Organization of bike-sharing in Amsterdam and Berlin

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Abstract: This research investigated the organization of the bike-sharing systems of nextbike and Donkey Republic in Berlin and Amsterdam by means of a policy document analysis, stakeholder interviews and an expert meeting. It was found out that Berlin has a more stable bike-sharing system with more public support and positive attitude from the actors and society towards it. In Amsterdam, this is because of negative experiences with the flood of free-floating shared bikes in 2017, an already high cycling rate and scarce public space not the case. Therefore, the current experiments are a careful approach of the municipality to allow bike-sharing only on a small in scale in order to determine the potential value of it for the city's mobility. In the end, Berlin could take Amsterdam as example in terms of more evaluation of their bike-sharing system to improve it, whereas Amsterdam could imitate Berlin in their attitude to give the bike-sharing system firstly enough space and time to develop and to become accepted and successful before drawing conclusions on their value. Goudappel and AEM Institute could in the future help municipalities in their efforts to establish an knowledge exchange network for bike-sharing if this is wished.

Keywords: Bike-sharing, policy learning, stakeholder analysis, urban mobility, MaaS

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List of acronyms

BSS Bike-sharing system

BS Bike-sharing

DR Donkey Republic

NRVP Nationaler Radverkehrsplan

PT Public Transport

MaaS Mobility-as-a-Service

VRA Vervoersregio Amsterdam

1 Introduction

Urbanization and climate change raise the need for more sustainable and future-proof mobility. This mobility needs to be emission-low, spatially efficient as our cities become packed, but also widely accessible. It is commonly agreed on that active travel is key in this transition and over the past decades shared micro-mobility as one way to accommodate active travel gained large popularity and is world-wide implemented to contribute to above-mentioned goals.
It can be a strong link between mobility services, as it offers a solution for the first and last mile preceding or following a public transport or car use. Furthermore, bike-sharing renders active travel more accessible, e.g. in financial and spatial terms. In consequence, the dependence on motorized car traffic, especially in urban areas could be reduced leading to less traffic jams, better air quality and societal health, more efficient use of vehicles and space.
The different cultural, societal and historical context of countries and cities influence the sort of issues they encounter with shared micro-mobility as well as their dealing with it. Thus, European cities developed different approaches and strategies how to integrate and handle this new form of mobility. Cities across Europe could profit from each other's experiences and knowledge and learn from each other to improve their own bike-sharing system. Therefore, this paper will compare the cities Berlin and Amsterdam in their handling with bike-sharing to investigate opportunities for mutual learning.

2 Problem context

This chapter gives background information to the research topic and positions it within the field of research. The author critically examines the state of the field. The author describes what has and has not been studied. Furthermore, the topic is well positioned in more general and topic related developments in the field (of research) as described in scientific and nonscientific sources.

2.1 Research motivation

Goudappel is commissioning this research as part of their cooperation with AEM institute in Berlin that involves also investigation into international knowledge transfer. Goudappel is a Dutch mobility expert advising on mobility projects in the Netherlands and abroad through partnering institutions such as AEM institute. Within Goudappel, the assignment is settled in the department "Mobiliteit en ruimte".
Examining bike-sharing systems with the aim to conclude on improvements for their handling can finally contribute to more sustainable infrastructure and communities as promoted by the Sustainable Development Goals 9 and 11.

2.2 The controversy of bike-sharing

Decision-makers and businesses promote bike-sharing as sustainable form of transport (Médard de Chardon, 2019) which is also perceived by the public as such (Hurtubia et al., 2021; Nikitas et al., 2016). Sheehan et al. Shaheen et al. (2010) state the following potential benefits of bike-sharing Shaheen et al. (2010):

1. Increased flexibility of mobility
2. individual cost savings
3. easy and cheap system implementation
4. reduced congestion and fuel use
5. increased attraction of public transport by solving the last mile problem
6. healthier lifestyle
7. raising environmental awareness

Compared to private bikes, they overcome inconveniences such as risk of theft or the search for parking space and can be better used in combination with public transport as taking a bike on the bus or train is often not

allowed, but a shared bike can be rented at the destination (Radzimski & Dzicielski, 2021). Furthermore, shared bikes can be the financial accessible solution to travel through the city where public transport routes and scheduling do not fit the user's needs and can indirectly encourage cycling through the visibility of bikes and cyclists in the public space (Goodman, 2014).
This supplementary benefit of bike-sharing to public transport is often seen as main benefit that could lead to higher public transport use and thus a reduction of trips made by car. Bike-sharing's complementary nature to public transport has been confirmed by several studies (Leth et al., 2017; Yao et al., 2019). A Roland Berger study reports, that 80 % of Chinese cities with BSS see reductions in their traffic congestion and air pollution improvements (Roland Berger, 2018).
There is potential demand, as complement to Public transport, thus to promote multi-modal transport as alternative to car traffic (Ahillen et al., 2015; Jansen, 2019). Furthermore, bike-sharing could relieve pressure on the bicycle parking infrastructure (De Openbare Ruimte, 2018)
However, there is some controversy on this topic, as other studies have shown that shared bikes rather substitute public transport than car trips. Still, there have been found 2-20 % conversion rates for car trips (Ricci, 2015; van Marsbergen et al., 2022). This is supported by a study in New York, which found out, that public transport was the main transport mode to be substituted as 60 % of bike-sharing users travelled before by bus. The second most substituted mode was walking, so that substitution of the car, taxi or the own bike occurred at a much lower share (K. B. Campbell & Brakewood, 2017). Thus, most of the benefits stated by Shaheen and the other authors are only valid under the premise that bike-sharing actually replaces trips made by car or the private bike, which is questioned heavily in the research field. Médard de Chardon (2019, p.401) furthermore states that all benefits are overestimated and bike-sharing is even counterproductive to sustainable mobility as it for example "disenfranchises the already marginalized" to the benefit of a hyper-mobile group of users that are mostly young, white, male with above-average income (Ricci, 2015; Shaheen et al., 2013) for example by placing bike-sharing stations mainly in city centres and high-income urban areas. Furthermore, bike-sharing is frequently associated with vandalism, littering, hindrance of public space, low-quality of the bikes.
In consequence, bike-sharing in its current implementation often does not return the benefits for which it has been introduced. Considering the theoretical potentials that lie within bike-sharing that also have been partly observed, I hypothesize that with better integration, operation and regulation measures these benefits could actually be tapped (in the long-term).
The biggest potential of bike-sharing is seen in combination with public transport which is (described in the theoretical background) apparently not attractive enough to encourage car users to use shared bikes. Thus, this integration is also one of the main drivers of BSS (Castro, 2011; Fishman et al., 2013; Nikitas, 2018) that needs to be accommodated and enhanced for this synergy of bike-sharing and public transport to evolve. Integration means a high dependence on other variables. Therefore, i hypothesize that some of these measures for good integration, operation and regulation need to touch extensively other fields that bike-sharing is connected with, for it to flourish, to return the promoted benefits and to in the end contribute to sustainable mobility. Partly this is also affirmed by Fan and Harper (2022) and Ricci (2015)who conclude that Bike sharing can increase cycling levels and thus reduce car trips when general pro-cycling measures are implemented as well such as improving the cycling infrastructure.
In Amsterdam and Berlin, almost everyone possesses a bike and cycling levels are relatively high with 25 % in Amsterdam and 16 % in Berlin. Nevertheless, both cities introduced bike-sharing, although Amsterdam has taken a more careful approach and temporarily even banned certain bike-sharing systems. More on the contexts of both cities is explained in the respective chapter in the methodology.
Considering previous research showing bike-sharing has potentials, but is also vulnerable to similar exploitation (private profit, no public benefit) and thereon based hypotheses, there is a research gap whether nevertheless some elements and strategies of bike-sharing systems are successful and can render bike-sharing a valuable transportation mean contributing to sustainable mobility, respectively can preempt the current failures. This concept in its three dimensions, namely eco-friendly, socially acceptable and economically sustainable transportation, will be further explained in the theoretical background.
This research adds to the existing knowledge body by extending the evaluation of BSS to the organizational dimension behind in terms of policies and institutional and organizational factors. Thereby, the cities' different approaches to bike-sharing will be revealed and conclusions over the effectiveness of distinct approaches can be drawn. Furthermore, this research looks specifically whether these findings could be valuable to the

other city's handling of BSS.

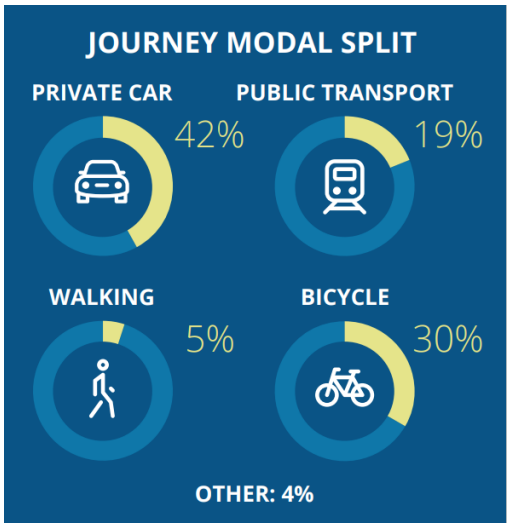
2.3 The case study context of both cities

The following table shows basic characteristics in Berlin and Amsterdam:

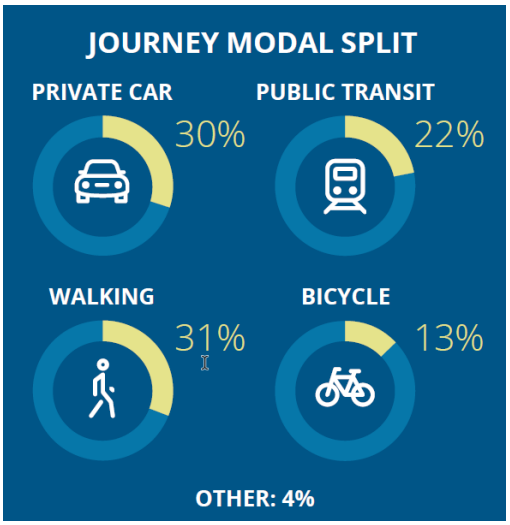
	Amsterdam	Berlin
Area	219 km2	892 km2
Inhabitants	904,000	3.7 Mio
Population density	4125	4108 p/km2
GDP/Capita	59,300	42,221
Share of people with an migration background	50% (O+S)	35.7%

Both cities are very similar in their density with Amsterdam being roughly 4 times smaller. Both cities have a high share of internationals respectively people with a migration background. This has been included to the table as this has an impact on the acceptance of cycling and thus bike-sharing.
The consultancy Deloitte developed a City mobility index in which they compared several cities world-wide regarding their preparedness for future mobility. Amsterdam and Berlin have been both part of this analysis, however in 2020, respectively in 2018. This difference might lead to slight distortions in results and also slightly different methodologies applied, but nevertheless acceptable to draw a general impression of mobility in the cities.

The figure 1c and 1d show the modal splits in Amsterdam and Berlin in 2020, respectively 2018 (Deloitte.Insights, 2018, 2020).

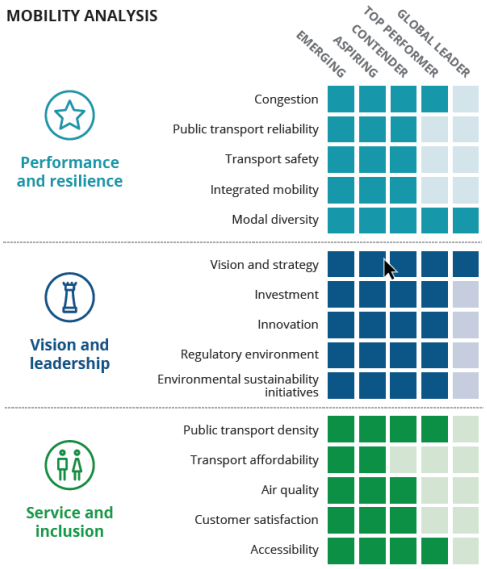


(a) Modal share Amsterdam

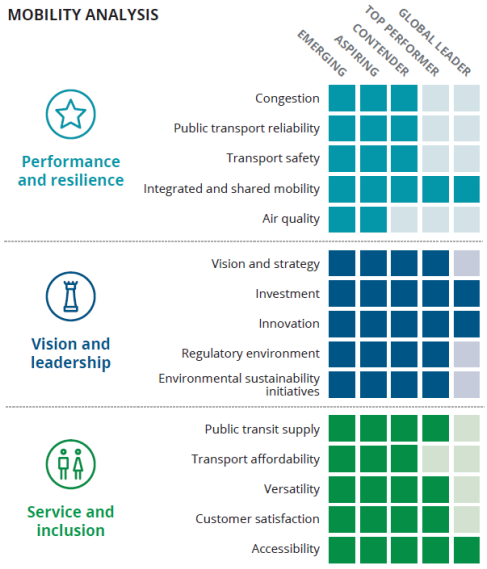


(b) Modal share Berlin

The active modes cycling and walking are combined stronger in Berlin than in Amsterdam and together with the Public transport system the percentage of journeys made with the private car is 12 % lower than in Amsterdam. One can say that for Amsterdam cycling takes up for almost all the ways that might be done by walking in Berlin. The public transport system in both cities consists of rail, bus, metro and tram with Amsterdam also having ferries. Deloitte analysed both mobility systems regarding three topics with each 5 criteria, namely performance and resilience, the cities' visions and leadership and service and inclusion. This can be seen in the following graphics:



(c) Mobility analysis Amsterdam (Deloitte)



(d) Mobility analysis Berlin (Deloitte)

In general, the index finally rates Berlin a bit higher in terms of readiness for future mobility, but due to the potentially different criteria and data sets, this should be acknowledged carefully.

2.3.1 The case study context of Berlin

In Germany, where - statistically speaking - almost every inhabitant owns a bicycle, rental bikes function mainly as an additional mobility option for commuters or visitors, who do not have their private bike with them (and not so much as an alternative to private property) (Senatsverwaltung für Umwelt Mobilität Verbraucher- und Klimaschutz, 2022). In Berlin, there are currently six bike-sharing providers (Berlin.de, 2022)

Bike-sharing provider	Business
Wheels	E-bikes without pedals
Call-a-bike	Hybrid BSS by the Deutsche Bahn
Nextbike	Official partner of the city with a hybrid BSS
Donkey republic	Hybrid BSS by the Danish start-up Donkey republic
LimeBike	Free-floating system with e-bikes
City of Berlin	FLotte: Cargo-bikes

To offer equitable and sustainable mobility, the city of Berlin supports bike-sharing financially (Senatsverwaltung für Umwelt Mobilität Verbraucher- und Klimaschutz, 2022). The bike-sharing companies are optimistic about the demand and plan to further increase the offer. However, the shared bikes are mainly accumulated in the city centre of Berlin, confined by the ring line of the suburban railway (Agora Verkehrswende, 2018) which is not suitable for a well-integrated mobility offer (FOCUS Online, 2017). There are efforts made to improve the situation as Nextbike for example recently opened another 20 stations both inside and outside the inner ring. Thus, the density of stations in the suburbs is slowly improved.
There have been during the past years three Asian BS operators in Berlin, that either withdrew from the market due to too much push-back or went bankrupt. Push-back as they flooded mostly uncontrolled the city with a large amount of free-floating bikes, that were often subject to vandalism and even calls for theft. Safety issues are in Berlin also largely seen in the lacking or poor infrastructure that offers little protection and space towards the motorized traffic (tipBerlin, 2019). Berlin does not have the same thorough cycling infrastructure as Amsterdam, and struggles expanding it. This is due to comparably high bureaucracy and a

cumbersome administration system with unclear responsibilities, but also due to a strong lobby for motorized traffic. Generally, the car is a symbol of status and freedom. Hence, whenever motorized traffic is planned to be restricted, there are still debates emotionally held that often slow bicycle-friendly developments down. This is nowadays changing, but still remarkable (DW, 2011; tipBerlin, 2019).

2.3.2 The case study context of Amsterdam

The Netherlands are a world-wide cycling example with 25 % of daily trips being made by bike (National Institute for Health and the Public Environment, 2018). Cycling infrastructure in the Netherlands is more developed and the bike as transport more anchored in society than in Germany. The Netherlands were in the past 50 years successful with the promotion of cycling (Centre For Public Impact (CPI), 2016). The metro system is the backbone of Amsterdam's public transport network and has been substantially expanded during the last three decades. Buses, ferries and trams and rail, offered by GVB, Amsterdam's public transport operator, complement it and were adapted according to the metro network (AMS institute, 2021). The city within the ring of the highway A10 is a low-emission zone in which diesel cars are partly forbidden to enter (City of Amsterdam, n.d.).
Bike sharing is currently relatively unfamiliar in the Netherlands as most people own a bike. Therefore, government and private parties also show a reserved attitude towards bike-sharing. The OV-fiets, operated by NS, the Dutch railway operator, is the only exception and a big success in the Netherlands. It is only available at train stations and therefore tailored to commuters and for them also financially attractive, as employers often pay for it (Ma et al., 2020).
There is potential demand, as complement to Public transport, thus to promote multi-modal transport as alternative to car traffic (Jansen, 2019). Furthermore, bike-sharing could relieve pressure on the bicycle parking infrastructure (De Openbare Ruimte, 2018). Still, it is seen as unlikely that bike sharing could gain substantial popularity in urban areas in the short-term (Netherlands Institute for Transport Policy Analysis (KiM), 2018; van Zessen, 2017).
Next to DR, another popular bike-sharing system is Swapfiets, that rents out bikes for personal use for long-term use with monthly subscription fees. Regarding user characteristics, Ma et al. (2020) found that users of Mobike in Delft, thus a BSS operator with similar business model as Donkey republic was more likely to be used by non-Dutch people with no driving licence, whereas OV-fiets and Swapfiets more likely served the opposite group.

3 Research Dimensions

3.1 Research aim

Based on the contradictory views on potential and benefits of bike-sharing mentioned in the context, this research aims to find out successful strategies and elements of the BSSs Donkey republic in Amsterdam and nextbike in Berlin and their organization. In a bigger context, these findings can contribute to international knowledge exchange between cities and can enhance mutual learning from the other city's experiences to improve the own bike-sharing system. Manifested and successfully applied measures in one city might be of great help in other cities to tackle their bike-sharing challenges. Hence, the paper aims to disseminate bike-sharing related knowledge and experiences internationally to foster the sustainable mobility transition in urban areas and explores which role the consultancies Goudappel and AEM Institute could take in this process.

3.2 Research questions

The following research questions were formulated to reach this goal.

RQ 1: What does the literature tell about the successful organization of BSS and policy transfer?

RQ 2: How are the publicly supported bike-sharing schemes organized in both cities and with which effects?

RQ 3: How do actors perceive BS and how does their involvement impact the organization of the BSSs of Donkey Republic and Nextbike in Amsterdam, respectively Berlin?

RQ 4: How could Goudappel and AEM Institute support the exchange of successful approaches to bike-sharing?

3.3 Research scope and limitations

The first paragraph outlines the scope of the research, followed by the second paragraph summarizing the limitations.
E-scooters compete with bikes for similar markets, but as those are a recent development, it is not yet clear how they influence bike-sharing and a city's mobility (Nawaro, 2021). Currently, it also seems as if e-scooters are mainly associated with leisure traffic, whereas BSS seem to be more likely used on a daily basis (Bieliński & Ważna, 2020). This could be a snapshot and only ascribed to the fact that e-scooters are not as normalized as bikes yet. Nevertheless, the available experiences and data situation make bike-sharing a more suitable topic for this research.
This research mainly focuses on implications and approaches on the policy level, hence resulting in output particularly suitable for the public authorities and the involved actors in policy-making. Therefore, Donkey republic as Amsterdam's official partner and nextbike as Berlin's official partner are chosen for the analysis and other systems are rather neglected.
For this research, policy documents will be investigated to find out how the cities deal with this new form of mobility and what aspects regarding bike-sharing they are focusing on, and whether these documents give an indication whether learning and knowledge transfer, e.g. from best practices in other countries, has already taken place. Médard de Chardon (2019) states that municipalities associate benefits with their sharing system, but rarely explicitly state the purpose of their BSS. Therefore, the policy analysis will also take into account broader mobility policies that might shed light on the underlying motivations. Furthermore, this analysis will also expand to BSS elements themselves, as it is assumed that not all relevant actions introduced to the systems are described in policies, but are e.g. rather practical considerations and directly implemented by different stakeholders.
In the end, this research should offer a good picture of how bike-sharing is organized in the respective city. This means that this research also touches upon operational strategies of bike-sharing businesses, but does not go deeper into an analysis of their business structure.
The different sorts of shared bikes, thus e-bikes, cargo-bikes, standard bikes can be means to reach different sustainable mobility objectives. Therefore, considering the different sorts of shared bikes could reveal interesting deviations between the cities focus and approaches.
The research is investigating the current situation and does not try to display the history of bike-sharing in both cities. It is a rather holistic, general investigation of the organization of the bike-sharing system in the cities to capture main relations within it, successes and failures of certain elements and approaches.
The outcome are recommendations for Berlin and Amsterdam, based on the other city. Therefore, the output does not aim to be a full picture of what can be done better in the other city, but rather what can be learned just from one other example city. Furthermore, the state of policy-learning is summarized and a proposal delivered how it could be enhanced. This excludes an evaluation of how effective this proposed strategy is. Hence, the research finishes with the validation and evaluation of these results by experts and the further integration of these insights into the knowledge base of mainly Goudappel. In terms of scope, this means that the results are not processed to be directly integrated and applied in the municipalities. This also includes policy learning where the conclusions focus on practical implications for the Goudappel and AEM, but are not extended to the municipalities as this is more difficult to realize, considering time restraints and the repeatedly required involvement of these external parties.

As the relation between bike and e-scooter- sharing is excluded from the research, it is expected that the

research does not reflect the possible impact that the expansion of e-scooter sharing can have on the bike-sharing market in the upcoming years.
The investigation relies mainly on qualitative data obtained from interviews and literature, as time and extent of this thesis do not allow analysing broad relations within the field of bike-sharing based on quantitative data. There are also differences in availability of the latter one, so it can at most be used to complement the main qualitative data. In the interviews, individuals will explain their perspective on bike-sharing and what they perceive as effective. Thus results might depict a slightly distorted reality as results are not based on the objectively measured performance of the BSS.
The results of this research, thus the (un)successful examples can also apply to other cities, but due to the research being bond to the context of the two cities, only to a limited extent.

4 Theoretical framework

In this chapter, I outline the theoretical framework with key concepts linked to mutual policy learning as overarching research context and the organization of BS as concrete research aim.
The review conducted by Glaser et al. (2022) serves as one basis for this literature review as most of the used literature regarding policy learning is found by backward searching.

4.1 What is policy transfer and learning?

There is no doubt that policy transfer does occur in various ways. Learning from elsewhere is popular throughout history and nowadays a reasonable way to develop innovative policies, such as for the sustainable mobility transition (Glaser et al., 2022). This is based on the assumption that the solutions to similar policy problems across the globe might also be applicable in other contexts (Dolowitz & Marsh, 2000).

4.2 Marsh and Dolowitz's framework for policy transfer analysis

Dolowitz and Marsh (2000) set a milestone in policy transfer studies as they developed a framework that is used until today to analyse policy transfer processes. In their framework, policy transfer is seen as a dependent variable that is influenced and explained by different factors, such as involved motivations and actors, degree and level of transfer, subject of transfer, settings of transfer, possible constraints and failures. This framework is shown below and, for this research interesting, features and aspects are explained with the help of other supporting literature.

TABLE 1
A Policy Transfer Framework

Why Transfer? Continuum: Want To		Have To	Who Is Involved in Transfer?	What Is Transferred?	From Where			Degrees of Transfer	Constraints on Transfer	How To Demonstrate Policy Transfer	How Transfer leads to Policy Failure
Voluntary	Mixtures	Coercive			Past	Within-a Nation	Cross-National				
Lesson Drawing (Perfect Rationality)	Lesson Drawing (Bounded Rationality)	Direct Imposition	Elected Officials	Policies (Goals) (content) (instruments)	Internal	State Governments	International Organizations	Copying	Policy Complexity (Newspaper) (Magazine) (TV) (Radio)	Media	Uniformed Transfer
	International Pressures		Bureaucrats Civil Servants	Programs	Global	City Governments	Regional State Local Governments	Emulation	Past Policies	Reports	Incomplete Transfer
	(Image) (Consensus) (Perceptions)									(Commissioned) (uncommissioned)	
	Externalities	Pressure Groups	Institutions			Local Authorities		Mixtures	Structural Institutional	Conferences	Inappropriate Transfer
	Conditionality	Political Parties	Ideologies					Inspiration	Feasibility	Meetings/ Visits	
	(Loans) (Conditions Attached to Business Activity)								(Ideology) (cultural proximity) (technology) (economic) (bureaucratic)		
	Obligations	Policy Entrepreneurs/ Experts	Attitudes/ Cultural Values						Language	Statements (written) (verbal)	
			Consultants Think Tanks Transnational Corporations Supranational Institutions	Negative Lessons			Past Relations				

Figure 1: Policy transfer framework according to (Dolowitz & Marsh, 2000)

Extending the table, the two authors elaborate that subjects to transferal can be several elements of policies, such as goals, content, instruments, programs, as well as contextual elements such as institutions, ideologies, ideas, attitudes and negative lessons. Policies and programs are clearly distinguished by understanding policies rather as broad visions or "statement of intentions" and programs are specific "courses of action" to implement policies (Dolowitz & Marsh, 2000, p.12). These contents of transferal will be further elaborated in section the section "What is learned".

Dolowitz and Marsh also highlight the relation between policy transfer and policy failure, as the attempt of policy learning does not necessarily result in successful and positive policy outcomes. According to them, there are three types of such policy failures that are summarized in the following table (Dolowitz & Marsh, 2000).

	Incomplete transfer	Inappropriate transfer	Uninformed transfer
Failure mechanism	Crucial elements of the policy or related policies have not been transferred leading to the policy not being able to develop its full potential	The policy functioned in a different social, political, cultural, economic environment and does not suit the context of the country in which it is transferred	Insufficient information about the functioning of the policy and its context in the example country

Table 1: Different policy failures

Wolman elaborates these issues and points out that

"policies exist in a political context; they reflect the relationships among existing political forces that are likely to differ from country to country. They also reflect the relative influence among the various groups and

interests in a country and the nature and extent of political bargaining and resultant compromises among them." (Wolman, 2009)

For this research, the potential difference in influence of the Fietserbond and ADFC on policy-making around cycling is an example in this matter. Thus, returning to Wolman's argument, this is an addition to the failure due to an inappropriate transfer as a policy that is a viable solution to a problem in one context, may not be in another. He identifies especially the lacking objective evaluation of policies and their transferability as main cause leading to policy failure, hence sharpen Marsh and Dolowitz's contention of not enough research carried out with a qualitative perspective. Wolman's proposal for solving this, is the introduction of a policy translator. As this already touches upon the execution of policy transfer, further elaboration is left to the following section (How is transferred).
In their review, Glaser et al. (2022) conclude from a number of other papers that effective policy learning is a long-term process in which several regular transfer moments e.g. in form of study tours, conferences, collaboration should be embedded.

For it to result in successful policies and to pre-empt policy failure, Wolman recommends to install a

"neutral and expert policy translator" – neutral in the sense that they are not committed to the policy to be transferred, expert in the sense that they are knowledgeable about the policy, and policy translators in that they have a deep understanding of policy and political setting in both countries." (Wolman, 2009, p.24)

Furthermore, Dolowitz and Marsh (2000) mention that the involvement of stakeholders in the transferal process is seen as a driver rendering the implementation of these policies more probable and successful. This is supported by research on stakeholder involvement in policy making processes as stakeholders are firstly educated about e.g. innovations and sustainability impact, and furthermore more open to collaborate as they were involved from early on and had their perspectives considered, resulting optimally in suitable compromises and win-win arrangements (Krywkow, 2009).

Glaser (2021) mentions additionally organizational factors such as local cooperation, engagement in policy networks and organizational resources, such as financial and human resources in terms of knowledge and capacity which are all interrelated and also influenced by aforementioned factors of leadership and cultural values.

4.3 What is learned and transferred?

There are three layers of learning subjects, namely the success factors of bike-sharing, the policies that lead to the implementation of success factors and the institutional and organizational factors that influence the policy-making process. The first two topics are content-related, whereas the third layer is process-related. It relates to the context around policies as interpreted by Dolowitz and Marsh (2000). This also means that the same institutional/organizational factors that shape learning processes, thus the "how is transferred and learned" can themselves be learning content, the "what is transferred and learned".

4.3.1 Factors impacting the success of bike-sharing:

Alberto Castro investigates the success factors to bike-sharing in his dissertation and draws conclusion on their relative influence on the success of bike-sharing. These factors will be presented in this section and serve then as direct basis for the research as they provide directions for which sort of strategies, policies and elements of BSS to investigate.
The Oxfords dictionary describes success as "accomplishment of a purpose or a goal". High numbers of users or bike rentals are therefore themselves not yet a good indication for success. From the benefits stated by literature, e.g. in the problem statement and the assumption that municipalities aim to improve the well-being of their inhabitants, success for bike-sharing could be stated if they improved a city's or its inhabitants mobility, health, economy, image of the city and environment by achieving specific goals belonging to each category (Castro, 2011). These specific goals of Amsterdam and Berlin are subject to the research to be conducted.
The following drivers and barriers to bike-sharing are determined by Castro, which he further investigated for significant correlation with bike-sharing success in a correlation and multiple regression analysis. He defined

success based on rents per bike per day. The highlights mark the factors he found correlating significantly to the dependent variable rents/bikes/day, thus to the success of a BSS.

Drivers	Barriers
# Bicycles and stations	Overuse
Distance between stations	Underuse
Density of stations	Theft and damage of bicycles
Technology	Breakdowns
Availability of service	Redistribution
Subscription and usage fee	Traffic accidents
Metro stations provided with BSS	Public space conflicts
Advantageous fee for PT passengers	Competition with bike rental shops
Population density	Dissatisfaction and bad image
Climate	
Car modal share	
Public transport modal share	
Bicycle modal share	
Cycle network density	
Tourism	
Vandalism/Theft	
Traffic safety	

Table 2: Drivers and barriers to bike-sharing success

(Castro, 2011)

As already discussed is rents/bike/day a limited indicator for bike-sharing success especially from a sustainable point of view. However, it is currently the most reliable indicator to draw quantitative conclusions on the success of bike-sharing and the influencing factors.
Other researchers have concentrated on the evaluation of particular factors, for example the combined bicycle transit mode without special focus on bike-sharing however. Van Mil et al. differentiate between transit related factors, first/last mile factors and context related factors that influence bicycle-transit demand. From this research, it appears that users rather cycle a longer distance if they can avoid a transfer through this. Moreover, they find that cycling infrastructure is a crucial factor to increase cycling rates, and thus bike-sharing (Van Mil et al., 2018).
Mateo-Babiano et al. (2017) found that technical factors presented the biggest barrier to successful bike-sharing and highest benefits where seen in the environmental benefit, lowest in the economic benefit. This has been concluded based on surveys capturing the perception of individuals. Technical factors included here maintenance of bikes, adequate and safe cycling infrastructure and the spatial availability of shared bikes. If existent, these function also as facilitators (of bike-sharing success) that he divides in design/technical, financial/economic, regulatory/policy. Strong economic factors are for example partnerships with parking operators or the public transport sector, riding the first 30 minutes for free and integrated ticketing. Policy facilitators were seen as even more important, especially a strong political will, a supportive policy climate with policies supporting non-motorized traffic rather than discouraging private car use.

4.3.2 Policies

The last paragraph already referred to certain policies as well as factors influencing policy-making for bike-sharing and micro-mobility. Latter ones are further described in the next section. According to Dolowitz and Marsh (2000), policy elements such as Goals, contents, instruments and programs can be subject to policy learning. In this section, there is an overview of policies and policy instruments used to promote and regulate bike-sharing, respectively cycling that thus shape the success factors.
Policies may entail many sorts of measures as for example standards, taxes, subsidies and permits. The following points show the exemplar influence possibilities of such policies based on the responses of DR and **Europeancyclistsfederation2017PolicySharing**; Senatsverwaltung fuer Stadtentwicklung Bauen und Wohnen

(2016) and Senatsverwaltung für Umwelt Verkehr und Klimaschutz (2018).

- Determining the kind of parking spaces, their location and capacity
- Limit or heighten the number of shared bikes and parking spots in the area
- Limiting the number and kind of providers
- Oblige the provider to actively redistribute the bikes and intervene if clients do not follow the set rules for parking e.g.
- Attributing other responsibilities to the provider such as regular maintenance
- Promoting bike-sharing with campaigns
- Supporting the provider through subsidies
- Creating market conditions for fair competition or monopoly depending on the goals of the public authority
- Creating infrastructure
- Creating partnerships and possibilities of collaboration, also with other actors
- etc.

4.3.3 Institutional and organizational factors

Institutional and organizational factors influence the policy-making process from which above-mentioned policies emerge. Institutional factors refer here to influential norms, values and thereby resulting customs, whereas organizational factors refer to the adapted processes in organization that lead to achieving an organization's goal. Occasionally, these factors overlap as in the case of Glaser et al. (2022), where leadership for policy learning is a factor not clearly assignable.
Institutional factors are cultural values resulting in public acceptance and participation, leadership and hierarchy. All these factors guide the effectiveness, efficiency and outcome of policy making.
Organizational factors on the other hand include for example the involved actors, their relations, hence also their collaboration and communication processes, the policy-making or political system with allocated responsibilities and human and financial resources to support and organize bike-sharing.

Thus, it follows from the literature review that a stakeholder analysis of the actors involved in the BSSs would be able to reveal the above-mentioned factors and organization. Enserink et al. (2010) provides guidance on how to choose actors and how to conduct such an analysis. Their proposed methods and analysis steps such as describing actors' attitudes and interests and their the formal relations cover the factors found and described above.
Considering the different kinds of policy failure as described by Dolowitz and Marsh (2000) there will be a further step in this research to validate and evaluate the found strategies and their potential for the other city.
Consequently, this research will focus on the description of the two BSSs as basis for understanding, the goals, attitudes and collaboration of the involved actors and a further validation and evaluation of the concluded strategies. The results section will be also structured accordingly. The following section on the methodology explains how these research aspects will be carried out.

5 Methodology

This section explains the methods used for conducting the stakeholder analysis and also justifies the taken approach beginning with the choice of comparing cities and systems followed by other choices for example regarding the investigated actors and the research process.

5.1 Justification of case studies

The research questions are answered based on case studies of Amsterdam and Berlin. Yin (1984) describes a case study "as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used."
Bike-sharing is such a contemporary phenomenon whose success depends on depends on how it is regulated, integrated and operated in the complex mobility system of a city. S. Campbell et al. (2003) confirms, that case studies are a more suitable for urban research as they can capture complex urban processes and varied and conflicting perspectives better than statistical analyses. Therefore, case studies of the organization of Berlin's and Amsterdam bike-sharing systems are chosen as research method to investigate the context and functioning of bike-sharing to reveal mechanisms, relations and approaches valuable for the other city.
Disadvantages of case studies are their difficult generalization of results as the investigated phenomenon is often strongly influenced by its individual context as mentioned above (Tellis, 1997; Yin, 1984). This at the same time lead to an advantage of the case study that allows us to consider the context and evaluate the phenomenon, here bike-sharing more holistically and in a real-world environment (Zainal, 2007). Other disadvantages are the often occurring inclusion of biased views as data which can distort the conclusions (Yin, 1984). This aspect was also mentioned as limitation of this research in the scope and will be further discussed in the following sections.
Berlin was first chosen as case study as AEM institute, the partner of Goudappel operates there, thus being able to provide data and background information. Furthermore, the bike-sharing system in Berlin in the most extensive in Germany, which is assumed to correspond to most bike-sharing related measures to analyse. Thereafter, Amsterdam as biggest city in the Netherlands was chosen as second case study to have match the basic characteristics of Berlin e.g. regarding size, governmental structure, societal structure. Furthermore, Amsterdam deploys a much more careful approach to bike-sharing whereas Berlin deploys bike-sharing services on a much larger scale with several years of experience.

5.2 Desk research

Official government reports, strategy and vision documents, web pages of the operators, the cities and partners are the source of knowledge to identify

- characteristics of the bike-sharing system
- the policies in place and the aims behind them
- the evidence of policy - learning in the documents
- the institutional and organizational factors influencing the policy-making process and its outcomes. These factors include the municipal organization, the policy-making system, the organization of collaboration and the external actor network.

The available contacts at Goudappel and AEM can also be helpful to enrich the findings. The results are the basis for the interviews with different actors involved in the organization of bike-sharing.

5.3 Expert interviews

Quantitative data on bike-sharing indicators are to different extents available for Amsterdam and Berlin and furthermore difficult to relate to effects of bike-sharing due to the amount of influencing variables in the system. Within the given time frame, the complexity of this system can be analysed more thoroughly through qualitative data as it allows to investigate bike-sharing system and context in Amsterdam and Berlin more holistically. This data can also directly explain phenomena, place aspects into a certain context and make connections between different aspects, thus revealing underlying relations. These insights are needed to evaluate the cities' approaches to bike-sharing and to in the end identify appropriate recommendations regarding bike-sharing for the other city.
To obtain this form of data, semi-structured interviews with experts in the mobility field will be conducted. These interviews are used to draw collaboration and policy approaches, actor networks to reveal differences

in how the current policies are made and how barriers are overcome and goals approached. Furthermore, the interviews will be used to evaluate the found strategies and the bike-sharing phenomenon itself based on the perceptions of the participants to draw an approximate conclusion on the effectiveness on the underlying factors and the resulting policies.
The advantage of semi-structured interviews is here, that a certain frame, namely bike-sharing as contribution to sustainable mobility can be given, but within this frame, the interviewees can elaborate on aspects that they consider of importance and offer profound insights that are not evident from the beforehand researched analysis of the system.

Interview partners
By selecting experts with different backgrounds and perspectives on the topic Enserink et al. (2010), biased views are balanced out and in consequence major distortion of the conclusions as one limitation of case studies should be avoided. Campbell argued similarly, that although singular interviews might be unrepresentative, together they can form a clear picture of BS's success and the policy network behind it (Campbell 2003). For each city, the four main actors of bike-sharing reflecting different perspectives were chosen. Those are the bike-sharing operator, the public authority, the cycling club representing users and the main public transport provider. This one is chosen, as the most promoted benefit of bike-sharing is its potential to reduce car trips when integrated with public mass transport and because a preliminary research revealed their involvement in several action steps for the implementation of the system, such as the choice of appropriate locations for BS stations. The cycling clubs were invited for interviews to capture a general attitude of the population on the BSSs and to find out whether there is lobbyism for BS and potential differences. The number of actors is limited to four, due to the time constraints for this research, although more stakeholders could have been identified. The following table shows the interview partners for those perspectives.

Perspective	Berlin	Amsterdam	# Interviewees (each)	Priority
Bike-sharing business	Nextbike	Donkey republic	1	High
Multi-modal transport	BVG	GVB	1	Medium
Mobility planning	Senat Berlin	Gemeente Amsterdam	2	High
User	ADFC	Fietsersbond	1	Low

For the public authorities it was planned to conduct two interviews per city to capture the perspective of both the organizing unit being the senate department and the municipality as well as the perspective of the districts. Municipality and district also share responsibilities regarding BS and policy-making so that two interviews are more suitable to explore the interplay of these actors. Priorities refer to the importance of conducting interviews with these stakeholders, so that in case of insufficient capacity, certain interviews might be omitted from the research. It also means that there should be some sort of contingency planning for the high priority partners in case they cannot or do not want to participate in the research. Regarding the BS operators this might mean to rely on another BS operator, such as Donkey republic instead of Nextbike in Berlin. For Amsterdam, this appears to be more difficult as there is no other comparable bike-sharing operator next to Donkey republic, meaning they should be contacted very early on with the inquiry for an interview, to be able to change plans if necessary, for example by investigating Rotterdam, which has more bike-sharing systems and operators. The stakeholders will be invited to individual online interviews. Content of the interviews were questions regarding the functioning of the bike-sharing system, pursuit goals, attitudes regarding the effectiveness, the collaboration and involvement of the actors and also attitudes regarding the other city's BSS, whereby the latter one is optional and is mainly time-bound. Interviews of the same actors in the two cities are scheduled around the same dates so that similar bases are given for the consecutive interviews with the other actors. This is important as the question list is altered between the interviews to incorporate given answers and impulses by previous actors.

5.4 Expert group

A workshop is held to evaluate the answers of the respondents, regarding their validity and their potential for transfer to the other city in terms of feasibility and what would be needed to integrate the findings in

the other system. Simultaneously, the workshop also proposes and investigates further how the participating Goudappel colleagues could use the findings to support municipalities in policy learning and to enhance Goudappel's participation in bike-sharing policy-making projects. The insights obtained from this meeting is the last section of the thesis, resulting in conclusions and recommendations on how to enhance policy-learning in municipalities and the role of advisors, such as Goudappel in the field of bike-sharing, but potentially also in other transport policy areas.

5.5 Conceptual research model

Research question	Methods	Results
RQ1: Literature on policy learning and BSSs	Literature review	Basis for the choice of research focus and methods
RQ2: Characteristics of the BSSs of nextbike and DR	Desk research (Websites, articles, fact sheets) + Stakeholder analysis (Policy analysis & interviews)	Description of the BSSs
RQ3: Stakeholders' opinion and impact on BSSs	Stakeholder analysis (Policy analysis & interviews)	Goals, attitudes, collaboration
RQ4: Goudappel's and AEM Institute's role in knowledge exchange	Expert meeting	Validation and evaluation of the findings

6 Results

This chapter encompasses the results from the policy document analysis, interviews and expert meetings, whereby the first two methods are used to explore and describe the BSS as well as its organization and the latter is used to validate, evaluate the results as well as investigate learning potential between Berlin and Amsterdam.
More specifically, the interviews with the actors are used to explore (public) BSS and their organization in Amsterdam and Berlin focusing on the interplay of actors that creates the system, rather on the singular actors. Therefore, the following chapter is organized topic-wise focusing on goals and purpose of the BSS, attitudes and estimated effectiveness, collaboration and characteristics of the BSSs with a distinction in each of these categories for Amsterdam and Berlin. It allows sketching the system more holistically and showing the relations and differences in perspectives of actors better, leading to a better overview of differences in the organization of the systems in the two cities. Another reason for this structure is also that some actors were in the end found to have a only a marginal role, so that their answers fit better to complement or highlight important oppositions to the main actors, but on their own do not contribute a lot to explain the organization of BS.
The policy analysis has two functions. On one hand, it supports the literature review for obtaining an overview of the BSSs in the two cities and to thus be able to develop the interview questions. On the other hand, it also supports the interviews as it complements answers from the interviews and sets the contexts of the BSSs. This is especially of importance for the sections on goals and attitudes as well as the explanation of the system characteristics.
At the end of this section, there is a comparative analysis done comprising the results from policy analysis and interviews that are also analysed with regard to factors and in the literature review mentioned concepts and is as such also input for the following section in which these contents are validated and evaluated and the learning potential and contexts of the two systems investigated through the expert meeting.

6.1 Characteristics of the bike-sharing schemes

Berlin
The city of Berlin partners with Nextbike, a company from Leipzig and supports it as the main public BSS. It also offers bike-sharing outside the inner city, however limited, and is the provider that operates most

extensively in terms of spatial accessibility and amount of bikes (Agora Verkehrswende, 2018). In 2021, there were 5000 bikes at 700 stations (Senatsverwaltung für Umwelt Verkehr und Klimaschutz, 2018; Tagesspiegel, 2021). Nextbike is since 2016 the public supported BSS after a europe-wide concession was conducted. The rights and obligations of nextbike and the senate department as responsible public authority are laid out in a contract that runs until 2024. This contract describes also the system's set-up, for example how locations for nextbike's sharing stations will be determined, whereby the spatial layout of the previous public BSS (Call-a-bike by DB) is used as a basis. With the subsidies, nextbike runs their business independently and is not further support by the senate department regarding the installation of the sharing stations e.g.
In Berlin, company BVG is responsible for public transport. Bike-sharing is connected with it through online platforms such as Jelbi with which all kinds of shared mobility and public transport can be booked. There are also a VBB card and Nextbike abonnements. All bikes are equipped with card readers to facilitate these payment options. Available abonnements are for example, 10€/month with daily 30 minutes free and after that 1€/15 minutes and fixed stations where the bike can be returned, but can also be returned on any public space with some exemptions for a surcharge of 0.5€ (Nextbike, n.d.)

Amsterdam
In Amsterdam, the municipality went into an experimental phase from Summer 2021 with public bike-sharing by partnering up with several BSS providers, whereby DR represents the biggest one. Currently, they operate 600 bikes in Amsterdam East and South and other smaller providers operate in other areas (DR). Amsterdam has this careful approach as it already banned shared bikes from the city in 2018. The municipality does not support the BS companies financially, but takes over the installation of the stations. In consequence, pricing plans lie in the responsibility of the provider and in DR's case, this means there are also subscription plans with which the price of a ride decreases the longer one rides the shared bike.

6.2 Stakeholder analysis

In this chapter, a stakeholder analysis is conducted to understand the role of stakeholders and the organization behind the BSSs. The action spaces and perceptions of different actors influence the BSSs as different attitudes compete and depending on available action space and power, the system is shaped accordingly. The analysis is based on a policy document analysis and interviews held with the various stakeholders in both cities as described in the methodology chapter. Both methods are combined to describe and explain the goals, problem perceptions and attitudes, collaboration and role of the stakeholders in the organization of BS in Amsterdam and Berlin.
Policy documents especially show the goals of public authorities, their focus points, strategies and attitudes towards this mobility form, the expectations beforehand, whereas the interviews validate these as they help displaying the actual implications and reality of the described goals and strategies, for example how effective the systems are perceived and if goals are reached. Furthermore, the interviewees also explain deeper lying relations and roles of actors. Hence, they enrich the policy document analysis, but are also the main source of information as policy documents mainly focus on the action spaces of public authorities. Next to interviews and policy documents, also sources such as websites are included to complete the stakeholder analysis and the description of the BSS.

6.2.1 Goals

This section on goals comprises the goals of different actors, retrieved by interviews whereby the ones of public authorities are also supported by goals found in policy documents ranging from EU-level to local level in the municipality of Amsterdam, respectively the senate department of Berlin.

On EU-level bike-sharing is promoted via the Platform for European bike-sharing & systems (PEBBS) that is run by the European cyclists federation encompassing several cycling clubs. It is recommended to governments to enable a fair market for many providers to reach mobility goals. Their document also mentions the EU as supporting several policy frameworks to encourage the sharing market, which were not cited and also could not be found via internet search, so that in general it appears that responsibilities are currently left with

local authorities as these systems are also operated on a local level (CIVITAS, 2017).
Bike-sharing is still mentioned as part of strategic and tactical European cycling documents such as the Federal Ministry - Republic of Austria (2021), the Green deal, European Commission (2021) and the Urban Mobility Framework (Eltis, 2022). The overarching goals in these documents are the cut of emissions and the establishment of a smart, competitive, safe, accessible and affordable transport system as described in the Green Deal **EuropeanCommissionADeal**. BS is mainly referred to as part of multi-modality to avoid car use and thus to reduce emissions (Smart and sustainable strategy (2021)). Furthermore, BS is mentioned as option to obtain private sector funding to enhance cycling, and in connection to e-ticketing systems and mobility cards and under the subgoals of open standards for data exchange for interoperability between providers of different transport modes (Federal Ministry - Republic of Austria, 2021). This plan also portrays BS positively as it meets the demand for sustainable transportation.

Berlin
Firstly, the ambitions and goals found through the policy documents are described. Thereafter the findings from interviews are summarized. The Senate department in Berlin is the responsible public authority for BS in Berlin, being influenced by EU-level policies that translate into national policies. Therefore, the national policies on bike-sharing are also summarized at first, followed by the most influencing layer of policy documents, namely the local policies of the Senate department.
The national cycling plan (Federal Ministry for Digital and Transport, 2021) is the guiding strategic document in Germany. The European cycling federation concludes that it is one of the most comprehensive across Europe providing specific targets and having been worked out in consultation with professional associations and different layers of government (ECF, 2021). The main theme is more, safer and better cycling traffic in order to make Germany a cycling country by 2030.
Regarding BS, the national government has ambitions to assign more action space and flexibility to local public authorities and to lay an enabling legal framework creating legal certainty and simplifying the integration of (cargo)bike-sharing systems and especially their spatial infrastructure into the public space, thus encouraging redistribution of public space (ECF, 2021). In general, the national ambitions are to control the market via permits and clear regulations. Moreover, collaboration between different public actors, the public transport authorities, public transport and bike-sharing operators is aimed for to ensure uniform pricing and digital integration with public transport. Part of this integration is the obligation of bike-sharing providers to cooperate transparently for data evaluation. Another focus point of the national policy is the promotion of cycling economy, by enabling new business models such as bike-sharing and promoting cycling tourism, by targeting also tourists with the established bike-sharing schemes, for example by allowing rentals across municipalities. This NRVP also supports several concrete actions, e.g. for learning the biannual Nationaler Radverkehrskongress (NRVK) (National cycling congress) and the cycling academy (Fahrradakademie) which organizes courses for municipal employees to build capacity (p. 16).
Permits and clear regulations determine for example whether bike-sharing is seen as special use of public space or not. Currently, station-based bike-sharing needs permits and pays for the use of public space, whereas free-floating bike-sharing is mostly seen as common use of space, and therefore does not require permits and is not obligated to pay fees. In consequence, municipalities have a hard time setting up regulations regarding parking of shared bikes as the legal ground is missing. Similar is valid for the set-up of a publicly supported system via tendering and in general for steering sharing offers in a compatible direction, leading to municipalities being rather reserved than proactive (Agora Verkehrswende, 2018). This topic is subject to many discussions as for example in Berlin where the law for special use of public space and thus permitting and pricing should be adapted by autumn 2022 to allow more regulation and the more controlled and fair development of bike-sharing.

Berlin's goals are mainly stated on the website of the senate department for Environment, mobility, consumer and climate protection as well as in strategic and tactical policy documents.
The mobility law of Berlin (MobGe Be, 2018) lays a legal foundation for prioritizing active mobility and public transport over individual motorized traffic in transport planning and sets goals and requirements. Regarding BS it states that a BSS should be supported by appropriate measures according to the goals of the act and the public demand and that during the expansion of the system, more focus should be put on bikes for people with mobility limitations (MobG Be § 36, (6)) (Berlin.de, 2018)

The two main plans impacting mobility and BS are mapped out accordingly and translate the goals to more concrete actions. Firstly, there is the StEP MoVe, the city development plan for mobility and traffic for 2030 that contains a strategic element and the tactical catalogue of mobility measures for the city. StEP MoVe is the superordinated plan for city-wide mobility. The StEP MoVe aims for comfortable, climate friendly, sustainable and safe traffic with only 18% of ways in 2030 travelled by motorized individual transport (2018: 26%) whereby the biggest modal shift should be to cycling traffic. The catalogue of measures for mobility projects until 2023 is a 16 pages document that does not specify budget for all actions, making it not very concrete yet if everything can be realized. Regarding bike-sharing there is only one measure formulated namely the expansion of the public bike-sharing system (Senatsverwaltung fuer Umwelt Verkehr und Klimaschutz, 2021).
Secondly, there is the cycling plan (Radverkehrsplan des Landes Berlin) as one of five direct follow-up plans to the mobility act that specifies the StEP MoVe further (Senatsverwaltung fuer Umwelt, 2020). Its mission statement is that more people should ride their bike, while being and also feeling safer to do so (p.8). Regarding BS, an equivalent offer should be available in all parts of the city, thus to expand the BS offer also outside the inner city to promote the equivalence of different mobility offers (p. 65) and to make mobility more socially sustainable (p. 60). Parallel, a study is demanded to determine possible development scenarios and performance indicators for BS and to estimate the societal benefit and the economic viability. Subject of the plan is also the possible integration of the BSSs into the payment system of the VBB (Transport region Berlin Brandenburg). Regarding information provision, BS should also be part of a separate informative website over cycling infrastructure in Berlin. More concrete, the cycling plan also answers to the negative aspect of BS namely blocking public space by stipulating constant contact between the senate department and the BS providers.
Summarizing, these goals in national and local documents are relatively broad, mainly saying it should be supported according to higher goals, should be expanded and rendered more inclusive, integrated with PT to overall be a contribution to active mobility and less car dependency. On national level the focus is more put on underlying goals to enable this, such as goals formulated relating to digitization, and the expansion of responsibility at local authorities.
The specific websites and fact sheets of the senate department offer more concrete information. Here, the goal with the publicly supported BSS Nextbike is to ensure climate-friendly, affordable and city-friendly mobility and to put profit last. BS is also explicitly stated as form of public transport, that is subsidized to provide mobility also in areas where a commercial BSS usually would not be profitable. A press publication from 2016 states the long-term goals of relieving the inner-city car traffic as well as reducing the carriage of bikes in public transport. Regarding target group, this press publication states inhabitants travelling short distances, such as commuters and public transport passengers that would use BS as transport mean for the first and last mile. In contrary, the website on BS only mentions mostly spontaneous people and tourists that could use the bikes to drive to the next tram or metro station (Senatsverwaltung für Umwelt Mobilität Verbraucher- und Klimaschutz, 2022).
The interview with the senate department clarifies that the higher interests are a climate-friendly mobility for all, that is mainly offered via the environmental alliance (PT and active travel). Specifically regarding bike-sharing, it should become a widely used public transport mean, promote inclusiveness and social sustainability via wide financial and spatial accessibility and support PT via good digital and spatial integration (of stations) by filling the gaps of the previous public BSS (Call-a-bike by DB), by supporting the formation of mobility hubs (Jelbi by BVG). More concretely, a dense network of stations and a large number of bikes is aimed for, whereby density is prioritized above the expansion of the system. Moreover, it is mainly targeted at inhabitants.
This is affirmed by Nextbike, that also see themselves as provider of PT to offer mobility to all. Furthermore, Nextbike as commercial business aims for expansion in the outer city which they deem possible with further subsidy. Referring to Covid, BS is not only a way to stimulate PT use with a first/last mile solution, but also to offer a sustainable alternative when capacity limits in PT are reached.
The ADFC share the goals of nextbike and the senate, but are not involved in the collaboration between the senate department and nextbike, but rather pursue their own BS operation (fLotte Berlin) that is a free cargo-bike rental. The BVG, that could not be talked to directly, operates Jelbi, a platform for MaaS (Mobility as a service) that is both virtually and physically offered. The Jelbi-stations bring sharing offers to metro and light rail stations and as such aims for the integration of PT with shared mobility to provide

a holistic mobility option as alternative to car traffic. Nextbike is one of the sharing options. Jelbi is supported as pilot by the Senate department that will be expanded if successful. In general, the perspectives of the actors on (value) and goals of bike-sharing are aligned, especially between the main partners senate department and nextbike and both pull together, although the processes connected to that could be improved in their efficiency, especially from nextbike's perspective on expanding to the outskirts of the city and the collaboration regarding the determination of new stations.

Amsterdam

The national vision bike (National toekomstbeeld fiets) is the vision that several actors (governments (national, provinces, transport regions, municipalities), businesses, academia, NGOs) in the mobility field share. They founded together the Tour de force to promote cycling. This vision describes how cycling can contribute to spatial and societal challenges, which investments and collaboration is needed and sets it thus in a bigger picture exceeding the field of mobility. Those challenges are climate mitigation, the construction of 1 million new apartments until 2030, the accessibility in rural regions, spatial and financial efficiency and inclusiveness. Bike-sharing is sometimes mentioned as part of the solution. The vision for 2040 is that everyone has access to a bike, either owned, shared, leased or rented. This makes bike-sharing a fixed component of the cycling future/vision. Other aims mentioning bike-sharing are: 1. Town centres and larger Public transport stations are equipped with bicycle parking, shared mobility offer and infrastructure for active mobility. 2. The capacity of existing parking areas is better used by amongst others allocating room to cycling forms differing from the norm. 3. Reduce the ownership of a second bike at a station, e.g. through the offer of micro-mobility and create thus more capacity in parking facilities. (all p. 29) 4. Using the STOMP principal as standard in mobility planning and area development (hierarchical importance of transport modes: First walking (Stappen), then cycling (Trappen), public transport (Openbaar Vervoer), MaaS, Private car) Part of the national vision are different stages breaking down the vision to smaller time frames. Stage 1, called "Zet de fiets op 1", aimed at setting the bike at the top of as many political agendas as possible, also outside the mobility field, to enhance the normalization and integration of cycling in diverse settings. The second stage, called "Schaalsprong fiets", aiming at realizing the big potential of the bike, with all involved actors formulating own ambitions, committing and collaborating for this final change (Tour de Force, 2022) The Rijkswaterstaat, the executive organ of the ministry of infrastructure and water, published a fact sheet on bike-sharing. It stresses the goal of interoperability (booking of several BS services possible via one app), the importance of good infrastructure (capacity on cycling ways and in the public space for the installation of stations) for success and that municipalities should know exactly what role and value a BSS could take in their municipality before implementation/permission of such a system (Rijkswaterstaat, n.d.).

The advises and information in the fact sheet are partly based on the (Nationale) agenda fiets 2017 – 2020 (national bike agenda) that has been also published by the Tour de Force prior to the National vision bike. That agenda is considered as it is the basis for other information found and was the agenda in place when the experiments for Amsterdam were planned. Most of its points have been considered again in the National vision, however the aspects on interoperability and bike-sharing as first/last mile transport with the consequence of being able to omit certain less popular bus routes were more elaborate (Tour de Force, 2016). The ministry of infrastructure and water itself did a research on the developments, effects and potentials of car and bike-sharing in the Netherlands based on different policy scenarios. The results show that shared mobility will be most effective in urban areas, that a combination of policy incentives for shared mobility and against car ownership and utilization would result in the strongest growth of shared mobility. Car-sharing is expected to grow more than bike sharing and for bike-sharing to grow there need to be clear advantages created compared to the own bike. Those measures need to be well thought through and form an integrated package rather than independent deliberate measures. They also attest that bike-sharing mainly replaces PT, walking and the own bike, whereby no effects on accessibility or sustainability are known for the Netherlands. Further conclusions are that the main barriers for establishment and expansion of a BSS are the high cost of the re-balancing process of bikes in a free-floating system and the difficulty to obtain permits. Subsidies could help creating more offer in regions weaker in demand and could be part of PT concessions. Adequate cycling infrastructure must be provided, the simpleness of utilization ensured and campaigns for consciousness and the stimulation of bike-sharing organized to increase the attraction and potential of bike-sharing (Jorritsma et al., 2021).

The CROW-fietsberaad is the a knowledge centre for cycling policy for decentral governments. They also published a guide for municipal bike-sharing policy. The premise of this document, developed in coordina-

tion with the association of municipalities (VNG) is that bike-sharing can be a valuable addition to existing transport means, if good organized (Kwink groep, 2019).
The following picture shows which policy documents around shared mobility exist in Amsterdam:

The Mobiliteitsaanpak Amsterdam 2030 is the fundamental mobility policy in Amsterdam. In it, only car-sharing is mentioned. The policy document "Deelmobiliteit, kansen voor de stad" (also Beleidsnota deelmobiliteit) is the agenda for bike- and scooter sharing in Amsterdam. It is developed based on collaboration between the municipality, the VRA and consulted market parties (19) and two discussion rounds. It mainly describes potentials, policies and background information on BS. The goals of the agenda are to open up legal possibilities for BS operations and to embed them in controlled experiments to find out if bike-sharing (and scooter-sharing) could be valuable to their transport system. Moreover, to regulate the utilization of scarce public space in Amsterdam and prevent a reoccurring flooding of shared vehicles as happened in the beginning of 2017. Hence, the main instrument and the basis for the experiments are permits for singular providers. These permits allow for a 2 year long operation with 1 year of extension possible in only certain areas. Linked to the permit are regulations as well as obligations, e.g. to collaborate for interoperability, to share data with the municipality, and to safeguard privacy. The permits allow free-floating bike-sharing, but not in dense areas such as the city centre and restricted to a limited city area as the positive effects of BS are not yet proven to justify the set up of a large scale system. The main potential and goal of bike-sharing is to transition from ownership to usage of transport means and in the first instance to make the ownership of a second bike redundant and to thus relieve pressure on parking areas, to stimulate PT use (as experienced with the OV-fiets) and to reduce car and scooter use. According to the municipality, reasons for shared mobility are more choice and independence, no ownership, thus no extra costs and efforts, fast and accessible (considering combination of PT and bike-sharing faster than the journey with the car), more space on the streets through saved car and bike parking spots and it being a sustainable (electric) transport mode (**GemeenteAmsterdam2019**). Amsterdam developed several agendas that relate and refer to bike-sharing, such as the Agenda car-sharing (Agenda autodelen), the Agenda Amsterdam autoluw, the programma fiets and the programma smart mobility. The Vervoerregio Amsterdam (Transport region Amsterdam), the association of transport authorities in the region, also developed visions, in which shared mobility plays a role and the Meerjarenplan fiets. In the following just the ones with some more specific considerations of bike-sharing will be shortly explained.

The Meerjarenplan fiets 2017 – 2022 builds on the Mobiliteitsaanpak (similarly to the Cycling plan of Berlin that builds on Berlin's mobility law). It has three focus areas, namely the comfortable crossing of the city, easy parking, and new cycling. These translate to the expansion of infrastructure, more and easier access to parking and regulations, innovations and campaigns for more cycling and better cyclists' behaviour. Bike-sharing is mentioned a few times also with referral to other (European) cities and their systems and pointing out the negative experiences China and Amsterdam made. They especially also referred to Antwerp and their successful publicly supported BSS (similar to Berlin), doubting afterwards immediately the potential success of such in Amsterdam due to high bike ownership. Their own pilots with BSSs at that time are also described, mainly targeting businesses and their employees as user groups. Within the focus point new parking, bike-sharing is mentioned as instrument to reduce the number of parked bicycles. Potentials are seen at PT and P+R locations which would be further analysed with the GVB, NS and the VRA. In the section on new cycling, a market research is announced to investigate the potential and needed regulatory framework for BS which resulted in the above discussed policy paper "Deelmobilitiet, kansen voor de stad". On a small note, the plan mentions to investigate whether BS can also increase the access to cycling (Gemeente Amsterdam, 2017).
The Agenda Amsterdam autoluw (January 2020) states that in the short term the ov-fiets should be expanded to metro stations. It recognizes that the potential of the bike especially on the last mile is not exploited, whereas it is on the first mile. At some PT nodes, the option to place electric shared bikes should be explored. This policy as well as the policy autodelen focus however mainly on car-sharing as it also shows to have greater potential compared to bike-sharing (Gemeente Amsterdam, 2020).
The smart mobility agenda (2019 – 2025) states as goals: - to render Amsterdam smart mobility city nr. 1 by making shared mobility an equivalent alternative to car ownership, by offering affordable, reliable and accessible shared mobility. - To render all Amsterdammers', visitors' and freight travel cleaner and smarter - To progress further with the digital mobility system

(Gemeente Amsterdam, 2019) In this document, bike-sharing was mentioned as one option under innovative mobility forms to use for last mile. The introduction shed a negative light on it referring to the already experienced mobility transition and the issues it has brought.

In Amsterdam, the goals regarding BS are not yet as aligned among the actors as in Berlin, but made more clear and transparent in interviews and in the number of policy documents on this topic, developed by different government institutions (e.g VRA) and levels. Websites and the interviews with the municipality affirmed that the main goal of the experiments are to investigate the value BS could bring to Amsterdam considering that bikes are already highly available to people, bike rental and lease possibilities, such as Swapfiets, and the municipality offering wrongly parked and finally removed bikes for cheap (Fietsersbond). Considering this, the municipality could imagine BS to replace the second bike at stations, improve the last mile and thus the multi-modal door-to-door travel as alternative to a car trip, and BS accessible mainly via fixed stations and hubs, as it was stated in the interviews. Donkey republic on the other hand aims for their shared bikes being used as own bikes, also occupying public bike parking in front of apartments and as such being a free-floating system with little restrictions to the location of parking. As such, DR sees their bikes in the long-term fulfil a bigger purpose than what is carefully pictured right now by the municipality. This carefulness will be further elaborated in the next section on attitude. From the interview with DR, it also appeared that the VRA has ambitions regarding regional BS services. For this purpose, the VRA prepared a vision on BS in the region Amsterdam where potentials also of suburban, rural and industrial areas is analysed. The Fietsersbond is not involved in the collaboration and also does not have any ambitions regarding the further promotion of cycling, but rather regarding regulation as they do not want to see bikes of a commercial business occupying the already scarce parking options of inhabitants. Taking into account the BS situation in 2017, where public space was overcrowded with shared bikes, one could say that the Fietsersbond aims for such a situation to not happen again, meaning that as long as BS is quite limited in Amsterdam, they do not intervene and have no ambitions. The GVB is fine with his role of not being actively involved in the collaboration of the municipality and Donkey republic, as long as there is no direct connection of his business and the BS. Reason for this attitude is also that the municipality and the GVB pursue similar goals of less pollution and more sustainable transport in the city and a well organized BS system to not obstruct the public space. In terms of bike-sharing the GVB aims for a good integration with BS, whereby BS acts as supplement to PT to offer wide and reliable service e.g. in so-called white spots, where PT service is not profitable, in case of temporary service problems of the PT and as prolongation of PT, so as last mile solution. The interviewee stated that in the sum, this would support the goal of reducing cars in Amsterdam. More concretely, GVB aims to include BS, specifically DR from autumn 2022 in their app to show users the locations of Donkey bikes. If this works well, it would be aimed to integrate the BS service further by allowing customers to book and unlock the bikes with their app. At this point, GVB would wish for more direct influence in the collaboration of the city and DR as then responsibilities and risks would be shared and GVB is more directly engaged. Influence regarding the marketing and location of the shared bikes, whereby a collaboration between the municipality, BS providers and the team within the GVB, already now busy with station and mobility hub development could lead to better connection and well-organized PT system combining traditional PT and BS.

6.2.2 Attitudes and perceived effectiveness

Berlin

In the German and European policy documents there is the underlying assumption that BS is a sustainable and effective form of mobility, that should be supported. This is the main issue, as it presents a major obstacle for cities to control bike-sharing in such way that it serves the public. The opinion prevails that only a public bike-sharing system, or at least well regulated, so not the free market, can meet the city's mobility needs for more accessible and sustainable mobility by integrating it well to public transport. There is definitely a positive attitude towards bike-sharing from the side of public authorities, which can be both seen in policy documents as well as confirmed through the interviews. In the StEP MoVe, it is stated that BSS next to the cycling ways network and increased parking possibilities have made cycling over short distances attractive, safe and comfortable. There it is also described as already self-evident part of mobility, especially for the younger generation (Step MoVe, p.30) . In interviews it was strongly confirmed that bike-sharing is needed and adds value to the mobility of Berlin. Hence, there is no discussion on the utility of such a system in Berlin, but is from all sides agreed on. Interesting to observe is that there is little evidence as Berlin

apparently puts less focus on the evaluation of the effects of bike-sharing on the mobility system in terms of users and the change of transport modes. This has been concluded from the interview with the senate department where the utility of asking questions to changes in modes was doubted and highlighted that they do not want to know too much about users and mainly orientate themselves at the usage of the bike-sharing system in total and per bike and day. In terms of total users, there is over the last years a continuous upward trend according to the interviewee whereas the usage/bike/day stagnates at 2. This can be explained by the simultaneous expansion of the system with bikes and stations next to the increase of users. The little focus on evaluation of effects and data can also be explained by the general perception that this relatively new innovation needs time to become accepted as new mobility option and to finally show its full potential impact. For the long-term, the utility should rise above 2 to justify the investments into this system, but the senate department is confident based on the development of user numbers.
Another attitude the both nextbike and the senate department display is that they provide first and foremost a mobility service, similar to PT and that such a service that is connected to the goals of wide accessibility and putting profit last for the common good can only be delivered by a public supported and regulated system. A commercial one would mainly focus on touristic and mobility hotspots, which is also shown in maps worked out by Agora Verkehrswende that show the operation area of different providers in 2018 (Source).
Nextbike assumes that their system is wider accepted than other commercial systems as the public support makes it more trustful. The uniform distribution of locations across the city as a result of this cooperation also leads probably to more acceptance and usage among all kinds of inhabitants. Moreover, acceptance is raised through various partnerships with all kinds of organizations. This is further elaborated in the section on collaboration.
Thus, Berlin concluded for itself that bike-sharing has earned its place as part of sustainable mobility and as such should receive public promotion. This attitude, similar to the goals are shared by the ADFC.

Amsterdam
The municipality of Amsterdam is unsure about the value which manifests itself in the set goal for the experiment of finally exploring and quantifying its benefit for the city. Because it is not sure, if effort and investments in BS return public benefits, the city pursues a careful approach, of allowing only small, provisionally pilots (regarding stations e.g.), asking this commerce to sustain itself without additional subsidies and evaluating this system thoroughly. This carefulness originates from the bad experiences made with free-floating BS in 2017 when mainly Asian providers flooded the inner city of Amsterdam with their bikes. This led to large disturbances in the public space followed by annoyed citizens vandalizing and throwing the bikes into the channels. The situation was also hard to resolve as responsible companies could not be reached and there were not yet legal grounds regarding BS on that the municipality could have acted. Other reasons for the careful attitude of the municipality is the good availability of bicycles in the city through ownership, rental shops for tourists, as well as the OV fiets. In contrary to Berlin, Amsterdam also needs to be more careful as Amsterdam is denser and public space is scarcer and more valuable so that potential externalities carry more weight. Thus, it is even more urgent to know beforehand which functions and mobility modes have the right to occupy this scarce resource. Whereby in Berlin, it is speaking for itself to support BS as PT with subsidies, this is currently not intended by the municipality of Amsterdam. The interviewees explained this with the almost 100% ownership of bikes in Amsterdam, so why would they subsidize something that everyone has access to. Furthermore, the entire city of Amsterdam can be cycled across, whereas Berlin is too large to do so, so people would rely on a supplement to cycling, such as PT to cross the city as alternative to the car. Hence, according to the municipality, a combination of PT and BS makes more sense in Berlin, but does not need to be further encouraged in Amsterdam that actually has a dense coverage of PT with no need for last-mile solutions. However, the interviewees left open that if a significant benefit to mobility can be detected in the experiments, public subsidies might be subject to discussion. Regarding learning, the municipality's representatives answered that they mainly looked to other Duch cities, whereby this is also difficult as the conditions in the relatively car-based and larger Rotterdam cannot be compared to Amsterdam's. Furthermore, it was assumed that for international learning, Copenhagen would seem more logical and suitable than Berlin due to similar conditions regarding cycling. However, the representatives appeared to be open-minded to exploring the BSS in Berlin and specifically its inclusiveness.

The municipality is still collecting data and therefore could not share results. However, some general estimations were given. For example, it can be seen that the use of BS increases strongly, however also that the

shared bikes are used by tourists a lot which is still estimated to be the biggest target group. DR agrees that they have quite a few customers that are tourists which they conclude from illegally parked bikes in the inner city that they need to remove. The high usage of the bikes also leads to the designated parking areas being constantly empty, so that Amsterdammers use them again as normal bike parking spaces. It stays open whether this poses a problem. Another conclusion that they share with the Fietsersbond is that Cargo bikes seem to be actually used by inhabitants and are very welcome. Regarding the effectiveness of BS on Amsterdam's mobility, it was mentioned that already small adoption numbers could make a street look different if in turn car parking is omitted. Regarding the effectiveness of the system, the municipality is aware that the form of these experiments is not optimal and that a BSS only works with a dense network and sufficient bikes like in Berlin, however the question is if there is sufficient support for this from the municipality and its inhabitants. In general, it was also mentioned that for effectively changing urban mobility to more sustainability, car-sharing holds higher hopes.

Similar to the goals, DR has mainly an opposing attitude, being sure that BS can be of great value for the city and in the long-term for the region of Amsterdam. DR stated that being a public BSS such as in Berlin would be the best option possible, comparable to the system in the region of Antwerp that was installed in August 2022. DR thinks of the experiments as inconvenient for the users due to the fragmentation of providers and thus very limited sharing possibilities across areas.

GVB's contact person explained that GVB looks in total positively towards the BS development which can be seen at the goals. However, among its employees, there is also a fair amount that fear a concurrence rather than a mutual support from BS, which is understandable seeing some literature coming to similar conclusions. The most effective collaboration and the best functioning system of BS and PT could be achieved by only allowing one or two BS providers in Amsterdam via concessions preventing fragmentation which in turn leads to enhanced collaboration and profitable business conditions. Linked to this is also the interviewee's opinion that a BSS can only be successful in terms of service offer and business case if it has a sufficient size and is well-organized, which is missed by the current pilots. This coincides with DR's opinion. Another perception of the interviewee representing GVB is that the municipality is afraid of laying to much power in the hands of only one or two BS providers. A solution to this carefulness is the establishment of public BSS which would grant the municipality more control over these BS systems and would fit the purpose of BS as public transport and benefit better. If the market was free, a large body of rules would be needed for regulation, which would be disliked by the operators as they would like to operate as freely as possible. This however would most probably interfere with the public interest in BS. These statements are clearly biased as the GVB is themselves a subsidized public transport company and the interviewee as employee convinced by MaaS and public transport systems which was pointed out by the interviewee himself.

The Fietsersbond does not agree with the positive attitude of GVB and DR, as they consider the impact of BS too small and the externalities being larger than the benefits. It was pointed out that parking is already scarce in Amsterdam so they don't agree with a commercial business such as DR taking away these spots from inhabitants. Only cargo BS appears positive in their view that deems to usefully complement people's mobility. Regarding regular BS however, the Fietsersbond does not see a market need considering the existing bike rental possibilities in forms of shops and Swapfiets, the municipal support to equip everyone with a functioning bike through e.g. cheap buy-outs of illegally parked bikes. Hence, within their agenda cycling infrastructure and safety are a lot more crucial topics than BS. However, if the situation gets worse or the BS scheme is to be significantly expanded and thus occupying more public space and parking again, they probably would actively intervene. The interviewee stated that they are in general a bit more conservative towards these technologies mentioning in this regard also the demography of the Fietsersbond and their main action period being the 1970s, 80s and 90s, when the cycling revolution took place in the Netherlands.

6.2.3 Collaboration

Berlin

Responsibility for BS is found at different public authorities: The Senate department has the most influencing role with most responsibility as it is the contract partner for nextbike, sets the legal framework and thus has an enabling role towards bike-sharing deciding on conditions that are crucial for the shape and success of the BSS. It executes this enabling role through guidelines for districts and inhabitants on how to handle

the shared bikes in case of nuisance for example or how to properly use them regarding parking in the public space. Another aspect where this enabling role shows is regulation of the market. On one hand, this refers to the set-up of a public supported BSS, thus the organization of Europe-wide tendering and in the end setting up a contract with the company nextbike to deliver the BS service according to the standards and requirements the city set. On the other hand, also to current discussions about pricing and licensing of public space, for which free-floating bike-sharing providers currently don't need to pay and are free to use it for their business operations, which is especially advantageous to free-floating providers, such as Donkey republic, as 4 shared bikes of one kind can stand together without requiring a permit. These actions however also imply that Berlin takes a promoting role thus actively wanting this form of mobility being in Berlin, which is in line with their attitude of believing in the value of BS. This formal basis of collaboration for BS only exists between the senate department and nextbike, however not with the other BS providers such as Donkey republic.
The guidelines and policies set by the senate department need to be implemented and followed by the districts which are the other part of public authorities in this system. They are involved in all decisions concerning direct street level, for example the search for suitable locations for nextbike-stations and consequently they are responsible for granting permission for these.
The senate department also has a coordinating role, executed mainly by one manager, which refers more direct to the operations and development of the system, whereas the enabling role to the conditions of it. Part of that role is the organization of the system, such as collaboration and the balancing of different interests through stakeholder involvement via discussion rounds before the installation of the system to agree on a common vision and to inform and regular update the other actors on the progress and situation. In this role, the senate department regularly discusses with nextbike as provider, offers feedback, is aware of collected data, distributes this information to other channels if necessary, e.g. cycling lobbies and promotes collaboration with other stakeholders such as transport companies. In this regard, the senate department also lays some responsibility on the transport company BVG by supporting them in executing the Jelbi project and also lets a free hand to nextbike that partners e.g. with research institutes to improve their system and to increase acceptance and usage (Interview with nextbike). However, the BVG does not hold a formal role in the collaboration of the senate department and nextbike.
In the section on attitudes, it was mentioned that Nextbike thinks their system is quite well accepted because of various partnerships that they enter. They are collaborating with the BVG in terms of Jelbi and the incorporation of nextbike into the VBB card (electronic PT card), universities, tourism associations, research centres to improve the system and its utilization and several campaigns on street level (DEINE FLOTTE 21, Lass dein Auto stehen!, Sommerflotte, temporary playing streets) that are often organized via the districts and initiated by citizens.
According to both interview partners at the municipality and nextbike, the collaboration is working out quite well. Nextbike mentions that they have a relationship build on trust, whereby the municipality concede nextbike a free hand for their other collaborations (as just pointed out) and also for experimentation with their system which is possible within the legal framework of their agreement. This concerns for example the set-up of flex streets instead of fixed stations where needed. However, nextbike also points out that the senate department currently holds back and actually could promote more actively the integration of sharing offers with PT and the expansion of the system beyond the inner city. Hence, with their collaboration they already follow similar goals for bike-sharing and share similar beliefs, but they could pull stronger together to expand and improve the system.

Amsterdam:
In Amsterdam, the municipality describes their role as being responsible to provide space to explore these possibilities and to ensure a good and balanced offer (Beleidsnota deelmobiliteit in Amsterdam). Similar to Berlin, the municipality is mainly organizing, whereas the districts are involved for concrete implementations on their areas. In general, the public authorities have an enabling role as they provide the framework for these BS operations in Amsterdam, but in this specific case of the experiments, they also act as partners to the BS companies to find out together the best way of establishing a BSS through collaborating on monitoring, experimenting and installing/financing the experiments (the BS stations e.g.). Prior to these experiments, there have been also consultations with different actors, such as the GVB, the Fietsersbond, the VRA, etc, which further do not play a role in collaboration currently, but as seen from goals and attitudes would like to take on more responsibility in the future and have formed own opinions and visions. According to GVB,

there could be more guidance from the municipality and in general public authorities to integrate the MaaS services and structure this development more for it to be an attractive alternative to car-usage. The contact person also admits that the actual implementation of such a well-integrated BSS is difficult, even though GVB is optimistic. The main issues lie in its firstly more expensive organization and complexity of collaboration for MaaS, the many involved parties and for the user in the more complex and multi-modal trip compared to mono-modal, comfortable trip by car. This needs to be changed as MaaS (including BS) needs to be an attractive and simple to use system for customers to accept it. The interviewee agrees that measures in other areas (e.g. gas taxes, parking prices) need to be implemented to raise the acceptance and usage of MaaS. To achieve this, there should be more clear guidance from the federal government to reconcile all MaaS projects and measures and integrate them to one functional and simple system. Currently, there are too many loose, unstructured projects that sometimes are too small, such as the current pilots and discontinue too fast without further promotion.
The GVB is not formally involved in the bike-sharing cooperation between the municipality and Donkey republic. They were similarly to the Fietsersbond invited to initial discussions, but were further not consulted e.g. with location planning. An essential element in the future cooperation between transport companies, such as the GVB and BS operators is the platform 9292, as it acts as a mediator bundling information from different providers and forwarding information to the transport operators and their systems. As such, the GVB also sees it in their responsibility to bring sharing providers at one table and aggregate their information, so that not every single transport company needs to set up agreements themselves with the sharing providers.

6.2.4 Comparative analysis Amsterdam and Berlin

This section summarizes the main findings from the stakeholder analysis and highlights interesting differences and similarities between Amsterdam and Berlin as well as among the actors of one city. Moreover, these are set in relation with the already explored literature for deeper interpretation.

Policy development in Amsterdam/ the Netherlands and Berlin/ Germany
In general, Amsterdam has developed a lot more agendas related to bike-sharing compared to Berlin. This might be the result of the repelling experiences made in 2017 and 2018 with free-floating shared bikes that flooded the public space of Amsterdam that is scarcer than Berlin's. The higher number of papers can be recognized on all levels of public authorities, with Amsterdam having developed several agendas and programs, the Ministry of Infrastructure and Water also published guidelines and information, and the VRA, the regional transport authority also published policies centring on bike-sharing and its role for public transport. It is interesting, that the VRA portraits mainly the potentials of bike-sharing and shows a positive attitude, whereas the municipality of Amsterdam itself is a lot more careful, stresses the importance of the currently conducted experiments and is reserved about the future of bike-sharing in the city. One could say, the VRA as more distant, also long-term thinking institution, has an optimistic attitude and sees the long-term benefit, whereas the municipality itself sees and focuses on the immediate struggles and the short-term struggle and rather small effects of the system, which is reasonable as they are closer to street-level than the VRA.
Even though Berlin has already established their bike-sharing system since years, and have it also variously integrated, run campaigns in neighbourhoods, there is very little (public) information, evidence and strategy papers for the system. One could argue that those are not needed anymore as the system is already long established, but on the other hand, there are still challenges and goals to reach such as increasing usage and expanding the system outside of the inner city ring. This is probably based on a difference in policy culture with less visions and strategies for the public being developed in Germany/Berlin than in the Netherlands.
Moreover, you could state that in the Netherlands different levels of government work closer together towards one goal than in Germany. This is based on the different guidelines/agendas developed at different levels and the fact that all public authorities are united in the tour de force to work out common policy and bring local actors to national level. Hence, in the Netherlands, the public authorities work closer together than in Germany, whereas Germany has stronger bonds with the other actors through common goals and attitudes which is not the case for the Dutch situation.
This factor of the quality and quantity of policy frameworks was as such not expected in the literature review to influence the BSS. However, it could be suggested that the strong basis of policy documents with

regulations, elaborated discussion on goals, reasons and value of BS in Amsterdam and the Netherlands lead to a more controlled, less daring BSS. Whereas in Berlin, where almost no policy documents give clear direction and requirements regarding BS, it was and is maybe easier to implement a larger system with the attitude of letting it develop and grow to be accepted over the years and to integrate itself into the mobility system.

Aligned attitudes in Berlin, controversial attitudes in Amsterdam

In Berlin, the actors share similar goals and attitudes. Nextbike and the senate department as main actors in the BS organization were able to define common goals and ground with their contract. The reasons for this agreement is on one hand, the concession of public subsidies which makes it easier for nextbike to agree to and realize the senate department's goals and on the other hand the belief across different actors that BS is a form of PT and as such worth to support and expand for more sustainable mobility. This thought is carried across the population also by the ADFC, that offers a free cargo BS service and spreads the idea and good image of BS with its attractive offer. Similar counts for the BVG, the public transport companies as well as the various campaigns running at street level.

Amsterdam shows a different picture. DR as BS provider obviously represents the opinion of BS being a positive contribution to Amsterdam's mobility which is partly recognized by different government levels, especially in long-term documents and on the macro-scale as already explained in the previous paragraph. However, on the local and short-term level, which is the city of Amsterdam itself, negative experiences are felt directly, such as the flood of Asian BS providers. Consequently, BS is doubted and the public hand chooses a rather careful approach, where it does not yet want to decide whether to further promote or inhibit BS. Discussions also exist within the GVB, but which is in the majority positively set towards BS. The Fietsersbond with their strictly opposing attitude adds to this torn field of opinions. The main reason why Amsterdam sees BS in general more negative is their smaller spatial expansion compared to Berlin, where the available mobility, including PT and the high cycling rate and bike ownership guarantee wide accessibility across the city.

These differences in political contexts with on one hand relatively stable basis in Berlin and quite the opposite in Amsterdam lead to nextbike's public BSS in Berlin that is already the second publicly supported system after Call-a-bike by DB and is continuously expanded and more accepted by Berlin's inhabitants, whereas in Amsterdam, one cannot speak yet of an established, reliable system considering the shortness and small area covered of the experiments. These differences also mean that it is difficult to transfer elements and strategies from Berlin e.g. to Amsterdam, as they resulted from this strong supporting political background towards BS that is not given in Amsterdam. This is what is described by Wolman (2009) in the literature review with the warning that trying to transfer in such as situation would lead to policy failure.

Goals in Berlin and Amsterdam

The goals can be divided in certain categories, which are goals of BS itself, that are also shared by cycling or other forms of shared mobility, subgoals to reach them, and goals of the systems deployed.

In Berlin, goals of the system are to provide mobility for all, that is achieved through wide financial and spatial accessibility and to thus make the mobility offer richer, whereas in Amsterdam, the goal of the system, namely the experiments is to find out if and what the additional value of bike-sharing would be to mobility. Regarding specific goals of bike-sharing itself, the goals coincide for both cities for more multi-modality, in the end replacing car trips and to make the cities less car-dependent, whereby Amsterdam focuses as subgoals on the replacement of the second bike at stations, the last-mile solution, and Berlin focuses on the reduction of bikes in public transport and also including the first-mile solution. The subgoals to these overarching goals are intermediate goals or strategies, such as integration with PT, interoperability across different (bike)sharing providers and especially for Amsterdam an extensive evaluation of data regarding BS and for Berlin high accessibility.

Comparing the answers of the interviewees of the municipality Amsterdam and the senate department in Berlin with the drivers for a successful BSS as in chapter 4.3.1., there is agreement. Especially Berlin made it clear that they prioritize the density of the system over its expansion which is agreed on by Castro (2011) as the distance between the stations and thus the density of the BS network are significant drivers for a successful BSS. Both cities also confirmed that their goals of integration with PT are realized by implementing BS stations close to PT stations which Castro (2011) also defines as strong driver.

Berlin does first, Amsterdam evaluates first

The approaches of the two cities however differ a lot, with Amsterdam first wanting to evaluate the benefits and then implement and Berlin doing the opposite, implementing the system and acknowledging that benefits will show and amplify over time only, so rather little evaluation is needed. Moreover, in Berlin the basic focus is on offering several mobility options, whereby it is firstly less important if this has positive impacts on sustainable mobility. As mobility service, BS is counted clearly as PT service that deserves subsidies.
In general, one could say Berlin has more of a "Doing" – approach, whereas Amsterdam follows a very careful approach with the experiments. Monitoring, evaluating and researching potentials have a higher value in their approach than in Berlin. Therefore, Amsterdam focuses also a lot more on the collection, exchange and utilization of data and furthermore puts, as well as other levels of government a focus on interoperability. This can be explained by the more progressed and liberal view on digitization, smart mobility and data transparency. Connected to the careful approach is also that Amsterdam clearly describes goals, reasons and how cycling and then BS contribute to societal challenges that are only indirectly related to mobility and strengthen thereby the justification and basis of their approach. Amsterdam is also more explicit about the end goal of bike-sharing, namely reduced car ownership. This is not mentioned similarly in Germany, maybe because of the still stronger connection to cars and above-mentioned focus on firstly providing several mobility options.

Only small influence of the PT
In the end, it turned out that the public transport companies have less influence and are less involved than expected in the organization of the BSSs, which might change in the future, when integration between BS and PT progresses. This is the same case for Amsterdam and Berlin.

The influence and attitude of cycling clubs
The cycling clubs ADFC and Fietsersbond are also very different. They partly mirror the general attitude of inhabitants, as the Fietsersbond is unsure, even repelling towards BS, and the ADFC open-minded and even operating their own cargo BSS. They also reflected the cultural conditions, with the ADFC being very present and prospering in Berlin in the light of the mobility change from individual transport to sustainable solutions and the Fietsersbond being not that active anymore considering cycling revolution has happened already decades ago in Amsterdam.

6.3 Expert meeting

The expert meetings are used to validate, evaluate the answers and attitudes revealed through the policy document and interview analysis by mobility experts from Goudappel and AEM Institute and to furthermore assess whether and how Goudappel could support cities, at the example of Amsterdam and Berlin to learn from each other to improve their BSS.

The respondents at Goudappel were quite sceptical towards the set-up of the experiments in Amsterdam as they also questioned if impact shows on such small scale. They also questioned the sense of framing the pilots in Amsterdam as experiment. Such innovations should be implemented with more room to thrive and develop, even though potentially limited in time and with back-up plan.
Another point in the discussion was the connection of BS with PT. The experts proposed to not focus that much on an integration with PT and the synergies that without doubt can emerge, but see it as a more wholesome system also apart from PT. Hence, there could be more potential of BS to replace car trips ¡ 5km if it was seen as independent city-wide mobility option as part of mobility hubs for example, that can be used on its own. This approaches a bit Berlin's attitude of providing another mobility service to chose from. The attitude of Berlin, that only a publicly supported BSS could provide such a fair and well-accessible mobility option was however not shared. It was rather suggested that it would be more clever to subsidize the infrastructure, thus for example mobility hubs, that would offer different providers opportunities to develop their business, be profitable and still have a free hand and on the other hand would let the municipalities still control the public space.
Business opportunities were especially seen in the outskirts and regions around the city where there is actually a last-mile problem or in the future as last-mile solution not for the PT, but for the car, when people would

park their vehicle at a Park & Ride at the outskirts of the city and then use another transport mean, e.g. a shared bike to reach their destination in the city. Furthermore, attention for the general benefits of sharing instead of owning for a private person should be raised to realize e.g. what was proposed above with framing bike-sharing as mean to get rid of car-trips under 5km within the city.
As for the current situation, the experts do understand the critical voices and the insecurity about BS in the city of Amsterdam and contextualized the issue at hand especially with regard to the idea to solve the last mile. Amsterdam is so dense that the bus station you would arrive to, usually is in walkable distance to your destination. This is a large difference to Berlin, where this might not be the case. However in Amsterdam, you then would not need a BS station at that bus stop. If you like to avoid the travel by bus, one could rent an OV-fiets at the train station, which would then act as concurrence to the bus. The experts' opinion is that the market is dominated by the OV-fiets and its popularity so that it is difficult for DR to enter the market and be attractive and visible at these locations. These arguments do in no way relate with the findings of Castro (2011), as he does not mention any of the aforementioned points as barriers to BS. Moreover, what he found as drivers, e.g. a high bicycle modal share, which is given in Amsterdam, was seen by the interviewees and the experts as drawback for BS as everyone has their own bike and cycling is not really needed to be encouraged through the visibility of even more cyclists.
They also affirmed that the Fietsersbond in the Netherlands is quite conservative and their reluctant attitude towards BS was to be expected.
It was also discussed and pointed out that transferable solutions should always be adapted to the conditions at the destination, instead of trying to adapt the conditions for the solution to fit. This is a fundamental rule, according to which the experts drew a line from the subsidized BSS nextbike to the subsidized infrastructure (instead of BSS) in Amsterdam. This corresponds to the learnings from Dolowitz and Marsh (2000) on policy failure. Moreover, it shows that consultancies could act as that independent policy translator as described by Wolman (2009) that accumulate experiences from different projects, cities and contexts and that could help municipalities to assess their situation and possibilities regarding BS. However, it was also agreed on by Goudappel and AEM Institute that the initiative for this must come from the municipalities. It is not the responsibility of private businesses to actively offer services for networking and transferring knowledge between cities. Though, they could offer their advise for setting up an appropriate network between municipalities or to act as knowledge source in existing networks for example through educational activities such as workshops and other educational activities to disseminate the accumulated experiences from different cities and projects.

7 Discussion

From the preliminary investigation, it appeared that especially the transport companies would have a larger role in the organization of bike-sharing. This however turned out to be not true which led in the end to only two main actors namely the municipality and the BS provider.
For further research it would also be interesting to compare approaches from cities with a more similar background e.g. regarding cycling culture or regarding the BSSs. Examples for that would be Antwerp that resemble Berlin more in terms of BSSs and Copenhagen that resembles Amsterdam more in terms of cycling culture.
Moreover, it would be interesting to see how these different approaches and experiences could be exchanged, if there is interest for this and how such knowledge could find its way to the executing institutions namely municipalities and BS providers.

8 Conclusion

In summary, factors of a successful BSS according to the literature review that were confirmed through the research are especially the density and size of a system. The organization and stakeholder involvement in the projects are determining how the system is developed and used. The organization is influenced by the attitudes the actors have. Both Amsterdam and Berlin for example rely on similar collaboration schemes, mainly involving only the municipality/senate department and the BS provider. However, how they collaborate and develop the system depends on their goals, attitudes and to what extent they are aligned.

In the end, since Berlin's actors mainly agree in attitudes and goals, the system is quite extensive and a stable part of mobility already for years. Nextbike operates a hybrid system that is mainly station-based but also allows spatially regulated free-floating BS. The system is uniformly distributed across the inner city of Berlin which is made possible through the subsidies and offers financially attractive subscriptions so that nextbike and the senate department sssume that their system is socially fairer and in general more attractive and useful for the public than an only commercially driven system. Through the positive attitude of several actors, although not directly involved in the collaboration between the senate department and nextbike, the acceptance and usage numbers of nextbike are rising and there is a mainly positive climate in the city towards the BSS and its further expansion. In Amsterdam, goals and attitudes among actors are not aligned so that only careful approaches are taken e.g. in the form of the relatively small-scale experiments whereby the municipality does not financially support the providers. The negative experiences the city made in 2017 with free-floating providers and a high cycling rate as well as dense city leads to opposing voices in the society, such as the Fietsersbond that question the benefits of BS. With an unsteady political background, it was probably not possible to implement larger or more long-term projects. The current experiments run for two years in some parts of the city, whereby the operation is fragmented as each provider is only allowed to operate their shared bikes in their assigned city district. The municipality's main goal with this organization of BS is to find out how and if BS can be successful in Amsterdam.
The attitudes of Berlin and Amsterdam regarding their approaches are opposite, wherein also the biggest chance for learning lies. Berlin could invest more in the evaluation of their BSSs, like Amsterdam does, considering also its longer existence in the city, to find out where the value lies and how the system could be specifically improved, e.g. regarding their usage rates, that stagnate at 2 rides/bike/day. On the other hand, Amsterdam could get more reliable data from their evaluations if they took the risk to expand and integrate their system more, and also giving this innovation time to be accepted. To improve their systems, it would be useful if cities could exchange their experiences via a platform for example. Such structures do exist, but BS is most likely still to small as development to occupy space in these platforms. If in the future, municipalities would like to invest in this, Goudappel and AEM could be sources of information about contact persons, different cities' experiences and integration with other mobility services.

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