GHENT UNIVERSITY

Interreg 2 Seas Mers Zeeën MOBI-MIX

CARSHARING INSIGHT REPORT

MOBI-MIX

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About MOBI-MIX

MOBI-MIX brings together partners from four different countries: the Netherlands (City of Rotterdam), Belgium (Antwerp city, Ghent University, City of Mechelen and POLIS), France (Metropolitan area of Valenciennes, Transalley technology park and Gustave Eiffel University), and United Kingdom (Norfolk County Council, Cambridge Cleantech and CoMoUK).
The project aims to encourage behaviour change and to achieve positive environmental gains in the urban environments of five cities/regions in the 2 Seas area. The five MOBI-MIX cities are interested in facilitating the implementation of innovative mobility solutions. The uptake of low carbon transport modes is of interest here, since the overall objective of the project is to decarbonise road transport. Effective implementation of shared mobility and MaaS solutions are the two main ways to achieve these goals. Cities are working closely with mobility providers and other local stakeholders to ensure the shared mobility ecosystem develops to the benefit of the entire city.

A series of four insight reports focuses on the different transport concepts that these cities want to implement. The first report explored MaaS (Mobility as a Service) and can be read here. The current report centres on carsharing, looking at the latest developments across Europe and beyond.

Executive summary

Transport can be an enabler of wellbeing, providing people with options to move, access employment, services and leisure facilities. However, transport systems are also negatively impacting the liveability in cities, as they are often congested, noisy and polluting. As more and more cities are working to develop and implement Sustainable Urban Mobility Plans (SUMPs), innovative transport solutions which reduce negative aspects are becoming more widespread. While active travel and a performant public transport network will remain key pillars in SUMPs, cities are well aware that cars will continue to play a role in their cityscape.

The challenge is to make the role of private cars less prominent and change people's behaviour in favour of a smarter use through an attractive carsharing schemes.

Indeed, carsharing can be part of the multiple efforts municipalities do to transform the mobility system in favour of sustainable modes of transport. However, implementing carsharing schemes comes with specific challenges. This insight report discusses, first, what carsharing is and what different business models currently exist. Part 2 focuses on multiple policy actions and recommendations related to a successful implementation of carsharing. These are explored in combination with good practices and success factors in different cities, based on interviews with policy makers from Berlin, Brussels, Paris, Prague and Stuttgart. Part 3 discusses the short- and long- term impact of carsharing implementation. Throughout the report, interviews with experts and practitioners reveal insights on the impact that carsharing has had in various cities, while also highlighting future pathways.

Note on terminology:
In this report, carsharing refers to free-floating, station-based, cooperative, and peer-to-peer systems, which are different from ride-sharing services (e.g., Uber, Bolt), carpooling (e.g., BlaBlaCar), traditional rental services (e.g., Sixt), and long-term rentals (e.g., Swapfiets). Here, carsharing is used as the equivalent term of car clubs in the UK.

Part 1 – What is carsharing?

Definition, types, advantages and disadvantages

Carsharing - the basics

Carsharing or car sharing was first introduced back in 1948 in Zürich. Later in the '70s and '80s multiple experiments were launched (and failed) in France and Amsterdam. In the '90s carsharing re-emerged, from whereon it continued to grow slowly. When the new millennium started, car sharing took off to where it is today thanks to elements such as the introduction of smartphones which facilitated the rental process. Carsharing systems are now operating in over 2000 cities from 46 countries, gathering approximately 15 million members and 157 000 vehicles (Movmi, 2018).

Carsharing is a sharing system which allows customers to rent vehicles for (generally) short periods of time. Depending on the specific business model, vehicles are found in (indoor and outdoor) carsharing stations or parked freely on streets. Customers use carsharing vehicles by the minute, hour, or day, and pay on a time and/or kilometre basis. Providers place cars at the disposal of potential customers, mostly on the public domain. They ask a fee for the loan of their cars depending on the length of the usage. The principle of carsharing is relatively simple. Individuals gain the benefits of private cars without the cost and responsibilities of ownership. Instead of owning one or more vehicles, a household has access to a fleet of vehicles on an as-needed basis (Rabbitt, 2016; Hara and Hato, 2017).

Carsharing may be thought of as a specific form of organised short-term car rental. Yet, multiple minor differences exist. While using car rental, a user is tied to the opening hours of the rental company, whereas for carsharing this is not the case since the services are available 24/7. The administration for carsharing systems is generally more straightforward than for car rental. The latter requires administrative procedures each time a car is rented. In carsharing systems, the system works automatically after signing up for membership and filling in the different documents (Autodelen.net, n.d.).

Carsharing business models

Shared mobility or mobility in the sharing economy might sometimes be difficult to clearly delineate, due to the different emerging models. Two features are common to all of these new mobility services: there is an element of sharing an asset (e.g., a vehicle/car) instead of owning it, and they rely on technology (e.g., a digital platform).
Specifically for carsharing, there are five main models. These differences are mainly based on where a car needs to be returned after using it.

Four of these types are between businesses and consumers (B2C) or among businesses (B2B). The fifth business model is based on people sharing their personal car. This last model can range from grassroots organisation with a limited amount of vehicles (-20 vehicles) in a small town with non-profit goals - "cooperative carsharing", to a large amount of vehicles (+1000 vehicles) in a for-profit organisation - "peer-to-peer carsharing" (Münzel et al., 2018). These different models lead to different impacts (Eltis, 2019).

Roundtrip station-based: In this type of carsharing, the shared vehicle needs to be brought back to the same spot it was rented from. Examples of this type are Cambio and Ubeeqo. This type of carsharing model has shown the best results in reducing car ownership (BCS, 2020).

Roundtrip home zone-based: This type is similar to the previous one, the difference being that the shared vehicle does not need to brought back to the exact same parking location, but to the same neighbourhood it was rented from.

Free-floating with pool stations: Cars can be returned in a different area to the one where they were rented from but must be parked in a dedicated carsharing hub/station/bay. This system is very similar to station-based bike-sharing schemes. Examples here are Autolib' (France), Amber (the Netherlands) and BlueCity (United Kingdom).

Free-floating with an operational area: This type of carsharing allows users to leave their car at any parking place in the operational area of the provider. Carsharing companies that use this model are Car2Go, Zipcar and DriveNow. This type of carsharing would result in the lowest reduction in car ownership (BCS, 2020).

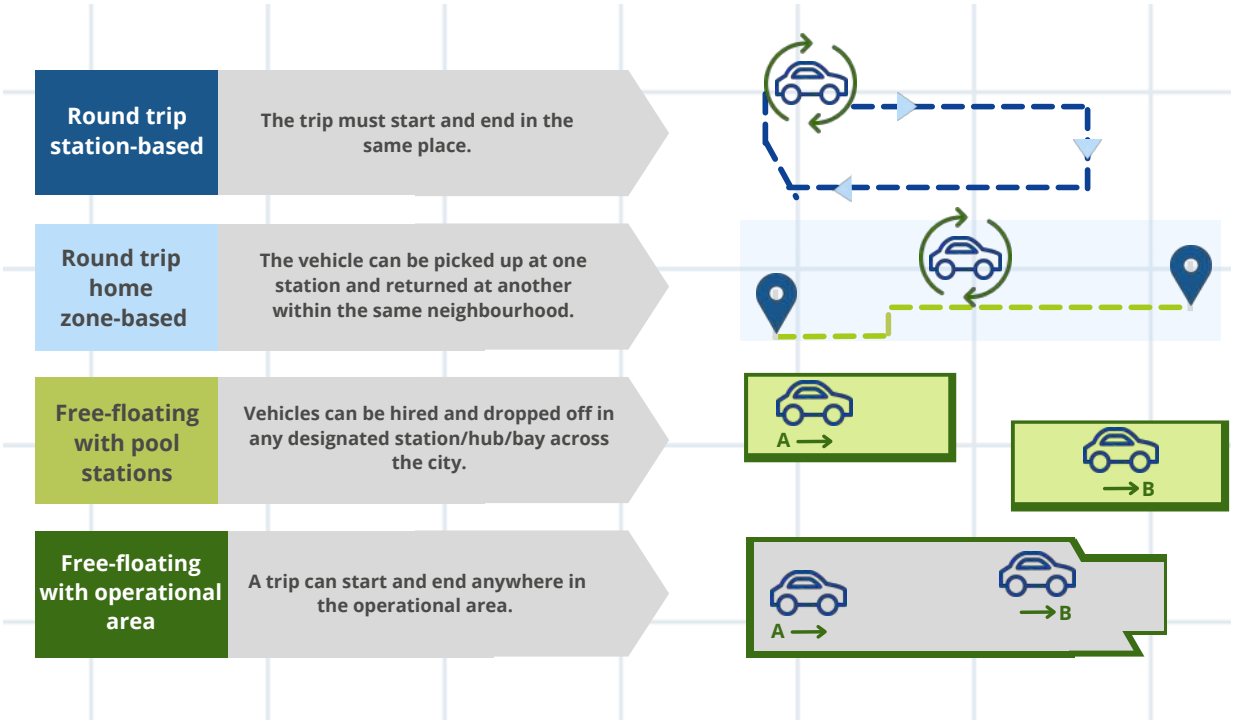

Figure 1: Carsharing models (Adapted from Movmi, 2018)

Personal vehicle carsharing (peer to peer): Compared to the previous four types, this is the only one where vehicles are shared among private drivers. Sharing happens either in (closed) community groups or peer-to-peer where a company organises the carsharing. In this system, individuals can rent their private cars when not in use, allowing other people to use them (Münzel et al, 2018).

- Supply and demand often meet through a broker that provides an on-line platform, such as a website and/or mobile application, and collects the payment, often taking a percentage of the total revenue. An analogous case of this model in a different sector, is Airbnb. Examples of this type are Dégage, easyCar Club, Getaround, hiyacar and Drivy.

Main advantages

Reduction in number of cars

The main advantage expected from carsharing in cities relates to the reduction in the number of cars. This happens when enough persons/families get rid of their personal car and start using other modes of transportation (including a shared car). This decrease is seen as a promising way to reduce traffic, congestion, and CO2 emissions. People who use shared cars drive a smaller number of kilometres than those who own a private car (CoMoUK, 2020; Rabbitt and Ghosh, 2016; Taylor et al., 2016).

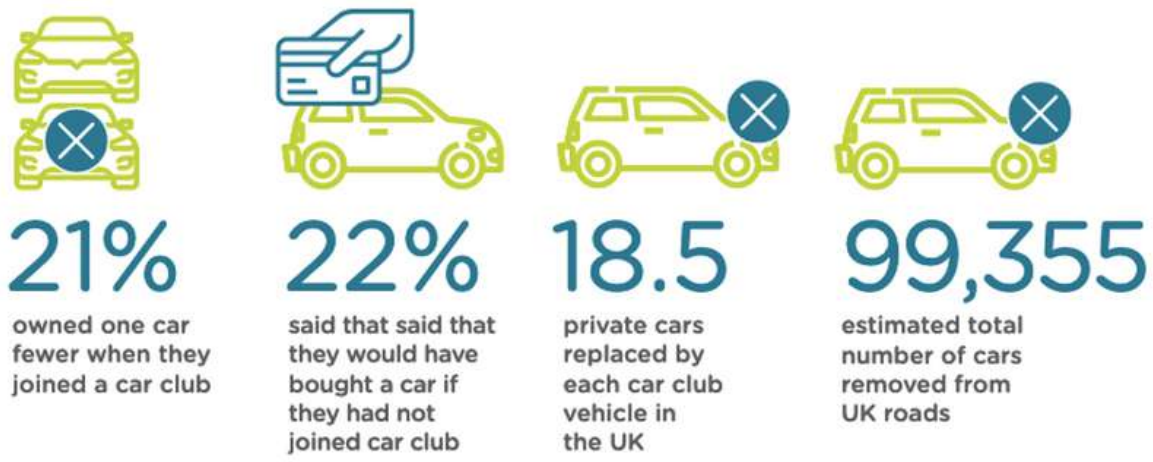

Figure 2: Results of CoMoUK's 2020 Car Club survey

When car sharers get rid of their car, there is a clear benefit for society. Yet, other studies have showed that the situation is a bit more nuanced. Carsharing is often used by people who did not own a car before the scheme was implemented. Furthermore, most often people who own a car and start carsharing get rid of their second or third car (Giesel & Nobis, 2016). Therefore, the impact in the net reduction of cars should not be overestimated. To evaluate the impact of carsharing, it is better to evaluate the reduction of vehicle km's travelled and number of trips than the number of cars.

In the United States, research has also shown that those who became members of a carsharing company clearly drove less kilometres per year as they did before joining a carsharing programme. Furthermore, they noticed that the population density had a clear correlation with the car kilometres travelled. The higher the population density, the lower the amount of kilometres (Martin & Shaheen, 2011). The actual reduction in cars depends on the local context, though. Shaheen et al. (2019) found that numbers vary, depending on the region and shared mobility model. Their research showed that each shared car in a city replaces between three and twenty private cars. COMOUK found similar numbers in the UK. Depending on the local circumstances, one shared car displaces between 9 and 23 vehicles. This number varies due to aspects such as quality of public transport, amenities, cycling infrastructure and density (COMOUK, 2020). A study conducted in Bremen, Germany, showed that every carsharing vehicle replaces 16 privately owned vehicles or prevents their purchase (ShareNorth, 2018).

Reduction in parking space

A more efficient use of (shared) cars in cities can lead to a reduction in the number of needed parking spaces. When shared cars replace privately owned ones, the parking spaces become public spaces and can then be used for other purposes, often increasing the liveability of neighbourhoods (Cervero et al., 2007; Eltis, 2015; Shaheen et al., 2010). This can improve urban environments, allowing citizens to enjoy, as well as better air quality. González-González et al. (2020) stated that a reduction in the need for parking could enable the renewal, attractiveness, and liveability of core areas of a city. However, in many cities (e.g., Antwerp, Berlin, etc.), the demand for parking spaces for private cars is still relatively high, limiting the potential to transform parking spaces into other functions.

Socio-economic advantages

Besides the societal advantages (e.g., increase in liveability and reduction in cars and car kilometres travelled), there are multiple other advantages for carsharing users themselves. The main ones are financial, as there is no longer a need to own a private vehicle. The fixed costs associated with owning a vehicle (e.g., purchase, insurance, regular inspections and maintenance, fuel, etc.) are shared between the users of a shared car. Litman (2000) has stated that carsharing has a lower fixed cost, but higher variable costs than private-vehicle ownership. His findings showed that households who use carsharing save between 500$ and 1500$ a year. This creates a net decrease in the budget used for mobility while keeping the regular advantages of a private car. Another important fact is that car owners tend to underestimate the cost of owning a private car. A recent German study found that they underestimated this on average by €221, a misjudgement by 52% (Andor et al., 2020).

In addition, many carsharing systems allow using a specific car suitable for current goals/needs (e.g., larger van, small car, family car, etc.). Furthermore, carsharing is a social and inclusive way of mobility. The price structure makes occasional use of a vehicle affordable for those who are not able to afford a private car, including low-income households. Recent estimates state that up to 20% of carsharing users would not be able to buy a personal car (COMOUK, 2020, Eltis, 2018; Litman, 2000; ShareNorth, 2018; STARS, 2019).

Users have different motivations to join carsharing, ranging from value-seeking (related to saving money), to convenience (e.g., saving time), lifestyle (desire for status) and environmental considerations (saving GHG) (Schaefers, 2013).

Socio-economic advantages

The potential positive environmental impacts are among the main reasons why carsharing solutions are part of MOBIMIX. The reduction in private car usage can lead to a significant decrease in the carbon dioxide emissions, and multiple academic scholars have studied the impact of carsharing. Nijland et al. (2015) found for their study in the Netherlands an average reduction of 1600 car km per year compared to the situation before carsharing, which corresponds to a reduction of approximately 250 kg of CO2 per carsharing user per year. Firnkorn and Müller (2011) analyzed the environmental effects of a one-way carsharing service (which allows users to begin and end trips in different locations) called car2go in Ulm, Germany. The shift from public transport or private car use to carsharing vehicles was taken into consideration and resulted in an average reduction from 312 to 146 kg CO2/year for each carsharing user. Baptista et al. (2014) studied the energy, environmental and mobility impacts of carsharing through empirical results for Lisbon, Portugal. The study showed that employing hybrid and electric vehicles (EV) could reduce CO2 emissions by approximately 35% and 65%, respectively, for all light-duty vehicles in the Lisbon area (Jung & Koo, 2018). Shaheen et al. (2019) estimated in U.S. cities an average GHG emission reduction of 34 to 41% per household or an average reduction of 0.58 to 0.84 metric tons per household for roundtrip carsharing. Studies of free-floating, one-way carsharing estimate that vehicle reduced GHG emissions by 4% (Calgary) to 18% (Washington, DC) on average.

Main disadvantages

Inconvenience

As with any transport mode/system, carsharing has some disadvantages linked to service model, local attributes, time of day, etc. The usage of a shared car requires some planning, depending on the business model (see Shared mobility models section). Users often need to make a reservation to make sure they have a vehicle. Otherwise, there is a possibility that no vehicle is available when needed (Shaheen et al., 2018). An optimal number and distribution of cars can reduce this problem to a minimum.

Another inconvenience is the fact that carsharing providers seldom offer child seats, which requires users to bring their own child seats (COMOUK, 2020).

Technical difficulties

Besides this inconvenience, users may also experience some problems such as a dirty interior of the car, unresponsive client support or problems when opening or locking a vehicle. As carsharing schemes often rely on mobile applications to rent, open, and lock a car, problems can appear due to depleted phone batteries or a lack of internet connection. Furthermore, not everybody has a smartphone or can use one to book and pay for a shared car.

Redistribution

For providers too, there are some disadvantages. One of the 'problems' of carsharing, especially for free-floating models, is the re-distribution of shared cars throughout the city/region. Multiple approaches have been tried to optimise this, but an ideal solution remains to be found (e.g., de Almeida Correia & Antunes, 2011; Kek et al., 2009). Further studies should focus on solving this issue.

Perception

Another disadvantage might be the image or perception of carsharing. In many countries, owning a car remains a symbol of status. Besides, many people who have never tried car sharing, believe it is very inconvenient, expensive, and unreliable. The multiple business models that often are present in one city require some research for the users to know what model satisfies their needs (Krzton, 2018). Nonetheless, efficient marketing campaigns can raise awareness and help reduce this disadvantage.

Potential negative impact on sustainable transport modes

The main goal of carsharing is most often linked with sustainability in a broad sense. Therefore, it is important to know that carsharing can sometimes lead to a modal shift from sustainable transport modes such as walking, cycling and public transport to shared cars – a concern also shared by the City of Prague (see below). Shaheen and Martin (2016) found that, in a context of five different North American cities where a free-floating carsharing system was deployed, carsharing created a modal shift from bus, urban rail, walking and cycling towards carsharing. Although some people started using active and public transport more, there were more people whose usage of these sustainable modes decreased after the uptake of carsharing. This might result in an increase in car usage and more congestion in cities. The modal shift effect has a strong rebound impact on the environmental benefits of carsharing (Amatuni et al., 2020).

However, it is important to note other studies concluded that carsharing and other sustainable transport modes mostly go hand in hand, reinforcing each other (COMOUK, 2020).

The case of Prague, Czech Republic

"Parking fee exemption for EVs incentivises adoption, but it can also lead to more people shifting from Public Transport or active modes, which is undesirable"

Interviewee	City hall of Prague
Duration of service	Present in the city since 2016, when there were 4 companies.
Duration of pilot	Research for pilot implementation started in 2016 Pilot launched in September 2018 and planned to run until 2020 (free for users) Currently ongoing in altered version (no longer free)
Types and size of car sharing	SB: Autonapul, Ajo – small fleets (around 60 shared cars in total) distributed in some areas. FF: Car4way (800-900 cars), Anytime (400 cars), GreenGo (electric vehicles) FF with operational areas: Uniqway (small scale, developed by Skoda, initially only for students) Since May 2021, five car sharing providers with a total number of approx. 1500 shared cars.
Motivation	Carsharing is seen as one part of multimodal travel. Prague created a SUMP in 2020, yet only 1-2 (out of 300) specific points refer to carsharing, since Prague is a Public Transport-focused city.
City-wide coverage	Concentrated in the same area, covering mostly the city centre and neighbourhoods around.
Regulation channel	Parking permits: carsharing gets a special permit, cheaper than the usual parking price. The city establishes some prerequisites for a carsharing operator to be able to opt for the permit: • vehicle must be keyless or contain the key in the car • the system needs to be open to all citizens • Cars should ensure a relatively wide geographical coverage • Operators should ensure new fleets, to avoid frequent breakdowns and have fewer emissions. The parking permit contains two different rates, controlled through a 'switch system' (a virtual switch that uses data to apply the corresponding parking fee). If no one uses the car and it is parked on the street, the operator pays the parking price (very cheap). When the user is using the vehicle and parks on street, they pay the normal parking price. EVs do not need to pay to park, but this encourages more riding, also from people who wouldn't have used the car otherwise. The parking tax exemption will change from 2022, to rebalance the system.
Stakeholder engagement	There is a carsharing association operating independently from the city. Any newcomer operator should agree to its conventions and obtain the vehicle switch. The parking association holds a yearly conference, where the city and the members meet, mostly informally.
Impacts on sustainability	Negative impact on public space usage (not on CO2 emissions) due to free parking permit for EVs, that encourages car use.
Barriers of car sharing adoption	Owning a car in Prague is inexpensive, both in terms of acquisition and parking prices. Adding to the low cost of private car ownership, citizens use cars only for specific trips (shopping, traveling outside of the city, etc.), since public transport is cheap and reliable. Besides, carsharing has only been present for 5 years in the city, and it will take more time for it to become more popular.
Impacts on sustainability	The city knows if the vehicle is being used or not (via the "switch) and basic information about operations, including the average number of rentals. Following the "time vehicles are unused" metric, approximately 23% of the time the vehicles are being used.

Affordability and inequality

A last potential disadvantage of shared cars is affordability. If carsharing leads to a significant modal shift away from public transport, this could mean that eventually public transport is reduced. We need to keep in mind the associated social exclusion risks of this happening, as car sharing is not a particularly affordable mode (for regular use, compared to PT/walking/cycling)
Further, there is also spatial inequity? The shared cars are not always available for every one everywhere in the city. Are we sure to have available shared car when we need it.

Part 2 – Policy actions and recommendations

Carsharing: Success factors

Municipalities and cities can take various actions to make carsharing work in their city. A good starting point is learning from other cities where carsharing is already a success and adapt it to the local context. The following sections discuss strategies adopted by leading carsharing cities, most of which were laureates at the 2020 Carshare City Awards (Movmi, 2020). In addition, these recommendations build on the experience gathered in other European projects, such as the STARS project (STARS, 2019) and SHARE-NORTH (ShareNorth, 2018).

Increase hurdles around personal vehicle ownership

A first action a city can take relates to private car ownership. Local authorities can create policies to make it more difficult and expensive to own and use a personal vehicle in their city. This will increase the motivation for people to switch to a multi modal mobility lifestyle, especially when car-reduction policies are combined with investments in urban densification, cycling, public transport and incentives for carsharing. The city of Madrid has created a Restricted Access Zone for vehicles in 2018 (similar to the Congestion Charge Zone in London). In this zone, private vehicles have to pay to enter this zone. For shared cars (and its users) this is free.

Furthermore, parking is free for carshare vehicles. Similarly, Bergen has increased the cost and ability to purchase on-street parking for residents, while creating mobility hubs – points where citizens can access various modes of public and shared transport, including bikes and cars (Movmi, 2020)

Develop an equitable and comprehensive parking framework

As the previous example showed, traffic and parking management are among the main actions cities should consider. Parking privileges are not only essential for successful carsharing operations, they also create a powerful incentive for people to change their behaviour. If parking a personal vehicle is more burdensome than parking a shared one, people will be more likely to give up their private vehicle(s). Local authorities must ensure that finding a parking space for shared cars is easy and convenient, and not a treasure hunt (Eltis, 2018; Shaheen et al., 2010; ShareNorth, 2018). As the case of Stuttgart shows (see below), local authorities have the power to identify and provide suitable space, especially for station-based schemes.
Depending on the different carshare models present in a city, a different parking policy approach might be necessary.

A differentiated parking policy is particularly important if a combination of free-floating and station-based carsharing initiatives are present. Free-floating shared cars have different requirements than those shared cars which can be returned in the same place. Multiple operators provide additional users with a choice of service. Yet this will require more time for the user (additional registration, etc.) and for the city (managing relations with each operator). This can lead to increased competition between the different operators (COMOUK, 2020).
Furthermore, an optimal geographical spread throughout the city/region might be an extra push to not only have carsharing in neighbourhoods where companies can make enough profit, but also in those neighbourhoods where this is less evident (Eltis, 2019).

The city of Vancouver, the North American Carshare Capital, has one of the most comprehensive parking policy frameworks. In this city, carshare organizations can obtain parking spaces on-street, which will then be exclusively reserved for their shared vehicles. Furthermore, there are special residential carshare permits that allow members to park vehicles in residential neighbourhoods, in time-restricted zones and even for free when 'regular' cars have to pay a parking ticket.

Besides, Vancouver offers a financial incentive for developers to add carshare parking in new developments at a ratio of 1:5. This translates into cost savings of about CAD 160 000 (approximately €100 000) if they install just one parking space for a shared car.

The case of Stuttgart, Germany

"One of the success factors of the carsharing scheme is its flexibility. The installation of a new station is as easy as its termination and removal"

Interviewee	Mobility department, focused primarily on strategic actions.
Duration of service	Station-based systems have existed in the city since the 1990s, with Stadtmobil. As vehicles were parked in garages, they were not very visible or accessible. The city started boosting car sharing in 2017 after the national Parliament passed a new law enabling municipalities to grant public space to carsharing.
Types and size of car sharing	FF: ShareNow with around 350 cars (reduced from 550 cars due to multiple reasons, including COVID). As a special case, in Stuttgart all of the vehicles are electric. The operator profits from an extensive charging infrastructure and from the city's decision to provide free parking. SB: 607 SB carsharing parking places: 519 on private properties, 88 in public space. The operators are Stadtmobil (576), Flinkster (24), Ford Carsharing (4) and deer (3).
Motivation	The city is in a valley area and public space is scarce. Car sharing is considered a good opportunity to help reducing parking pressure, as it might reduce private vehicle ownership in the long term. Generally, the city is very supportive of all shared mobility solutions.
City-wide coverage	SB covers almost the entire city, being present in all districts. The city nudges CS operators to move to the outskirts, and operators generally accept because this is an opportunity for advertisement, as more vehicles on the street makes them more visible.
Regulation channel	No shared mobility operator (including carsharing) needs a license to operate. The city is facilitating station based carsharing by identifying and providing new locations every year, and SB operators must apply.
Stakeholder engagement	Car sharing providers and the city maintain regular meetings, which results in good communication and cooperation. Each year, following a set of conditions for the establishment of a car sharing station (good accessibility and pedestrian infrastructure, targeting residential areas, distance between stations, etc.), the city offers new parking places, and providers can express their interest. Providers distribute parking places among themselves without conflicts. If two parties are interested in the same one, they do a draw, and the winner gets the place. This procedure is backed by the law. The system is highly transparent and open. There have been some difficulties to introduce electric vehicles in station-based schemes. The problem is the contract between the energy provider, car sharing operator and charging company. Right now, the charging infrastructure is expensive and makes it harder to deploy more stations. Currently, to deploy a station, only a painting needs to be done on the road, but for electric vehicles more elements need to be added to create the station (charging infrastructure, more signs, etc.)
Impacts on sustainability	The city has not observed benefits related to public space savings yet but is confident that these will be visible in the long term. Citizens are benefiting from an increased transport offer and are being more and more aware of the different options, realising that there are alternatives to private car.
Barriers of car sharing adoption	The automotive industry is very important in the region, playing a role in the cultural heritage. Promoting other means of transport and encouraging sharing (instead of owning) can sometimes be difficult for the city, as it can be considered a threat to the industry.
Data sharing	Very basic, only fleet size (not always easy with FF providers).

Ensure that carshare parking privileges are affordable

An action that is closely related to the previous one is the pricing of parking shared cars. The economic margins for carshare operators are often razor thin (Movmi, 2020). High parking costs are one of the most cited reasons why carshare organisations leave a city. The parking pricing strategy in a city has to be focused on creating a long-term relationship with the carshare provider. The city of Ghent offers carshare permits for free. In Madrid, electrical carshare vehicles are allowed to enter the Restricted Access Zone for free. This has resulted in more carsharing providers that offer zero emission vehicles. In Calgary, the city introduced tiered discounts for carshare vehicles based on the areas they are parked in. This way, they can support areas that are transit deserts, while 'creating' alternative transportation options for residents who live there (Eltis, 2019; Movmi, 2020).

Make carsharing part of a larger mobility ecosystem

Attracting enough people towards carsharing is often necessary to be economically viable. The number one reason people switch to a new form of mobility is convenience (Eltis, 2018; ShareNorth, 2018). Providing easy access to a variety of options for different use cases will increase ease of use and behaviour change. This supports the success of the carshare organisations present in a certain city. Additionally, investments in performant public transport and safe walking and cycling infrastructures are necessary to make it possible for people to live without a private car (Eltis, 2019).

Local authorities across Europe are trying to improve their multimodal offers, with cities such as Mechelen trialing free public transport. The city of Bremen is also striving to continuously improve its local public transport network and promote cycling. This is part of the strategic objective to reduce the number of cars on its streets. Carsharing is not a stand-alone measure, but is embedded into overall urban development and transport strategies. The city's goals and strategies are intended to allow as many people as possible to make their daily trips by walking, cycling and public transport. Carsharing in Bremen is seen as a supplement to these sustainable modes, and only together can they be an alternative to the private car (Glotz-Richter, 2016). Furthermore, the city of Bremen has been a leader in developing a concept called Mobil.Punkt – the equivalent of a mobility hub (see below) – where citizens can access different means of transport. Here, carshare vehicles are collocated next to bus stops. These Mobil.Punkts are easily accessible by bike and on foot (ELTIS, 2015; STARS, 2019). Additionally, in Bremen users can buy a season ticket which combines carsharing and public transport. This extends the service of public transport and creates a more solid ridership base for public transport, allowing people to adopt less car-dependent lifestyles. To increase visibility, carsharing stations are also marked on the public transport map of Bremen (Glotz-Richter, 2016).

Invest in MaaS and mobi-hubs

Technology can help to improve user friendliness of carsharing, making it easier to book, access and use, while also facilitating multimodality. One of the technologies that focusses mainly on this is the Mobility as a Service (MaaS, cf. Insight Report 1 of MOBI-MIX) concept. The usage of MaaS can lure users towards carsharing, since this is one of the options that can be available in a MaaS application. Here, it is important to avoid that people use MaaS to shift from public transport to carsharing.
Furthermore, it is necessary to optimise the potential of carsharing through investments in mobility hubs. Mobility hubs foster the integration of carsharing, public transport and other shared mobility modes to reach one main goal: replacing private car ownership.
Thus, MaaS and mobility hubs represent an opportunity to integrate virtually and physically different means of active, public, and shared transport modes.

Adopt a mix of suitable carsharing models

As discussed, multiple types of carsharing exist, each with their unique features. Multiple studies (e.g., Lempert et al., 2019) show that depending on the type, different motivations and travel patterns exist. Aiming for a suitable mixture of carsharing models is key to start new services with a dedicated fleet in areas which are not yet on the radar of carsharing providers. Therefore, it is important for local authorities to keep an eye on the different forms and ensure their complementarity.

Rethink fiscal systems to create a mobility budget

Value-added tax (VAT) rates for carsharing are fluctuating around 20% in all European countries, and they are always at the same level as those for car rental. Since carsharing has a proven positive effect on public space, modal shift and liveability of neighbourhoods, VAT rates for carsharing could be reconsidered. In addition, current fiscal incentives for company and salary vehicles must be reformed as they are one of the biggest thresholds for further growth of carsharing. Fiscal stimuli for a mobility budget should be also considered. This system could offer employers and employees a number of alternatives for company cars. Within MOBI-MIX, the city of Antwerp is collaborating with three MaaS providers to engage companies which would normally provide their employees with cars (through mobility budgets). The aim is to provide employees access to a diverse mobility offer which becomes more convenient than the company car.

Include carsharing in more policy areas

In order to create an optimal policy framework, carsharing itself should be included in other policy areas, as it covers different topics such as mobility, public space, new housing developments and even social cohesion and work. Integration of carsharing in all these fields avoids conflicting legislation. For instance, fiscal policy can have an immense positive or negative impact on carsharing and access to an affordable shared car can make all the difference to find a job. To maximise integration, it might be useful to work with a carsharing and/or shared mobility officer (Eltis, 2019).

Include communication & awareness-raising campaigns

The integration of carsharing in parking and housing policies can have positive effects by reducing the number of cars in a city and the number of driven kilometres travelled by private cars. However, many citizens and stakeholders are still unaware of what carsharing is and how it works. Moreover, the transition from car ownership to the use of shared vehicles takes time. It is a mental shift which is not easy to make, yet having a chance to try carsharing can lead to longer term adoption. Therefore, governments and local authorities should inform and communicate the advantages of carsharing in improving the quality of life for inhabitants (Glotz-Richter, 2016):

- Mentioning carsharing in regular media reports (e.g., when discussing the issue in political committees).
- Using billboards (especially near public transport stops and stations).
- Running public awareness campaigns for carsharing (as opposed to marketing activities of specific carsharing operators).

Support carsharing as a sustainable solution to be integrated into SUMPs

A broader social transition towards shared mobility is based on embedding these sustainable solutions to private car ownership in policy papers, at governmental level.

Establishing an action plan for carsharing, containing ambitious and achievable goals on short and medium term, is the first important step and should also be part of a city's Sustainable Urban Mobility Plan (SUMP).

A SUMP is a strategic planning instrument that tries to meet the mobility needs of the inhabitants and businesses in a city where quality of life and liveability are central. It does this on the basis of existing planning methods, supplemented by the principles of integration, participation and evaluation. Within the mobility policy, SUMPs are therefore an important tool to steer people's mobility behaviour (Taxistop, 2016). Linked to carsharing, a SUMP should include measures in the field of parking policy, integration of carsharing in new housing projects and implementation of mobility hubs, and monitoring the use of space by (shared) cars. Considering carsharing as a component of the overall transport system is essential to maximise its social, environmental and economic benefits (Eltis, 2019). Nonetheless, as the case of Brussels demonstrates, strategies, regulations and agreements must be flexible enough to adapt to different innovative changes within the (car)sharing ecosystem.

The case of Brussels, Belgium

"The regulatory framework needs to keep up with innovation – more data sharing, new operation models, new types of vehicles".

Interviewee	Brussels Mobility (regional transport authority). Developing projects such as shared mobility, MaaS, electromobility.
Duration of service	Carsharing services active since 2003.
Types and size of car sharing	• 219 stations for 635 station-based vehicles (Cambio is the biggest one with 500 cars, GetAround, GreenMobility) • 140 free floating vehicles (Poppy) • Peer-to-Peer car sharing (CozyWheels) New operators showed interest in coming to Brussels
Motivation	Shared mobility (which includes car sharing) is one of 50 concrete actions of the vision for 2030 roadmap, in the framework of SUMP. The goal is to make car usage more efficient, by reducing the need for a personal car, since a private car is only circulating 5% of time, compared to 40% for shared cars.
City-wide coverage	The carsharing offer is unevenly distributed across the region, concentrating mainly in the city centre and in the inner neighbourhoods to the east of the canal. SB had incentives for covering more parts of the city. Cambio is covering the entire region. Others have a smaller coverage due to smaller operational size.
Regulation channel	CS regulated through parking. However, regulations are old (2012) and need to be updated. They were first drafted for station based, later adapted for free-floating. CS operator only pay 25€/car/year for parking. Challenges of the current regulation: 1. CS providers only share data once a year. The information is too spaced out, making it hard to keep up with the reality of car sharing, especially free-floating. 2. Regulations only apply to public parking. New operating models, like GreenMobility, are not covered since they operate in hotspots in private off-street parking 3. New types of vehicles appearing, e.g., Free to Move offers Citroën Ami, an electric quadricycle that can be driven from 14 years old. A new regulatory approach is needed to encompass all shared vehicles without specifying models, since these will continuously change.
Stakeholder engagement	Limited at first, but when shared mobility started flourishing in Brussels, the region hosted a meeting where the Shared Mobility Work Group formed. The group meets every 4-5 months to discuss topics such as new policies, parking regulations, citizens consultations, etc. Group members include a representative of each of the 19 communes and mobility operators. Recently, shared mobility will also be represented in the Regional Mobility Commission, a forum where new policies are presented, evaluated, and then taken forward to the government level.
Impacts on sustainability	Motorisation rate is going down in Brussels, as a result of improved quality of public transport (STIB & SNCB), a diversity of shared mobility options, and awareness raising regarding the cost of car ownership. In a study from Cambio (2016) among its users, it was estimated that each shared car can replace up to 8 private cars.
Barriers of car sharing adoption	Currently, street parking remains too cheap, disincentivising citizens to get rid of private cars. New regulations will make it more expensive, yet there is a lot of opposition. Nonetheless, this remains an incentive for car sharing operators to come.
Data sharing	Collecting basic information about trips (average duration and distance, number of trips, origin and destination of trips) and fleet (size, station location, number of users). Brussels had a pilot aggregating near real-time data from shared mobility operators. Origin and destination aggregated data was very useful to understand how services work and if regulations were being respected. The region is currently looking to start a new tender for data, which will feed into the MaaS architecture.

Share the municipality's fleet

In Belgium, research by Autodelen.net (n.d) showed that most of local governmental cars do not travel more than 10 000 km per year. During weekends and outside office hours, these vehicles are not used at all. A possible option for those unused vehicles during these times is to put them in a carsharing scheme as a sign of good leadership. This would be useful in further promotion carsharing and at the same time cities could optimise fleet costs. In Flanders, one in ten municipalities (including Mechelen and Ghent) share their private fleet when not in use (Autodelen.net, n.d. – b; Eltis, 2019). To keep up with carsharing developments, Antwerp might develop a new car management policy that looks more like a hybrid model. The local authority believes it is more convenient to own a smaller fleet that is shared with residents outside office hours, while also offering carsharing services for employees.

Introduce a Mobility Management Program for Employers

Another action a city might do to enforce carsharing is linking carsharing with the professional market. In several cities, extensive employer marketing and education campaigns have been instrumental to reduce single vehicle occupancy of commutes and are an excellent way in motivate people to use carsharing. In 2011, Paris introduced a Mobility Management Plan to decrease the carbon footprint of its own staff commuting to work. Employees can use alternative modes such as carsharing, bike-sharing or public transit instead of their own personal vehicles. As of 2018, France has implemented Mobility Management Plans for all employers with more than 100 employees. In Grenoble (the Grenoble Presqu'île travel plan), a mobility management plan was implemented for 16 000 users. This resulted in decrease of single car use to only represent 37% of all trips. Alternative trips represent more than 110 000 km per day (EPOMM, 2017). In 2019 these plans became mandatory for all French administrations, as well (Movmi, 2020). In the US, Seattle has been a leader in Transportation Demand Management (TDM) measures for years. "Commute Seattle" is an organisation working with the local authorities and all major employers in the region to reduce commuting in single occupancy vehicles. Programs are varied and include a large educational component (Movmi, 2020). In Antwerp, "Smart Ways to Antwerp" helps outline a sustainable mobility policy for companies. (Slim naar Antwerpen, 2021).

Maintain a balanced mix of users and locations

Maintaining a 'balanced' mix of users is important to carsharing success. For instance, neighbourhood users typically reserve vehicles for evenings and weekends. In contrast, business users generally reserve vehicles from Monday to Friday, during daytime hours. Hence, these two user groups complement each other. Since carsharing must compete with privately owned vehicles, car-haring vehicles must be distributed in a decentralised manner to satisfy a wide range of customer needs (Shaheen et al., 2010).

Ensure quality of carsharing provider

Local authorities can establish a quality standard or a certain certification for carsharing operators, especially when they offer support for setting up carsharing schemes.

This can help cities to make sure the quality of carsharing is adapted to their expectations. The city of Bremen requires carsharing operators to meet certain standards in exchange for using public space for stations and accessing other benefits from the city. Bremen initiated a certification for carsharing providers under the official German Blue Angel eco-label. Its main requirements are (Glotz-Richter, 2016):

- High service quality (24-hour reservation, 24-hour car pickup and return);
- A tariff structure based on time and mileage (e.g., no free kilometres);
- A tariff structure that encourages short usage periods;
- Low-emission, low-noise vehicles;
- Regular care and maintenance of vehicles.

In addition, accessing carsharing usage data is crucial for local authorities to monitor and measure the effects of carsharing, allowing to adapt and improve the offer. Data licensing can be negotiated with carsharing operators through both carrot and stick policy approaches. Cities can, for instance, offer financial or administrative support in exchange for data. In contrast, cities can also make it mandatory for operators to provide data in order to receive functioning permits. A common approach to delivering data is in the form of dashboards or monthly statistics. Standardising approaches across operators allows local authorities to analyse and use knowledge, while national or pan-European standardisation can facilitate comparison (Eltis, 2019).

Unfortunately, as Berlin's example shows, cities often lack data on carsharing usage. In turn, this prevents them from understanding the real impact and from formulating or adjusting carsharing goals and policies.

The case of Berlin, Germany

"The city can have some benefits in not intervening in the car sharing schemes (e.g., save time and money with tenders), but also many disadvantages (e.g., no power to influence development or request data)."

Interviewee	Senate Department for the Environment, Transport and Climate Protection
Duration of service	Berlin was one of the first cities that hosted carsharing. StadtAuto Drive (formerly StadtAuto Berlin) began in 1988 as a university research project aiming to demonstrate that carsharing was a viable option in Germany. Since then, the carsharing ecosystem has constantly evolved.
Types and size of car sharing	Approximately 10 companies with a total number of around 7.000 shared cars. FF: most companies SB: only about 100 cars
Motivation	All CS operators are private, and the city is not financing them in any way. Nonetheless, Berlin acknowledges their added value and the fact that the city would not be able to provide this service and bring such a high number of shared cars in such a short time, especially EVs. This way, Berlin can avoid the tendering process and has no need to manage.
City-wide coverage	CS is mostly concentrated in the city centre (2/3 of the vehicles), particularly along the train line that goes around it. There are attempts to expand the service into new neighbourhoods in the outskirts. Currently, about 60% of the city is covered.
Regulation channel	As the city offers no benefits for carsharing operators at the moment, it has no power to regulate and influence them. CS companies are asking for the same parking permits that citizens can access (10€/year), claiming to be beneficial for the city. However, the city knows SB can bring some benefits, but has no evidence for FF. For now, CS providers pay the regular parking price.
Stakeholder engagement	Berlin and carsharing operators have come in conflict due to a new law which requires operators to pay a fee for using public space, not just for parking, but also for advertising their brands. Shared mobility operators (including CS) formed a lobby to address the city as a group, and not bilaterally. Currently, the city is hosting workshops with the group and other departments to find a common ground and address issues collectively.
Impacts on sustainability	Impacts of CS are not currently understood due to lack of data from CS operators. However, an analysis conducted by ShareNow claims that carsharing helps solving the dilemma between precautionary measures people are taking to travel during COVID and congestion issues. Outside of the pandemic, carsharing and PT could be complementing each other, helping cities become more sustainable.
Barriers of car sharing adoption	Daily use of CS can get expensive, compared to owning a car, so most families use it sparingly. Besides, as station-based CS requires ceding parking spots from public space, citizens are not happy with this (determining to a low number of SB vehicles).
Data sharing	Berlin is conducting the first exercise in CS data collection, asking companies about the number of cars deployed, where they operate, the number of users they have, what type of engines vehicles have, average trip length/duration, how often vehicles are used, etc. Some CS operators are refusing to share data, and there are ongoing discussions to reach an agreement.

Learning from carsharing failures

In Paris, the Autolib' scheme was in place from 2011 until its collapse in 2018. The shared cars were all electrical in a free-floating model with pool stations. The scheme ended due to multiple reasons, starting with a decline in interest. In 2016, the number of Autolib' subscribers reached a peak of 110,000. However, by the end of 2017, that number fell back to 102,000. Autolib' was partly a victim of its own success since its fleet of 4,000 EVs did not seem to be large enough to satisfy demand, leaving users frustrated when they were not able to find a car in their neighbourhood. Another explanation for the drop in users relates to the state of the self-service cars which were sometimes dirty, damaged and increasingly used by homeless people to sleep in. At the same time, Autolib' faced fierce competition from the growth of cheaper ride-hailing apps like Uber, which were considered easier to use. The combination of those elements made the scheme collapse when it ran into debt and the local government refused to compensate the company for any losses. Now it is replaced by multiple smaller carsharing organisations (Futura mobility, 2018; Thelocal.fr, 2018) and the City of Paris is successfully managing the Mobilib programme (see the following page).

Carshare programmes can also fail when they are not well adapted to the specific local context.

For instance, in the city of Rennes an experimental programme of residential carsharing was created. One shared car of a business company was added in a residential lower middle-class neighbourhood. This shared car was seldom used by private car owners and attracted mostly non-motorized vehicle users (cyclists, pedestrians, and public transport users). In this case, the amount of private car owners and car miles travelled actually increased when this shared car was installed. This was certainly the opposite effect to what was expected from this experiment. To avoid such results, the implementation must adapt to the local context. A first action is communication. In this particular case, in Rennes, it would have been important to show families a simulation of their future mobility without a personal car. This could have included workshops where people could see different alternatives and how each of them worked. A second action is making sure to incentivize people to use their mobility budgets for sustainable means of transport, instead of buying/using private cars. Furthermore, attracting more people towards carsharing, was done by making constraints for owning a personal car, e.g., make finding a parking spot more difficult. Creating positive incentives, e.g., providing nice parking for shared cars, did increase the number of carsharing users as well (Audiar Rennes, 2017).

The case of Paris, France

"Local authorities can have a big leverage in influencing the development of carsharing through parking regulations, and this can help them maintain coherence with other mobility measures (e.g., zero emission zones)"

Interviewee	Shared Mobility Development – City of Paris (authority over the city of Paris - 2 million inhabitants, not over the metropolitan area - 4,5 million or the region - 12 million).
Duration of service	First shared cars started with "Caisse Commune" in 1999. In 2007, the city started being interested and established a car sharing label, awarded to those guaranteeing quality and accessibility. The city granted compliant CS operators parking places. In 2011 Autolib arrived, providing 4000 electric vehicles and over 6000 charging points (3.000 in the city). The Autolib system was free floating with pool stations. After several issues with the delegated company, the service stopped in 2018. In 2015, the City launched Service de Véhicules Partagés (SVP), offering more than 200 station based roundtrip carsharing parking places to foster alternatives to trips done by private car. In 2019, after a sixfold increase, the supply was renamed Mobilib'. The city also created a parking label for this station-based system.
Types and size of car sharing	SB: 5 operators (Ubeeqo, GetAround, Communauto, Ada, Clem) & 1500 station-based shared cars. Around 185 out of 436 stations include electric charging points. SB service also includes around 250 shared commercial electric vehicles, provided by Clem in 54 stations. FF: 3 operators (ShareNow, Free2Move, Zity) & 1800 shared cars, all electric
Motivation	All CS operators are private, and the city is not financing them in any way. Nonetheless, Berlin acknowledges their added value and the fact that the city would not be able to provide this service and bring such a high number of shared cars in such a short time, especially EVs. This way, Berlin can avoid the tendering process and has no need to manage.
City-wide coverage	Stations are well distributed around Paris, after the city analysed residential density and potential to foster multimodality to improve locations and distribution.
Regulation channel	The Regional Authority in charge of mobility (Ile-de France Mobilité - IDFM) created a quality label for which car sharing providers can apply. To obtain it, providers must comply with certain requirements and guarantee good services for the community, besides sharing data. The label has also helped to prevent other drivers from parking on Mobilib' places, as the highway code recognises the car sharing label. Carsharing parking spots are clearly marked through signs and street painting.
Stakeholder engagement	Every provider can bring their service to the city. However, to benefit from the car sharing label (parking in public places), they must participate in competitions launched by the city. The regional label has a series of requirements, which are later evaluated by IDFM. If it is accepted, the provider will receive the label for 4 years, which can be renewed.
Impacts on sustainability	A station-based shared car can replace between 5 and 8 personal cars, freeing up public space which can be better valued. Carsharing users are notably more multimodal than average citizens, contributing to car traffic and pollution reduction. Besides, carsharing vehicles are generally newer and less polluting than private vehicles, offering many people a chance to use electric vehicles (which might still be too expensive to own).
Barriers of car sharing adoption	Electric vehicles depend on the vehicle's autonomy and the charging stations available outside of Paris, so users need to check in advance if there are charging points available where they're going.
Data sharing	Through the label, operators must share basic service data (number and location of stations, availability of vehicles, etc.) and ridership data (e.g., number of trips, number of km, number of active users, etc.) every 6 months. Besides, operators must compile a yearly report which also includes information on user profiles.

Part 3 – The impacts of implementing carsharing

The different policy actions and recommendations stipulated above show that there are multiple actions through which local authorities can play a vital role to ensure carsharing is successful. However, there is no solution that suits all cities, and the strategy should be developed depending on local circumstances.

In large sized cities (> 500.000 citizens), carsharing can be provided by large, profit-oriented firms. These companies are capable of offering efficient and flexible services, using the most advanced technologies with highly differentiated and customised prices. In medium and small sized cities (< 500.000 citizens), the challenges for carsharing operators are much greater. The demand is often lower here, as a result of a mix of unfavourable factors (e.g., higher car ownership level, larger parking availability and less public transport possibilities). To make carsharing work, a different business model for the provision of carsharing is required. This needs to be more socially oriented, seeking greater involvement of local municipalities and public transport operators to offer a favourably priced service (Eltis, 2019; Liao et al., 2020; Rotaris & Danielis, 2018).

The impact that cities can expect is also related to this, both in the short- and long-term.

Short term implications

In the short term, cities should seek to cooperate with the providers of carsharing, citizens and wider communities. Setting-up pilot projects is an ideal way to do this. This allows them to gather know-how and do some fine-tuning on the type(s) of carsharing they want to implement in the long term. Other short-term implications require the set-up of a legislative framework, and the provision and design of public space for shared cars (Eltis, 2019). Setting and achieving realistic goals is important, learning from cities where carsharing is more advanced.

Long term implications

Once the short-term goals have been met, cities have to keep on improving the way they handle carsharing in their city. To meet more ambitious goals, more advanced measures will be necessary. In the longer term, a larger group of users will start to show travel behavioural changes. Replacing their (hypothetical) private car with a shared car is the main long-term goal for most current leading carsharing cities.

Despite continuing, debates on the impacts of carsharing, multiple studies (e.g. Ballús-Armet et al., 2014; Firnkorn & Muller, 2011; Liao et al., 2020; Namazu & Dowlatabadi, 2018) show that each carsharing system has a different impact on users and the environment.

These studies found that station-based systems have the highest potential to reduce car ownership, whereas free-floating systems have the lowest potential. Users of peer-to-peer carsharing tend to use the shared vehicles as a replacement for the classic car rental rather than for daily use (ShareNorth, 2019).
The main reasons that non carsharing users cite for not trying the service (although, in principle, they think it is a good idea) is their perception as inconvenient and unavailable when needed. Changing this mindset is not easy, although carsharing providers and municipalities can adopt certain strategies to enhance the support and demand for carsharing. Providers should highlight the benefits of carsharing use, including addressing the *perceived usefulness.*

Furthermore, clever marketing strategies should be applied to lower the threshold to try carsharing, for instance, with demonstrations and carsharing mentoring schemes that prove the reliability and ease of use of carsharing services (cf. communication). The last recommendation is related to the use of the private car. Behaviour, and especially mobility habits are difficult to change. Therefore, municipal governments should make it more difficult to use private cars inside of cities, promoting active and shared travel modes by making them easier to access than individual cars (ShareNorth, 2019).

Shaheen et al. (2019) found that the main overall impacts of carsharing are the following: the larger amount of sold vehicles and more delayed or foregone vehicle purchases.
There is an increase in the use of some alternative transportation modes (e.g., walking, biking) and in access and mobility for formerly carless households. The researchers also found a reduction in vehicle miles/kilometres travelled (VMT/VKT) and a reduction in fuel consumption and greenhouse gas (GHG) emissions. Finally, they foresee greater environmental awareness. 29% of people that started carsharing in Philadelphia became more aware of the environmental impact of car use after joining the carsharing programme (Lane, 2005; Kawgan-Kagan, 2015).

The impact of the COVID-19 pandemic on carsharing and potential future development

The recent health crisis had significant consequences on the way we move, all around the world. As many countries have imposed lockdowns and encouraged distance working and learning, the need to travel decreased significantly. However, the COVID-19 pandemic has had unequal impacts on different transportation sectors, leading, on the one hand, to a crash in the aviation market and a decrease in public transport, and, on the other hand, to an increase in private transport means and walking (Heinrich-Böll-Stiftung, 2021).

Certainly, physical distancing and cleanliness have been important to avoid contamination with the virus. A survey by MobilityTechGreen showed that those two criteria are also vital in the choice for a transport mode. Carsharing offered many a safe way to travel. People without a private vehicle have been able to hire a shared car and avoid being in contact with too many people while travelling. Of course, car sharing providers had to invest resources in biosecurity measures to satisfy governmental requirements and give users higher safety standards that encourage use. These measures were more frequent cleaning of vehicles, hydroalcoholic gels and disinfectant wipes in the car (MobilityTechGreen, 2020). Increased operational costs (e.g., for sanitation) and the difficulty to reach profitability might lead to a potential consolidation process (less operators in the market).

Despite these efforts, the consumers' concern for the hygiene of shared services had a clear impact on demand. McKinsey found that below 10% of users reported feeling shared services to be safe (McKinsey, 2020). Further, lockdowns decreased also the urgency to move around since economic activities were reduced to a minimum or performed remotely (Mount et al., 2020)

Different surveys coincide in pointing out that between 17% and 40% of respondents intend to use more of their personal cars, with 25% reporting using it as their exclusive transportation mode going forward (BCG, 2020; IBM, 2020). This is likely to apply to people already owning a car, but this might also translate to increased car ownership, too. Available evidence suggests that car purchase intent is on average at around 10%, still below pre-pandemic levels, although it has grown up four percentage points from the beginning of the first wave. Similarly, Garaus and Garaus, (2021) found that the perceived physical risk of contamination results in a negative effect on the likelihood of using a shared car.
Nonetheless, the need to reorganize public transit to make it more flexible, coupled with the consumers' shift towards micromobility offers cities a good incentive to integrate the different travel modes physically, while also paving the road for Mobility-as-a-Service (MaaS) developments.

Part 4 – Conclusion

In conclusion, carsharing is a transport means that can bring multiple advantages and can be a tool in making cities more liveable. Carsharing has the potential to reduce the need for parking space, the number of cars and CO2 emissions. Although different types of carsharing and multiple business models exist, the factors ensuring success are similar across cities. On the one hand, a city can implement certain measures to induce behaviour change, such as parking management, communication and rethinking fiscal systems. On the other hand, local authorities can make investments to help carsharing flourish and create the right circumstances for carsharing providers.

Although the impact of carsharing is visible both in the short and in the long term, few studies have been able to demonstrate causal impacts. The three step methodology developed in MOBI-MIX will bridge this gap, showing the effects of carsharing pilots primarily in the city of Rotterdam.

Nevertheless, as this insight report has shown, there are already numerous good practices and valuable lessons to learn from. Cities wanting to implement a carsharing system have the necessary tools to avoid potential negative impacts. Hopefully, this insight report supports local authorities in this sense, providing them with insights on how carsharing can contribute to reaching wider liveability and decarbonisation goals.

Part 5 - Further reading and references

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