEO Dara Khosrowshahi.* Retrieved from theverge.com: https://www.theverge.com/2019/9/26/20885185/uber-ceo-dara-khosrowshahi-interview-exclusive

Howe, E. (2018). *Global Scootersharing Market Report 2018.* Berlin: Innovationszentrum für Mobilität und gesellschaftlichen Wandel.

IPPC. (2019). *Summary for Policymakers. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate.* IPPC.

Janasz, T. (2018). *Paradigm Shift in Urban Mobility.* Wiesbaden: Springer Fachmedien.

Jeekel, H. (2016). *Smart mobility and societal challenges: an implementation perspective.* Eindhoven: Universiteit Eindhoven.

Julsrud, T. E., & Priya Uteng, T. (2015). Technopolis, shared resources or controlled mobility? A net-based Delphi-study to explore visions of future urban daily mobility in Norway. *European Journal of Futures Research*, 1-10, DOI 10.1007/s40309-015-0069-6.

Kenny, M., & Fourie, R. (2015). Contrasting Classic, Straussian, and Constructivist Grounded Theory: Methodological and Philosophical Conflicts . *The Qualitative Report*, 1270-1289.

Klemsdal, L. (2012). *From Bureaucracy to Learning Organization: Critical Minimum Specification Design as Space for Sensemaking* . New York: Springer Science+Business Media.

Kukreti, I. (2017, November 6). *India's demand for teak wood endangers Ecuador's rainfo.* Retrieved from downtoearth.org: https://www.downtoearth.org.in/news/agriculture/under-siege-58894

Lee, S. M. (2018). Innovation: from small "i" to large "I". *International Journal of Quality Innovation*, 1-10.

Levin, K., Cashore, B., Bernstein, S., & Auld, G. (2012). Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. *Policy Sciences*, 123-152.

Møller, J. K. (2008). Meta-Innovations on Strategic Arenas: Innovative Management in Public Organizations. In L. Fuglsang, *Innovation and the Creative Process: Towards Innovation with Care* (pp. 142-165). Chelntenham, UK: Edward Elgar.

McKinsey. (2017). *The Automotive Revolution Is Speeding Up. Perspectives on the emerging personal mobility landscape.* Düsseldorf: Mckinsey Center for Future Mobility.

Mintzberg, H. (2015). *Rebalancing society. Radical renewal, beyond left, right and center.* Oakland: Berrett-Koehler Publishers.

MobiPunt. (2020, January). *What is a mobipunt?* Retrieved from mobihubs.eu: https://mobihubs.eu/

Mulder, J. P., Hommes, S., & Horstman, E. M. (2011). Implementation of coastal erosion management in the Netherlands. *Ocean & Coastal Management*, 888-897.

Nikitas, A. (2019). How to Save Bike-Sharing: An Evidence-Based Survival Toolkit for Policy-Makers and Mobility Providers. *Sustainability*, 1-17.

Noto, G., & Bianchi, C. (2015). Dealing with Multi-Level Governance and Wicked Problems in Urban Transportation Systems: The Case of Palermo Municipality. *Systems*, 62-80, doi:10.3390/systems3030062.

Palley, T. I. (2006, December 9). Milton Friedman: The Great Laissez-Faire Partisan. *Economic and Political Weekly*, pp. 5041-5043.

Pankratz, D. M., Nuttall, K., Eggers, W. D., & Turley, M. (2018, December 20). Regulating the future of mobility: Balancing innovation and the public good in autonomous vehicles, shared mobility, and beyond. *Deloitte Insights*.

Parvin, P. (2018). Democracy without participation: A new politics for a disengaged era. . *Res Publica : A Journal of Moral, Legal and Political Philosophy*, 31-52. doi:10.1007/s11158-017-9382-1.

Patashnik, E. (2003). After the public interest prevails: The political sustainability of policy reform. *Governance*, 203-234.

Perry, D. (2019). Lilium unveils all-electric air taxi. Flight International. *Flight International*, 10.

Perry, J. (2015). Climate change adaptation in the world's best places: A wicked problem in need of immediate attention. *andscape and Urban Planning*, 1-11.

Policy, O. R. (2010). *Regulatory Policy and the Road to Sustainable Growth.* Draft Report/ OECD.

Porter, M. E., & Van der Linde, C. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *The Journal of Economic Perspectives*, 97-118.

Pulina, M., & Cortés-Jiménez, I. (2010). Have Low-Cost Carriers Influenced Tourism Demand and Supply? The Case of Alghero, Italy. *Tourism Analysis*, 617-635.

Raf, S., & al, e. (2014). *Transport. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Intergovernmental Panel on Climate Change.

Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 155-169.

Roland Berger. (2014). *SHARED MOBILITY: How new businesses are rewriting the rules of the private transportation game.* Munich: Roland Berger: Strategy Consultants GmbH.

Roland Berger. (2018). *Bike Sharing 5.0: Market Insights and Outlook.* Berlin: Roland Berger.

Ruhl, J. B. (1997). Thinking of environmental law as a complex adaptive system: How to clean up the environment by making a mess of environmental law. *Houston Law Review*, 933-1002.

Saldaña, J. (2009). *The Coding Manual for Qualitative Researchers.* London: SAGE Publications Ltd.

Schönberg, T. (2018, August 20). *Bike Sharing: Cornerstone of Future Mobility.* Retrieved from rolandberger.com: https://www.rolandberger.com/en/Publications/Bike-Sharing-Cornerstone-of-future-urban-mobility.html#!#Read%20more

Schellong, D., Sadek, P., Schaetzberger, C., & Barrack, T. (2019, May). *The Promise and Pitfalls of E-Scooter Sharing*. Retrieved from bcg.com: https://www.bcg.com/de-de/publications/2019/promise-pitfalls-e-scooter-sharing.aspx

Schmalensee, R. (1993). The costs of environmental protection. *Massachusetts Institute of Technology Centre for Energy and Environmental Policy*, 1-46.

Schneider, A., Wickert, C., & Marti, E. (2017). Reducing Complexity by Creating Complexity: A Systems Theory Perspective on How Organizations Respond to Their Environments: Reducing Complexity by Creating Complexity. *Journal of Management Studies*, 182-208.

Sengupta, S. (2019, September 20). *Protesting Climate Change, Young People Take to Streets in a Global Strike.* Retrieved from nytimes.com: https://www.nytimes.com/2019/09/20/climate/global-climate-strike.html

SenUVK. (2018). *Berliner Mobilitätsgesetz (MobG) – mit Begründungen [Mobility law Berlin with explanation].* Berlin: Senat für Umwel, Verkehr und Klima.

ShareNow. (2020). *Frequently Asked Questions*. Retrieved from share-now.com: https://www.share-now.com/de/en/faq

Shmulyian, S., Bateman, B., Philpott, R. G., & Gulri, N. K. (2010). ART OR ARTIST? AN ANALYSIS OF EIGHT LARGE-GROUP METHODS FOR DRIVING LARGE-SCALE CHANGE. *Research in Organizational Change and Development*, 183-231.

Smart City Expo World Congress. (2019). *About Smart City Expo Congress.* Retrieved from smartcityexpo.com: http://www.smartcityexpo.com/en/the-event/about-scewc

Snowden, D. J., & Boone, M. E. (2007, November). Decision making: A Leader's Framework for Decision Making. *Harvard Business Review*.

Spring, J. (2018, August 28). *Special Report: Appetite for destruction - Soy boom devours Brazil's tropical savanna.* Retrieved from reuters.com: https://www.reuters.com/article/us-brazil-deforestation-specialreport/special-report-appetite-for-destruction-soy-boom-devours-brazils-tropical-savanna-idUSKCN1LD16B

Statistik Berlin Brandenburg. (2018). *Bevölkerungsstand*. Retrieved from statistik-berlin-brandenburg.de: https://www.statistik-berlin-brandenburg.de/regionalstatistiken/r-gesamt_neu.asp?Ptyp=410&Sageb=12015&creg=BBB&anzwer=6

Staudenmaier, R. (2019, July 8). Electric scooters' rollout off to a bumpy start in Germany. *DW*.

Stern, N. (2018, October 8). *We must reduce greenhouse gas emissions to net zero or face more floods*. Retrieved from theguradian.com: https://www.theguardian.com/environment/2018/oct/08/we-must-reduce-greenhouse-gas-emissions-to-net-zero-or-face-more-floods

Szyszczak, E. (2006). Experimental Governance: The Open Method of Coordination. *European Law Journal*, 486-502.

The Partnerships Resource Centre. (2016). *Wicked Problems Plaza: Principles and Practices for Effective Multi-Stakeholder Dialogue.* Rotterdam: The Partnerships Resource Centre RSM.

United Nations. (2019). *Sustainable Transport.* Retrieved from sustainabledevelopment.un.org: https://sustainabledevelopment.un.org/topics/sustainabletransport

United Nations Development Programme. (2019). *Sustainable Development Goals: Background on the goals.* Retrieved from undp.org: https://www.undp.org/content/undp/en/home/sustainable-development-goals/background.html

Van Tulder, R., & Keen, N. (2018). Capturing Collaborative Challenges: Designing Complexity-Sensitive Theories of Change for Cross-Sector Partnerships. *Journal of Business Ethics*, 315-332.

Van Tulder, R., & Pfisterer, S. (2013). Creating Partnering Space. In M. M. Seitanidi, & A. Crane, *social Partnerships and Responsible Business. A Research Handbook* (pp. 1-27). Routledge.

Visit Oslo. (2019). *The Oslo toll rings*. Retrieved from visitoslo.com: https://www.visitoslo.com/en/transport/by-car/toll-ring/

Waddock, S., Waddell, S., & Dentoni, D. (2015). The complexity of wicked problems in large scale change. *Journal of Organizational Change Management*, 993-1012.

Wells, C. W. (2013). *Car Country: An Environmental History.* University of Washington Press.

Wettenhall, R. (2003). The rhetoric and reality of public-private partnerships. *Public Organization Review*, 77-107.

WHO. (2018). *Global Status report on Road Safety.* Geneva: World Health Organization.

Wijen, F. (2019, September 19). Qualitative Research. Rotterdam, The Netherlands.

Willsher, K. (2018, October 15). *'I leave the car at home': how free buses are revolutionising one French city.* Retrieved from theguardian.com: https://www.theguardian.com/cities/2018/oct/15/i-leave-the-car-at-home-how-free-buses-are-revolutionising-one-french-city

Wolfe, D. A. (2018). *Experimental Governance: Conceptual approaches and practical cases.* Background paper for an OECD/EC Workshop.

Yin, R. K. (2014). *Case Study Research: Design and Methods.* London: Sage Publications.

Appendix 1 – Data structure (Gioia method)

First-order codes	Second-order codes	Aggregators
Amsterdam - implementation ideas Berlin - not driving Berlin - Open attitude Berlin - patient Reluctant municipality - Amsterdam	Attitude	Change
Behavior challenge Berlin - Austerity and old public sector Municipality Berlin - Bureaucratic System	Behavior challenge	
Amsterdam - only 10% use car Car as a means to stay connected outside of the city Car data Car free areas incentivize trade Car is expensive Car-sharing - No competition between station based and free-floating Car-sharing Act - operators consulted Car-sharing as a means to replace car-ownership Car-sharing in residential areas reduces car ownership Car-sharing not interlocked with public transport Car-sharing to incentivize public transport Car-sharing to reduce land use for parking Difficult to reduce car ownership German car industry hindering Policy - regulating number of vehicles Reduce space for cars Replace car ownership Replace car usage Replace taxis Suburban car-sharing What does car-sharing want to replace	Car related	
Bike as the backbone of urban transport City Centre Focus Geography influences urban mobility Historic Infrastructure Importance of real estate industry Infrastructure Public transport is backbone of urban transport	Infrastructure	
KPIs - flexibility Citizens decide about their mode of transport Citizens usage Include citizens	Society requirements	

KPIs - availability Local groups of interest Locality People don't mind using several apps People mind using several apps Pricing for everyone Regulation - kick scooter off the sidewalk Rising societal interest social inequality Societal interest critical factor Societal polarization Society - bottom up Society - feedback in the app Society - focus groups Society - top down Society should profit from operators' data		
Agreements Amsterdam - open minded towards conversations Berlin - no exchange Berlin - No small scale discussion space Berlin - optional stakeholder meetings Berlin - Senate vs districts Berlin - Top Down Collaborate with private sector Collaboration - Stakeholder meetings Collaboration - Standardized Collaboration - Standardized (Optional) Collaborative legislation building Contact person missing Conversations Collaboration Develop solutions within each municipality Develop Trusted Partner Listening to each other Municipality Amsterdam wants collaboration Operator - Show their worth Operator - want regulation Other Dutch cities - open stakeholder meetings Protect Trusted Partner Public sector participation Competition among sharing types Competition to reduce pricing	Collaboration	Collaboration
Complement public transit Complementarity among operators Complementarity by distance Complementarity by weather situation	Complementarity	

Complementarity is a marketing tool connected to work places Connectivity among operators and public transport distances travelled NO Complementarity among operators Shared Mobility as Supplement		
Amsterdam - Live Data API interface Berlin - neutral actor for data Berlin - Open Data format Data connectivity Data protection Data reporting Digitalization Missing Heatmaps	Data Interface	
Amsterdam - control access to MaaS Attract various MaaS platforms MaaS MaaS - become too powerful MaaS - Full integration more difficult for cars MaaS - Google MaaS - integration is too complex MaaS - Modularity MaaS - neutrality MaaS - Skeptical MaaS - who has the responsibility MaaS - worldwide presence MaaS does not reduce car ownership MaaS to create complementarity MaaS to decrease private car ownership Open towards MaaS Risks of Uber as MaaS	MaaS	
Influence Taking NGO - focus on government NGO - need contact person NGO - urban society as constituents NGO Berlin - Requires Stakeholder meetings Participating in associations Tool - Claim spaces Tool - Power of the people Write articles/ studies	NGO Requirements	
Operator - offering incentivized parking Engage with user base Happy to share Operator - open to provide live data	Operators' requirements	

Operator - want open conversations Operators - Pilot Projects required Operators - want collaboration Proactively show data to Berlin		
Amsterdam - top down approach Berlin - rules not enforced Streamline data formats	Enforcement	Enforcement
#Shared vehicles/ #Total vehicles = Small Amsterdam - Vision Berlin - no clear vision Business Case - shared services Change pricing depending on country Cultural challenges for business models Pricing of shared services Profitable shared mobility services Regulation - Charging spots Replace vehicle ownership Shared mobility competition reduces space Shared mobility measurement Shared Mobility substitute wrong target group Shared services are fun Shared services provide comfort	Effects of Shared Mobility	Experimentation
A/B testing Allow Experimentation Amsterdam - mobility hubs experiment Balance of experimentation and control Berlin - 1st pilot in place (Jelbi) Berlin - BVG MaaS Importance of experimentation Job group related mobility solutions Pilot-sized experiments	Experimentation	
Car-sharing association - consulting Free floating - Internet Connection Free floating car-sharing helped the reputation of station based car-sharing Free floating car-sharing reaches more people Free-floating - high availability Free-floating for inner cities Free-floating vs station based Hub-centric model Integrate station-based and free-floating Station based car-sharing - had more time to develop Station based car-sharing - traffic relieving Station based car-sharing for outskirts	Free Floating vs Station Based	
Kick-Scooter - Too early to say that we replace the car	Kick-Scooter related	

Kick-Scooter - young industry Kick-scooter for tourist No ambition to change mobility Reputation loss		
Best case example - Bremen Best case example - Hong Kong Best case example - London Best case example - Marseille Best case example - Paris Example Asia - use labour laws Special Case - Leipzig	Case Examples	Leadership
Congestion Ecological Sustainability Greenhouse gases KPI - car replacement rate Life expectancy of mobility service Measurement - land use Measurement - noise Measurement - Safety Measurement of Sustainability number of rides per scooter Occupancy Rate Shared Cars incentivize local consumption Social sustainability Space SPLIT Sustainability - Healthy cities Sustainability - Physical Sustainable - Economical factor Sustainable Operations Vehicle Capacity to Vehicle Occupancy Rate to direction	Measurement of Sustainability	
Active modes of transport Emission free by 2030 Leadership in MaaS MaaS by public agency creates sustainability Municipalities can incentivize electric car fleets Municipality sets direction Municipality should steer and promote car-sharing NGO - requires stronger control Operator - need contact person Rural areas want operators Too much control Who maintains the infrastructure?	Vision & Leadership	
Amsterdam - no private parking	Parking Issue	Regulation

Berlin - no parking contract for car-sharing firms Berlin - no private parking required per house Berlin - parking is district responsibility Counter congested parking spots Educating users about parking Large parking spaces at public transport stations Mobile phone parking Park cars outside the city Parking reduces space Policy - land use Policy - Parking Policy - Price of Parking Policy - Private Parking		
Berlin - Great public transport Commuting Ignore public transit Time line is very long when regarding public transport	Public Transport	
Amsterdam - control leads to sustainability Balance of free market and control Berlin - administrative capacity Berlin - catalogue of rules missing Berlin - climate neutral 2050 Berlin - Common Use (Gemeingebrauch) Berlin regulation - Overlapping responsibilities Business activity rather low Car-sharing Act - empowerment law Control operators Don't provide too many obstacles to the operators Extend Bike lanes Forbid kick-scooter Limit #providers for long-term commitments Max 2-3 operators Mobile Hubs Mobility Budgets Mobility Decision - Tender based on rating Mobility Law - operators consulted No regulations needed Policy - road taxes Reduce emissions other than CO2 Regulation - Permit scheme Regulation - qualitative criteria Regulation - require sustainable operations Subsidies for operators	Regulation	

Subsidies station based car-sharing Tender development		
Berlin - sees need for control Berlin - space division Bikes reduce land use One type streets Recreate space Transport blocks pedestrians	Space related	
Amsterdam - Subsidize electric cars Berlin - subsidy not option Subsidies for society Subsidies in form of less expensive parking for shared cars Subsidize public transport	Subsidies	
Conflict of interest - OEM and Car-sharing Invited discussions One data format worldwide Only anonymous data	Transparency	Transparency

Appendix 2 – Guideline operators

Company // Guideline

Organization Questions

1. Can you briefly introduce your organization?

Personal Questions

1. What is your role in the company?
2. Are you involved in the collaboration with municipalities?

Sustainability Questions

1. How does your company define sustainability?
2. How sustainable do you consider your company's product?
3. What is needed to make the product environmentally more sustainable?
4. What incentives need to be set by the government?

Private-sector Collaboration/ Complementarity

1. Could a cooperation with scooter-/ bike-/ car-sharing company improve your sustainability?
2. Which other sharing-service has the highest complementarity to your product?

Municipality Collaboration

1. What governmental steps are you taking when expanding to a new city? In how far was Berlin/Amsterdam different?
2. What collaborative challenges did you encounter in the past?
3. What regulations are currently posing challenges in Berlin/Amsterdam?
4. What incentives/ policies would you like to see/ are required from the government?
5. How can local policymakers help to integrate your product better into the urban mobility environment?
6. Would you make changes to your business model (free-floating to station-based) if the city requires it or directly exit the city?
7. In how far does the customers' usage of public transport play a role in your business development considerations? (e.g. Many shared services only build next to metro stations)

Local society

1. Does the local customer affect the design of the product *or* your service? If yes, to what degree do you incorporate such feedback?

Appendix 3 – Guideline municipalities

Municipality // Guideline

Organizational Question

1. Can you briefly introduce your organization?
2. Can you give a brief insight into Berlin's/Amsterdam's mobility plans and the role of shared mobility?

Personal Question

3. What is your role in the organization?

The role of shared mobility services

1. What defines sustainable transport for Berlin/ Amsterdam? How do you measure it?
2. What is the biggest obstacle to a less carbon dependent urban transport system?
3. How can shared mobility services support the development towards an increasingly sustainable city?
4. Which shared mobility service has the biggest long-term potential in Berlin/ Amsterdam?
5. Do some shared mobility services offer complementarity potential?
6. What threats does the establishment of shared mobility services include?

The role of public transit

1. In how far do shared mobility services and public transit need to be complementary?

Collaboration with companies

1. Who approaches who? Are companies always approaching you? Is there a standardized procedure?
2. What form of collaboration do you desire?
    a. Current best-case? Current worst case?
3. What facilitates a good collaboration? Could you name certain criteria?
4. How can incentives/policies/ rules increase shared mobility services' efforts to develop more sustainably?
5. Could you imagine a collaborative approach to offer a Mobility-as-a-Service-solution, where public transit and individual sharing services are incorporated into one app?
6. How do you consider the development of companies like Uber who start to offer all services in one App? (opportunity or danger?)

Local society

1. In how far do you think that your decisions towards a the future of mobility include the citizens' opinions?

Appendix 4 – Guideline society

Society // Guideline

Organizational Questions

1. Can you briefly introduce your organization?
2. Who are your main constituents?
3. What are your main goals as an NGO?

Personal Question

1. What is your role in the organization?

Your role as a representative of society

1. How would you (as a representative of society) define sustainable urban transport?
2. How do you think (as a representative of society) a sustainable shared mobility solution for a European metropolis would look like?
3. Do you think car-sharing can in the long-run reduce car ownership?
4. Does the level of societal interest help you to address your agenda? (meaning more societal interest leads to more influence for your NGO)
5. What can society do to achieve a more sustainable form of mobility?

Role of the Municipality

1. What incentives/policies/ rules do you think the government should set to help shared mobility services develop more sustainably?
2. Does the municipality's rulemaking align with what you request from them?

Role of the companies

1. How can companies actively tackle the downsides of shared mobility (waste, GHGs emissions, resource exploitation)?

Collaboration Questions

1. Who does your institution turn to, to make their voice heard? Companies or municipalities? Why?
2. How do you exert influence on these entities? What tools/ incentives can you use?
3. What collaborative engagements are you currently involved in?
4. How could those collaborations be made more efficient? What are current pain points?
5. What collaborations between sectors (firms, municipalities and NGOs) do you seek to see in order to make individual transport more sustainable?
    a. In which constellation?
    b. In which context specifically?
    c. What would it include?

Appendix 5 – Guideline experts

Experts // Guideline

Organizational Question

1. Can you briefly introduce your organization?

Personal Question

1. What is your role in the company?

Sustainability Questions

1. How would you define a sustainable form of urban transport?
2. How do you think does a sustainable shared mobility solution for a European metropolis look like?
3. Do you think car-sharing can in the long-run reduce car ownership?

Private-sector Collaboration/ Complementarity

1. Which shared services have complementarity potential?
2. What factors can motivate companies to engage in private partnerships?
3. Can companies that integrate various shared mobility services, like Reach Now be the future of urban transport? (One-stop shop)
4. What do you think of the multiplicity of micro-mobility solutions?

Collaboration between Companies and Municipalities

1. What incentives/ regulatory policies need to be set by the government in order to facilitate shared mobility services' efforts towards a more sustainable development?
    a. Should the amount of operators be constrained like in Paris or Amsterdam?
2. How can public transit be included in the development of shared mobility services?
3. How important is public transit for the sustainable development of shared mobility services?
4. In how far does the municipality need to be able to have an insight into the ticketing of public transit and of the private solutions? (thinking of remaining in control of the consequences of their policies → e.g. reducing vehicle ownership)
5. What would be the implications of having numerous shared mobility options?

Societal Interest

1. Do you think that societal interest moderates the regulations made for SMS? (meaning that public outcry leads to changes in policies)