11. Assessing policies to scale up carsharing[1]

Karla Münzel, Marlous Arentshorst, Wouter Boon and Koen Frenken

1.   INTRODUCTION

Our current transportation system is heavily based on the use of private cars. This leads to a range of problems including the emission of greenhouse gases, air and noise pollutants, the depletion of resources, congestion, and inefficient land use (European Environment Agency (EEA), 2018; Eurostat, 2016). It is commonly recognized that the unsustainability of the transport system cannot be solved by technological innovations alone. Instead, we also need to change the way we use the different mobility options available (OECD and ITF, 2017).

Carsharing, a service where consumers share access to cars, is a mobility innovation that is based on the use of underutilized assets and on access instead of ownership. Carsharing can be an efficient way for consumers to access a car when needing one without the costs and the hassle of owning one. Carsharing is found to have a positive influence on multiple urban problems, such as reducing the number of cars and parking spots needed, the number of kilometers driven by users, emissions, and congestion, as well as increasing access for underserved groups (Chen and Kockelman, 2016; Giesel and Nobis, 2016; Nijland and van Meerkerk, 2017; Schreier et al., 2018). Carsharing can thus have a positive societal impact through acting as a means in achieving multiple societal goals, such as reducing emissions, improving livability in cities, and increasing equitable access to mobility. Because of this potential contribution to societal goals, policy makers are interested in scaling up carsharing and learning about supportive policy measures. Carsharing is an example of a socio-institutional innovation involving new business models, new user practices, and new government policies, as part of a transition towards a more sustainable transport system (Pel, Chapter 2 in this volume).

While carsharing schemes date back at least to the 1980s in Western Europe, they only play a minor role in present mobility systems. Most people favor ownership of (one or more) cars to cover their individual transport needs,

which means that the car regime is still dominated by private ownership. The notion of regime, in short, refers to "established practices and associated rules" that apply in a particular socio-technical system (Geels, 2011; Pel, Chapter 2 in this volume). In the case of the mobility system, the current regime is characterized by private car ownership, the practice of car commuting, the car as a status symbol, and the supporting infrastructure of roads, parking lots, and facilities accessible by car (Meelen et al., 2019). In this respect, carsharing is still a niche product serving the needs of particular users, mostly inhabitants of large cities with higher education and higher incomes and who are often environmentally motivated (Burkhardt and Millard-Ball, 2006; Dill et al., 2016; Namazu and Dowlatabadi, 2018). The niche is only to a limited extent "protected" by municipalities through support measures, primarily by providing cheap or free parking spaces for shared cars.

While carsharing has been extensively studied empirically (for a review, see Münzel et al., 2019), scant attention has been paid to the question of which policies governments could adopt to further promote carsharing. Exceptions are the studies of Shaheen et al. (2004) and Enoch and Taylor (2006), who presented early reviews of support measures for carsharing, while Akyelken et al. (2018) recently showed empirical evidence of the need for policy measures. Other articles reported on policies supporting carsharing only as a sidenote (e.g. Millard-Ball et al., 2006; Prettenthaler and Steininger, 1999; Shaheen et al., 2006). Because of the potential benefits carsharing can offer, policy makers, businesses, and environmental organizations alike aim to upscale carsharing, which supports the transition to a more sustainable system based on access to, instead of ownership of, mobility. Public policy can – among others – contribute to such transition and act as a success factor in scaling up carsharing. It has remained unclear, however, which policy measures can upscale carsharing adoption and which policy measures are unsupportive or even act as failure factors for the scaling up of carsharing. Here, we provide a review of measures recommended and validate their effectiveness and feasibility with multiple stakeholders for the case of the Netherlands. We further identify which measures are perceived as not achievable or controversial, what barriers limit the implementation of measures, and which roles need to be taken up by different stakeholders.
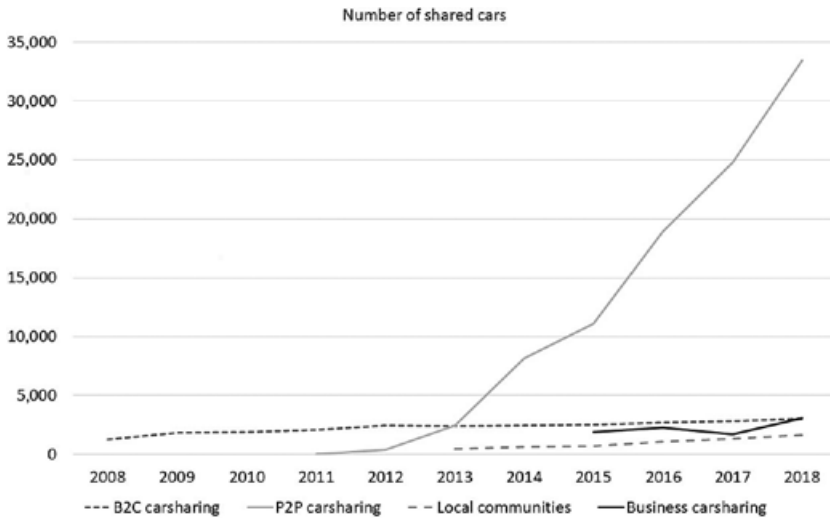
2. CONTEXT – CARSHARING IN THE NETHERLANDS

An interesting, innovative, albeit not successful project in Amsterdam can be considered the forefather of modern carsharing. In 1972 the Witkar ("white car") project was launched, featuring small electric cars that could be taken instantaneously from charging stations in the city center on one-way trips.

The idea of small shared cars as a sustainable alternative to the private car was born, although this particular project was ahead of its time and failed a few years later, partly because it lacked municipal support (KiM Netherlands Institute for Transport Policy Analysis, 2015; Nijland and van Meerkerk, 2017). The first successful carsharing organizations started in the late 1980s in Switzerland and Germany and offered cars in a business-to-consumer (B2C) roundtrip business model, where the organizations each owned a fleet of cars that could be booked per hour or per day and taken from specific parking spots or stations and had to be returned to the same stations (Münzel et al., 2018; Truffer, 2003). This type of organization also arrived in the Netherlands at the beginning of the 1990s, and carsharing programs were stimulated by the Ministry for Transport as it considered that carsharing could help achieve the goals of reducing car use and vehicle emissions (Ministerie van Verkeer en Waterstaat, 1988). In 1995 the government together with a number of mobility providers also supported the establishment of the "Stichting voor Gedeeld Autogebruik" (Foundation for Shared Car Use) to develop concepts for access-ing a car without owning one (Enoch and Taylor, 2006). B2C roundtrip car-sharing grew slowly but continuously, provided by a handful of organizations that operated nationally or only locally. In 2010 another type of carsharing was introduced in the Netherlands where the cars available to be rented belong to private car owners and the organization offers only the platform and insurance. This peer-to-peer (P2P) business model was able to achieve quick growth since private car owners have basically zero marginal costs in putting up their car on the platform (Meelen et al., 2019). A third type of carsharing that has been offered since 2015 in Amsterdam only is B2C free-floating carsharing, where cars can be found, picked up, and left anywhere in the operating area without having to return it to the same station.

Taken together these three forms (B2C roundtrip, P2P, B2C free-floating) amounted to around 41,000 shared cars and around 400,000 users of carshar-ing services in the Netherlands in spring 2018. The more recent data on 2020 suggest that this number has further increased to 65,000, mainly due to the increase in P2P sharing (CROW, 2021). Growth in carsharing supply is mainly taking place in the largest cities and can be observed to be most strong for the P2P carsharing type. Figure 11.1 shows the growth of carsharing supply in the Netherlands up until 2018, for which public data are available. These numbers should be regarded in relation to the 8.4 million cars currently on Dutch roads and 11.2 million driver's license holders (CBS, 2019a, 2019b). Carsharing in the Netherlands is thus still a niche market and users can be seen as belonging to the early adopter category (Rogers, 2003), and comparable to other West European countries (Münzel et al., 2019).

In 2015 a Green Deal between governmental authorities, companies, and environmental organizations was set up with the aim to stimulate the scaling

Number of shared cars

Source: CROW (2018).

Figure 11.1   The growth in the supply of shared cars in the Netherlands

up of carsharing and reach 100,000 carsharing cars by 2018 (Rijksoverheid, 2015), and it was renewed in 2018 with the ambition to reach 700,000 carsharing users by 2021 (Rijksoverheid, 2018). The Deal has the goal to encourage companies, governments, and citizens to meet their mobility needs in a way that makes maximum use of the opportunities that carsharing concepts offer and to reduce the number of parking spaces, making more space available for greenery, recreation, and clean mobility modalities. Two publications recommending policy measures followed from working groups of Green Deal participants during the first Green Deal phase. They were both called "Rode Loper" (red carpet) and intend to give recommendations to local (Autodelen.info, 2018, De Rode Loper voor autodelen) and national authorities (Autodelen.info, 2019; De Rode Loper voor de Rijksoverheid) on how to produce regulations and policy conditions that stimulate the scaling up of carsharing. They cover the topics of removing barriers that are preventing carsharing organizations from scaling up their services, like improving processes; promotion and communication campaigns towards consumers and companies; decreasing the attractiveness of private car ownership; and parking policies. They also give suggestions for monitoring and research on the developments of the market. At present mostly the largest cities of the country have dedicated policies to support carsharing and make it an important part of the mobility system. Two examples with dedicated policy plans for the support of carsharing are the cities of Utrecht and Amsterdam, which

also have the largest supply of shared cars per capita (Münzel et al., 2019). Both cities made plans to formulate a vision on carsharing seen in the wider domain of urban planning and climate action, incorporating the integration of carsharing in new developments, the stimulation of innovative initiatives, and measures to improve communication with carsharing organizations and inhabitants (Gemeente Amsterdam, 2019; Gemeente Utrecht, 2015). These two publications developed by Green Deal participants as well as the plans published by the cities signify new initiatives to implement policy measures that support the scaling up of carsharing. These recent activities by a specific group of actors (Green Deal participants) raise questions on how a larger circle of stakeholders evaluates them and how the measures can be shaped and implemented on a larger scale in practice.

3.   METHOD

To gain insight into and understanding of measures to make carsharing an important part of the mobility system – their perceived impact, feasibility, and related barriers – we identified measures from the literature and policy reports and presented a shortlist of these measures for reflection by various relevant stakeholders during a workshop. Together with the workshop participants, we aimed to identify those measures perceived to be the most impacting and feasible and those perceived as not achievable or controversial, including barriers that limit implementation, and the envisioned roles of different stakeholders to realize the measures.

We started with a *review of the literature* to identify measures for introducing and scaling up carsharing by governmental and market actors. We consulted scientific articles, international and national policy reports that described policy measures for scaling up carsharing, and articles and reports that described barriers to the scaling up of carsharing, including the proposed solutions to overcome these barriers. We searched using Google and Google Scholar with the keywords "carsharing AND policy/policies" and "carsharing AND support", as well as searching on websites of carsharing associations (in the Netherlands, Germany, United Kingdom, Belgium), for documents on policies and support measures. Furthermore, through snowballing, we followed relevant publications in the reference lists. In total ten articles and eight reports were identified that described measures. The measures were subsequently categorized based on the sector it was envisioned would implement, or was already implementing, the measures (government or automotive sector). Based on the categories identified, a shortlist of four categories with 42 measures to introduce and scale up carsharing was made, which was subsequently validated by both us and an independent carsharing policy expert. As a result of

Table 11.1   Expertise and working field of consulted experts

Position	Actor group
Workshop	
Senior advisor	Government (national level, infrastructure)
Department head	Government (national level, infrastructure)
Policy advisor	Government (national level, economy/climate)
Senior researcher	Government (national level, planning agency)
Policy officer	Government (provincial level)
Policymaking intern	Government (provincial level)
Director	Automotive sector (carsharing)
Director	Automotive sector (carsharing)
Communication manager	Automotive sector (carsharing)
Product manager	Automotive sector (rental, carsharing)
Communication and corporate social responsibility manager	Automotive sector (leasing)
Product marketing manager	Automotive sector (leasing)
Section manager	Automotive sector (industry association)
Program leader	Environmental organization
Advisor/architect	Consultancy (planning, citizen involvement)
Interviews	
Senior policy officer	Government (Dutch municipality network)
Project manager and policy advisor	Government (local level)
Transportation planner	Government (local level)
Senior advisor public affairs	Consumers (touring club)
Consultant	Consumer network (private carsharing)

the input obtained, eventually, 21 measures in four categories were included on the shortlist. The reviewed and validated measures are presented in Section 4.

To gain an understanding of the perceived impact and feasibility of the identified measures in the context of the Netherlands, we presented the short-list for reflection by various relevant stakeholders during a workshop. Experts from governmental institutions (local, regional, and national level) and the automotive sector (including carsharing, dealer association, rental, and leasing organizations) as well as knowledge experts (from universities and consultancies, environmental organizations) were invited to discuss measures to upscale carsharing. In total 15 experts participated in the workshop (Table 11.1).

Workshop participants were divided into four groups of three to four participants based on their working field in order to ensure a variety of actor groups.

The workshop consisted of three stages. It started with an introduction of the project, after which, as a first stage, the participants engaged in a discussion, led by a facilitator, about which measures were perceived as needed to make carsharing part of the Dutch mobility system. The shortlist of 21 measures, divided into the four categories, was presented to the participants. As part of the discussion, participants were asked to place the identified measures in a timeline that contained a "main road" to visualize those measures perceived as necessary, and a "side road" to visualize those measures perceived as less important or slowly contributing to the aim of scaling up carsharing. With this, insight was obtained on the order, the envisioned effect, and the potential coherence of different measures. Participants were also asked to identify and discuss measures that were missing and to remove those measures that were considered unrealistic, not desirable, or not contributing to the aim of scaling up carsharing. As a conclusion to the first stage, all the groups presented their outcomes. In stage two, participants were asked to prioritize three measures taken from the previous exercise that they perceived as most important, and these were explored in depth with a focus on barriers related to the measures, solutions to overcome these, and the identification of actor(s) perceived as initiators and executors of the measure. As a third step of the workshop, the four groups presented their outcomes to each other and participants were invited to contribute to the outcomes of other groups by going into dialogue with each other. Potential options for future collaboration were explored and questions raised about the barriers or tasks of each other's organizations.

To ensure that all key measures were identified and addressed, five organizations who were unable to join the workshop, but whose input was considered relevant and necessary, reflected upon the results of the workshop in separate feedback interviews (see Table 11.1). A summary of the workshop discussion was presented together with the shortlist of discussed measures. The interviewees were asked to reflect on the measures identified as desirable, undesirable, and controversial and were asked to state their perspectives on these, as well as add measures they thought to be important. In addition, barriers for taking on new roles and implementing measures as an organization were discussed in depth.

Data Analysis

Notes were made during and after the workshop by the facilitators for further analysis and a summary of the outcomes of the workshop was sent to the participants for checking. The workshop notes, as well as the additional insights gained from the feedback interviews, were included in the analysis dataset. Using thematic and open coding, we identified, coded, described, and categorized topics in the data obtained. This resulted in the identification of different

aggregation levels of the scaling-up challenge of carsharing, which, in turn, formed the basis for further interpretation and definition of the articulated barriers and solutions to translate these barriers into opportunities for policy makers, innovators, and others to support and facilitate the scaling up of carsharing to become part of the mobility system.

4.   POLICY MEASURES

Carsharing can contribute to reaching multiple societal goals, like decreasing emissions, increasing livability, and increasing equity, and the scaling up of carsharing is therefore seen as a valuable goal by policy makers. Various success and failure factors for the scaling up of carsharing and its contribution to reaching societal goals have been identified in earlier studies. There is a need to identify the most promising measures that enable the scaling up of carsharing and relate the measures to reaching societal goals.

Previous literature on carsharing has reviewed measures to support carsharing directly or indirectly. The first type of policy supports the niche of carsharing while the latter type of policy weakens the dominant regime of private car ownership.

We first treat *niche-supporting measures*. The measures help the niche practice of carsharing develop and expand through protecting it, directly helping it expand, or taking away barriers. Most measures discussed are (to be) taken by local authorities, while some are (to be) applied at a higher level or by other stakeholders. The literature showcases examples of measures being taken since the 1990s in North America and Europe.

Parking: The review of the literature identifies that niche support through measures on the topic of parking are most prominent. Measures on this topic include the provision of parking spots for free or for reasonable prices, in attractive locations (close to transit hubs, preferably on-street for increased accessibility and visibility and in front of public land instead of private property for increased acceptance), and without long bureaucratic processes (Akyelken et al., 2018; Enoch and Taylor, 2006; Kent and Dowling, 2016; KiM Netherlands Institute for Transport Policy Analysis, 2015; Le Vine, 2012; Loose, 2009c; Millard-Ball et al., 2006; Prettenthaler and Steininger, 1999; Shaheen et al., 2006, 2004; Stars project, 2019; Steininger et al., 1996; Vanhee, 2010), as well as measures stimulating developers to include carsharing in the plans for new buildings or areas (Akyelken et al., 2018; Enoch and Taylor, 2006; Loose, 2009c; Millard-Ball et al., 2006; Shaheen et al., 2006; Stars project, 2019; Vanhee, 2010).

Start-up support: Another measure supporting the carsharing niche is direct help in the start-up phase of a carsharing organization through, for example, start-up grants that help overcome the high initial costs of setting up a car-

sharing service or organizational help for initiatives (Enoch and Taylor, 2006; Shaheen et al., 2006, 2004). A more indirect but powerful support measure municipalities can take in the emergence phase is using the carsharing service themselves for municipal employees, which provides the carsharing organization with a base demand and a number of bookings (Enoch and Taylor, 2006; Loose, 2009c; Millard-Ball et al., 2006; Shaheen et al., 2006; Stars project, 2019).

Information and promotion: Using carsharing as a municipality is also a measure to promote carsharing to the inhabitants of a city. This and other measures on communication, promotion, and information are also reported in the literature. Providing information to both inhabitants and businesses about carsharing and making carsharing visible, as well as joint marketing efforts of, for example, a municipality or public transit operators and carsharing organizations, are considered important measures in supporting the carsharing niche (Akyelken et al., 2018; Enoch and Taylor, 2006; KiM Netherlands Institute for Transport Policy Analysis, 2015; Loose, 2009b; Prettenthaler and Steininger, 1999; Shaheen et al., 2004; Vanhee, 2010). Some studies report the importance of setting up organizations for information dissemination on the local or the national level, that can support awareness campaigns (Enoch and Taylor, 2006; Loose, 2009b). Political support that puts carsharing on the political agenda is likewise identified as a support measure (Akyelken et al., 2018; Enoch and Taylor, 2006; KiM Netherlands Institute for Transport Policy Analysis, 2015; Loose, 2009b; Vanhee, 2010).

User incentives: Measures supporting the niche can also be aimed at the consumers and can be financial in nature, especially targeting specific groups, or give special rights to users of carsharing vehicles like special lane access or access to restricted zones in a city (Enoch and Taylor, 2006; Loose, 2009c; Shaheen et al., 2006, 2004).

Integration with public transit: Previous studies have put forward measures to integrate carsharing into public transport provision (Akyelken et al., 2018; Enoch and Taylor, 2006; KiM Netherlands Institute for Transport Policy Analysis, 2015; Loose, 2009a, 2009c; Röhr and Rovigo, 2017; Shaheen et al., 2010, 2006). Measures on this topic include providing parking spots at public transport locations and offering combined access passes. Some more recent studies indicate the importance of including carsharing in an integrated Mobility-as-a-Service (MaaS) offer (Akyelken et al., 2018; Stars project, 2019).

Legal measures: Legal measures can be taken to support and protect the carsharing niche. A call for recognizing carsharing as a unique mode of transport in legal frameworks has been reported (Autodelen.info, 2019; Stars project, 2019). Some studies also mention measures of exempting carsharing

from specific taxes (Akyelken et al., 2018; Enoch and Taylor, 2006; Shaheen et al., 2006, 2004).

Planning: Studies report the importance of integrating carsharing into the planning of authorities. This applies to transport strategies but also the wider domain of urban planning as well as planning for reaching climate targets or increasing social cohesion. When changes relating to parking, parking standards, and carsharing are part of a larger mobility plan, lower numbers of parking spots are more acceptable to residents (Enoch and Taylor, 2006; Kent and Dowling, 2016; Millard-Ball et al., 2006; Stars project, 2019; Vanhee, 2010).

Although most studies focus on the measures taken to support the carsharing niche that are described above, some also report on measures that bring *changes to the car regime*.

Vision: Integrating carsharing into the planning and into the development visions of authorities on the transportation system and the built environment can also be seen as a measure to change the car-focused transportation regime.

Parking: Two measures often mentioned are making changes to parking norms and thus decreasing the number of required parking spots in new building projects or reducing the number of issued parking permits for residents (Akyelken et al., 2018; Enoch and Taylor, 2006; KiM Netherlands Institute for Transport Policy Analysis, 2015; Loose, 2009c; Millard-Ball et al., 2006; Shaheen et al., 2006; Stars project, 2019; Vanhee, 2010). Taking away parking spaces that are already built seems to be a much harder and contested measure to be taken by municipalities, although increased parking pressure can have a positive effect on carsharing (Akyelken et al., 2018). But acceptance can be increased if alternatives are available, such as offering carsharing and removing parking spots only where alternatives such as public transport are available (Enoch and Taylor, 2006). Furthermore, good communication to residents about changes is important (Autodelen.info, 2018; Vanhee, 2010), as well as giving back to the community through placing something at the location of the former parking spot that increases livability (e.g. greenery, play area) (Autodelen.info, 2018). Acceptance is also increased if requests for carsharing parking and removal of parking spots come from community groups (Autodelen.info, 2018). This process can be stimulated.

Taxation: Another measure with the power to change the regime concerns taxation. Studies report the possible impact that higher taxes on car ownership (variable and fixed costs) and removing tax incentives for company cars and their use can have (Akyelken et al., 2018; KiM Netherlands Institute for Transport Policy Analysis, 2015; Prettenthaler and Steininger, 1999; Shaheen et al., 2006; Stars project, 2019).

Table 11.2 gives an overview of the measures reported in the literature. We also added a column indicating whether local or national authorities are to initiate the policy measure.

These measures collected from the literature review were used to compile a shortlist of measures that were then presented in the workshop. The measures were categorized into three levels (local, national, all levels of government) following the categories of the reviewed measures in Table 11.2. Next to policy measures, measures taken by industry players can also influence the scaling up of carsharing and are included in discussions within the Green Deal network. We therefore decided to include measures to be taken by industry players on the shortlist discussed during the workshop. Five industry-led measures were developed and included in the shortlist, based on the results of an expert interview with a coordinating member of the Green Deal network and on our own expertise of the carsharing field. Next to conducting several academic studies on carsharing, we have followed and actively participated in a wide range of stakeholder and policy events over the last four years. These events focus on an increase of cooperation and collaboration of mobility providers to aggregate services and thus increase user convenience, as well as on sharing data needed by authorities and researchers to improve planning. Table 11.3 gives an overview of the measures presented in the workshop.

5.   RESULTS

The main finding holds that only a few out of the 21 measures are unequivocally perceived as both effective and feasible. Many possible measures are not paid much attention or are judged to be of little importance or as having limited impact. Some other measures are contested by the participants, who assess feasibility and desirability differently. The following section describes the insights gained from the workshop combined with the results from the additional interviews on the evaluation of the 21 measures presented. Furthermore, the roles of different stakeholders in implementing measures that support the scaling up of carsharing are discussed.

Positively Evaluated Measures

Three types of measures are identified as most important to support the scaling up of carsharing: 1) the implementation of encouraging and supporting measures by municipalities, 2) the development and implementation of visions on sustainable mobility systems and urban planning that include carsharing as an integral part, and 3) a national support or coordination hub.

First, the stakeholders agree that municipalities need to start taking action and implement measures that encourage carsharing by users and support pro-

Table 11.2   *Measures supporting carsharing as reported in the literature*

	General measure area	Specific applied measures	Who?
Niche support	Parking policies	Providing parking spots for free/reasonable prices	L
		Making processes for requesting spots easy and fast	L
		Stimulating developers to include carsharing parking spots	L
	Start-up help for carsharing providers/ citizen initiatives	Start-up grant provision	A
		Organizational help and facility provision	L
		Providing base demand through using it as a municipality	L
	Providing information about carsharing and raising awareness	Providing information to citizens and businesses	L
		Making carsharing (spots) visible through signs etc.	L
		Joint marketing with providers	L
		Setting up an organization for information dissemination that leads awareness campaigns	N
	Political support	Putting carsharing on political agenda	A
	Incentives for consumers	Financial incentives (e.g. vouchers for specific citizen groups)	L
		Special rights for carsharing users (access to special lanes or to restricted areas)	L
	Integration with public transport	Providing parking spots at public transport locations	L
		Offering combined access passes	A
		Joint marketing campaigns	A
		Including carsharing planning in MaaS plans	A
	Legal measures	Recognizing carsharing as a separate mode in legal frameworks	N
		Exemption from specific taxes	N
	Integration into planning	Integration of carsharing into transportation and urban planning	A
Regime change	Integration into visions	Integration of carsharing into future visions/agendas on the transportation system and urban development	A
	Parking policies	Changing parking norms	L
		Reducing the number of parking spots	L
	Taxation	Increasing taxes on car ownership	N
		Decreasing tax incentives for company cars in use by individual employees	N

Note: L = local authorities; N = national authorities; A = authorities at all levels.

Table 11.3   *Shortlist of measures presented in the workshop*

Implementation level	Measures
Government (general)	• Drawing up a vision for the mobility system and area development that includes carsharing • Defining shared mobility as a fully-fledged category in traffic law • Invest in modalities that will be used more (public transport and bicycle) as a result of carsharing • Allowing or initiating experiments in the field of car use • Open data rules: when issuing carsharing concessions, companies are obliged to share data and work together • Subsidies for the car industry to invest in carsharing

Government (national level)	• Tax measure: making the "company car" less attractive
	• Tax measure: higher tax on car ownership
	• Set up a national/provincial coordination center for carsharing
	
	  – National campaigns
	  – Support for provinces and municipalities
	  – Standardization process for interoperability
	  – Harmonization of policies
	
	• Financing of research on carsharing
	• Subsidies for pilots or promotion campaigns

Government (local level)	• Adjust parking policy in favor of shared cars (lower parking standards, make permits more expensive, increase paid parking areas, remove parking spaces, reasonable rates for carsharing companies) • Information provision to residents and companies (structural communication, visibility) • Improve communication with carsharing companies and speed up processes • Start-up assistance for carsharing companies (e.g. by using carsharing as a municipality) • Help for citizens' initiatives that commit to/set up carsharing
Industry	• Cooperation in the form of an umbrella booking platform • Collaboration with other mobility providers for data standards for aggregation of available services • Collaboration between carsharing companies in marketing campaigns (and use of the universal logo) • Increase cooperation with public transport • Make usage data available to government/research institutions

viders of carsharing. The considered package of measures includes those on parking, communication with carsharing providers, and communication and information provision towards citizens and businesses. These measures are in line with those recommended in the "Rode Loper" (red carpet) documents and

findings of previous research. Supporting carsharing by providing parking for carsharing cars at a reasonable price and through facilitating charging infrastructure for shared electric vehicles are envisioned as uncontroversial and desirable measures. At the same time, making concrete changes to the existing regime of private car ownership through, for example, taking away parking spots or raising parking prices, is perceived to be more difficult for municipalities as they are facing criticism from citizens who feel that their "right" to an affordable parking spot is being taken away. Raising, for example, the cost of residential parking permits to trigger giving up a car is seen as a realistic option only in large cities where parking congestion is high and ample alternatives to private car ownership are available. All stakeholders also consider information provision key for successful support of carsharing. Some of them emphasize that information provision and clear communication with providers is valuable and should be implemented, but that promoting specific forms of carsharing or specific providers over others by municipalities is problematic. According to them, municipalities should provide a level playing field. Other participants raise the potential of municipalities collaborating with carsharing organizations to set up promotional and information campaigns around the advantages and possibilities of carsharing. In discussing the measures to be taken up by municipalities around information provision and parking, participants conclude that the strongest measures are already known on a national level and in the group of Green Deal carsharing members, but that this knowledge is not widely known at the municipal level and implementation is as a result limited to a few of the largest cities in the Netherlands. Other municipalities are envisioned to lack knowledge and awareness as well as the capacity to implement carsharing measures. Participants voice a need for convincing carsharing arguments and practical tools or guidelines in order for these other municipalities to implement carsharing. It remains an open question as to which actor can play the role of disseminating knowledge about measures and of offering assistance in introducing new policy measures that can promote the upscaling of carsharing.

Second, the workshop participants and interviewees articulate the need for the development and implementation of visions on sustainable mobility systems and urban planning that include carsharing as an integral part. According to them, these visions can be linked to plans for achieving environmental and climate goals. Through connecting carsharing to climate goals, it can be brought to municipalities that have not yet considered it as something worth stimulating. Examples of provinces and municipalities that have started to integrate carsharing into future visions and planning or set up action plans on carsharing were discussed and the potential impact of integrating this measure at all levels judged to be high.

Third, setting up a national support or coordination hub is considered an important measure to help the upscaling of carsharing, and relates to the

first-mentioned measure and the need for inter-authority learning. A national authority could coordinate the provision of information about the options, benefits, availability, and ease of use of carsharing to citizens, companies, and local authorities. Knowledge about impactful measures has to be disseminated to lower-level authorities and help with implementation needs to be provided. In order to bring carsharing to the attention of various different stakeholders, a national campaign needs to inform them about the benefits for a city or neighborhood, such as saving space and increasing the quality of life, as well as for individuals. Furthermore, attention can be drawn to potential benefits for different target groups and regions, for example for lower income groups or smaller municipalities. In addition, the provinces are mentioned as possibly being able to take a key role in integrating carsharing into planning and diffusing knowledge on best practices and effective policy measures to municipalities. Provinces can connect carsharing to regional mobility schemes and to measures they currently need to set up in collaboration with municipalities to reach climate goals.

Negatively Evaluated Measures

Some measures are perceived to be not feasible or not desirable. Discussions on changes in the national taxation regime that would increase taxes on ownership of cars are instantly discarded by the participants as being not possible in the current political climate. Such a measure would run against an emerging consensus to raise higher taxes on car use (road pricing with a fixed price per driven kilometer) while in exchange lowering the taxes of car ownership. Equally, participants from the automotive sector and the Dutch touring club, representing large numbers of citizens, do not envision higher taxation on car ownership as desirable. Because of this strict "no-go" statement made by several participants, discussions during the workshop did not go further into the topic, but in two feedback interviews an interesting argument came up, emphasizing that any new taxes on cars can be seen to be positive as they draw the attention of users to the high costs of cars and can trigger thinking of alternatives. Subsidies for the car industry to invest in carsharing are also clearly evaluated negatively. Participants are of the opinion that the car industry is not in need of subsidies from the government in order to be able to invest in new business models and services.

Unnecessary and Unimportant Measures

Multiple measures are perceived to be unnecessary or not very important by the participants and as a result were not discussed in depth. Indicating carsharing as a new category in transport law as well as increased cooperation

with public transport stay mostly undiscussed as a result. Investing in other modalities like public transit and cycling infrastructure is evaluated to be only of importance later on, once carsharing has grown more. The measure of providing carsharing companies with start-up assistance through, for example, municipalities becoming launching customers of carsharing is partly evaluated positively but is perceived to be not that important and as not having a large effect. During the workshop, no attention was given to the measure of allowing or initiating experiments in the field of car use, although in the later interviews experiments such as MaaS pilots or shared electric vehicles in neighborhoods, set up by a province or municipality, are named as being positive examples of putting alternatives to car ownership on the agenda.

Controversial Measures

Not all measures are unanimously assessed or valued positively by participants. For some of the measures discussed certain stakeholders envision barriers, while others question the effects or desirability of the measures. Sharing of usage data by mobility providers both with each other and with authorities or research institutes is such a controversial measure. Providers are hesitant to share privacy-sensitive or competition-sensitive data. Authorities and research institutes, on the other hand, require usage data to be able to assess the usage and effects of offered services, so as to be better able to integrate carsharing into planning. Furthermore, they see an aggregation of supply on one platform as a powerful tool to raise the interest in and usability of carsharing for consumers. Providers articulate being more open to such an aggregated umbrella platform once a functioning MaaS platform is in place and the benefits for companies and the role of governmental regulation are clear.

In the group of participating stakeholders there is disagreement about the need for more research on the topic of carsharing. Some participants believe that research into the impacts of carsharing and its different forms is important, so that they can be clearly mapped and carsharing can thereby be better integrated into policymaking and planning decisions. For an accurate impact study, however, carsharing companies should be willing to provide usage data to independent researchers. Other participants do not see the need for such a study and are of the opinion that enough is known about the positive impact of carsharing and about barriers for scaling up. A question that thus arises for further discussion is on the subject of determining which data can be possibly shared by providers and what is needed for authorities to take effective action.

Although it is seen as necessary by all stakeholders for municipalities and provinces to be better informed and helped in implementing measures supporting carsharing, opinions differ on whether a national coordination center or authority for carsharing is necessary and if a national authority should

be setting up a campaign promoting carsharing. Some feel that an "official" national coordination center would make processes unnecessarily complex, or that national authorities should not be running "marketing campaigns" for carsharing providers. Others see a need and potential for having one national coordination center that can support provinces and municipal authorities, spread knowledge, standardize processes, and harmonize policies.

In sum, this study shows that, according to the participating stakeholders, information about the advantages of carsharing is key. These advantages need to be made clear to various stakeholder groups. Private consumer groups, as well as companies, can be convinced by the different advantages carsharing can offer, be it, for example, cost-efficiency, ease, access opportunities, or increasing space availability. Local and regional authorities need to be convinced of the advantages of carsharing and the benefits a dense network of carsharing can offer a municipality or region, benefits such as decreasing space scarcity in the larger cities or increasing mobility access in more rural areas or for specific inhabitant groups. Here, the question remains who needs to take on the role of informing these different stakeholder groups. Some argue that solely the carsharing providers should be promoting and marketing their services, while many participants are of the opinion that authorities also have an interest in scaling up carsharing and should thus get more involved in informing about and promoting carsharing.

6.   SUMMARY

All stakeholders participating in the workshop or interviews agreed that car-sharing can contribute to reaching the climate targets which the Dutch government has set itself following the Paris Agreement. In addition, carsharing can increase livability in crowded cities through being part of a transition of the mobility system. Because of this contribution of carsharing towards reaching societal goals, authorities on all levels should have an interest in supporting its scaling up. This study shows that there are a number of success and failure factors for scaling up carsharing. Table 11.4 summarizes them. The success and failure factors address challenges at the niche as well as the regime level, challenges that can be addressed with the right policy measures.

Measures supporting the carsharing niche and those more directly changing the car ownership regime were both discussed. However, the focus of the participating stakeholders clearly is on measures supporting the carsharing niche, which they evaluated as feasible and desirable. Measures challenging the established regime of private car ownership are perceived as being impossible or at least controversial. As some of the participants represented regime actors (e.g. the Dutch touring club), these evaluations can be seen as typical regime reactions. Furthermore, the workshop showed that measures to be taken by

Table 11.4   *Success and failure factors for scaling up carsharing*

Success factors	Failure factors
Support for carsharing by municipalities: Dedicated encouraging and supporting measures for the supply and use of carsharing have a positive effect on the scaling up of carsharing (e.g. measures on parking, communication with carsharing providers, communication and information provision towards citizens and businesses).	*Slow and difficult processes of authorities in communication with providers*: Scaling up is slowed down by unstandardized and lengthy processes that carsharing providers face when, for example, applying for parking permissions.
Provision of parking spaces for carsharing cars: Providing parking for carsharing cars is often named as one of the most important measures a municipality can take to support carsharing development. Carsharing parking should preferably be on-street, well visible, and close to public transport stops. Providing it with no or low costs can offer additional support.	*High attractiveness of car ownership*: A high attractiveness of car ownership through low costs, availability of good infrastructure, and high convenience levels decreases the chances of consumers reducing ownership and using carsharing.
Unattractive parking situation: Low parking norms (e.g. in new development/ redevelopment of areas), removal of parking spots, and high parking prices can decrease the attractiveness of car ownership and use and stimulate the use of carsharing.	*Low knowledge base on benefits of carsharing*: A low information level about carsharing, its benefits, supply, and operation mode in the general public leaves use of carsharing at a low level. A low knowledge base within national and local authorities on the contribution of carsharing to reaching societal goals reduces use of supportive measures and integration of carsharing into visions and plans.
High costs of car ownership: Higher taxation on car ownership can potentially lead to decrease in car ownership and increased use of carsharing.	*Unmonitored development*: A lack of knowledge on the development of carsharing (supply, use, effects) disables policy makers from implementing concrete supportive measures.
Multimodal mobility vision:Municipalities having a multimodal mobility vision for the future that is not focused on car mobility make carsharing an integral part of the solution for the mobility system and solving urban and climate challenges.	*Ambiguity in governmental roles*: Missing clarity on which governmental body should take up the role of spreading information on successful policies and processes to local authorities.
	Low collaboration: A low level of collaboration between different stakeholders slows down the development of the carsharing market.

Success factors	Failure factors
Support for local authorities: Information provision of recommended policies and governmental actions that stimulate carsharing to local government, including measures like improving governmental processes, promotion and communications campaigns, decreasing attractiveness of car ownership, parking policies, monitoring and researching developments. Having a national support or coordination hub to spread knowledge and best practices, and to standardize processes (through practical tools and guidelines), can be helpful in this.	*"Unlevel" playing field*: Uneven support of different (types of) providers of carsharing can lead to an unlevel playing field and lack of competition on the market.
Good communication about policy changes: Good communication towards citizens and businesses about changes in policies and a larger vision make policy change more feasible and socially and politically accepted (e.g. communication about benefits, changed parking situations, and alternatives).	
Experiments: Experiments in the field of mobility services can increase knowledge on effects and increase acceptance by citizens and businesses.	
Integrated mobility services: The integration of services can improve the service quality and attractiveness of mobility services for users, and the sharing of data by mobility service providers with each other and with authorities and research institutes can improve knowledge on effects and developments.	

authorities were discussed more freely, while measures to be taken by stakeholders from the industry, like collaborating with other providers or sharing data with authorities, although potential success factors, were controversial because of competitive pressures among providers.

Measures to be taken by authorities and perceived to have the highest impact are changing parking policies, actively promoting carsharing, and integrating carsharing into planning around transportation and urban development. Stakeholders also perceived information provision about the advantages of carsharing to citizens, companies, and local authorities as a promising policy. These measures have been identified as important success factors. Most measures that all stakeholders agree on can be taken at the municipal level, but municipalities are in need of help in order to take on this substantial role. A bridging function needs to be fulfilled between, on the one side, the knowledge available at the national level and in the Green Deal community and, on the other side, the lack of knowledge available at the majority of municipalities. That bridging of the gap in knowledge and ambition between the national government and municipalities is difficult and can potentially act as a failure factor. This has also been mentioned by Akyelken et al. (2018) for the case of the Tel Aviv region and the Israeli government. However, there are also controversies about how far governmental support for specific solutions or providers should go. Actors from the current regime perceive strong support from authorities and promotional activities for carsharing to be possibly unfair and undesirable. When taking on the goal of building a level playing field for different providers, policy makers need to be aware of the failure factor of an unlevel playing field and use measures that are not supporting one solution over the other but that rather take away advantageous regulation supporting the old regime of private car ownership instead of supporting the niche of carsharing with new measures. This could also prevent new regulations becoming outdated quickly in such a dynamic market and would be in line with the warning from Le Vine (2012) and KiM Netherlands Institute for Transport Policy Analysis (2015) that policy makers, especially those at the local level, should stay flexible in policy use and strive for diverse options.

It can be concluded that supporting the carsharing niche offers options for accelerating the upscaling of carsharing. The niche can be supported by improving processes for carsharing companies, by developing parking policies that facilitate carsharing, and by encouraging and supporting neighborhood initiatives in setting up carsharing solutions. Large-scale changes at the regime level, for example through substantial tax increases, are difficult or not feasible, but at a smaller, local level, changes in the regime, for example through changes in parking policy, can have a major impact.

7.   DISCUSSION

The current car regime is based on private car ownership and its supporting infrastructures. In addition, private car ownership is embedded in our social and cultural system and has symbolic power next to being a convenient transport mode (Truffer, 2003). The current regime has led and still leads to negative consequences on, for example, climate, livability, and equity. Carsharing can act as a means to achieve positive impacts on multiple societal goals. Given the regime in place, changes are incremental and geared to optimize the current system, with the capabilities and resources of incumbent players being used. More radical change is restricted since the established rules, structures, and culture lead to slow changes in regulations, norms, and practices. Carsharing offers an alternative to the regime of private car ownership. It makes use of existing regime infrastructure but builds on new behavioral practices, cultures, and business models. The socio-technical system of the regime is relatively stable, but larger societal trends, such as growing urbanization, the growing awareness of climate change, growing digitization, and the growing service economy, can influence the system and open a window of opportunity for a niche innovation like carsharing to break through and move into (or replace) the dominant regime (Geels, 2002, 2004; Loorbach, 2007; Pel, Chapter 2 in this volume). Nonetheless, changes in policies and new supportive measures are necessary for carsharing and other new mobility forms to scale up.

The insights from the various stakeholders show that large-scale changes at the regime level (like changes in taxation) are more difficult to implement or lack (political) feasibility, while smaller regime changes, often at the local level, can also have a substantial stimulating impact (e.g. changes in parking policy). Slower, but continuous changes to the regime in a small local setting can create the right "protection" in order for the innovation to be successful. Changes in parking policies seem to be of major importance for attracting new consumers to carsharing and giving up private car ownership.

The current measures that support the carsharing niche are an example of "Strategic Niche Management" (Kemp et al., 1998), as the measures are providing a "protective space" for carsharing providers. This is most literally exemplified by the dedicated parking spots for carsharing operators, while other measures including subsidies and the integration of carsharing with public transport services provide further niche support. However, while these measures contribute to the further upscaling of carsharing, it is unlikely that carsharing on its own will fundamentally change the car regime. Rather, carsharing policies in the Netherlands follow a "fit and conform" empowerment logic (Smith and Raven, 2012), rendering the niche innovation competitive given otherwise largely unchanged selection environments. The development

of carsharing as an alternative for private car ownership has not prompted any bold measures to phase out private car ownership.

Our study makes clear that policy makers and other stakeholders refrain from policies that discourage private car ownership, even though this is a potential failure factor for the upscaling of carsharing and the positive impacts on reaching societal goals. Instead, they agree on measures that stimulate the niche of carsharing to further grow. There is thus backing for creating support for the carsharing niche, but little for breaking down the established regime. As a result, policy inconsistencies emerge where the regime logic hampers the further growth of carsharing. Problems because of these inconsistencies can be identified at local and national authorities as well as when looking at industry stakeholders. First, at the *local level* changing parking regulations exemplify the inconsistencies between niche support and regime change. While carsharing can be supported through providing parking spots in crowded locations, where it could then free up space because people decrease car ownership (Enoch and Taylor, 2006), municipal regulation limits the possibilities to actually remove parking spots. Taking away parking spots decreases earnings and this loss has to be compensated elsewhere. Second, the *national government* is using inconsistent policies: on the one hand they want to stimulate the use of shared mobility as they see its potential; on the other hand higher taxes on car use (road pricing) are being discussed in combination with a decrease in taxes on car ownership to compensate citizens and keep costs in balance. Such a reduction in the cost of car ownership obviously will slow down the scaling up of carsharing. Apparently, challenging the current regime by increasing taxes both on car use and on private car ownership is considered a political no-go, comparable to earlier findings by Akyelken et al. (2018). Only large cities with a green, progressive electorate have developed ambitious plans to change the car regime, including measures on parking, reducing car ownership and use, improving communication with carsharing providers, supporting innovative carsharing initiatives, and integrating carsharing into new developments (Gemeente Amsterdam, 2019; Gemeente Utrecht, 2015).

Apart from ambiguities in government policies, *industry stakeholders* active in the carsharing market also maintain inconsistent perspectives. B2C carsharing providers want to position themselves as the only truly sustainable and thus best solution for car ownership alternatives. They clearly search for support from authorities for the carsharing niche and for bringing changes to policies supporting the current regime of private car ownership. P2P carsharing providers, by contrast, operate more in line with the current car regime, as P2P sharing is based on people owning private cars that are rented out on the platform. Hence, while B2C providers emphasize the need to challenge private car ownership, P2P providers do not call for disruptive changes to the car regime. Outsider actors moving into the carsharing market, like car rental

and leasing organizations, and organizations representing the current users of the regime, like a touring club, are also less inclined to challenge the current regime, as their organizations are well established in the current automotive industry and profit from a stable regulatory environment.

On a final note, our study makes clear that policies supporting carsharing should be discussed within the context of the multimodal mobility system as a whole. Several stakeholders consider the scaling up of carsharing as a means to an end rather than a goal in itself. The scaling up of carsharing, then, may be better seen as one out of multiple and complementary solutions towards decreasing car ownership and use, as also emphasized earlier by Millard-Ball et al. (2006). Indeed, stakeholders agree on the importance of a functioning multimodal mobility system in which carsharing is an integral part. This should be taken into account in the planning and visions for the mobility system and in wider urban planning. Accordingly, stakeholders' opinions converge towards considering MaaS as the desirable new paradigm in mobility. At the same time, however, changing the focus from carsharing to MaaS may well slow down sustainability improvements in the mobility system, as many technical and institutional challenges surrounding MaaS are still unresolved. As the upscaling of carsharing as one specific solution does not jeopardize a more comprehensive transition towards MaaS as such, the wish to move to MaaS does not constitute an argument to reduce support of carsharing.

Our study has some limitations. As it focuses on the Dutch context, our findings are only to a limited extent generalizable to other countries, as the regulatory situation, stakeholder composition, and political landscape have an important impact on which measures are perceived to be most impactful and feasible. Having said this, the current regime of private car ownership is a global regime, which suggests that our findings may well be relevant to other countries as well. The literature review also showed that policy measures in place or being discussed indeed overlap greatly between countries. Our method of hosting one workshop with a limited number of participants is also a limiting factor when interpreting and generalizing the results, as there might be more opinions and perspectives on measures and barriers perceived by other stakeholders. At the same time, the participants represented a wide variety of stakeholder groups and we supplemented their views with insights from five additional interviews. It has to be noted that some measures were not discussed in depth as they were directly pushed off the table as being not feasible or desirable. This limits the understanding of the possible effects they could have on the scaling up of carsharing. Similarly, the possibility to overcome barriers in upscaling through the combination of measures was not discussed. Furthermore, a workshop setting can lead to some participants dominating the discussion with their views and opinions. To avoid this from happening, we split up into groups, with each having a facilitator moderating the discussion.

Next to these limitations concerning the method, it has to be noted that we did not analyze the direct impact of the specific policy measures on societal goals and can therefore not draw conclusions on the effectiveness of single measures in impacting societal goals such as emission reduction or reduced urban space used for cars.

Future research on carsharing policy could include qualitative and quantitative analyses of the impact of the discussed policy measure. Also, similar workshops in other countries, or multi-country workshops, to compare which situations lead to different outcomes in terms of what measures are perceived as useful, could be valuable. Collecting these different perspectives can generate insights into best practices that many countries can profit from as well as reveal contextual factors that need to be taken into account in carsharing policies. Furthermore, future research could apply a wider focus to analyze measures supporting the larger transition of the mobility system instead of focusing on carsharing services. Finally, our research also makes clear that municipalities need more practical help in setting up and implementing measures supporting the growth of carsharing. Developing a tool or a template for an action plan that municipalities can easily fill in and adjust to their local context could be a valuable option to contribute to realizing a larger role for carsharing in the mobility system.

NOTE

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