



# STARS

Shared mobility opportunities And  
challenges for European cities

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# **The growth of car sharing in a business as usual scenario**

## **Deliverable D2.3**

Version n° 1.3

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## Acronyms

<b>APPS</b>	Mobile applications	<b>MaaS</b>	Mobility as a Service
<b>CAWI</b>	Computer Assisted Web Interviewing	<b>P2P</b>	Peer-to-Peer
<b>CS</b>	Car sharing	<b>PHEV</b>	Plug-in Hybrid Electric Vehicle
<b>EV</b>	Electric Vehicle	<b>PT</b>	Public Transport
<b>FFOA</b>	Free Floating with Operational Area	<b>RTHZ</b>	Roundtrip homezone-based
<b>FFPS</b>	Free Floating with Pool Station	<b>RTSB</b>	Roundtrip station-based
<b>FMLM</b>	First-Mile, Last-Mile	<b>SUMP</b>	Sustainable Urban Mobility Plan
<b>ICE</b>	Internal Combustion Engine	<b>WP</b>	Work Package
<b>LTZ</b>	Limited Traffic Zone		

## SUMMARY

Car sharing is rapidly evolving over the last years. The interests of many car manufacturers in the car sharing market are witnessed by the introduction of new typologies of car sharing (free floating systems) mainly in selected large cities, that need a huge initial investment in order to be operative. A larger diffusion of car sharing services around the cities make the service itself more visible to the potential users; then the established maturity of the organisations is making car sharing a more viable option to the eyes of the city population.

Given such trends in the recent past, how car sharing will evolve in the near future? Are other actors going to be involved in the car sharing market? Will we have the same typologies of service or something is going to change? What will be the actions of the policy makers and the city administrators in respect to the car sharing?

The present research report aims at giving a qualitative picture of car sharing, its growth perspectives and evolutions in the near future, according to the action that are already being planned from the car sharing operators. A particular attention will be given to the main opportunities and barriers deriving from the local and national car sharing policies.

In the first chapter of the report are described the materials used and the methodology adopted to carry out the analysis in order to pursue the main goal.

The second part provides new insights on the expected changing in the car sharing panorama, such as the diffusion of different services, their territorial extension, the fleet composition and the number of customers, seen through the operators' point of view.

Finally, the analysis of the main national and local car sharing policies, the beneficial actions that will boost its diffusion and the main barriers seen through the eyes of car sharing organisations and city administrations is carried out.

# 1 Introduction and research method

## 1.1 Introduction

This document contains the results of the analysis carried out on the basis of the collected information about the development plans of sharing mobility schemes in the short and medium term, which are already being prospected in the European cities identified in deliverable *2.1 - Car sharing in Europe: a multidimensional classification and inventory*, by different service operators, industrial players and policy makers.

The main goal pursued in this task is to forecast, in a qualitative way, the growth of car sharing under a business as usual scenario, therefore simply taking into consideration the above mentioned stakeholders' views. This was achieved by collecting information that will allow the STARS team to understand the natural evolution of this mobility service through the expectations and the actions put in place or being planned. On one hand, the investigation deals with the way in which car sharing systems are likely to evolve; on the other hand, what the main national and European policy barriers and opportunities are and how they are implemented by decision makers and city administrations.

It is important to underline that, unlike the project WP5 where the full potential of car sharing will be assessed through the definition of rupture scenarios based on the technological and human potential of car sharing systems, this task will exploit the natural evolution.

## 1.2 Research method

Different sources are considered to better understand the possible evolution of car sharing in the short-medium period from different stakeholders' point of view:

- **In-depth survey administered to the CS operators:** The interview is conducted using a CAWI methodology (Computer Assisted Web Interviewing) by sending the web survey link to the operators. Before starting the survey, each interviewee needs to read, understand and accept the terms indicated in the informed consent, following the ethics clearance processes which are setup in STARS Deliverables 8.1 and 8.2. The survey contains 84 questions referred to a large range of topics and it has required, on average, one hour of time to be completed. Questions vary among topics such as juridical form of the operator, technological features, reservation options (e.g. possibilities for last minute vs. long before actual use), financial characteristics (deposit, price per hour, per kilometre ...). Many of them have been already





analysed in the deliverable *2.1 - Car sharing in Europe: a multidimensional classification and inventory*. A complete list of the questions is reported in Appendix 1.

- **City administration survey:** The interview is conducted using a CAWI methodology by sending the web survey link to city administrations. As mentioned above, also in this case before starting the survey, each interviewee needs to read, understand and accept the terms indicated in the informed consent. The survey is composed by 31 questions targeted to transport policy makers at the local level and it has required, on average, one hour and seven minutes of time to be completed. It contains relevant questions about existing driving conditions, existing transport policies, existing public transport conditions, existing car sharing conditions, public sector support and technology readiness in the cities where car sharing organisations are operating. A complete list of the questions is reported in Appendix 2.

### 1.2.1 In-depth survey administered to the CS operators

Among all the questions reported in Appendix 1, in this document only specific ones focusing on the expected services evolution within each country as well as in each organisation interviewed under the current market conditions will be analysed. In particular, questions from Q53 up to Q84 will be analysed.

As reported in chapter 3 of the deliverable *2.1 - Car sharing in Europe: a multidimensional classification and inventory*, the STARS consortium selected 28 cities spread over 12 EU countries. In January 2018, 56 responses from different CS operators out of 20 cities in 12 different countries via an extensive online survey have been collected. Nevertheless, a small group of 12 car sharing operators has been discarded, since they did not answer to any question among those analysed in this deliverable; thus the sample is composed by **44 services** operating in 17 cities of 10 different countries, listed in Table 1.

Most of the analysed questions are 5 points semantic scales, so that the interviewee can only indicate one grade of the scale, i.e. from extremely decrease to extremely increase. Different kinds of representations are used, including pie charts, bar charts and tables to show the result of these questions. For one question the computation of the average value from a semantic scale is also used, by assigning a numerical value to each element of the scale, ranging from 1 (most negative) to 5 (most positive).

Other related questions are not only oriented to understand what the expected changing in the car sharing sector are, but they also investigate the reasons behind the indicated trends, by using open-

ended questions. For these open-ended responses a semantic analysis has been used, where each answer has been analysed and simpler labels extracted. Using this approach, it was easier to detect common reasons shared among different operators.

Questions were also disaggregated on a country basis: only for three nations (namely, Germany, Italy and Belgium) we collected a sufficient number of answers which allowed us to have a sufficiently representative sample of the prevailing operators' views in those countries. Table 1 shows the sample breakdown by country, where the three above countries are marked in bold.

Country	City/Cities	Car sharing operators answering the task questions	Car sharing operators answering the task questions [%]
<b>Belgium</b>	<b>Brussels, Gent</b>	<b>7</b>	<b>15,9%</b>
Bulgaria	Sofia	1	2,3%
France	Paris	1	2,3%
<b>Germany</b>	<b>Berlin, Bremen, Köln, Mannheim</b>	<b>12</b>	<b>27,3%</b>
<b>Italy</b>	<b>Milan, Rome, Turin</b>	<b>12</b>	<b>27,3%</b>
Latvia	Riga	1	2,3%
Netherlands	Amsterdam	2	4,5%
Spain	Barcelona, Madrid	2	4,5%
Sweden	Göteborg	3	6,8%
United Kingdom	London	3	6,8%
<b>Total</b>		<b>44</b>	<b>100,0%</b>

**Table 1: In-depth survey respondents per country. Countries with a good sample size are marked in bold**

Additionally, for some questions it was interesting to explore how the belonging to different car sharing schemes impacted on answers. Therefore, answers were also disaggregated according to the category of car sharing already defined in deliverable 2.1 - *Car sharing in Europe: a multidimensional classification and inventory*. Such categories are recalled below, while related descriptive statistics are in Table 2:

### Roundtrip services

Car sharing services operating in a roundtrip system represent about 55% of all respondents who took this survey. Of these services, nine out of ten are working with the station based variant (shared cars must be brought back to the same parking place). The share of home zone based operators (shared cars must be brought back to the same neighbourhood) is around 10%.

## Free floating services

Free floating car sharing services represent almost one third of the total research population (30.3%). The sample extracted for the specific purpose of this task, is composed by a higher percentage (36.4%). In both cases there is however a gap between the respective shares of the ones with operational areas (FFOA) and pool stations (FFPS). The first represents 95% of the answers, the second only 5%: unfortunately, only one operator with pool stations took our in-depth survey.

## Peer-to-peer (P2P) services

This type of car sharing is representing 14% of the entire research population and the 9% of the sample extracted for this task.

Category of car sharing	Operators involved in the in-depth survey	Operators involved in the in-depth survey [%]	Operators answering the task questions	Operators answering the task questions [%]
<b>Free Floating</b>	<b>17</b>	<b>30,3%</b>	<b>16</b>	<b>36,4%</b>
<i>FFOA</i>	<i>16</i>	<i>28,5%</i>	<i>15</i>	<i>34,1%</i>
<i>FFPS</i>	<i>1</i>	<i>1,8%</i>	<i>1</i>	<i>2,3%</i>
<b>Peer-to-Peer</b>	<b>8</b>	<b>14,3%</b>	<b>4</b>	<b>9,1%</b>
<b>Roundtrip</b>	<b>31</b>	<b>55,4%</b>	<b>24</b>	<b>54,5%</b>
<i>RTHB</i>	<i>3</i>	<i>5,4%</i>	<i>2</i>	<i>4,5%</i>
<i>RTSB</i>	<i>28</i>	<i>50,0%</i>	<i>22</i>	<i>50,0%</i>
<b>Total</b>	<b>56</b>	<b>100,0%</b>	<b>44</b>	<b>100,0%</b>

Table 2: In-depth survey respondents per category of car sharing

Since the sample dimension falling in the different categories of car sharing is quite different, percentages as well as absolute values are used in the following analysis to better support considerations on the observed perspectives by different car sharing services.

## 1.2.2 City administration survey

In order to get a broader view on the current mobility policies adopted by different European cities, in particular their impact on the car sharing developments the STARS consortium spread a web questionnaire among 20 city administrations of 12 different countries, on the base of the results of the in-depth survey. The idea was to obtain the decision makers' point of view about the current mobility policies and their direct and indirect impacts on car sharing services, especially in those cities where the car sharing organisations interviewed in the other survey are operating in.

Through the city administration survey, we could find relevant data about existing driving conditions, existing transport policies, existing public transport conditions, existing car sharing conditions, public sector support and technology readiness.

At the end of April 2018 **seven cities** located in Belgium, France, Italy and Netherland responded out of 20.

This questionnaire is mainly composed by multiple-choice questions, plus some open-ended ones where a description of the relevant measures and/or the link to external sources (documents, laws, mobility policy plans) was asked. The purpose was to help the STARS consortium to understand the actions put in place by each city administration. The analysis of the feedback of this questionnaire has been less structured compared to the previous one, given the need to analyse a lot of qualitative information retrieved from the policy documents to which we have been pointed by the survey respondents.

Since there are no German cities who answered the survey while we had a lot of German car sharing operators which provided information through the former survey, Bundesverband Carsharing e.V. (bcs), as member of the STARS consortium contributed a passage on national and regional German car sharing policies. This is based on German car sharing surveys done by diverse institutions, bcs own surveys, an internal bcs working group on e-car sharing and bcs knowledge in general.

## 2 Operators' views on the evolution of current car sharing systems

Answers analysed in the following subheads refer to the development perspectives of the car sharing sector in 10 different European countries.

A first set of questions are referred to the general perspective of the car sharing sector in the country where the service is operating (Q53 – Q67, Appendix 1), while the second set is more focused on a self-assessment of the future perspectives of each individual service (Q68 – Q80, Appendix 1).

### 2.1 General perspectives at the country level

In order to understand the car sharing perspectives in different European countries, it was asked to each car sharing organisation to give its point of view about the more likely growth trend and further expected evolutions not only in the city where it is operating but at national level.

#### 2.1.1 Expected changes in the number of car sharing users and operators

A couple of questions wanted to investigate how the number of car sharing active users as well as the number of car sharing operators are going to change over the next 5 years (Q53 and Q55 respectively). The answer could be chosen in a range between extremely decrease and extremely increase. Both questions have a sub-question, where it was asked to motivate why the car sharing users and operators will evolve in the indicated way.

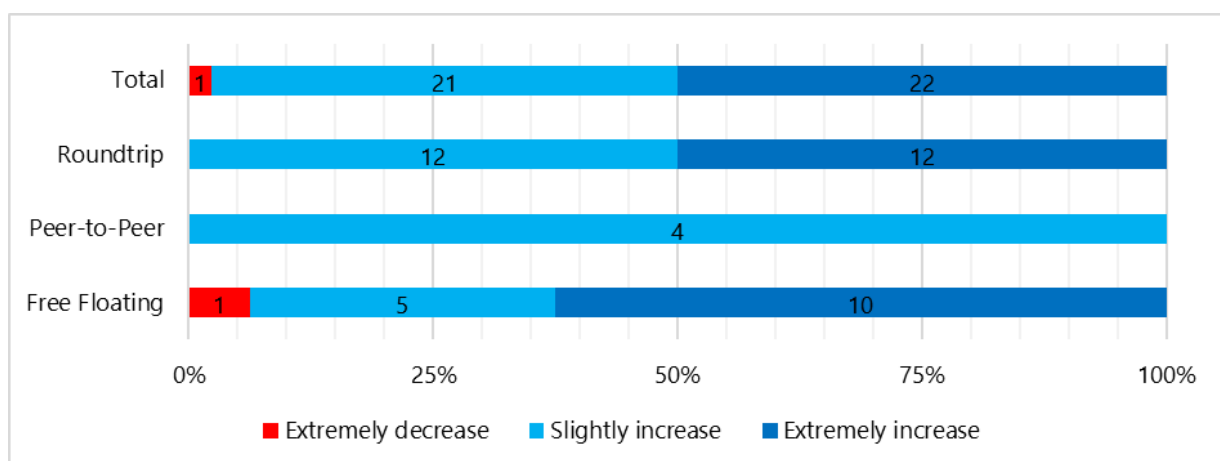


Figure 1: Changing in the number of car sharing users by category



Figure 1 above shows a set of bar charts referred to the expected number of car sharing users in the next five years: the first bar represents the total number of collected answers while the other ones represent a disaggregation of the answers grouped by different category of car sharing, as defined in paragraph 1.2.1 of this document.

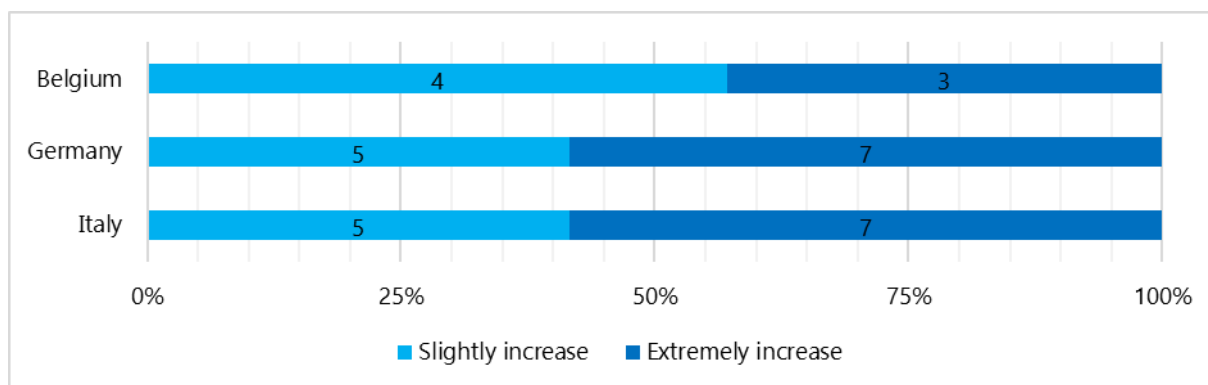
The first bar in Figure 1 shows that almost all the interviewed operators (98%) forecast an increment of car sharing users over the next five years.

The following motivations are given as a support of their expectations:

- population who lives in the cities is increasing;
- car sharing services are gaining in popularity;
- the increasing of car ownership costs and new mobility attitudes, especially related to the concept of using a car only when you need instead of owning a car;
- parking problems;
- more people are aware of air pollution problem.

Looking into the different categories, roundtrip schemes have half of the respondents that forecast a slight increase in the number of users while the other half a stronger increase. On the other hand, free floating operators seem to have a more optimistic perspective since the two third of them believe in an extreme increase in the number of users, even if one of them expects an extreme reduction without indicating a motivation.

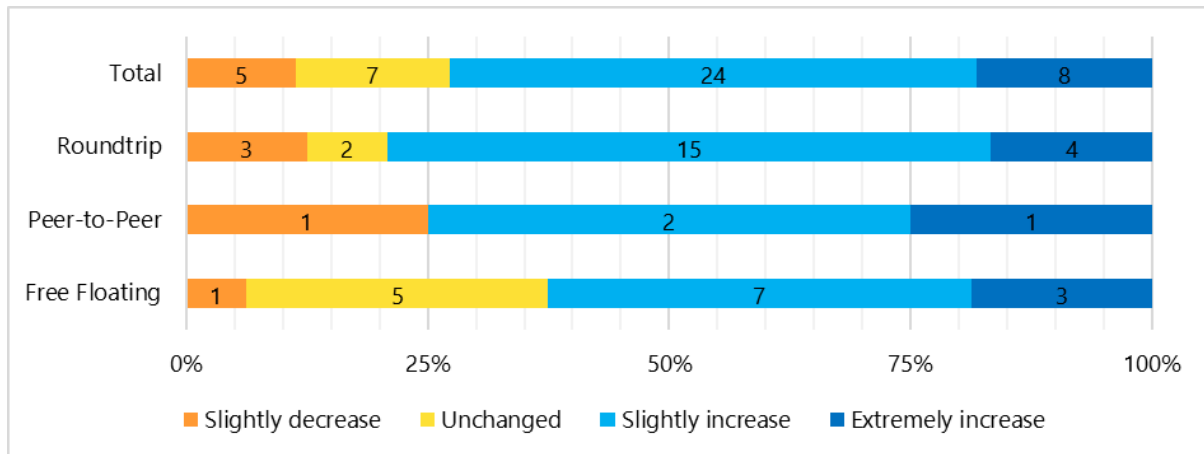
Future changing in the number of car sharing users in those three countries mentioned in the paragraph 1.2.1 are showed in Figure 2 below.



**Figure 2: Changing in the number of car sharing users by country**

Belgian operators seem a bit more cautious, while German and Italian operators foresee an extreme increase in the number of car sharing users, probably supported by the results achieved in recent years. (STARS, 2018)

Figure 3 below shows slightly different expectations about the number of operators in the future.



**Figure 3: Changing in the number of car sharing operators by category**

Referring to the aggregated answers, the largest part of the interviewed operators continues to think that the number of operators will increase but not so sharply. The main reasons are:

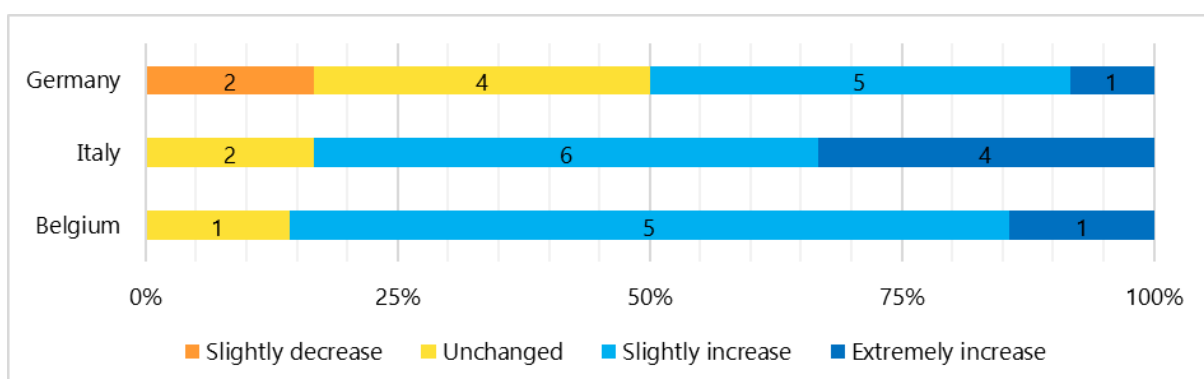
- the increasing demand;
- market opportunity: the potential of the car sharing market has not been saturated yet, on the contrary it is going to expand, and this will attract new players;
- urbanization and diffusion of smartphones.

On the other hand, in contrast with the previous category, there is a group of interviewed which forecast a slightly decrease in the future number of operators, mainly because of:

- the competition between operators;
- merging of different medium-small operators into a large operator;
- operative costs are increasing, so only large operators can be able to face them.

Finally, the common motivation given by the operators which expect an unchanged situation is related to the attractiveness of the car sharing industry together with a huge quantity of investments required by the business model: in one hand big operators will enter in the market but on the other hand some operators will leave the market, because their economic resources are not enough.

As done before, a disaggregation by country is presented in the following Figure 4.



**Figure 4: Changing in the number of car sharing operators by country**

In this case German car sharing organisations think it is more likely a slight increase in the number of operators but a good number of them forecast an unchanged situation. This is not the case of Italy and Belgium, where most of the operators believe in a slight or even strong increase in the number of car sharing providers.

## 2.1.2 Diffusion of different services

More specific questions about the diffusion of different typologies of car sharing at the national level were asked (Q57 and Q59): the interviewees could choose an answer ranging from extremely reduced to extremely more widespread. Figure 5 and Figure 6 show the perspective at country level of disaggregation.

It is interesting to observe that while in Germany and Belgium a balanced growth is expected for different typologies of car sharing, in Italy the situation is the opposite: 8 out of 12 organisations think that free floating is going to be extremely more widespread, while an extreme reduction in station based car sharing is expected.

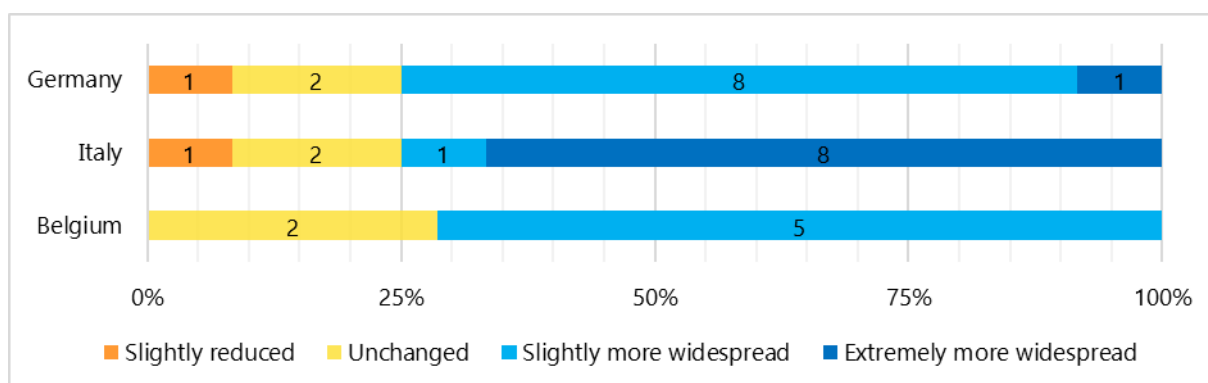


Figure 5: Diffusion of free floating car sharing services by country

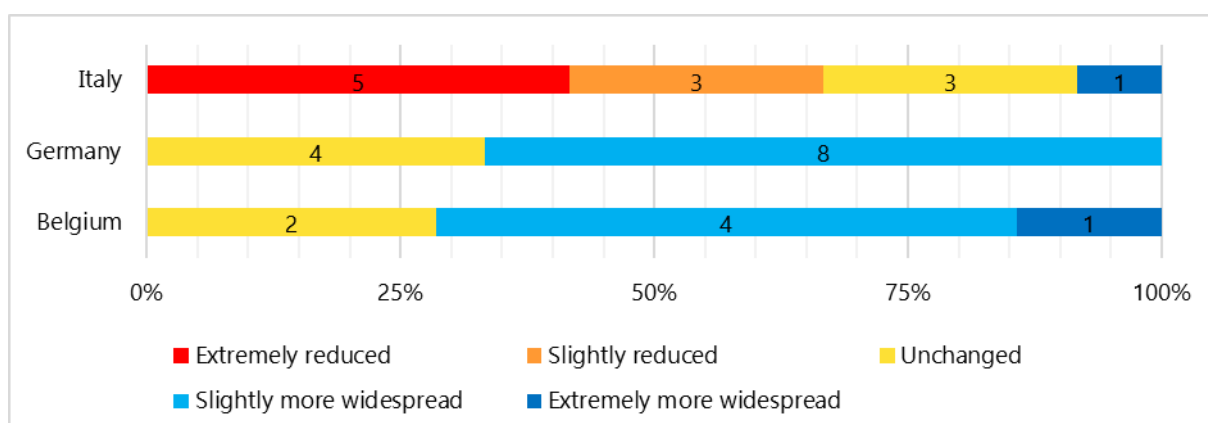
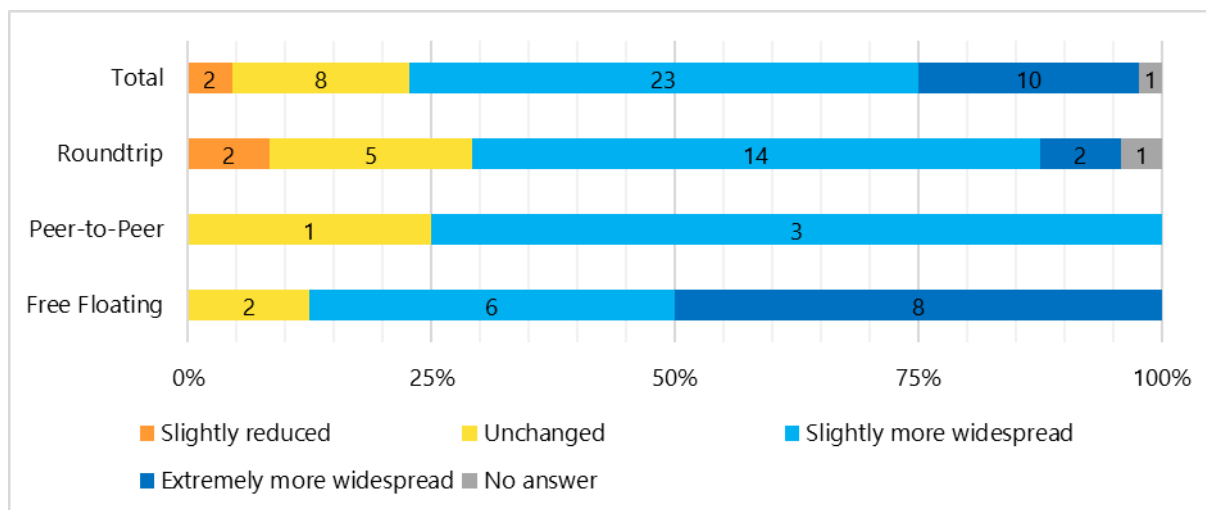


Figure 6: Diffusion of station based car sharing services by country

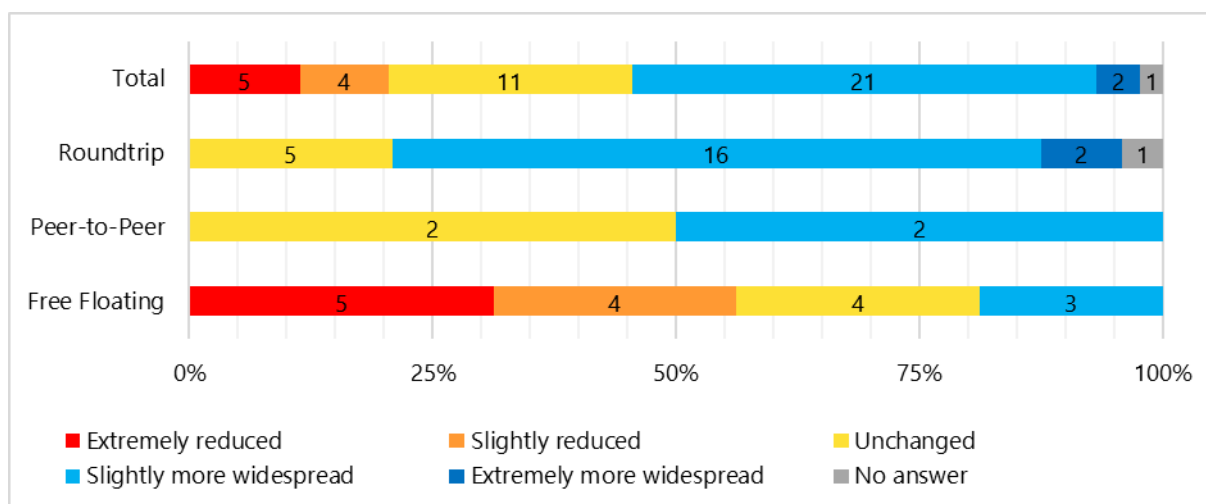


This is partially explained by the high number of free floating car sharing organisations operating in Italy that take part to the survey, and by the closing or resizing of some station based services occurred over the last years.<sup>1</sup>

Figure 7 shows the foreseen diffusion of free-floating systems, according to the kind of service operated by the respondent. Similarly, Figure 8 shows the diffusion perspectives of station-based car sharing services.



**Figure 7: Diffusion of free floating car sharing services by category**



**Figure 8: Diffusion of station based car sharing services by category**

Comparing Figure 7 and Figure 8, from the operators' point of view both services are going to be slightly more widespread: a common given explanation is the increasing of the market opportunities as a consequence of the increasing demand. The increasing demand is also the main motivation

<sup>1</sup> [http://torino.repubblica.it/cronaca/2017/03/10/news/io\\_guido\\_chiude\\_addio\\_dopo\\_15\\_anni\\_al\\_car\\_sharing\\_pubblico-160239859/](http://torino.repubblica.it/cronaca/2017/03/10/news/io_guido_chiude_addio_dopo_15_anni_al_car_sharing_pubblico-160239859/)

among the 10 respondents who forecast an extremely more widespread diffusion of free-floating car sharing systems.

Referring to free-floating systems only, its higher flexibility and the recent performances enhancement due to logistic improvements are also used by the respective operators to motivate this future trend through the open-ended question Q58.

On the other hand, station-based systems were referred to be slightly more widespread in the future, because of parking problems and the increasing cities support to these services.

Another interesting aspect emerging from the analysis of the answers is related to the different lines of thought of the organizations providing different services: for the station-based operators the diffusion of both types of service is comparable; on the contrary, for free-floating operators, only their scheme will grow while the station-based service will have an extreme reduction in terms of diffusion (about 12% of the total stated so): unfortunately, no one gave a motivation of the statement. In other words, operators tend understandably to be relatively more optimistic on the expansion of the kind of service that they operate.

### 2.1.3 Relationship with public transport

Concerning the relationship between car sharing and public transport, a specific question was oriented to understand to what extent the car sharing will take away customers from public transport (Q63). The resulting answers are reported in the Figure 9 below.

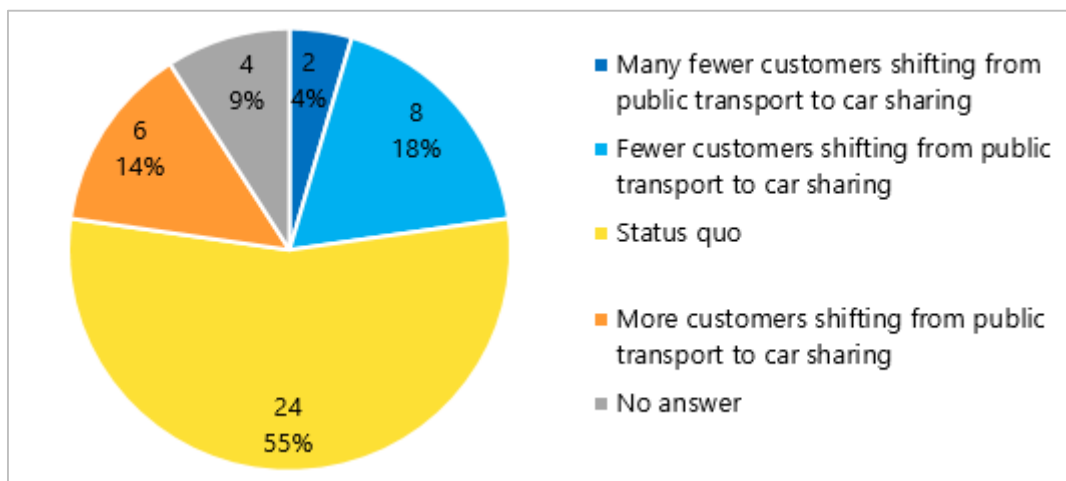


Figure 9: Customers shifting from public transport to car sharing

Most of the operators believe there will be no difference compared to the current situation in the customers shifting from public transport. The main motivation among the operators falling in this category is the complementarity of the services: the public transport and the car sharing services are

not in competition to each other but together they aim to reduce the dependency from the use of private cars; in this perspective, an increasing use of car sharing services will push up the use of public transport and vice versa.

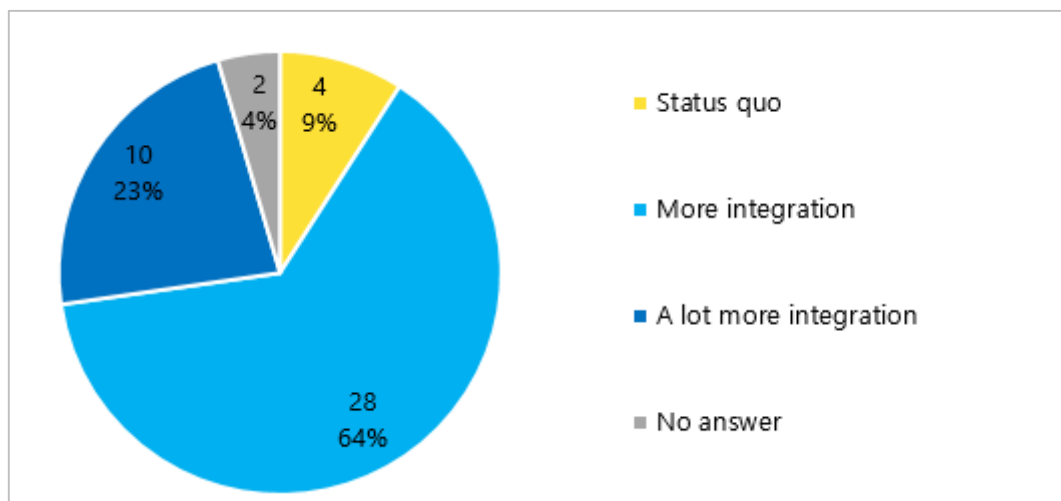
Finally, one interviewed gave a more exhaustive answer stating that the future shifting from public transport to car sharing will depend on the evolution of three elements:

- typology of car sharing service: more diffusion of free-floating car sharing will reduce the use of public transport;
- technology: autonomous cars will probably decrease the demand for public transport;
- government policy choices: decision makers will play an important role choosing to cut or invest in public transport.

A quarter of the respondents think that less public transport users in the future are going to change their mobility habits in favour of car sharing, simply because the two systems are not in competition as most of the respondents stated.

On the other hand, 6 respondents think that there will be more customers coming from public transport to car sharing: the main motivation is that car sharing can offer a more tailor made solution than public transport in terms of flexibility, comfort and privacy.

Regarding the relationship between car sharing and public transport, it was also asked to car sharing operators: Q64 - *"To what extent do you expect that car sharing services will integrate into the offer of public transport compared to the actual situation?"*.



**Figure 10: Integration between public transport and car sharing**

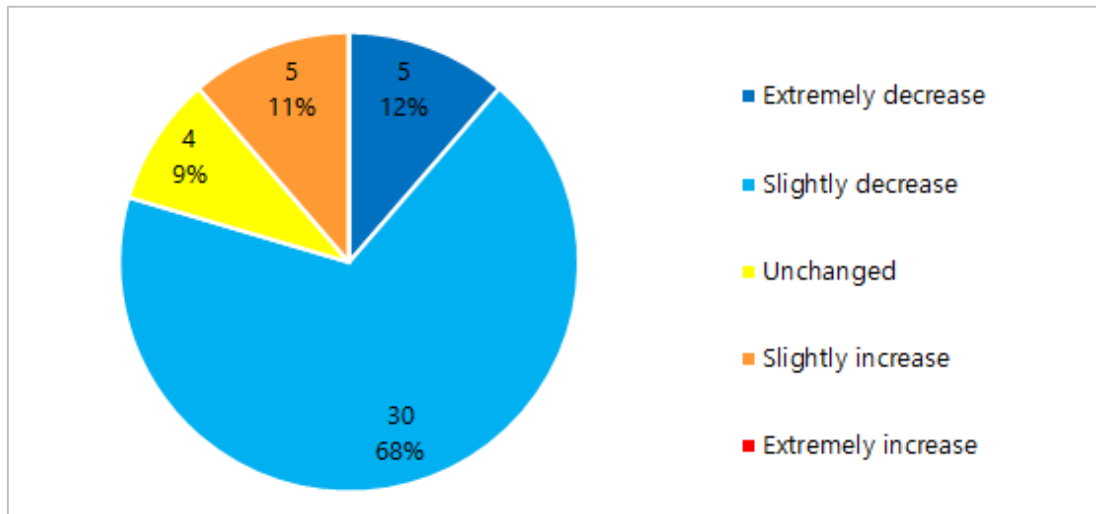
As showed in Figure 10, according to what has emerged so far, almost all the respondents predict a stronger integration of the two services in the future.

One of the main reason given by the interviewed is related to the interest of the public transport company to extent their sustainable mobility supply, gaining attractiveness and settling some first-mile, last-mile issues (FMLM) thanks to the integration with other mobility solutions such as car sharing; this integration is the basis of the next cities mobility step, the introduction of Mobility as a Service platforms (MaaS).

Moreover, digitalization is a key point that will enhance the integration between different services, providing easier tools to individuate solutions that can satisfy the mobility needs of the customers through a real multimodal supply.

## 2.1.4 Foreseen impacts on car ownership, automotive sector and on the introduction of autonomous vehicles

Additionally, some close-ended questions related to the perspectives of car ownership (Q65), the relationship with the automotive market (Q66) and the impact of autonomous vehicles (Q67) on the car sharing were asked. Figure 11 shows how the overall number of privately owned cars will change in the car sharing operators' expectations.



**Figure 11: Expected changes car ownership levels**

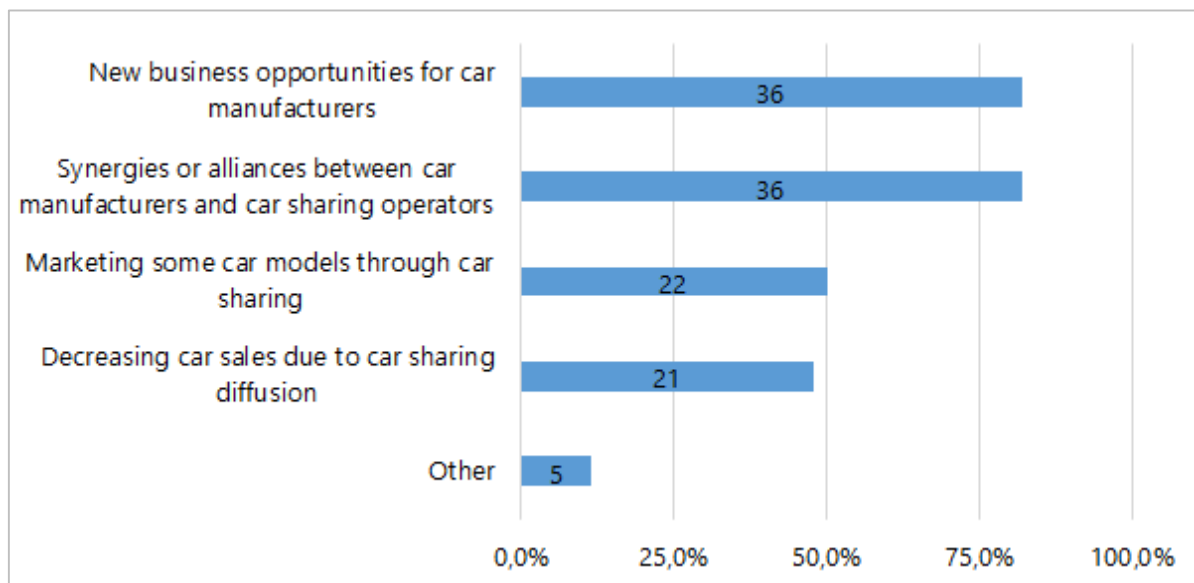
Not surprisingly, for the sample interviewed, the number of owned vehicles will slightly or even extremely decrease (80%): for this question it was not asked to motivate the prediction but, through the previous questions it seems clear that the most of respondents look at the car sharing like a connection between the mobility demand and the public transport supply, which will reduce the need of a private car.

Another question investigates which are the aspects (among those defined in a list) that will characterize the relationship between the world of car sharing and the automotive sector, compared to the current situation. The question together with the complete list of aspects is reported below.

Q66: "Which of the following aspects will characterize the relationship between the world of car sharing and the automotive sector, compared to the current situation?" (More than one answer is possible)

- Decreasing car sales due to car sharing diffusion
- New business opportunities for car manufacturers
- Marketing some car models through car sharing
- Synergies or alliances between car manufacturers and car sharing operators
- Other (please specify)

The results are showed in Figure 12, where is important to point up that more than one answer could be chosen by each interviewee.



**Figure 12: Relationships between car sharing and automotive sector**

More than 80% of the interviewed think that the automotive sector will continue to support the car sharing even more than now, mainly because of new business opportunities as well as further synergies or alliance between car sharing operators and car manufacturers.

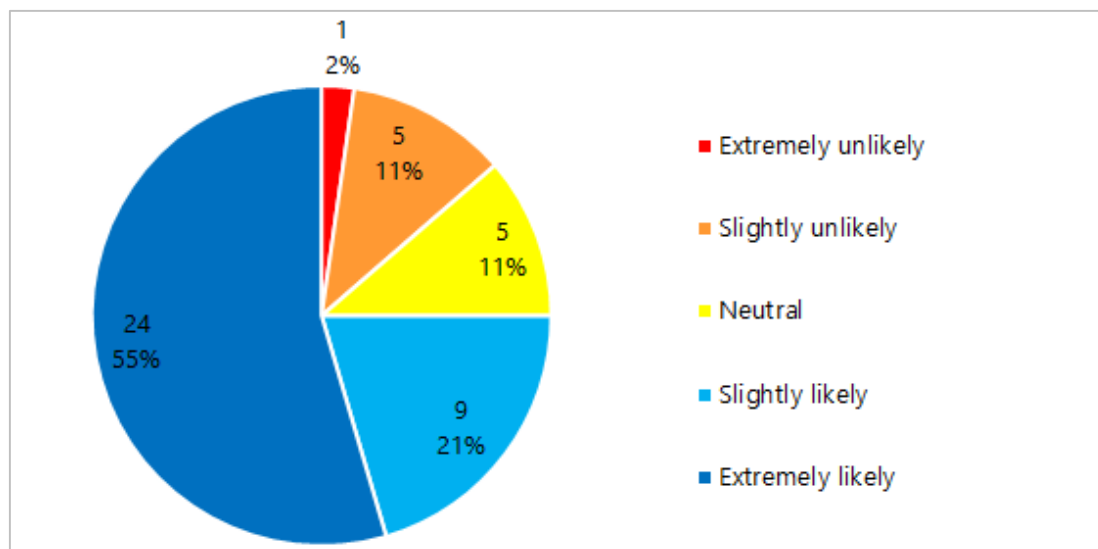
It is also the belief of three of the five operators that chose "other"; they gave the following more extensive answers:

- *"Automotive companies are convinced that in the long term, use of private cars in a city environment will become extremely difficult, if not impossible, and therefore car sharing services will define an alternative";*
- *"Car manufacturers see opportunities and try to influence the implementation of car sharing services to make money: they now know that they can sale "car for use" rather than "car for ownership";*
- *"More manufacturers will start their own car sharing services (as today BMW and Daimler)".*

Furthermore, 50% of the operators believe that the automotive sector can benefit in terms of marketing by advertising some vehicles through car sharing services.

On the other hand, almost half of the respondents are aware of a possible reduction in the car sales due to the car sharing diffusion.

Finally, related to the emerging theme of autonomous vehicles it was asked: Q67 - *"To what extent autonomous or self-driving vehicles are likely to be part of a car sharing fleet, assuming that they are available in the mobility market?"*



**Figure 13: Autonomous vehicles in future car sharing fleets**

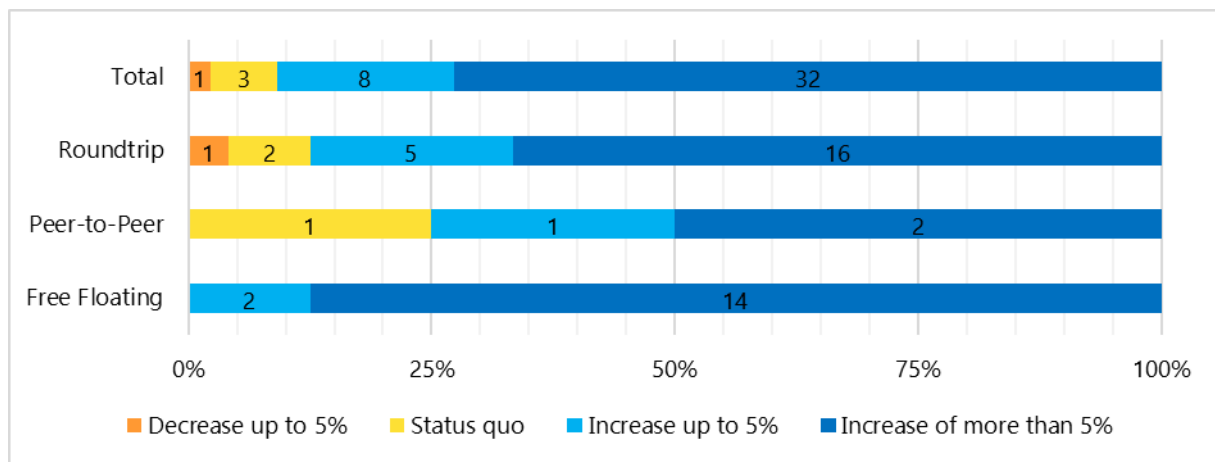
As reported in Figure 13, almost three out of four operators believe that if autonomous vehicles are available in the mobility market, they will likely be part of the future car sharing fleets.

## 2.2 Stated development plans at the organisation level

Beyond the general overview at country level that was presented in the previous subsection, in the following subheads answers related to each single organization future development are reported. As done before, answers are aggregated according to the category of car sharing defined in the first chapter.

### 2.2.1 Users and profitability expectations

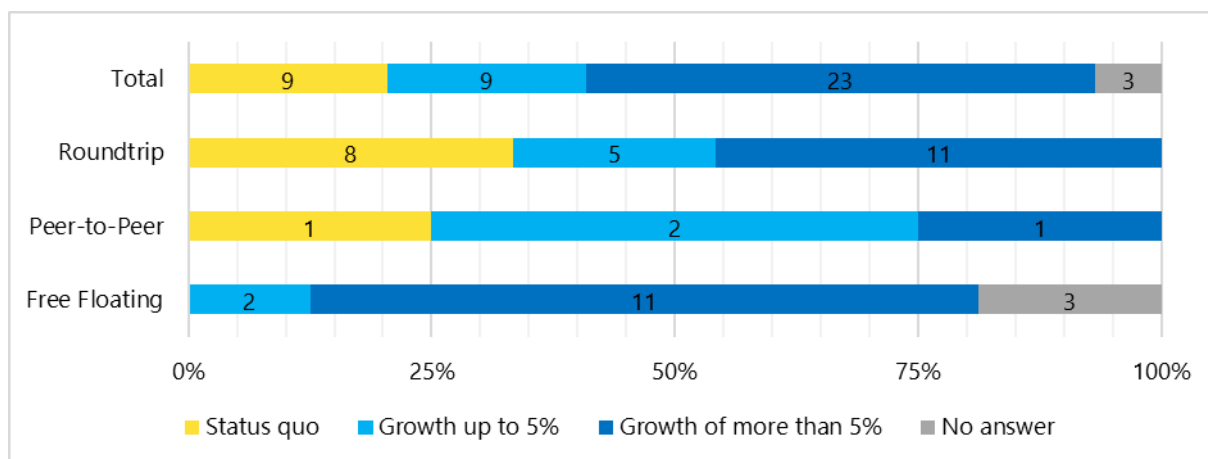
The first question aims at understanding the expected evolution in the number of users over the next five years for each car sharing operator (Q68). Subsequently, a general perspective of the business profitability is investigated (Q69).



**Figure 14: Changing in the number of car sharing users of their own services**

Figure 14 shows that more than 90% of the operators forecast an increase in the number of users of their own services, while just one station-based car sharing operator stated that the number of users of its service is going to decrease. Looking into the different categories, most of free floating operators believe in an increment, larger than 5% compared to the current situation.

The future profitability of the business seems to follow the expected trend of the number of users: Figure 15 shows that more than half of the respondents believe in a turnover's growth of more than 5% and another 22% a growth up to 5%.



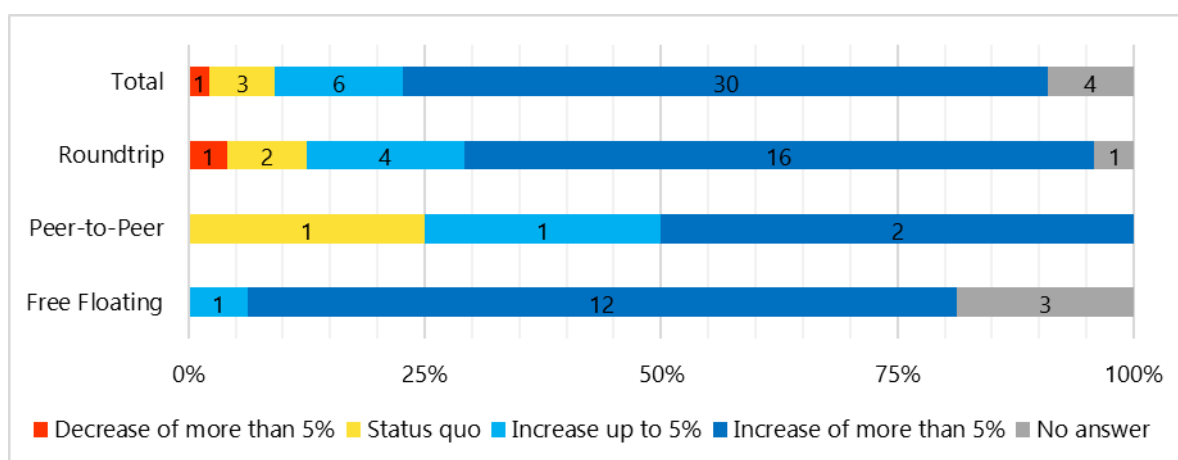
**Figure 15: Profitability of the business**

Among the different categories of car sharing, roundtrip and peer-to-peer schemes seem a bit more cautious in their previsions than free floating operators, which strongly believe in a growth of their business profitability.

## 2.2.2 Fleet changes

Another aspect investigated was the expected changes in the operators' fleets: firstly, if and how each organization's fleet size is going to change (Q70) and then if there are kind of vehicles which are not yet part of the fleet but they will be in the next future (Q71).

Figure 16 reported below shows that 90% of the interviewed is going to increase the number of vehicles of their fleet: surprisingly one operator, the same which previously predicted a reduction in the number of users, also forecasts a reduction of its fleet.



**Figure 16: Fleet dimension**



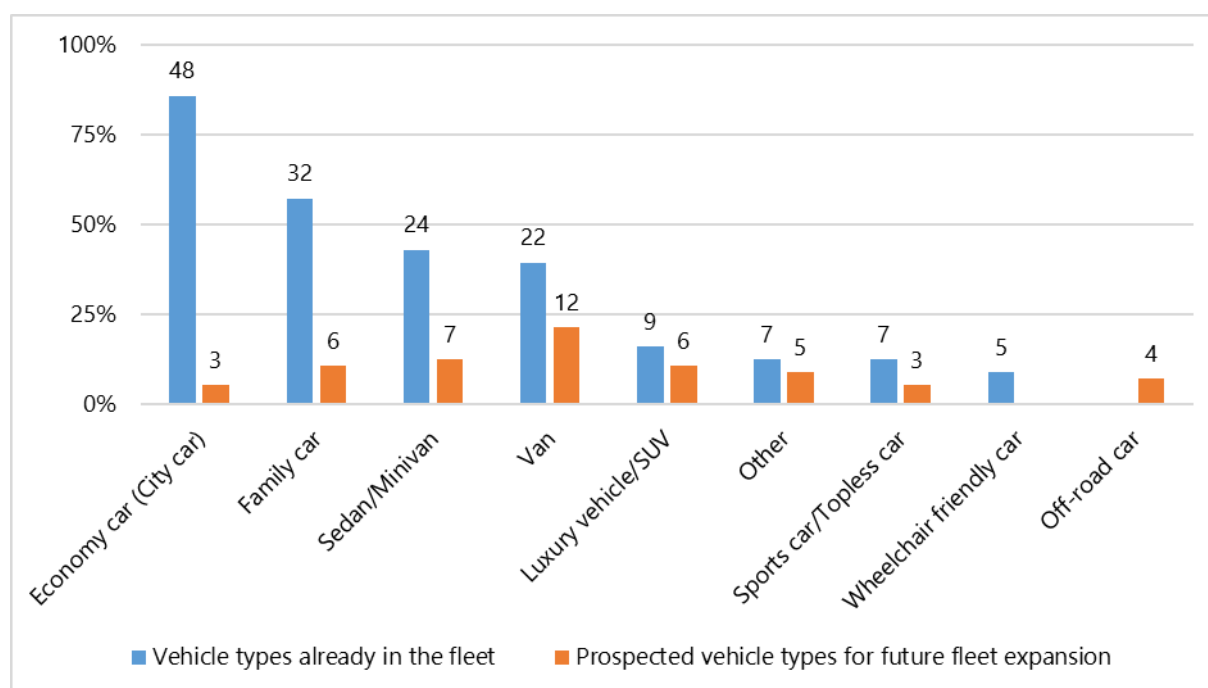
Unfortunately, through this interview it is impossible understand the main reason of this statement. The reduction in the number of vehicles might be due to an observed reduction in the number of users during the last years and vice versa or even other aspects which are pushing the operator to leave out the market.

Concerning the fleet composition, it was asked: Q71 - *"Which kind of vehicles are not yet part of your fleet but are likely to become part of it in the future?"*.

The interviewees could select one or more of the following categories:

- Economy car (City car)
- Family car
- Sedan/Crossover SUV/Minivan
- Luxury vehicle
- Sports car
- Off-road car
- Van
- Other, please specify

Figure 17 below presents the related answers.



**Figure 17: Actual and prospected composition of the fleet of different car sharing operators**

In order to have a better vision of the expected changes, it has taken into consideration the actual fleets composition as already analysed in the paragraph 3.10.1 – *Type of cars* of the deliverable 2.1 - *Car sharing in Europe: a multidimensional classification and inventory*, and it is compared with the future additions. For the purpose of having comparable results, only for this analysis, the total

number of interviewees is considered, rather only those who answered the questions which are the focus of this deliverable. Therefore, in this case the sample is made of 56 operators rather than 44 (see the last row of Table 2) and the percentage values subsequently assessed.

Figure 17 shows that most of the operators are going to add vans to their fleet. For example Enjoy in Italy<sup>2</sup> has introduced a fleet of vans beyond their city cars (Fiat 500) from March 2018.

## 2.2.3 Territorial expansion of the service

Some questions are referred to the car sharing operators' perspectives in terms of spatial expansion of the service: in this case we wondered if each service wants to expand its operations in other cities (Q72) or maybe just extend the size of the served area in the currently operating cities (Q73).

Concerning the expansion in other cities, Table 3 below shows that those operators that already operate in more than one city (and/or country) are more favourable to a further expansion, while for those operating in only one city a future expansion is more unlikely.

Actual geographic span	Planned expansion	Roundtrip	Peer-to-peer	Free Floating
Operators in one city	Total	7 (27,3%)	0 (0%)	2 (14,3%)
	<i>of which: Likely</i>	3 (9,1%)	0 (0%)	2 (14,3%)
	<i>of which: Unlikely</i>	4 (18,2%)	0 (0%)	0 (0%)
Operators in several cities in the same country	Total	7 (27,3%)	2 (50%)	5 (35,7%)
	<i>of which: Likely</i>	7 (27,3%)	2 (50%)	5 (35,7%)
	<i>of which: Unlikely</i>	0 (0%)	0 (0%)	0 (0%)
Operators in several countries	Total	10 (45,5%)	2 (50%)	7 (50%)
	<i>of which: Likely</i>	10 (45,5%)	2 (50%)	7 (50%)
	<i>of which: Unlikely</i>	0 (0%)	0 (0%)	0 (0%)
Total		24 (100%)	4 (100%)	14 (100%)

**Table 3: Planned expansion in other cities by geographic span of the operator and category of car sharing, with column percentages**

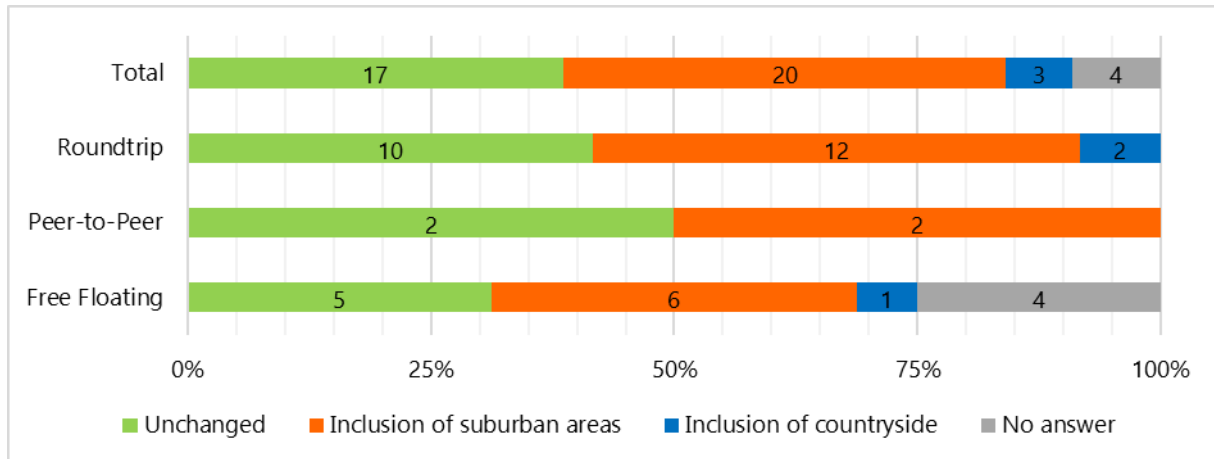
Organisations which foresee the expansion of their services are mainly motivated by the increasing demand as well as the intention to keep attracting new demand. One of the P2P operators stated that the main reason supporting the expansion is due to the lack of P2P services in the target city.

Looking at the different categories of car sharing it is interesting to observe that free floating organisations are operating in several cities and countries, while operators which are active in just

<sup>2</sup> Source: [http://www.repubblica.it/motori/sezioni/attualita/2018/03/20/news/enjoy\\_cargo\\_il\\_car\\_sharing\\_per\\_le\\_cose\\_-191745055/](http://www.repubblica.it/motori/sezioni/attualita/2018/03/20/news/enjoy_cargo_il_car_sharing_per_le_cose_-191745055/)

one city mainly provide a station based service. This has clearly to do with the larger scale of investments due to the larger fleet size that is needed to set up a free floating service.

In addition, it was asked how are the operating areas going to change in the next future. Results are showed in Figure 18.



**Figure 18: Operating area extension**

Almost the 40% of the interviewees does not have in program an extension of its operational area, while a 45% think about a future inclusion of suburban areas.

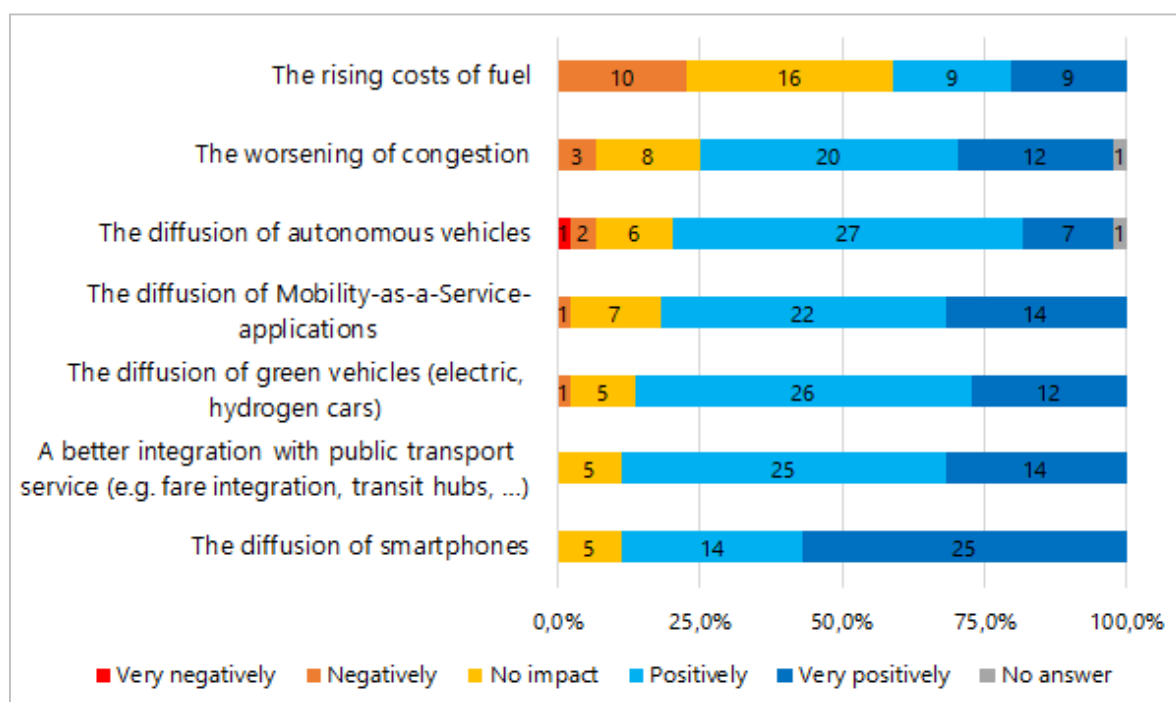
In general, it is possible to observe that station based services are more favourable to the extension than free floating and in both cases a projected inclusion of the countryside is not really commonplace.

## 2.2.4 Further influential elements

Finally, it was asked to the car sharing operators in which way some recent mobility themes will impact on each organization.

On the left-side of Figure 19 the proposed impacting elements are listed while on the right-side bar charts show the expected magnitude and direction of the impact on car sharing systems.

All the elements proposed seem to have positive or very positive impact on the car sharing except the rising costs of fuel: almost a quarter of the respondents think that this can impact negatively. This can be due to the fleets composition, which is presently mainly constituted by conventionally fuelled vehicles, as we analysed in the paragraph 3.10.2 *Sustainability of the fleet* of the task 2.1 - *Car sharing in Europe: a multidimensional classification and inventory*. On the other hand, the rising costs of fuel can have a positive impact on full electric operators.



**Figure 19: Impacting elements on the car sharing growth**

The smartphones diffusion will have the most positive impact on the operators' point of view: this is quite intuitive if compared to the reservation, localization and the door unlocking systems currently adopted by car sharing organizations.

### 3 National and local car sharing policy opportunities and barriers

Differently from what has been done before, the point of view of car sharing operators as well as city administrators and policy makers are analysed and compared in the following subheads.

#### 3.1 Policies impacting on the car sharing

##### 3.1.1 Beneficial actions for car sharing operators

Through the same survey whose answers were partially analysed in the previous chapter, car sharing organisations around Europe were asked to indicate the importance of a number of elements for their sector (Q81, Appendix 1). Respondents had to scale 15 elements, which are listed in the Table 4 below, from very unfavourable (value=1) to very beneficial (value=5). The top three elements that got the highest average score are marked in blue, the lowest ones in orange.

	Average	Unfavourable	Neutral	Beneficial
Dedicated car sharing stations on public street space	4.76	0.0%	2.3%	97.7%
Car sharing parking lots on other publically accessible spots (e.g. shopping centers, administration parking, hospitals, ...)	4.56	2.3%	4.7%	93.0%
Free access to paid parking zones	4.68	0.0%	2.3%	97.7%
Access to limited traffic zones	4.51	7.0%	4.7%	88.4%
Access to public transport lanes or High Occupancy Vehicles lanes	4.49	4.7%	11.6%	83.7%
Integration with public transport (ticketing and subscription)	4.44	0.0%	9.3%	90.7%
Standard and common rules (national or European level)	3.98	4.7%	30.2%	65.1%
Tax credits/incentives to employers who use car sharing	4.49	0.0%	9.3%	90.7%
Incentives to scrap cars	4.05	2.4%	19.0%	78.6%
User-friendliness of the system	4.56	0.0%	4.8%	95.2%
Reliability of the system	4.73	0.0%	4.7%	95.3%
Integration in new housing developments	4.24	0.0%	11.6%	88.4%
Road pricing	3.92	2.4%	26.8%	70.7%
Low emission zones	4.17	4.8%	19.0%	76.2%
Changes in ownership or sale taxes for cars	4.08	2.4%	24.4%	73.2%

**Table 4: Beneficial elements for car sharing<sup>3</sup>**

<sup>3</sup> "How beneficial are the following elements for car sharing?"



Dedicated car sharing stations on public streets are seen as the most beneficial measure with an average value of 4.76 on 5 (see Table 4), closely followed by the reliability of the system (4.73) and free access to limited traffic zones (4.68).

Whereas most of the elements above resemble policy rules or measures by any type of governments, two elements (the user-friendliness and the reliability of the system) relate to the operational features of the car sharing organisations themselves. Both indicators get a very high score from the respondents, being the second and fourth most beneficial elements for car sharing. Car sharing organisations indicate that they depend on government's choices for a number of important matters, but equally they admit that the operators themselves must guarantee a performant and user-friendly product.

Most of the elements presented in the table above get a high score. Only two have an average value below 4. Standard and common rules (at a national or European level) and road pricing are scoring respectively 3.98 and 3.92. It is worth to mention that even though these two elements have the lowest average value, still more than 65% of all respondents consider both measures as slightly or very beneficial.

The respondents were also asked to name one other policy option that would be particularly beneficial for car sharing. First a number of parking-related issues came forward. The car sharing services are striving for lower parking costs, faster procedures for requesting new car sharing locations, parking permissions for car sharing vehicles in resident park zones, integrated services within airports and train stations and police officers that invoice fines for people parking on car sharing stations.

Other policy options that came up were for example the removal of fiscal incentives for company cars or defining extra-legal benefits for car sharing when an employer gives the employee a mobility budget including car sharing. Respondents also expect governments to inform inhabitants about car sharing, to harmonize policies in different cities, to work on a regulatory framework, to boost innovations like electric mobility and to use shared cars themselves. Others would like to have access to a police database to check the validity of driving licenses.

One respondent suggests to make a difference between different kinds of car sharing and their effects, especially when it comes to providing incentives for car sharing schemes. If this doesn't happen "*car sharing will just become a new way of making big money for big companies and will not anymore participate to reduce the car impact within our boroughs*".

At last, one car sharing organisation is convinced investments in bicycle and public transport infrastructure are necessary if public authorities want to lead more people towards shared cars.

### **3.1.2 Action put in place by the city administrations**

In addition to the input from the car sharing organisations, we also wanted to include the cities themselves in this study. The 56 car sharing organisations that participated in our study are active in 20 European cities. Seven of those cities answered to an additional survey that focuses on mobility features of the city, which has been introduced in section 1.2.2. The respondents that were targeted are civil servants working for the mobility department and who are aware of the shared mobility policy in the city.

First, the respondents indicate whether the city has adopted policies to actively reduce private car ownership (Q8, Appendix 2). Five of them state that these policies have been adopted, in one city new rules are being actively developed and one respondent states there are no plans to introduce such legislation. Of course, several things can be understood as measures that reduce private car ownership. A number of examples stated by the respondents, make it more clear. To reduce private ownership or private use of cars the cities under research, among other things, promote car and bike sharing, offer free access to park and ride areas to owners of a season ticket for public transport, install or enlarge a limited traffic zone (LTZ), extent metro or tram lines and so on.

The large majority of the cities indicate they offer integrated ticketing for different transport modes (e.g. a smartcard that can be used on public transport and other modes). The only city that hasn't an 'all-in' ticket yet, is planning to implement this. All these measures also indirectly stimulate the use of car sharing. If the alternatives for a private car, i.e. high-performance public transport, safe bicycle connections, etc., are well developed, then car sharing is more likely to succeed.

The policy choices of the European cities under research do not only impact car sharing indirectly. Some measures, taken by local governments, have the clear purpose to support car sharing organisations together with the aim of reducing the number of cars in the city.

The most visible policy options are those relating to the public domain, and more specifically to the public parking spaces. Five out of seven respondents state that car sharing operators in their cities have free access to paid parking zones, independently from the typology of service they are providing (station based and free floating). The remaining cities gain no free access to paid zones and are not planning to do so in the future. On the basis of the mobility plans of different cities, it became also clear that several local authorities are planning to invest in (extra) fixed car sharing stations.

Fewer cities are willing to give car sharing organizations free access to limited traffic zones. Only three out of ten car sharing organisations indicate to have this kind of support from their city administration. The fact that this measure could possibly lead to more cars driving around in the city centre, can explain why there is less enthusiasm for this type of regulation. It is interesting to notice

that although all respondents represent big European cities, and all have large experience with different types of car sharing, they do not agree whether cities should support car sharing operators via free access to paid parking places or limited traffic zones.

Six out of seven city administrations that took the survey indicate to use shared cars for service shifts, while the last one is actively planning to use car sharing in the future. In this way local authorities try to reduce their own fleet of vehicles, and they also ensure greater sales for car sharing organisations. It was also asked if the cities offer marketing or financial support to commercial car sharing operators: more than half does, the others are not planning to do so in the future. Similar to the variances in parking policies, city governments have different approaches concerning an active (financial) support for car sharing operators.

At last the respondents were also asked to indicate whether the city has a policy action plan for car sharing. Five out of seven cities have a specific action plan with defined targets. Although cities differ from one another about the approach and support of car sharing, the majority is aware that this relatively new mobility branch will benefit from a strong policy plan for the future.



## **3.2 Main barriers and potential solutions detected by car sharing operators and current actions of city administrations**

The car sharing organisations got the opportunity to point out one or more current policy options in their country or city that represent a barrier for car sharing. Moreover, it was asked them to detect most effective actions to boost car sharing and how policy makers are working on it. Answers to such questions can be divided into eight categories:

1. Parking regulations;
2. Company cars;
3. Tax regulations;
4. Car sharing and public transport;
5. Practice what you preach;
6. Funding of electric vehicle vehicles in car sharing fleets
7. Pull-measures in favour of sustainable modes of transport
8. Push-measures to reduce individual motorised transport

### **3.2.1 Parking regulations**

Just like in the previous part, parking regulations seem to be hot issues for car sharing organisations.

#### **Assigned parking places for car sharing on public streets**

Car sharing is considered as a tool to reduce parking pressure. Replacement rates in different studies vary depending on the type of car sharing, the evaluation method and the location in the city where this effect is measured (Martin & al, 2010) (Shaheen & Cohen, 2013) (bcs, 2011) (Team red, 2015) (WiMobil, 2016). In two recent German studies on the matter one roundtrip car sharing car replaced between 8 and 20 private cars (bcs, June 2016) and 16 private cars (Team red, 2018). Similarly to what happens in Germany, one roundtrip car sharing vehicle is estimated to replace 8 private cars in Italy (ICS, 2009). But in highly condensed inner-city areas, where parking pressure is high and the relieving effect of car sharing is especially useful, it is hard for operators, to find parking places to offer their cars. Assigned parking places in public streets are a chance to get car sharing to that urban areas, where it is most needed.

One third of the European car sharing organisations interviewed mentioned the lack of dedicated parking lots or the lack of clear car sharing parking rules to be one of the main barriers. Parking regulations have a very direct impact on their core business and are, in the eyes of the respondents, of high importance for their business. One organisation calls for less available parking spaces in its

city. The oversupply of parking spaces would impede the growth of car sharing. If citizens can easily find a free parking lot in the neighbourhood, they are less encouraged to start with car sharing.

Local authorities have the key to a future-oriented parking policy, where car sharing, and shared mobility by extension, gets the place it deserves.

In Germany more than 90% of roundtrip car sharing cars are today parked on private ground<sup>4</sup>. This often means in underground parking lots, backyards or in supermarket parking lots. Here the shared cars are not visible to non-users at all. As a result, many inhabitants of cities do not know that car sharing is actually available to them. Assigned parking places enhance the visibility of station based car sharing systems.

In Italy it is the other way round: only roundtrip car sharing cars have dedicated parking lots along the streets and in public spaces. Basically, it is because this kind of services were firstly developed in Italian cities thanks to the public initiative *"Iniziativa Car Sharing (ICS)"*, which has as objective the introduction and the promotion of the car sharing. ICS was a convention among cities and local authorities, subsidised by the Ministry of the Environment (ICS, 2000).

On the contrary, private free floating car sharing companies do not have dedicated parking slots and this is one of the main problem for customers that want to reach crowded areas in pick hours (Chicco, 2016).

An interesting case is represented by the city of Turin: here parking slots on public area are also used by private operators. Car2Go and Enjoy obtained the permission from the City of Turin to use the 70 stations of Car City Club (ICS- iO Guido)<sup>5</sup>, since the public service stopped its operations<sup>6</sup>. Moreover, the e-car sharing Bluetorino signed an agreement with the city that allows the organisation to use some defined public spaces, but in exchange it has to build the recharging infrastructures. Then those recharging infrastructures are usable also to recharge private EVs and Plug-in Hybrid Electric vehicles (PHEVs) (Città di Torino, 2016).

It is however not easy, to give certain public space to individuals or companies. For example in Germany, in September 2017 the German federal government issued a law (Bundesanzeiger verlag, 2017) that describes, how this can happen. According to the law, assigned parking places for car sharing on public ground can be established in two ways:

1. Parking spaces can be generally dedicated to car sharing. Cars from all operators can use this places as long as space is available. This is useful for free-floating car sharing.

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<sup>4</sup> According to a bcs study on car sharing-parking in public streets done in 2017/2018, to be published in 2018

<sup>5</sup> Source: [http://torino.repubblica.it/cronaca/2017/05/17/news/car\\_sharing\\_a\\_torino\\_i\\_posteggi\\_organizzati\\_ioguido\\_a\\_enjoy\\_e\\_car2go-165626710/](http://torino.repubblica.it/cronaca/2017/05/17/news/car_sharing_a_torino_i_posteggi_organizzati_ioguido_a_enjoy_e_car2go-165626710/)

<sup>6</sup> Source: [http://torino.repubblica.it/cronaca/2017/03/10/news/io\\_guido\\_chiude\\_addio\\_dopo\\_15\\_anni\\_al\\_car\\_sharing\\_pubblico-160239859/](http://torino.repubblica.it/cronaca/2017/03/10/news/io_guido_chiude_addio_dopo_15_anni_al_car_sharing_pubblico-160239859/)

2. Parking spaces can also be dedicated to special car sharing cars alone. These places are useful for roundtrip car sharing.

The federal law incorporates a car sharing-definition to make sure, that public space is only given to operators that really provide cars that are open to the whole public and can be accessed and used independently by customers. Peer-to-peer operators are up to now excluded by this definition because the government did not want private car-owners to get access to car sharing parking spaces simply by offering their car on a peer-to-peer platform.

The German federal government is not allowed to issue laws on the use of public streets that belong to the federal states and the cities and communities. For this reason, the federal law is considered to be just a blueprint for further legislation. Federal states and cities have now to define own rules for turning public space into parking spaces for car sharing.

For cities and communities, the provision of assigned parking spaces is not a trivial legal matter: First, special parking places give operators an advantage in competition and the way they get these spaces has to be fair and in line with EU laws. Second, cities have to make sure that the car sharing service presented on public parking places is in line with the specific goals of traffic policy for the community. So, a fair and discrimination-free competitive tendering procedure tailored to the specific local policy goals of the community has to be designed.

It should finally be mentioned that assigned parking spaces for car sharing are not the same as the mobility stations that many public transport companies begin to implement at present. To be attractive to customers, the car sharing offer has to be as near to where people live as a private car.

For this reason, ideal places for car sharing-parking are in many cases not identical with the location of bus and train stops. In that direction, as already reported in the paragraph 3.2 of the deliverable 2.2 (STARS, 2018), the city of Bremen designed "*mobil.punkt*" as bigger mobility stations and so called "*mobil.pünktchen*" which are smaller versions of car sharing stations that can be implemented in condensed inner city residential areas.

In the recent Bremen car sharing-study, respondents rated the importance of "availability of car sharing cars" and "short distances to the next station" as highest priorities (Team red, 2018). Since satisfaction with these items is also remarkably high (82% and 84% are satisfied) the cities strategy seems to work.

### **Reduced parking fees for car sharing cars**

The German federal car sharing law also states, that reduced parking fees for car sharing vehicles are possible, if the municipality wishes to do so. This measure is however not uncontroversial. While operators naturally wouldn't mind to pay less for parking, the general public is discussing this in a

critical way. Citizens seem to be mostly unwilling to accept reduced fees for commercial activities in their public spaces. Furthermore, cities and communities in Germany are notoriously short of money. Against this background reduced parking fees can be the trigger for a public campaign directed against car sharing parking spaces in public streets. This has to be observed when this measure is considered.

### **Views of car sharing operators and city administrations related to parking policies**

It is interesting to look for differences or similarities in the answers of the city administrations and the car sharing organisations, by comparing the answers given to similar questions in both surveys as introduced in sections 1.2.1 and 1.2.2. Both stakeholders were asked to evaluate the current policy rules for car sharing in their city. As stated before, parking regulations were mentioned quite often. When we only take into account the answers from car sharing organisations that are active in the cities from which we received information, it is striking to see that the answers from both stakeholders fit perfectly together. Two cities stated that they don't gain free access to paid parking zones for shared cars. The car sharing operators from these cities are notably more negative about the prevailing parking rules. They state for example that "*lower parking costs for car sharing operators*" would be very beneficial for car sharing and that "*high parking rates (up to 1800 a year for one car)*" represent a clear barrier for their sector. The other car sharing operators clearly have less or even no problems with the parking rules in their city.

Discussions may be held about whether or not local authorities should grant free access to paid parking places, but it is clear that in the places where it is not currently happening, car sharing organisations clearly see this as a major obstacle for their business.

### **3.2.2 Company cars**

At least in Germany and Belgium, car sharing organisations are pointing to the fiscal incentives for company cars as one of the important barriers for car sharing. In Belgium company cars are seen as one of the biggest competitors of shared cars. Especially when an employee gets an unlimited amount of fuel, one doesn't see or feel the real cost of private car ownership. There is no (financial) incentive at all to change one's behaviour. Moreover, company cars are very often property of a lease firm, which don't allow sharing their cars among individuals. Some respondents are stating to oblige the sharing of company cars or to include public transport in to company car scheme.

### 3.2.3 Tax regulations

Governments are able to use tax regulations policy (both push and pull) to lead people to car sharing schemes. Apart from the tax measures described at the company car section and the additional ones mentioned in section 3.2.8, respondents are stating to exempt cars from congestion tax and (in Belgium) to grant car sharing services 6% VAT instead of the current 21%. Car sharing contributes, just like public transport, bike-sharing and taxi services, to a modal shift and sustainable transport modes.

On the pull side we see measures to make private car ownership more expensive such as an extreme increase of on-street parking pricing or charging car pollution.

### 3.2.4 Car sharing and public transport

#### **Integration of car sharing into public transport development plans and local-national climate protection plans**

Transport development plans, climate protection plans, etc. are common ways for public authorities to plan and promote sustainable forms of mobility. Making car sharing an integrated part of such plans would help to systematically promote the expansion of the services and their integration into urban mobility systems. It would also help to systematically assess if car sharing services of different form contribute to the goals of public authorities in the desired way.

#### **Integration of car sharing and public transport in Mobility as a Service (MaaS) – offers**

Some respondents consider car sharing as public sharing and therefore it should be financed by funds for public transport. Moreover, for some respondents the absence of an integration of car sharing within public transport is an obstruction for further growth. Others criticize the fact that in their city or country public transport is linked to only one car sharing service, which doesn't create a level playing field.

Despite the strong links between car sharing and public transport from a user perspective, the integration of the two is today not very far-reaching. Public transport and car sharing are usually two systems people use in parallel. The digital integration in a MaaS offer might be an important next step to solve this problem. MaaS offers might have the ability to make the whole system of shared mobility transparent to present non-users and give them a much easier access to it. This can help to make car sharing more visible and promote it as an alternative to car ownership. It might also help to integrate the different car sharing-services now operating in many bigger cities into one car sharing-offer to the customer.

### **Open PT-lanes for car sharing cars**

In Germany the measure “Open public transport lanes” has been introduced by the federal government in respect to EVs as a legal option for regional and city public authority. However, German cities did not open their bus lanes to electric vehicles for a good reason: the more vehicles there are driving on assigned PT-lanes the slower PT works. This is not in the interest of cities. It is also not in the interest of car sharing operators since the attractiveness of car sharing to customers is highly dependent on an excellent PT-offer as the backbone of everyday mobility.

In Italy, despite car sharing services can benefit of other less binding measures (almost in all cities car sharing cars can enter in LTZs, freely parking in toll parking slots and so on) the use of PT lanes is forbidden. As in Germany this measure is against the interest of the cities, that face with the everyday problem of the congestion and in many ways try to push citizens to use PT.

### **3.2.5 Practise what you preach**

Interesting to notice is the fact car sharing services think that it's a public duty to share cars. (Local) governments should use car sharing fleets instead of owning a fleet of vehicles themselves it would make it less expensive and it's a good way to promote the concept.

This part is not only about giving good examples but also about setting transparent, easy and fair administrative rules. Respondents are impeaching administrative disorder or the fact national legislation does not get a proper translation into (local) policy which creates ambiguity for the organisations and thus distraction of their core business. Other respondents point to the low interest from local politicians for shared mobility.

### **3.2.6 Funding of electric vehicles in car sharing fleets**

In some respect EVs and car sharing fit very well. Around 80% of the trips done with car sharing cars lie within the range of today's EVs<sup>7</sup>. In carsharing fleets EVs and ignition engine vehicles can be mixed in a way that allows customers to travel shorter distances with an EV and use the ignition engine vehicle for longer trips. This gives carsharing a strong advantage compared to private EV ownership. Furthermore, the sustainable image of both EVs and car sharing seems to naturally glue the two together. However, EV-based car sharing faces some additional problems. First, the loading time of the vehicles reduces the availability of the cars. Thus EV-based car sharing fleets have to be bigger than fleets with ignition engine cars to provide the same overall car-availability. Second, the EVs

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<sup>7</sup> Source: Internal bcs-workshop with carsharing operators on the topic of e-carsharing, bcs2017

themselves are more expensive and their value at the time of resale is unclear. This makes EV-car sharing economically unefficient, compared to ignition engine fleets<sup>8</sup>. As a result, high pressure on the rate of EVs in car sharing fleets can result in a slow growth of the whole car sharing system. For this reason, a public programme for the funding of electric vehicles in car sharing fleets would make sense to promote EV-car sharing.

Focusing on Germany, the existing recharging infrastructure for EVs is not suitable for car sharing cars. This is due to the fact, that EVs are only allowed to use this infrastructure if they are disconnected directly after recharging is finished – to make space for the next EV. But this is not in line with the booking patterns of car sharing cars. The public EV recharging infrastructure has to be designed in such a way that one recharging point is reserved to car sharing. The car sharing vehicle will then not be disconnected from charging point when full, but only when the car sharing user begins his/her booking. This problem can also be solved by construction special car sharing-stations for EV-car sharing. Both solutions need public funding.

An additional problem in EV-car sharing is the fact, that car sharing customers are EV-sceptics. In Germany the common learning of operators is, that EVs are booked only 30 to 50 percent as much as ignition engine cars. So, while the mobility patterns of car sharing customers fit very well to the EV technology, the psychology of the customers does not. Experiments show that this problem can be solved if operators actively get in touch with customers and promote the use of EVs – for example by doing test-tours<sup>9</sup>. But this kind of marketing produces high costs. For this reason, the funding of campaigns to make car sharing users familiar with EVs and overcome personal barriers when choosing electric vehicles, would make sense.

### **3.2.7 Pull-measures in favour of sustainable modes of transport**

Car sharing is not another method of using a car. As many studies show, car sharing changes the way people organise their mobility. For example 70% of all customers of roundtrip car sharing services in inner city areas who abandoned their own car, used a car less often after that (bcs, June 2016). They did not just transfer their original habit of car use to the shared car but also they used public transport and the bike more often. Other studies show, that households with a multimodal travel behaviour are most likely use car sharing<sup>10</sup> (WiMobil, 2016). It is clear from this, that car sharing is not a stand-alone offer. It needs an integration into a mobility eco-system together with public transport and a

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<sup>8</sup> Source: See above

<sup>9</sup> Source: See above

<sup>10</sup> to date unpublished studies on digitalization and multimodality by DLR, view first results at: [https://carsharing.de/sites/default/files/uploads/arbeitschwerpunkte/pdf/presentation\\_nobis\\_dlr\\_iaa-carsharing-symposium\\_21.09.2017\\_final.pdf](https://carsharing.de/sites/default/files/uploads/arbeitschwerpunkte/pdf/presentation_nobis_dlr_iaa-carsharing-symposium_21.09.2017_final.pdf)

good cycling infrastructure. For this reason, every measure that promotes public transport and/or bicycle traffic and the usage of bikes on a local level is also a push measure for the use of car sharing instead of a private car.

### **3.2.8 Push-measures to reduce individual motorised transport**

In Germany the use of private cars is subsidized in many ways. This is true for standing and flowing car traffic. Private car owners pay much to less for the use of precious urban space. For example today, the maximum price for a residential parking permit for parking on public streets is set at 30€ per year, although according to a court decision, higher fees would be legal. Increasing prices for residential parking permits in residential areas would make car sharing a cheaper alternative to owning a car.

A congestion charge for entering the city centre can also reduce the attractiveness of a private car and create an advantage for car sharing.

In Belgium and Italy owners of a car pay a yearly tax on the possession of the car and a onetime tax on the purchase. For now, there isn't a congestion toll or smart mileage charge in force in both countries, but several regional governments are thinking about implementing these kind of measures. Regardless of the fuel, car owners don't pay any extra taxes or charges for driving their car.



## 4 Conclusions

Car sharing is a mobility solution that is steadily growing around the Europe in the last decade. Many reasons are supporting this growth: the introduction of different services, the increasing interest of the automotive sector (Le Vine, et al., 2014), the technological innovation of the car used to provide the service, the reliability of these systems (Fondazione per lo sviluppo sostenibile, 2016), the diffusion of the smartphones, the cost savings (Cohen & Shaheen, 2006) and many more.

This deliverable offered some insights about likely developments and the growth forecasts in the short period (coming years) of the service. This was achieved on one hand by analysing the expectation of many car sharing organisations operating in several countries in Europe, on the other by looking at the main policies adopted by the decision makers, which can boost or hinder car sharing diffusion.

The number of users is likely to increase in each European country under research, probably with different expected growth rates depending on the local administrations actions. Among the different services, free floating schemes are considered more likely to keep growing, compared to station based and peer-to-peer systems. These forecasts are mainly justified in terms of the rising population living in the cities, the popularity gained by car sharing services, the rising costs of owning a car and lastly the increasing awareness of citizens about environmental issues.

The increase of the demand for car sharing represents an opportunity for the operators, which are forecasting an increase in their current turnover. Moreover, on the base of the information collected, it is quite clear that the number of operators in the near future is going to change. The increase in the number of operator is the most likely option, especially those providing a free floating service. In some cases, it is foreseeable a reduction in the number of organisations due to the merging of small and medium services into a big one, or at least new partnerships among different operators.

Concerning external collaborations in the mobility landscape, a better integration with the public transport services is expected; clearly, the integration needs to embrace all car sharing organisations operating in each city in order to avoid unfair competitions. It will be beneficial for both sides: firstly, it will reduce the number of users shifting from public transport, which needs to remain (or become) the backbone of urban mobility. Secondly, decision makers' intervention in promoting car sharing and soft modes (such as cycling and walking) as first-mile and last-mile solutions will increase the use of sustainable options at the expense of the use of private cars.

A better integration will bring hopefully to a reduction of car ownership: even if this could have a negative impact on the automotive industries, new business opportunities through synergies or alliance between car makers and car sharing operators are expected. The market of autonomous



vehicles seems to go in the same direction: most of the operators believe that if autonomous vehicles are available in the mobility market, they will likely be a part of the future car sharing fleets.

Regarding the development of car sharing fleets, it is foreseen both a global increase in the number of shared cars and a wider diversification of the fleets. In particular, the idea of introducing van vehicles into car sharing fleets is quite widespread among different operators.

The increasing number of car sharing vehicles well fits with the possible extension of the current operating areas: most of the operators agree in a further inclusion of suburban areas, while the extension to the countryside is still seen hard to develop, mainly because of higher costs and a lower density of population.

Another aspect that came out from the STARS research is related to the expansion of the current car sharing services: organisations that are already operating in different cities and countries will continue to do so as well as organisations, which are relatively smaller, that operate in single cities. The polarisation between big and small operators is therefore likely to continue in the future.

Among different elements that may impact on car sharing, there is one that seems to negatively affect the service expansion from the operators' point of view: the rising costs of fuel. This is mainly due to current fleets composition, where EVs represents less than the 30% of the shared vehicles adopted in the overall European panorama.

Since most of the trips done by car sharing cars lie within the autonomy range of today's EVs, the two concepts seem to fit well. However, EV-based car sharing faces some additional problems (such as charging time, a bigger fleet to provide the same overall car-availability, the higher purchasing cost, the need of a charging infrastructure) that make EV-car sharing economically inefficient compared to ignition engine fleets. For this reason, a public programme for the funding of electric vehicles in car sharing fleets as well as the construction of public loading infrastructure would make sense to promote EV-car sharing. This can also have a push and pull effect on the adoption of private electric vehicles from other users.

Some other policy makers/public interventions, which will probably boost the expected car sharing diffusion and growth, are foreseen. On one hand, the increase of reserved parking slots for car sharing services at the expense of existing public paid parking will reduce the space for private cars and hopefully discouraging their use. Moreover, a reduction in the taxes and/or in the parking fees for car sharing operators, if carefully introduced, will be extremely beneficial.

On the other hand, free access to the LTZs or its extension, which is a measure commonly required by car sharing organisations, need to be carefully evaluated by the city administrations: it can attract more users to car sharing services but it might produce an increase of vehicular traffic in those areas, finally making the overall transport system less sustainable.

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# APPENDIX 1: List of questions survey research

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## SURVEY CAR SHARING SERVICES

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Dear car sharing operator,

We are contacting you in the context of the **STARS-project**. This research on car sharing in Europe is funded by the Horizon 2020-programme of the European Commission. One of the main goals of the project is to understand how the [car sharing market in Europe](#) is functioning right now and what future scenarios are likely to develop.

In order to get a detailed view on the way car sharing services are operating, we selected 20 cities across Europe where all active car sharing organizations are asked to participate in a **survey**. With this questionnaire we want to learn more about the organizational, operational and technological characteristics of the car sharing industry and get an insight in the way you think the market will evolve in the next years.

Your information and opinions are crucial for the further success of this project, so we would be very grateful if you could take some time to answer the following questions.

The STARS-consortium will never refer to the answers of individual car sharing organizations and will only communicate about data on an aggregated level.

Thank you in advance,

The STARS-project team

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### INFORMED CONSENT

This survey is conducted as part of the EU Horizon 2020 research project STARS.

Please read the following very carefully:

- I have been given the opportunity to ask questions about the project.
- I understand that my participation is voluntary. I can withdraw from the study at any time during the survey and I do not have to give any reasons for why I no longer want to take part.
- I understand my personal details such as my name, email, phone number and address will not be revealed to people outside the project.



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- I understand that my words may be quoted in publications, reports, web pages, and other research outputs in anonymous or pseudonymous form only (no name or other personal identifiable data will be mentioned).
  - I agree for the data I provide to be archived in anonymised or pseudonymous form.
1. Do you agree to the above terms? By clicking Yes, you consent that you are willing to answer the questions in this survey.
    - Yes
    - No
  2. Before starting the actual questionnaire, we would like to know which car sharing organization is taking the survey.
    - Name of the car sharing organisation
- 

First of all, we want to ask some questions on the general characteristics of your organization. In the second part of the survey the focus will shift to the services you offer in one specific European city.

**Organizational form:**

3. Does your organization formally have a profit or not-for-profit character?
  - Profit
  - Not-for-profit
4. Which legal form applies to your organization?
  - Cooperative
  - (Unincorporated) Association
  - Corporation / Company
  - Other form, please specify ...
5. Who are the shareholders of your corporation or company?
  - Public shareholders
    - Who? ....
  - Public-private shareholders
    - Who? ...
  - Private shareholders (more than one option is possible)
    - Automotive industry, who? ...
    - Car rental industry, who? ...
    - Insurance sector, who? ...
    - Taxi sector, who? ...
    - Mobility sector, who? ...
    - Other ...

**Institutional form:**

6. Is your organization a public enterprise or a public/private partnership?
  - Yes
  - No

**Business model:**

7. Which statement applies to your organization? (more than one option possible)

- Customers can use our car fleet
  - Customers, car owners and people in search for a car to use, can use our (online) service to share a car
  - Customers, car owners and people in search for a car to use, can use our (online) service to share a car in a closed community
  - Other, please specify
8. In what year did your car sharing organization started to operate?
- ....
9. In how many cities are you operating at this moment?
- ....
  - If more than one, all in the same country?
    - Yes
    - No
    - If no, in how many countries?
10. What is the average number of inhabitants of the cities your organization is operating in?
- .... inhabitants

#### **Cooperation:**

11. Please indicate which statement applies to your organization? You can pick more than one answer.
- We cooperate with (a) public transport operator(s) in the field of marketing and/or customer service
  - We cooperate with (a) public transport operator(s) in the field of digital integration
  - We offer customers of (a) public transport operator(s) special tariffs
  - Our customers can use one key card for our services and those of (the) public transport operator(s)
  - Our customers can use an app for our services and those of (the) public transport operator(s)
  - We don't cooperate with public transport operators
  - Other, please specify
12. Does your organization cooperate with (local) governments to develop innovate car sharing projects?
- Yes, please indicate which projects ....
  - No
13. Does your organization cooperate with social services to develop innovate car sharing projects?
- Yes, please indicate which projects ....
  - No
14. Does your organization cooperate with businesses to develop innovate car sharing projects?
- Yes, please indicate which projects ....
  - No
15. Does your organization participates in social projects?
- Yes, please indicate which projects ....
  - No

16. Does your organization cooperate with academic research in car sharing?

- ☐ Yes, please indicate which projects ...
- ☐ No

17. Would you like to?

- ☐ Yes
- ☐ No

## **QUESTIONS ON SERVICES IN ONE SPECIFIC CITY**

### **Operational characteristics:**

18. Which of the descriptions below apply to cars offered by your service? (more than one option possible)

- Some/all cars have a defined pick-up location (parking place or station) and need to return to that location

19. How long in advance can customers make a reservation for this cars without paying extra fees?

- ☐ Up to 30 min
- ☐ Up to 2 hours
- ☐ Up to one day
- ☐ Up to one week
- ☐ More than one week
- ☐ No reservation possible

20. How long in advance can customers change or cancel a reservation for this cars without paying extra fees?

- ☐ Up to 3 hours in advance
- ☐ Up to 6 hours in advance
- ☐ Up to 12 hours in advance
- ☐ Up to 24 hours in advance
- ☐ Up to 48 hours in advance
- ☐ More than 2 days in advance
- ☐ Not possible without paying an extra fee

21. What is the minimum booking-time for this cars?

- ☐ 60 minutes or less
- ☐ One day or less
- ☐ More than one day

22. Does the city provide parking spaces/stations in public streets?

- ☐ No
- ☐ Yes, for some cars
- ☐ Yes, for most/all cars



- Some/all cars have a defined pick-up area (homezone or neighbourhood) and need to return to that area
  19. How long in advance can customers make a reservation for this cars without paying extra fees?
    - Up to 30 min
    - Up to 2 hours
    - Up to one day
    - Up to one week
    - More than one week
    - No reservation possible
  20. How long in advance can customers change or cancel a reservation for this cars without paying extra fees?
    - Up to 3 hours in advance
    - Up to 6 hours in advance
    - Up to 12 hours in advance
    - Up to 24 hours in advance
    - Up to 48 hours in advance
    - More than 2 days in advance
    - Not possible without paying an extra fee
  21. What is the minimum booking-time for this cars?
    - 60 minutes or less
    - one day or less
    - more than one day
- Some/all cars float across town and are picked-up and parked in special parking places/pool-stations spread across town
  19. How long in advance can customers make a reservation for this cars without paying extra fees?
    - Up to 30 min
    - Up to 2 hours
    - Up to one day
    - Up to one week
    - More than one week
    - No reservation possible
  20. How long in advance can customers change or cancel a reservation for this cars without paying extra fees?
    - Up to 3 hours in advance
    - Up to 6 hours in advance
    - Up to 12 hours in advance

- Up to 24 hours in advance
  - Up to 48 hours in advance
  - More than 2 days in advance
  - Not possible without paying an extra fee
21. What is the minimum booking-time for this cars?
- 60 minutes or less
  - one day or less
  - more than one day
22. Does the city provide parking spaces/stations in public streets?
- No
  - Yes, for some cars
  - Yes, for most/all cars
- Some/all cars float across town and are picked-up and parked on public streets
19. How long in advance can customers make a reservation for this cars without paying extra fees?
- Up to 30 min
  - Up to 2 hours
  - Up to one day
  - Up to one week
  - More than one week
  - No reservation possible
20. How long in advance can customers change or cancel a reservation for this cars without paying extra fees?
- Up to 3 hours in advance
  - Up to 6 hours in advance
  - Up to 12 hours in advance
  - Up to 24 hours in advance
  - Up to 48 hours in advance
  - More than 2 days in advance
  - Not possible without paying an extra fee
21. What is the minimum booking-time for this cars?
- 60 minutes or less
  - one day or less
  - more than one day
- Some/all floating cars can be driven one-way between this town and other towns (without the need to return them)

- I didn't find the appropriate operational characteristic for some/all of our cars. Please explain:...

**Technology contents:**

23. Which types of vehicles do you offer to your customers? You can pick more than one option.

- ☐ Economy car (City car)
- ☐ Family car
- ☐ Sedan/Minivan
- ☐ Luxury vehicle/SUV
- ☐ Sports car/Topless car
- ☐ Van
- ☐ Wheelchair friendly car
- ☐ Other, please specify

24. Can you indicate what share of your cars uses one of the propulsion/fuel types below?

- ☐ Petrol/gasoline
- ☐ Diesel
- ☐ Battery electricity
- ☐ Hydrogen
- ☐ LPG
- ☐ Hybrid (diesel or petrol)
- ☐ Other, please specify

25. Can you give an estimation of the average CO<sub>2</sub> emission of your car fleet?

**Registration & reservation procedure:**

26. How do new customers register for your car sharing service? (more than one option is possible)

- ☐ Via an app
- ☐ Via a website
- ☐ Via telephone
- ☐ At your customer service

27. Do customers have to pay a subscription fee?

- ☐ Yes
  - Between ..... € and .....€
- ☐ No

28. Do customers have to pay a deposit before using your car sharing service?

- ☐ Yes, a fixed amount
  - Between ..... € and .....€
- ☐ No, but they need a credit card to guarantee the deposit
  - Minimal card limit: .....€
- ☐ No

29. We want to know more about the contract your customers sign. Which statement applies the most to your organization?

- ☐ Our customers sign a single contract with our organization at the start
- ☐ Our customers sign a contract every time they rent a car

30. How do customers make a reservation for a shared car of your organization? (more than one option possible)

- Online via a website
- Via an app
- Via a call center
- Visit at the customer service
- Other, specify

**Insurance model:**

31. How does your organization cope with the insurance of the cars? Please indicate which statement applies the most to your situation.

- Insurance is included in our price
- Our price doesn't include insurance (customers have to look for an insurance themselves)

32. If you offer an insurance, is there a possibility for the customers to lower the own risk?

- Yes, customers can lower the own risk to an amount between 0 and 500 euro
- Yes, customers can lower the own risk to an amount between 501 and 1.000 euro
- Yes, customers can lower the own risk to an amount higher than 1.000 euro
- No
- Other, please specify

**Opening technology:**

33. In which way the shared cars can be opened by the customer? Please indicate all technology you use at least with one car.

- With a physical key swap
- With a chip card
- With a smartphone
- Other, please specify

34. What is the opening technology used for most of the cars you offer? (more than one answer possible)

- With a physical key swap
- With a chip card
- With a smartphone
- Other, please specify

**Pricing:**

35. How is a customer charged for using your service? (more than one answer is possible)

- Customers pay directly (after a ride) for the services we offer
- Customers pay periodically for the rides they made
- Customers pay a periodical service fee

36. Which parameters determine the price of a ride with your services? (more than one answer possible)

- Distance traveled with the shared car
  - Per kilometer

- Per set of kilometers (example: price for every 100 kilometers)
    - Other
  - Time traveled with the shared car
    - Per minute
    - Per hour
    - Per day
  - Other parameter(s), please specify ...
37. Does the price for a ride with your service include all energy-costs (fuel, electricity, gas etc.)?
- Yes
  - No, energy costs are charged in addition
38. What is the lowest standard price a customer will pay if he does the following: rides with the cheapest vehicle he can choose within your service (price should include all taxes and fees, price should exclude monthly service fees and promotional prices, standard package-prices can be considered):
- 1/2-hour booking, 7 kilometers driven; price: ...
  - 2-hour booking, 10 kilometers driven; price: ...
  - 8-hour booking, 150 kilometers driven; price: ...
  - 30-hour booking, 400 kilometers driven; price: ...

### Service dimension:

In order to get a clear view on the impact of your services, we are interested in some data about the number of customers, trips and cars. It's important to know that the STARS-consortium will never refer to the answers of individual car sharing organizations and will only communicate about data on an aggregated level. None of your answers will be publicly available.

39. How many shared cars of your organization are available in the city of ...?
- ....
  - If applicable for you, on how many locations? ...
40. How many unique members does your organization count in the city of ...?
- ....
41. During the last year, how many unique customers did use a car via your organization in the city of ...?
- ....
42. How many trips did you register during the last year in the city of ...?
- ....
43. What is the average distance traveled by a customer with one of your organizations' shared cars? (in km's)
- ....
44. What is the average time a shared car is used for one trip? (in minutes)
- ...
45. What percentage of your cars are parked on public streets?
- ...

### Role of car manufacturer(s):

46. Do you have a structural agreement with (a) car manufacturer(s) or a distributor of (a) car brand(s) to buy or lease their cars?
- Yes, with one specific manufacturer or distributor, namely ...
  - Yes, with more than one, namely .... ..
  - No
47. How are the cars financed?
- By a vehicle manufacturer finance company
  - By an independent finance company
  - By own finance
48. What is the financial arrangement you use to obtain new cars?
- Hire or purchase
    - With deposit
    - Without deposit
  - Lease
    - With deposit
    - Without deposit
  - Contract purchase
    - With deposit
    - Without deposit
    - With final 'balloon payment'
    - Without final 'balloon payment'
49. We are interested in the specific terms on which your car sharing vehicles are obtained. Do you buy the cars 'at own risk' or on 'agreed buy back'?
- We buy most of the cars 'at own risk', and can sell them at any price and at any time we want. To be more specific ... (more than one answer is possible)
    - we sell the used car after a fixed number of kilometers, namely ... kms
    - we sell the used car after a fixed amount of time, namely ... months
    - we sell the used car in order to recover a fixed percentage of the selling price, namely at ... % of the price
    - we sell the used car when maintenance costs are getting to high
  - We buy most of the cars on 'agreed buy back'. To be more specific ... (more than one answer is possible)
    - the used car is returned after a fixed number of kilometers, namely ... kms
    - the used car is returned after a fixed amount of time, namely ... months
    - the used car is returned on other terms, please specify ...
50. When you buy new cars, do you get a discount on the normal selling price?
- Yes
  - Yes, but only if we buy a large amount of cars at once, namely more than .... cars
  - Yes, but only if we buy a type of car for which the demand is not as strong as anticipated
  - No
  - If yes, can you give us an estimate of the discount you get on the normal selling price? .... % discount

51. Do you have a maintenance deal with (a) car manufacturer(s) or a distributor of (a) car brand(s)?

- ☐ Yes
- ☐ No

**Cost structure:**

52. What is the cost structure of your business model? What are the main costs incurred to operate your business model? (please include an indicative percentage of at least two types of costs)

- ☐ ...% vehicle fleet acquisition
- ☐ ...% Maintenance (fueling, cleaning vehicles...)
- ☐ ...% Insurance contracts
- ☐ ...% Municipality taxes
- ☐ ...% Customer services
- ☐ ...% Personnel costs
- ☐ ...% Others

**QUESTIONS ON SHORT AND MEDIUM TERM DEVELOPMENT PERSPECTIVES:**

The following questions aim to analyze your opinion about the perspectives of the **car sharing sector in your country**.

53. In your view, how is the overall number of active car sharing users going to change over the next 5 years?
- ☐ Extremely decrease
  - ☐ Slightly decrease
  - ☐ Unchanged
  - ☐ Slightly increase
  - ☐ Extremely increase
54. Why will the overall number of active car sharing users evolve in the way you indicated above?
- ☐ ...
55. How do you expect the number of car sharing operators will change?
- ☐ Extremely decrease
  - ☐ Slightly decrease
  - ☐ Unchanged
  - ☐ Slightly increase
  - ☐ Extremely increase
56. Why will the number of car sharing operators evolve in the way you indicated above?
- ☐ ...
57. How do you think the diffusion of free-floating car sharing systems (flexible car sharing) will change?
- ☐ Extremely reduced
  - ☐ Slightly reduced
  - ☐ Unchanged
  - ☐ Slightly more widespread
  - ☐ Extremely more widespread
58. Why will the number of free floating car sharing operators evolve in the way you indicated above?
- ☐ ...
59. How do you think the diffusion of station-based car sharing systems will change?
- ☐ Extremely reduced
  - ☐ Slightly reduced
  - ☐ Unchanged
  - ☐ Slightly more widespread
  - ☐ Extremely more widespread
60. Why will the number of free floating car sharing operators evolve in the way you indicated above?
- ☐ ...
61. To what extent do you expect that car sharing will take away customers from public transport compared to the actual situation?
- ☐ Many fewer customers switching from public transport to car sharing
  - ☐ Fewer customers switching from public transport to car sharing



- Status quo
- More customers switching from public transport to car sharing
- Many more customers switching from public transport to car sharing

62. Why will it evolve in that way?

- ...

63. To what extent do you expect that car sharing services will integrate into the offer of public transport compared to the actual situation?

- A lot less integration
- Less integration
- Status quo
- More integration
- A lot more integration

64. Why will it evolve in that way?

- ...

65. How do you expect the overall number of privately owned cars will change?

- Extremely decrease
- Slightly decrease
- Unchanged
- Slightly increase
- Extremely increase

66. Which of the following aspects will characterize the relationship between the world of car sharing and the automotive sector, compared to the current situation? (More than one answer is possible)

- Decreasing car sales due to car sharing diffusion
- New business opportunities for car manufacturers
- Marketing some car models through car sharing
- Synergies or alliances between car manufacturers and car sharing operators
- Other (please specify)

67. To what extent autonomous or self-driving vehicles are likely to be part of a car sharing fleet, assuming that they are available in the mobility market?

- Extremely unlikely
- Slightly unlikely
- Neutral
- Slightly likely
- Extremely likely

Now picture how **your organization** will look like within 5 years.

68. How is the number of car sharing users in your organization going to change?

- Decrease of more than 5%
- Decrease up to 5%
- Status quo
- Increase up to 5%
- Increase of more than 5%

69. How do you expect the profitability of your business will change?

- Loss of more than 5%
- Loss up to 5%
- Status quo
- Growth up to 5%
- Growth of more than 5%

70. How is your fleet size going to change?

- Decrease of more than 5%
- Decrease up to 5%
- Status quo
- Increase up to 5%
- Increase of more than 5%

71. Which kind of vehicles are not yet part of your fleet but are likely to become part of it in the future?

- Economy car (City car)
- Family car
- Sedan/Crossover SUV/Minivan
- Luxury vehicle
- Sports car
- Off-road car
- Van
- Other, please specify

72. Are you going to operate in other cities in addition to the ones where you are already present?

- Unlikely
  - Why is it unlikely that you will expand your network to other cities?
- Likely
  - Why is it likely that you will expand your network to other cities?

73. How is your operating area going to change?

- Including suburban areas
- Including countryside
- Unchanged

74. To what extent the **diffusion of green vehicles** (electric, hydrogen cars) is going to impact your organization?

- Very negatively
- Negatively
- No impact
- Positively
- Very positively

75. To what extent the **diffusion of autonomous vehicles** is going to impact your organization?

- Very negatively
- Negatively
- No impact
- Positively

- Very positively

76. To what extent the **diffusion of Mobility-as-a-Service-applications** is going to impact your organization?

- Very negatively
- Negatively
- No impact
- Positively
- Very positively

77. To what extent a **better integration with public transport service** (e.g. fare integration, transit hubs, ...) is going to impact your organization?

- Very negatively
- Negatively
- No impact
- Positively
- Very positively

78. To what extent the **diffusion of smartphones** is going to impact your organization?

- Very negatively
- Negatively
- No impact
- Positively
- Very positively

79. To what extent the **rising costs of fuel** is going to impact your organization?

- Very negatively
- Negatively
- No impact
- Positively
- Very positively

80. To what extent the **worsening of congestion** is going to impact your organization?

- Very negatively
- Negatively
- No impact
- Positively
- Very positively

### Policy opportunities and barriers:

The following questions aim to understand policy opportunities that could help to improve the car sharing system and barriers that might prevent the development of car sharing sector.

81. How beneficial are the following elements for car sharing?

	Very unfavorable	Slightly unfavorable	Neutral	Slightly beneficial	Very beneficial
Dedicated car sharing stations on public street space					

Car sharing parking lots on other publically accessible spots (e.g. shopping centers, administration parking, hospitals, ...)					
Free access to paid parking zones					
Access to limited traffic zones					
Access to public transport lanes or High Occupancy Vehicles lanes					
Integration with public transport (ticketing and subscription)					
Standard and common rules (at a national or European level)					
Tax credits/incentives to employers who use car sharing					
Incentives to scrap cars					
User-friendliness of the system					
Reliability of the system					
Integration in new housing developments					
Road pricing					
Low emission zones					
Changes in ownership or sale taxes for cars					

82. Are there other policy options, beyond the previous ones, that would be particularly beneficial for car sharing? Think for example about the regulatory framework, planning and infrastructure, fiscal measures, service provision, communication and marketing, guidelines, collaboration platforms, business support schemes, ...

○ .....

83. Describe at least one current policy option in your country or city that, according to you, represents a barrier for car sharing.

○ ....

○ ....

○ ....

○ ....

○ ....

84. If you could propose one policy rule which would be most effective to boost car sharing, which one would that be?

○ ....

## APPENDIX 2: List of questions city administration survey

Dear city administrator,

We are contacting you in the context of the STARS-project. This research on car sharing in Europe is funded by the Horizon 2020-programme of the European Commission. One of the main goals of the project is to understand how the car sharing market in Europe is functioning right now and what future scenarios are likely to develop.

In order to get a detailed view on the way car sharing services are operating, we selected 20 cities across Europe where all active car sharing organizations were asked to participate in a survey. This is also the case for the car sharing services in your city.

In addition to the organizational and technical characteristics of the organizations themselves, we are also interested in some features of the city they are operating in. That is why we would also like to ask you some questions.

Your information is crucial for the further success of this project, so we would be very grateful if you could take some time to answer the following questions.

The STARS-consortium will never refer to individual answers and will only communicate about data on an aggregated level.

Thank you in advance,

The STARS-project team

- 
1. Do you agree to the above terms? By clicking Yes, you consent that you are willing to answer the questions in this survey.
  2. Before starting the actual questionnaire, we would like to know which city is taking the survey
    - a. Name of the city
    - b. Name of the administrative department

### Existing driving conditions

3. In your city, what is the average speed of the transport modes below? (km/h)



*This project has received funding from the Horizon 2020 programme under the grant agreement n°769513*

- a. (Suburban) Train
  - b. Tram/Metro/Light Rail
  - c. Regular Bus (without own lanes)
  - d. Taxi
  - e. Car
  - f. Cycling
  - g. Walking
4. Can you indicate how the modal split in your city looks like today? (based on the number of trips per type of transportation)
  - a. Private motor vehicle %
  - b. Public transport %
  - c. Cycling %
  - d. Walking %
5. Can you indicate how the modal split in your city looked like about 10 years ago?
  - a. Year of research
  - b. Private motor vehicle %
  - c. Public transport %
  - d. Cycling %
  - e. Walking %
6. What percentage of public streets is subject to parking regulation (to the effect that people have to pay for parking)?
  - a. Less than 30%
  - b. Between 30% and 50%
  - c. Between 50% and 70%
  - d. Between 70% and 90%
  - e. More than 90%
  - f. Don't know
7. What is the car ownership rate in your city (number of passenger cars per 1,000 inhabitants)?
  - a. Very low (less than 350 cars per 1,000 inhabitants)
  - b. Low (between 350 and 450 cars per 1,000 inhabitants)
  - c. Medium (between 450 and 550 cars per 1,000 inhabitants)
  - d. High (between 550 and 650 cars per 1,000 inhabitants)
  - e. Very high (more than 650 cars per 1,000 inhabitants)
  - f. Don't know

**Existing transport policies**

8. Does your city have policies to actively reduce private car ownership?
  - a. No, there are none.
  - b. No, but these are being actively developed.

- c. Yes, these have been formally adopted.
9. If the city has policies to actively reduce car ownership or will have so in the future, can you provide us with a link to a reference document or can you list the main actions the city is putting into place?
10. Does your city have policies to actively reduce traffic congestion?
- a. No, there are none.
  - b. No, but these are being actively developed.
  - c. Yes, these have been formally adopted.
11. Does your city have policies to actively encourage car sharing?
- a. No, there are none.
  - b. No, but these are being actively developed.
  - c. Yes, these have been formally adopted.
12. If the city encourages car sharing or will do so in the future, can you provide us with a link to a reference document or can you list the main actions the city is putting into place?
13. Does your city have policies to actively encourage the use of electric vehicles?
- a. No, there are none.
  - b. No, but these are being actively developed.
  - c. Yes, these have been formally adopted.
14. Does your city have air quality targets mainly related to traffic generated pollution, on top of the EU Clean Air Directive (e.g. Nitrogen Oxides, Carbon Monoxide, Particulate Matter or Volatile Organic Compounds)?
- a. No, there are none.
  - b. No, but these are being actively developed.
  - c. Yes, these have been formally adopted.
15. How often does your city exceed the existing air quality requirements? (... days a year)
- a.

**Existing public transport conditions:**

16. Does your city have Park & Ride / Incentive Parking sites (designated places where people can leave their private vehicles and continue their journey by public transport)?
- a. None
  - b. Yes – 1 site
  - c. Yes – 2 or 3 sites



d. Yes – 4 or more sites

17. Does the city offer integrated ticketing for different transport modes (e.g. a smartcard that can be used on public transport and other modes)?

- a. No, and there are no plans
- b. No, but the city is actively planning to implement this.
- c. Yes

18. Has a Mobility as a Service-platform (MaaS) been developed for your city?

- a. No, and there are no plans
- b. No, but there are plans to do so
- c. Yes
- d. Does not apply

### **Existing car sharing conditions:**

19. The city permits car sharing operators to have free access to paid parking zones.

- a. No, and there are no plans.
- b. No, but the city is actively planning to implement this
- c. Yes
- d. Not applicable

20. The city permits car sharing operators to have free access to limited traffic zones.

- a. No, and there are no plans.
- b. No, but the city is actively planning to implement this
- c. Yes
- d. Not applicable

21. Can you indicate how many shared cars and car sharing users your city counts?

- a. Number of shared cars:
- b. Number of car sharing users:

22. Does the city administration use shared cars for service shifts?

- a. No, and there are no plans.
- b. No, but the city is actively planning to implement this
- c. Yes
- d. Not applicable

### **Public sector support:**

23. Does the city offer marketing or financial support to commercial car sharing operators?

- a. No, and there are no plans.

- b. No, but the city is actively planning to implement this
- c. Yes

24. Does the city have a policy action plan for car sharing with defined targets?

- a. No
- b. Yes

25. If yes, can you provide a link to this document?

- a.

26. Does your city have a high-level champion, influential figure or decision maker who is supportive of car sharing in your city?

- a. No
- b. Yes

27. Please provide the name and contact details of the high level champion mentioned above.

### **Technology readiness:**

28. What is the availability of public electric vehicle charging points in your city? (number of charging points per 100,000 inhabitants)

- a. Very low (less than 1 per 100,000 inhabitants)
- b. Low (between 2 and 30 per 100,000 inhabitants)
- c. Medium (between 31 and 60 per 100,000 inhabitants)
- d. High (between 61 and 90 per 100,000 inhabitants)
- e. Very High (more than 91 per 100,000 inhabitants)
- f. Don't know

29. What is the availability of free Wi-Fi in the city?

- a. None
- b. In limited locations only
- c. In the city centre only
- d. Across the whole city
- e. Don't know

30. What percentage of the driving age population owns a smartphone (that can access the internet)?

- a. Very low (less than 20%)
- b. Low (20% - 34%)
- c. Medium (35% - 54%)
- d. High (55% - 74%)
- e. Very High (75% or more)

f. Don't know

31. Does the city's public transport operators open their API feeds to web / app developers?

- a. No
- b. Some public transport operators open their API feeds.
- c. Yes, all public transport operators open their API feeds.