STARS

Shared mobility opporTunities And challenges foR European citieS

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Car sharing in Europe: a multidimensional classification and inventory

Deliverable D2.1

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SUMMARY

The world of car sharing is evolving rapidly and the need for a broad overview of the current state of the European car sharing scene is becoming increasingly apparent. Public authorities, from local to supranational governments, want to be informed about the evolutions in the car sharing sector in order to initiate new legislations or to eliminate existing barriers. Mobility actors and companies are looking for new opportunities, including car sharing, and want to be aware of the current playing field before making large investments. Citizens, for their part, want to be correctly informed about this relatively new mobility solution.

Desktop research

Work package 2, and more specifically this deliverable 2.1, is the starting point of the STARS-project and will serve as the basis for many tasks that will follow. In order to gain insight into future business models for car sharing, into the travel behaviour of car sharing users or into policy barriers and opportunities for car sharing, it is necessary to have a clear picture of the current state of car sharing in Europe. That's why this deliverable takes off with a descriptive analysis of the main characteristics of the car sharing market in Europe. As many organisations as possible are screened trough desktop research, in order to construct a database with basic information for every service. The grouping of this individual puzzle pieces resulted in a detailed report on car sharing in Europe, which includes 186 cases from 25 countries.

In-depth survey

Where the focus in the first part of the deliverable is very broad and attention is payed to all car sharing schemes, the second part opts for a more narrow view on a selected number of cities and organisations. There is also a clear shift in the research method. The first results are based on public data which can be found on the websites of the car sharing services. For the second part of the study, an online questionnaire was presented to car sharing organizations that are active in 20 specific cities in Europe. This in-depth study has a limited number of cases, but it can gauge more thoroughly to the current state of car sharing. New information about the shareholders, the financing and the service dimensions of the organisations came to the fore. Eventually 56 car sharing organisations out of 12 different countries participated to the online survey.

Multidimensional typology and validation by experts

Both data-sets, the desktop research and in-depth survey information, were used to search for links between different characteristics of the car sharing organisations. Can we find, for example, a relationship between the operational characteristic of an organisation and the size of its car fleet? These questions will be answered in chapter four. The analyses eventually lead to a multidimensional classification of car sharing services in Europe. Using cluster analyses, all observed organisations were divided into different profiles, based on their common characteristics.

In order to obtain a certain level of unity and support about the data and the analyses, several international car sharing experts were asked to review this deliverable. The validation process provided some useful suggestions which are described in chapter five.

Five categories of car sharing

Throughout the deliverable a number of key variables were used to describe and define car sharing organisations. Three business models of car sharing have been detected: car sharing providers with an own fleet, peer-to-peer car sharing and car sharing among neighbours. Since the two latter models have in common the sharing of private vehicles, and we only found three cases that belong to the last model, we decided to combine both models in further analyses.

In addition, also four operational characteristics were distinguished, including two roundtrip systems (station based or homezone based), and two free floating systems (with an operational area or with pool stations). Both variables, the business model and the operational characteristic, are of equal importance when analysing car sharing schemes. However, two different independent variables, that need to be used for every single analysis, would make the already large variable even more extended. That's why we opted for one newly assembled independent variable, namely the categories of car sharing, which forms a mix between both variables. It contains the four operational characteristics, which are all linked to an organisation with an own fleet, and peer-to-peer car sharing, where the organisations always use a homezone based operational system. In this way, all important variances between car sharing organisations can be measured and still the amount of tables and analyses stays limited.

Geographical dispersion

A lot of the results found during this research support earlier studies and confirm some common knowledge about car sharing (in Europe). Still, it is interesting to make this overview since car sharing has emerged in new regions in Europe and new technologies have changed the way we look at

(shared) mobility, since the last similar report[1]. Concerning the geographical dispersion of car sharing organisations, a large concentration of services can be found in Western Europe. Almost 60% of all organisations under research are located in the West. These systems are among the oldest on the continent and belong on average more to the category of roundtrip systems. In Eastern Europe, the smallest number of car sharing organisations has been detected (8%), the services are on average the youngest ones and also more free floating than roundtrip systems are active there.

Northern and Southern Europe have an almost equal share in the total number of car sharing organisations, respectively 15% and 18%, but the average age of the organisations and the car sharing category where they belong to most, differs a lot. The organisations in Southern Europe are among the youngest and opt on average more for a free floating system with an operational area than organisations in other parts of Europe. In Northern Europe, at last, car sharing has already come a long way and we see that, compared to the other regions, peer-to-peer car sharing has a strong position in the North.

Six profiles of car sharing

Every category of car sharing has its own specificities and a distinction can be made, among many others, based on the size of the fleet, the use of technology for the opening of the car and the average length and duration of a shared trip. Organisations within the category of **free floating systems with an operational area**, for example, on average have a large fleet, are using an app far more than a chip card to open the cars and have an average trip length and duration of less than 10 kilometres and 30 minutes. Eventually, the cluster analysis at the end of this deliverable brings forward six profiles of car sharing, each of them representing a number of car sharing organisations that have in common their operational characteristic, their business and pricing model, their fleet size, … Most of the organisations described above can be found in profile 1, namely free floating car sharing systems.

Services that opt for a **free floating system with pool stations** have on average a medium sized fleet and still choose more often for chip cards than for an app to open their cars. Most of this cases belong to profile 2, free floating car sharing systems with pool stations.

Where most categories of car sharing can be linked to a specific size of car fleet, services with a **roundtrip station based system** show large variation in their fleet size. In our study both station

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[1] MOMO report: The State of European Car-Sharing

based systems were detected with a very limited number of cars and with large fleets. The station based systems show similarities with pool station systems concerning the parking of the cars and that manifests itself, among other things, in the opening technology that is usually choses, namely chip cards. Concerning the trip length and duration, half of the trips of station based cars last longer than 6 hours and are longer than 50 kilometres. The above mentioned cases are clustered into different profiles, namely profile 4, 5 and 6. These profiles differ from one another in terms of the type of shareholders, the size of the fleet or the organisational form.

Organisations operating with a **roundtrip homezone based system** have on average a rather small car fleet and they use an app more often than a chip car to open the cars. During the multidimensional classification no separate profile was found for these organisations. Apparently, these cases don't have any features in common other than their operational characteristic.

Finally, **peer-to-peer carsharing organisations** can mostly call on a large car fleet, since these cars are owned by private users and not by the organisation itself. Almost all shared cars are used for trips longer than 50 kilometres and are opened with a physical key that has to be swapped between the owner and the user of the car. All these organisations are gathered in profile 3.

These profiles, together with the great amount of information on the car sharing providers will be used extensively during the rest of the STARS-project.

1 Introduction and research strategy

1.1 Introduction

The car sharing landscape in Europe is evolving rapidly. As new players are entering the field and the existing organisations are challenged by new technological developments, the car sharing market is changing face. The most recent comparative work on car sharing in Europe dates from 2009. The MOMO project then published their state of car sharing in Europe (Loose, 2009). Almost ten years later, there is a need for a new cross-border study that sketches a picture of contemporary car sharing in Europe.

This document aims to look at existing different practices of car sharing, by gathering relevant information through both desktop research and data collection activities from services in operation, partially following the method implemented in 2009 for the MOMO project.

Before going to actual research, first we want to explain some key issues concerning important assumptions to better understand the current report.

1.1.1   Definition of car sharing

The idea of replacing the privately owned car by a shared car was at the heart of the concept when car sharing emerged in 1987/1988 nearly simultaneously by different people in Switzerland and Germany[2]. Back then the "car-ready city" was the core concept of city-planning and negative effects of this began to show elsewhere in Europe's bigger cities. Proponents of car sharing figured that a shared use of cars would be a means to reduce the car dependency of most households and give room to other more sustainable means of transport in their mobility behaviour, but without sacrificing appropriate access to cars.

From the first experiments in small communities that organized the private shared use of a car evolved the concept of car sharing as a mobility service. This concept can be defined as follows:

- Cars are offered to customers as rental cars (as opposed to self-owned cars).

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[2] Car sharing in Switzerland started in 1987 with two different organisations, in Germany the first car sharing project started in 1988 in Berlin.

- Access to the cars is granted to everyone who signs in as a customer to the service.
- There is a frame agreement that allows the customer to reserve and use the car independently after he signed in to the service
- Reservation and use of the car can be done, but not necessarily, without direct contact to the service provider/car owner

This definition separates car sharing from car rental by putting emphasis on the possibility to use the shared car independently whenever needed. It reflects the original idea of providing a public car that can be used as easy and instantly as the private car. It is this core definition that helped us identifying car sharing services and distinguish them from other forms of car rental in our research. In the UK, carsharing is known as "car club" – "club" reflecting the idea of people buying-in to a community of users rather than the service being anonymous.

In recent years with the rise of internet and smartphone technology, the original idea of sharing a private car in a community has re-emerged as peer-to-peer car sharing. Peer-to-peer car sharing is usually organized by an internet- and app-based platform, which offers privately owned cars for rent. The process of renting the car lacks some core features of the car sharing-definition given above: Most peer-to-peer services offer no frame agreement and access to the car is not possible independently. As a result, the peer-to-peer service is much more like a traditional car-rental in many aspects. Since some peer-to-peer operators start to experiment with other process designs and advanced opening technology for the private cars, new kinds of car sharing may emerge. It is possible that even the distinction between private and public car will get fluid as peer-to-peer services evolve. For this reason we decided to integrate peer-to-peer platforms in our account of car sharing practices as well.

It should also be acknowledged that people informally share cars with friends and family. This usually involves people being named on other people's insurance policies as drivers. This essentially is carsharing. However, very little is known of the scale or impacts of informal carsharing and is not included here.

1.1.2   Business models

Carsharing business models roughly fall into two distinct groups:
- Operators that provide users with access to a dedicated fleet of vehicles that are owned or leased by the operator, or

- Peer-to-peer carsharing: "personal vehicle sharing occurs when privately-owned vehicles are made temporarily available for shared use" (Shaheen & Cohen, Carsharing market overview, analysis, and trends, 2013, p. 2), with the intermediary help of an internet platform. These organisations offer their customers, both the owner and the user of the car, an online search - and reservation platform, a contract and an insurance.

During our research we could distinguish a sub-form of peer-to-peer car sharing (see also 2.3.1), namely the sharing of private cars in closed community groups which are having a cost-based business model. For the purpose of this research we name it 'car sharing among neighbours'. Another distinguishing element is the juridical foundation. In a peer-to-peer car sharing system a user has to sign a contract with the owner every time before the actual use of a car. In the case of the so called car sharing among neighbours, a contract needs to be signed only one time (at the beginning of the relationship).
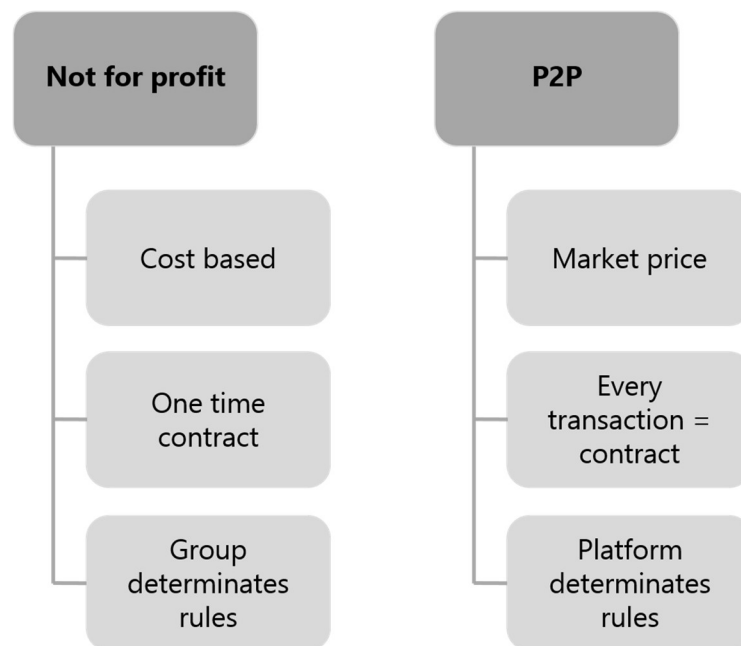
Figure 1: Two ways of sharing privately owned cars

So basically we ended up reviewing three business models;

1. Car sharing providers with an own fleet
2. Peer-to-peer car sharing
3. Sharing cars among neighbours

1.1.3   Operational characteristics

One of the most important distinguishing factors for car sharing organisations is their operating system. In order to distinct different typologies of car sharing we made a few preliminary assumptions concerning these operational characteristics. For this we looked into some basic work done by Susan Shaheen from the University of Berkeley (Shaheen, Chan, Bansal, & Cohen, 2015), the MOMO-project and a scientific advisory group of ACEA (Le Vine, Zolfaghari, & Polak, 2014). The STARS project partners then discussed this basic work on the base of new trends in shared mobility. For the purpose of this research 4 operational characteristics have been identified:

1. Roundtrip station-based or "back to base": a shared car has to be picked up and returned to the same (dedicated) parking spot.
2. Roundtrip home zone-based: a shared car has to be picked up and returned to the same area/(home)zone of the city. (No dedicated parking spots are in play).
3. Free-floating with operational area: a shared car can be picked up and returned in a large operational area. In most cases it is a whole city or even a different city. (No dedicated parking spots are in play).
4. Free-floating with pool-stations: a shared car can be pick up and returned in a large operational area but always in dedicated pool stations. In most cases it is a whole city or even a different city. This kind of service is also known in the literature as one-way station-based car sharing.
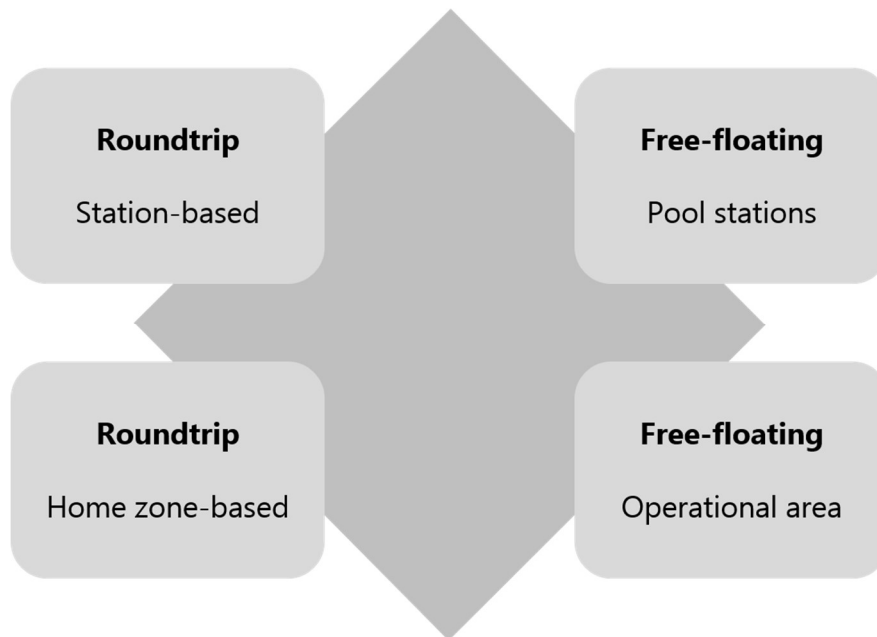
Figure 2: Overview operational characteristics of car sharing providers with an own fleet

1.1.4   Categories of car sharing

The business model and operational characteristic are two of the most defining variables of a car sharing scheme. In the analyses that follow, using two different independent variables would possibly make things too complicated. That's why we choose to build a new variable, constructed out of the operational characteristic and business model variables. Bringing together both variables, five categories of car sharing appear (see Figure 3). The new variable consists of the four operational characteristics, which only represent car sharing providers with an own fleet (business models A), and of peer-to-peer car sharing, which represents both car sharing business models where private cars are involved (B & C) and is characterised by a roundtrip homezone based operating system. This variable will be used as an independent variable during the desktop, in-depth and typological research in the coming chapters.

Business models:
- Car sharing providers with an own fleet (A)
- Peer-to-peer car sharing (B)
- Car sharing among neighbours (C)

Operational characteristics:
- Roundtrip station based (1)
- Roundtrip homezone based (2)
- Free floating pool stations (3)
- Free floating operational area (4)

Categories of car sharing:
- Roundtrip station based (A,1)
- Roundtrip homezone based (A,2)
- Free floating pool stations (A,3)
- Free floating operational area (A,4)
- Peer-to-peer car sharing (B,C,2)

Figure 3: Categories of car sharing

1.2 Research strategy

The project partners used two research strategies:

1. **Desktop research**: baseline information (type, business model, fleet size and characteristics …) has been collected for at least 90% of all existing EU services (descriptive analysis see chapter 2).

2. **In-depth survey**: data has been collected both at aggregated level (whole service) and at the anonymous disaggregated one (individual vehicle/customer/trip) from 20 different cities in 12 different countries in order to ensure adequate representativeness. (descriptive analysis see chapter 3).

On the basis of this research, a multidimensional typology of car sharing services has been built (see chapter 4), that considers the following elements: type of sharing, business model, service dimension, operational characteristics, technology contents, organisational form, institutional framework, mobility policies in operational area, characteristics of the city, characteristics of public transport system.

To end this report in chapter 5, we describe validation activities with stakeholders in Germany, Belgium and some Eastern European countries. The proposed classification has also been discussed with international experts and organisations concerning car sharing.

1.2.1   Desktop research

In order to get a broad view on the current state of car sharing within the EU, STARS started (December 2017) with a broad desktop research on all European car sharing organisations and researched at least 90% of all services in all EU countries.

By desktop research we could find relevant data about business forms, use of technology, pricing systems, number of cars, insurance and reservation systems. Also the research delivered sufficient information to decide which type of car sharing we were dealing with (roundtrip, free floating or P2P). In total, the desktop research took into account 31 variables which have been applied on 186 car sharing services in all EU countries. The services are counted on three levels: country, brand and operational characteristic. A car sharing organisation that operates in three cities within the same country will be counted as one case, whereas an organisation active in two cities from different countries is represented by two cases. Car sharing services that offer two different kind of systems (operational characteristics) in the same city or country are also counted as two different cases. The complete list of variables can be found in Appendix 3 of this report.

Remarks

Considering the large amount of work during the desktop research this was a team effort of the STARS-consortium. This means different researchers were involved in the process. The final list of data has been clarified through a scan by an experienced expert in the field of international car sharing. This person managed to detect some misinterpretations or even wrong data. Despite this check, some wrong data might appear in individual results. Moreover data collected was not always unambiguously or easy to find because of large diversity in styles and content. Yet we are convinced to have reached sufficient range and number of correct datasets to have a representative overview of existing car sharing systems in EU. Every given statistic and table shows the total amount of useful answers for that specific question in order to understand the dimension of the described variable.

Another important remark concerns the data research in Germany. Because the number of German car sharing organisations is rather big, and for convenience of further analyses, the STARS-consortium decided to not include all of them. Only those organisations that are active in a city with more than 50,000 inhabitants and/or have at least 19 shared cars were incorporated. 53 of in total 146 German organisations have ultimately been analysed during the desktop research.

1.2.2   In-depth survey research in 20 European cities

After having a broad view of existing car sharing services in EU, we wanted to know more in-depth insights on actual service operations at aggregated level (whole service) and at the anonymous disaggregated one (individual vehicle/customer/trip).

In order to establish a relevant and useful questionnaire, a list of questions was initiated via Autodelen.net based on previous work by the MOMO project and annual surveys in the UK run by Carplus. Considering three universities and three experts in the field of car sharing (bcs, Autodelen.net and Freie Hansestadt Bremen) are involved in the STARS consortium, first the survey has been discussed internally. After this the (slightly adapted) survey has been looked over by experts of (amongst other) University of Ghent, ShareNL and some Belgian car sharing providers. This method ensured an excellent (and extensive) survey.

The survey contains questions in a large range of topics of which are among other things juridical form, technological features, reservation options (e.g. possibilities for last minute vs. long before actual use), financial characteristics (deposit, price per hour, per kilometre …). Also we tried to understand the service dimension of different car sharing services. Therefore questions have been posed concerning the scale of the service, the average distance driven by a shared cars, number of customers, … The complete list of questions can be find in appendix 4.

The STARS consortium selected 26 cities spread over 16 EU countries to be sure having in-depth data of at least 20 cities in at least 4 different countries. We managed to have answers out of 20 cities in 12 different countries. In December 2017 we collected 56 responses via an extensive online survey.

Remark

For the majority of questions we reached a good response rate. Those touched more general issues and enabled us to have a detailed insight in the operating system and services. Most of the questions had a response rate of more than 90% and are significant.

The questions concerning the service dimensions had a much lower response rate, presumably because this data could be catalogued under 'sensitive' or 'secret'. However we managed to obtain some data. This might be not completely representative but we described the answers anyway because they are interesting as such. In order to understand the dimension of the described results we are always giving the total amount of responses given at one particular topic/question.

2 Desktop research in EU: a descriptive analysis

2.1 Geographical dispersion in Europe

2.1.1 Researched services and countries in EU

One of the aims of this desktop research was to integrate more than 90% of all European car sharing services into the study. With a total of 186 analysed car sharing services, spread over 25 countries, we managed to construct a database covering a very wide range of organisations (see Appendix 1 & 2 and Figure 4[3]). Germany is by far the country with the most different car sharing services, namely 155 but we only took into account those organisations with at least 19 shared cars and which are active in cities with more than 50.000 inhabitants. We ended up with investigating 53 German companies which is good for a share of almost 29% of the total researched car sharing providers in this research. If we also consider the smaller German services, there are 288 car sharing organisations in Europe.

Also in Belgium, France, Italy, the Netherlands and the UK a large number of car sharing services has been researched. In Greece, Cyprus and Malta we couldn't find a car sharing service, however an agreement between Transport Malta and Car2Go has been signed in October 2017 to run the service in Malta 2018.

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[3] In the countries that are colored grey no car sharing providers have been found, or these countries are not part of the EU.

1-5 carsharing organizations
6-10 carsharing organizations
11-15 carsharing organizations
16-20 carsharing organizations
21-25 carsharing organizations
25< carsharing organizations
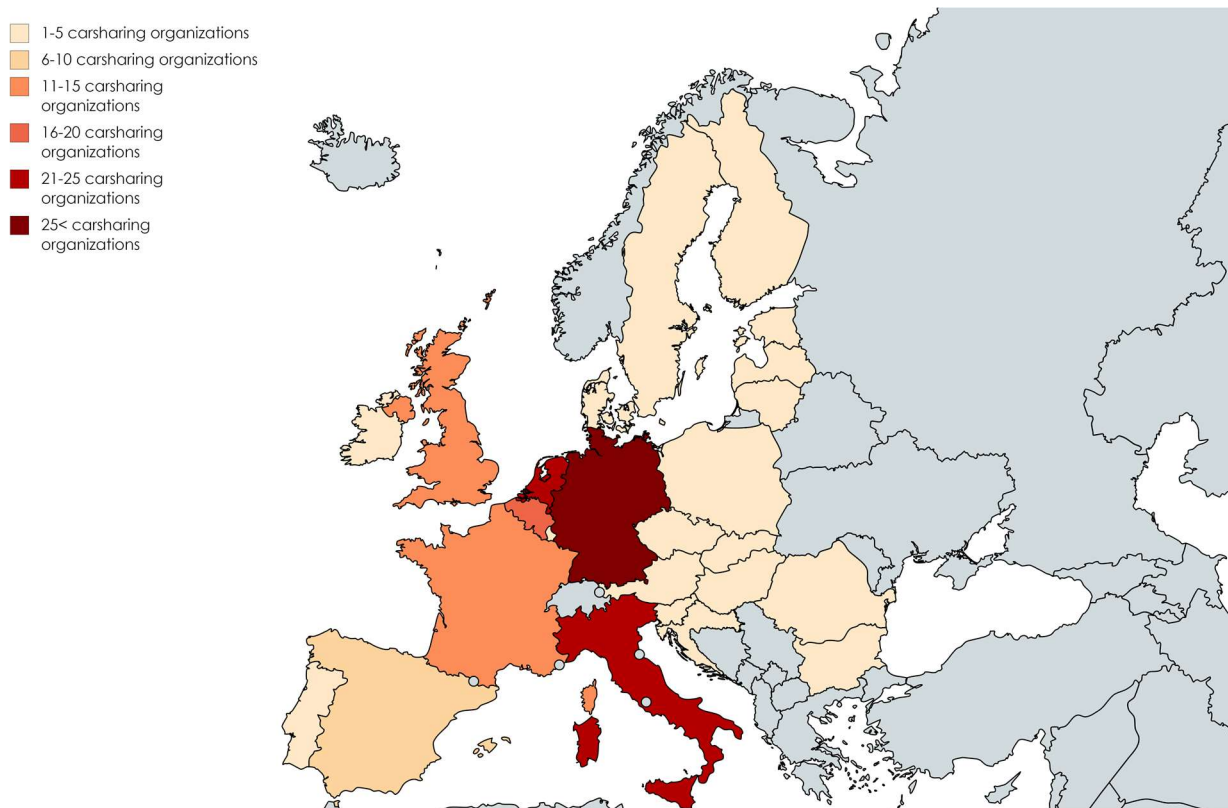
Figure 4: Number of researched car sharing services per EU country

Car sharing services in multiple countries

A couple of car sharing services are active in more than one country. As far as P2P services are concerned, Drivy is present in most countries. It operates in France, Belgium, Germany, Austria, Spain and the UK. Within the group of free floating services with an operational area, DriveNow tops the league. It cars can be found in 9 European countries. Ubeeqo, a roundtrip station based provider, offers cars to their customers in 6 countries. Other companies having a more 'international approach' are among others Car2Go, Zipcar, Communauto, SnappCar and Caramigo

2.1.2   A closer look in different European regions

According to the United Nations M49 Standard, created by the United Nations Statistics Division (UNSD), Europe can be divided into four geographic regions, namely Eastern, Northern, Southern and Western Europe (UN Statistics Division, 2018). Within the EU, the Western European countries contain by far the largest amount of car sharing services (60%). Southern Europe represents 18% of the total share, Northern Europe 15% and Eastern Europe 8%.
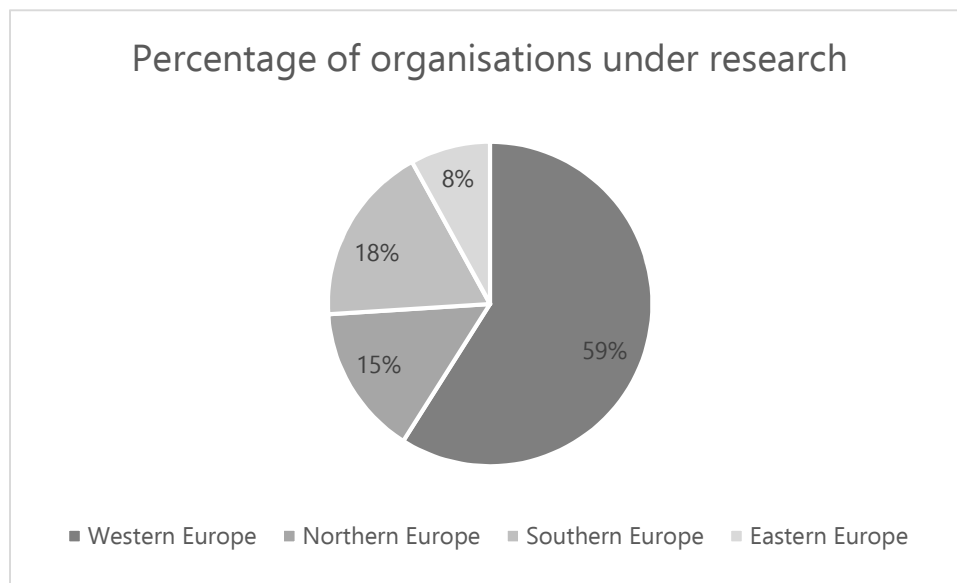
Figure 5: Share of organisations per European region

In the next section we will have a closer look on the category of car sharing (roundtrip, free floating and P2P) for each European region.

★ **Western Europe[4]: more roundtrip based car sharing services**

More than half of the car sharing services under desktop research were found in Western Europe. These six countries (21% of all EU countries) represent almost 60% of all car sharing services in the EU. As far as the categories of car sharing are concerned, it's interesting to see differences in comparison with the whole European desktop research are appearing. The share of the more traditional roundtrip as a total is higher in Western Europe (63% vs. 55%) as the share for, the younger concepts, both P2P and free floating are lower.

	N	%	% EU
Roundtrip station-based	56	51,4%	46,5%
Roundtrip home zone-based	13	11,9%	8,6%
Free-floating with operational area	20	18,4%	23,8%
Free-floating with pool-stations	7	6,4%	7,0%
Peer-to-peer (P2P)	13	11,9%	14,1%
Total	109	100,0%	100,0%

Table 1: Categories of car sharing - Western Europe

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[4] According to the UNSD six EU countries belong to Western Europe: Austria, Belgium, France, Germany, Luxembourg and Netherlands.

★ **Northern Europe[5]: more P2P car sharing services**

Although the Northern European countries represent almost 29% of total EU countries only 16% of all researched car sharing services are based here. What strikes the most is the share of P2P platforms. In Northern Europe 25% of the services is a P2P-platform, in the rest of Europe this share is more than 10% lower. The percentage of roundtrip services in Northern Europe is strikingly lower in comparison to the percentage of roundtrip services in the EU as a whole (39% vs. 55%). Also Northern Europe appears to have 10% more Free floating services with pool stations.

	N	%	% EU
Roundtrip station-based	9	32,1%	46,5%
Roundtrip home zone-based	2	7,2%	8,6%
Free-floating with operational area	6	21,4%	23,8%
Free-floating with pool-stations	4	14,3%	7,0%
Peer-to-peer (P2P)	7	25,0%	14,1%
Total	28	100,0%	100,0%

Table 2: Categories of car sharing - Northern Europe

★ **Southern Europe[6]: more free floating with operational area**

The 5 countries of Southern Europe represent 18% of the desktop researched car sharing services. The roundtrip services equal the average of the EU and P2P services are represented slightly lower (minus 5%). Free floating in Southern Europe however is far more dominant than the EU. This is due to big share of free floating with an operational area (plus 14% in comparison with the EU total).

	N	%	% EU
Roundtrip station-based	16	47,2%	46,5%
Roundtrip home zone-based	1	2,9%	8,6%
Free-floating with operational area	13	38,2%	23,8%
Free-floating with pool-stations	1	2,9%	7,0%
Peer-to-peer (P2P)	3	8,8%	14,1%
Total	34	100,0%	100,0%

Table 3: Categories of car sharing - Southern Europe

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[5] According to the UNSD eight EU countries belong to Northern Europe: Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden and United Kingdom.

[6] According to the UNSD seven EU countries belong to Southern Europe: Croatia, Greece, Italy, Malta, Portugal, Slovenia and Spain. Since we found no active car sharing organisations in Greece and Malta, these two countries were left out of the analysis. Also in Cyprus, by the UNSD seen as a Western Asian country, no active services were found.

★ **Eastern Europe[7]: more free floating than roundtrip**

Eastern Europe represents 21% of EU. 14 car sharing organisations have been researched here, which corresponds to 8% of all investigated services. It's noticeable no roundtrip home zone based systems, nor free-floating operators with pool-stations can be found there. The Eastern European region is the only one where we can detect more free floating systems with an operational area than roundtrip station-based systems. Also we can detect a larger share, in comparison with EU total, of P2P platforms.

	N	%	% EU
Roundtrip station-based	5	35,7%	46,5%
Roundtrip home zone-based	0	0,0%	8,6%
Free-floating with operational area	6	42,9%	23,8%
Free-floating with pool-stations	0	0,0%	7,0%
Peer-to-peer (P2P)	3	21,4%	14,1%
Total	14	100,0%	100,0%

Table 4: Categories of car sharing - Eastern Europe

2.2 Business model

Roughly, one can divide car sharing organisations into three groups. Organisations that share their own (or leased) fleet with customers represent the majority (86%). A Second business model is the facilitation of sharing private cars also known as peer-to-peer car sharing. P2P car sharing or "personal vehicle sharing occurs when privately-owned vehicles are made temporarily available for shared use" (Shaheen & Cohen, Carsharing market overview, analysis, and trends, 2013, p. 2), with the intermediary help of an internet platform. These organisations offer their customers, both the owner and the user of the car, an online search - and reservation platform, a contract and an insurance. 23 researched organisations fall into this category (13%).

	N	%
Public fleet	158	85,9%
Peer-to-peer (P2P)	23	12,5%
Private cars in closed community	3	1,6%
Total	184	100,0%

Table 5: Business model

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[7] According to the UNSD six EU countries belong to Eastern Europe: Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia.

As Table 5 is showing, we found three associations which are facilitating individuals to share their privately owned cars with neighbours, friends or family in closed groups. Those are worth mentioning because of the different approach comparing them with common P2P companies (see also 1.1.2). The three organisations (Dutch 'Vereniging voor Gedeeld Autogebruik' and Belgian 'Cozycar' and 'Dégage!') are facilitating a cost based car sharing system which means no profit will be made between the participants. They support the car sharing groups, which are closed communities, with standard contracts which can be tailor made, a registration platform, calculating tools (to establish the real cost for the use of a car) and sometimes with a special car sharing insurance. We assume more of these car sharing groups exist in Europe, but that they are hard to find during a desktop research because they don't publish their service online.

2.3 Categories of car sharing

One of the most important distinguishing factors for car sharing services is their operational system. As mentioned above we assigned three major groups: roundtrip, free floating and peer-to-peer.

2.3.1   Roundtrip

Roundtrip is the oldest type of car sharing and includes 55% of all researched services. The vast majority (46%) operates via a station-based system. This means the shared car must be returned to the exact same parking place where it was found. A variation on this system is the one with home zones (a couple of streets or a defined small area of the city). Customers need to return the shared car to the area where they found the car, but aren't obliged to park the car on the exact same parking lot. In 2018 this type is still relatively new and has a part of 9%. We see that some roundtrip (station based) services experiment more and more with this kind of car sharing (e.g. Cambio in the city of Antwerp, Stattauto and Flinkster in Munich). As a result of the operational characteristic, roundtrip services can give customers the possibility of booking long in advance.

2.3.2   Free floating

Free floating services have a large area (mostly a whole city) to pick up and return the shared cars. Although relatively new it's rising quickly and has now a market share of 31%. Most free floating services are working with an operational area (24%). This means shared cars have no fixed pick up location and can be found via their GPS location. After using the car, a customer can leave the car wherever he wants, as long as it is within the operational zone, which is in most cases one city.

Some free-floating systems are using pool-stations (7%). The cars of these operators can 'float' around the city, so they don't need to return to the same location, but they have to be parked on one of the numerous fixed pool-stations. As a result of the operational characteristic, free-floating cars cannot be booked long in advance. Car availability is dependent on where the cars are at the moment of a booking request

2.3.3   Peer-to-peer

All car sharing services described earlier in this section have in common the fact a company owns (or leases) the shared fleet. If we consider sharing privately owned cars recent years we see a strong growth. Nowadays 14% of EU car sharing services are taking care of facilitating the shared use of private cars.

	N	%
Roundtrip	**102**	**55.1%**
Roundtrip station-based	86	46.5%
Roundtrip home zone-based	16	8.6%
Free floating	**57**	**30.8%**
Free floating with operational area	44	23.8%
Free floating with pool stations	13	7.0%
Peer-to-peer (P2P)	**26**	**14.1%**
Total	185	100.0%

Table 6: Category of car sharing

2.3.4 Car sharing services with multiple operational characteristics

Apart from some car sharing services that are active in different countries (see section 2.1), we also detected some services which are offering different operational systems integrated in one service. These operators are summarized in the Table 2 below

Operator	Country	City/Cities	Free-floating with operational area	Free-floating with pool-stations	Roundtrip station-based	Roundtrip homezone-based
Cambio	Belgium	Antwerpen, Gent, Leuven			X	X
Book-n-drive	Germany	Frankfurt am Main	X	X	X	
Book-n-drive	Germany	Darmstadt, Mainz, Wiesbaden		X	X	
Flinkster (DB Car sharing)	Germany	München			X	X
JEZ! mobil GmbH	Germany	Halle an der Saale	X		X	
Stadtmobil	Germany	Hannover, Heidelberg, Mannheim, Essen	X		X	
Stadtteilauto Osnabrück	Germany	Osnabrück	X		X	

Stattauto eG	Germany	Kiel	X		X	
Stattauto München	Germany	München			X	X
teilAuto Mitteldeutschland (Mobility Center GmbH)	Germany	Leipzig	X		X	
Giraci	Italy	Bari		X	X	

Table 7: Car sharing operators with multiple operational characteristics

In Belgium for instance Cambio is traditionally a roundtrip station based car sharing service which is experimenting anno 2018 in three cities (Antwerp, Ghent and Leuven) with the use of a roundtrip home zone. Also Zipcar, traditionally a roundtrip station based service in different EU countries, is experimenting in one city with a different operational system. In Brussels the company is testing a free floating service with operational area. Zipcar is in the list above because it only uses one operational system at the time in one city.

Also in Germany, several car sharing organisations are using different operational systems within the same service. Stadtmobil, for instance, mainly offers cars in a roundtrip station based system, but in four cities the company offers a fleet of free-floating cars as well. Another German operator, Book-n-drive, even works with three different operational systems within the same service: in Frankfurt roundtrip cars can be picked up at fixed stations. The additional free-floating cars can be used and parked within an operational area and at pool-stations as well. Book-n-drive customers can also drive the free-floating cars one-way between the towns of Frankfurt, Darmstadt, Mainz and Wiesbaden. In the three last mentioned cities cars park at pool stations since there is no operational area defined for this cities.

As Loose (2015) points out, free-floating cars in a combined roundtrip-/free-floating system are booked much longer and travel longer distances then cars in stand-alone free-floating systems. This is explained as a result of the combined tariff-systems, that allows for cheaper prices of the free-floating cars.

2.4 Organisational form

The second variable that was taken into account is the organizational form of the organization. A very large majority of the car sharing services has a corporate structure (86%), while respectively 6% and 7% of the services opt for a cooperative or an association form. There's also one public authority

that engages in car sharing. A closer look on the corporate car sharing services shows that eight out of ten just are constituted from private shareholders. One in ten has only public shareholders and 9% has a mix of both public and private shareholders.

	N	%	N	%
Corporation / Company	151	85.7%		
Private shareholders			107	79.8%
Public shareholders			14	10.5%
Public-private shareholders			13	9.7%
Cooperative	11	6.3%		
(Unincorporated) Association	13	8.2%		
Other*	1	0.6%		
Total	176	100.0%	134	100.0%

*Public authority

Table 8: Organizational form

2.5 Reserving and opening the car

2.5.1 Reservation of the shared car

The vast majority of all shared cars of researched car sharing services can be reserved online, either via a website or via an application. Four out of ten organisations make it able for their customers to make a reservation via a phone call. Only 3% of the car sharing providers (still) has a customer service for reserving shared cars.

	N	%
Website	146	80,2%
App	145	80,1%
Phone / Call center	72	39,6%
Customer service	5	2,8%

Table 9: Reservation methods

It's interesting to have a more detailed look at this. The systems that work solely via an online reservation (website only/ app only/ website + app) represent almost 60% of car sharing services in

total. Since the possession of smartphones has risen drastically, car sharing-apps are no longer a curious phenomenon. Services offering their clients only an app to reserve a shared car are appearing twice as much than the ones offering a website only to fulfill the reservation process.

	N	%
Website only	17	9,4%
App only	33	18,3%
Phone / Call center only	0	0,0%
Customer service only	1	0,6%
Website + App	55	30,6%
Website + Phone / Call center	18	10,0%
Website + App + Phone / Call center	52	28,9%
App + Customer service	2	1,1%
All	2	1,1%
Total	180	100,0%

Table 10: Reservation methods - combinations

★ **Terms of reservation**

When we take a look at the terms of the reservation, it is clear two major systems come forward. Four out of ten operators are using a short-term reservation period (no longer than 30 minutes in advance). On the other hand, the same amount of car sharing services enables to reserve a car more than one week in advance, without paying extra fees.

	N	%
No reservation possible	3	3,3%
Up to 15 minutes	21	23,3%
Up to 30 minutes	15	16,7%
Up to 2 hours	2	2,2%
Up to one day	3	3,3%
Up to one week	9	10,0%
More than one week	32	35,6%
Unlimited	5	5,6%
Total	90	100,0%

Table 11: Reservation in advance without paying extra fees

★ **Minimum duration booking time**

Concerning the minimum duration of the time booked, two different patterns appear. A quarter of the operators sets the minimal duration of a booking at one minute, meaning that customers can leave or bring back the shared car after one single minute. By far the largest group of organisations (60%) is setting a minimum lending period of one hour. It is possible to return or leave the car earlier, but the customer has to pay for at least one hour.

It has to be noted, that the minimum booking time is not telling anything about the actual price of the service. Most service providers that use minute-based bookings charge a high price by the minute. On the other hand, time related prices in services with an hour-based booking routine are usually quite low. Thus in practice a 20-minute ride with a car rented by the minute is often more expensive than a 20-minute ride with a car rented by the hour. See section 3.9.2 for more details on prices.

	N	%
1 minute	32	23,2%
15 minutes	4	2,9%
20 minutes	1	0,7%
30 minutes	5	3,6%
1 hour	83	60,1%
2 hours	1	0,7%
5 hours	1	0,7%
6 hours	4	2,9%
8 hours	1	0,7%
1 day	6	4,5%
Total	138	100,0%

Table 12: Minimum duration reservation

2.5.2   Opening technology

One of the key issues of car sharing is to obtain access to the shared cars. Although the majority of the car sharing services provides a chip card (59%) or an app (45%) to open the cars, yet almost one in six organisations makes it still able to open the car via a physical key swap.

	N	%
Physical key swap	28	15,6%

Chip card	106	58,9%
App	81	45,0%

Table 13: Opening technology

The chip card is by far most popular mode to open shared cars (41%). 28% of services is using an app-only access system. It has to be noted that the widespread use of chip cards is not only a decision on the "customer/car-interface". It is also a decision concerning the issue of guaranteed access to the car. Chip cards make access to the car more secure because full connection to the internet is not needed in the moment the car has to unlock for the customer. This is especially important if cars park in buildings or underground garages. Thus providers who use any kind of stations show a tendency to provide chip cards as the only opening-system or along with an app based opening.

A physical key swap could be described as time-intensive and might make car sharing less flexible. Still 13% of all services hold on to this physical key swap as the only possible way to obtain access to the car. A large majority of the latter organisations are peer-to-peer services. Most of these private shared cars don't have integrated technology to open them with an app or a chip card.

	N	%
Physical key swap only	23	12,8%
Chip card only	74	41,1%
App only	50	27,7%
Chip card + App	27	15,0%
Physical key swap + App	1	0,6%
Physical key swap + Chip card	2	1,1%
All	3	1.70%
Total	180	100,0%

Table 14: Opening technology - combinations

2.6 Pricing

2.6.1 Subscription and deposit

★ **Subscription fee**

Almost half of all car sharing services demands a one-off subscription fee. Since the variation among the registration fees is quite large, we didn't look at the average fee. However, the median is less susceptible for large variation and amounts to 13 euros.

★ **Deposit**

A deposit can be used to ensure payment. We discovered two ways to handle this: a fixed amount that has to be paid when signing a contract or a credit card guarantee. Surprisingly nearly six in ten car sharing organisations do not ask a deposit or at least we couldn't discover anything on the respective websites. 15% of services demands a credit card guarantee and 26% require a fixed amount.

	N	%
No	94	58,4%
No, but credit card guarantee	24	14,9%
Yes, fixed amount	43	26,7%
Total	161	100,0%

Table 15: Deposit

Most of the time a fixed deposit is between € 100 and € 350. About one fifth demands an amount between € 50 and € 100, and almost one fourth a deposit between € 201 and € 250 (see Figure 6: Fixed amount deposits). We discovered also credit card guarantee is noticeable higher than the fixed amount. The average price for a fixed amount is € 220 against € 867 which is the average credit card guarantee.
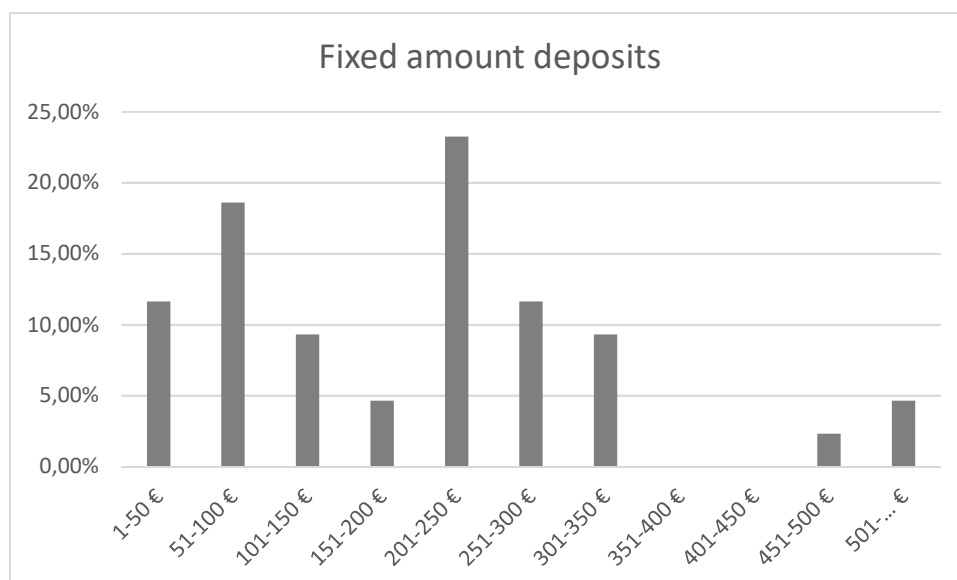
Figure 6: Fixed amount deposits

2.6.2 Pricing per trip

Besides a deposit and subscription fee, the business model of a car sharing service depends on the fee for using a shared car. Considering this is not infrequently a unique selling point for a car sharing provider, we see a large variety of pricing systems. It's not easy to compare them but we see clearly a few patterns. A car sharing service uses either a fee for usage time or a price for the travelled distance or a combination of them.

	N	%
Time travelled	62	34,4%
Distance travelled	8	4,4%
Combination	110	61,2%
Total	180	100,0%

Table 16: Pricing system

	Free floating operational area		Free floating pool stations		Roundtrip station based		Roundtrip home zone based		Peer-to-peer	
Time travelled	23	52,3%	11	84,6%	15	17,6%	4	30,8%	9	37,5%
Distance travelled	2	4,5%	1	7,7%	1	1,.2%	0	0,0%	4	16,7%
Combination	19	43,2%	1	7,7%	69	81,2%	9	69,2%	11	45,8%
Total	44	100,0%	13	100,0%	85	100,0%	13	100,0%	24	100,0%

Table 17: Pricing system - categories of car sharing

Most of the car sharing services (61%) are using a combination of time travelled and distance travelled, 34% are asking a fee for travelled time only. A minority (4%) is using a distance travelled based fee only. If we make a distinction per category of car sharing, it becomes clearer that free floating systems are using a solely time travelled pricing system more frequently than roundtrip or peer-to-peer systems. In addition, the roundtrip systems mainly opt for a combination of time and distance based pricing.

If we take a closer look on the distance based fee (in both the combination and solely system) the vast majority (85%) is asking a price per single kilometre. 15% charges a fee per set of kilometres. The results on the time travelled mechanism are more diffused. About 55% charges by hour and 35% charges by minute. Some (ca. 2%) organisations are demanding at least half a day rental and 8% make it obliged to use a shared car at least one day.

	N	%
Per minute	57	35,0%
Per hour	90	55,2%
Per half day	3	1,8%
Per day	13	8,0%
Total	163	100,0%

Table 18: Pricing system - time travelled

	Free floating operational area		Free floating pool stations		Roundtrip station based		Roundtrip home zone based		Peer-to-peer	
Per minute	38	97,4%	8	61,5%	8	9,9%	3	23,1%	0	0,0%
Per hour	1	2,6%	5	38,5%	71	87,7%	8	61,5%	3	20,0%
Per half day	0	0,0%	0	0,0%	1	1,2%	0	0,0%	2	13,3%
Per day	0	0,0%	0	0,0%	1	1,2%	2	15,4%	10	66,7%
Total	39	100,0%	13	100,0%	81	100,0%	13	100,0%	15	100,0%

Table 19: Pricing system – time travelled – categories of car sharing

Here too, a distinction per category of car sharing provides more clarity. While free floating systems more frequently use a tariff per minute, roundtrip operators are more in favour of a price per hour. Two thirds of the peer-to-peer systems charge a price per day.

Finally it is interesting to see fuel cost is in most cases (87%) included in the total fee. The other car sharing services (13%) demand refueling after using a shared car.

2.7 Insurance

In general (97%) car sharing services are providing an insurance for using shared cars. Only 5 services (ca. 3%) are asking customers to look for an insurance themselves. All of them are related to sharing private cars.

	N	%
Customers have to look for insurance	5	2,8%
Insurance included in price	174	97,2%
Total	179	100,0%

Table 20: Insurance

2.8 Number of cars

The total number of cars per car sharing service differs a lot between the European services. One third of the organisations has less than 50 cars in their fleet and about two thirds has less than 300 cars. Almost one in seven services owns or leases more than 1.000 shared cars. Because of the presence of some outliers, we didn't calculated the average. The median value per car sharing service is 194. Off course one service can be active in different cities.

	N	%
1-50	31	30.1%
51-100	9	8.7%
101-150	8	7.8%
151-200	10	9.7%
201-250	5	4.9%
251-300	6	5.8%
301-500	9	8.7%
501-700	5	4.9%

701-900	2	1.9%
901-1.100	4	3.9%
1.101-2.000	4	3.9%
2.001-3.000	3	2.9%
3.001-4.000	3	2.9%
4.001<	4	3.9%
Total	103	100,0%

Table 21: Number of cars per organization

One can expect some differences between organisations operating with a different system. In the table below we made a distinction between the five categories of car sharing. Again, only the median values are presented because the means are too affected by outliers. Among the organisations with an own fleet, the free floating systems have clearly a larger fleet than the ones operating with a roundtrip system. The median car fleet of the first group is more than four times larger than the latter group. The peer-to-peer organisations, which facilitate the sharing of private cars, have the highest median car fleet (1.000), but don't own these cars themselves.

		N	Median	Minimum	Maximum
Roundtrip		58	66	4	2.214
	Station based	52	72,5	4	2.214
	Home zone based	6	37,5	6	120
Free floating		36	300	12	6.000
	Pool stations	9	200	100	4.000
	Operational area	27	320	12	6.000
Peer-to-peer		9	1.000	80	36.000
Total		103	194	4	36.000

Table 22: Number of cars - categories of car sharing

3 In-depth research in 20 cities

In the desktop research we analysed 186 car sharing services in the EU. This part goes further and focuses on an in-depth analysis of car sharing services in 20 cities. Initially, car sharing organisations from 26 European cities were asked to participate in this study. These cities were chosen on the basis of their location (in function of geographical dispersion), the presence or absence of car sharing schemes and any existing contacts with organisations. Eventually, 56 car sharing services from 20 cities and 12 different countries answered the extensive survey (see Table 23).

Country	City
Belgium	Antwerp, Brussels, Ghent
Bulgaria	Sofia
France	Paris
Germany	Berlin, Bremen, Cologne, Mannheim
Ireland	Dublin
Italy	Milan, Rome, Turin
Latvia	Riga
Lithuania	Vilnius
Netherlands	Amsterdam
United Kingdom	London
Spain	Barcelona, Madrid
Sweden	Göteborg

Table 23: Cities in-depth research

3.1 Categories of car sharing

Just like we did in the descriptive analysis of the desktop research (see 2.1), we start this chapter with one of the most important distinguishing factors for car sharing services: the category of car sharing. We are using the same three major groups: roundtrip, free floating and peer-to-peer. The described stats can be found in Table 24.

3.1.1   Roundtrip

Car sharing services operating in a roundtrip system represent about 55% of all respondents who took our survey. In the desktop research, these services had the same share. We can state with some certainty around 55% of all car sharing services in the EU are using a roundtrip system. 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 slightly smaller than in the desktop research (10% vs. 15%).

3.1.2 Free floating

Free floating car sharing services represent almost one third of the total research population (30.3%). This share is, just like roundtrip, almost equal to the percentage in the desktop research (30.8%). There is however a gap between the respective shares of the ones with operational areas and pool stations. The first represents 95% of the answers, the second only 5%. In the desktop research it was more like 78% and 22%. Only one operator with pool stations took our in-depth survey.

3.1.3 Peer-to-peer (P2P)

Also the share of peer-to-peer services is about exactly the same. Both in the desktop and in-depth research this type of car sharing is representing 14% of the entire research population.

3.1.4 Desktop versus in-depth research

Overall, the comparison between the desktop and in-depth research shows that both populations are very similar regarding their category of car sharing. The only significant difference has been detected at the level of subcategories of free floating.

	N	%	% desktop research
Roundtrip	**31**	**55.4%**	**55.1%**
Roundtrip station based	28	50.0%	46.5%
Roundtrip home zone based	3	5.4%	8.6%
Free floating	**17**	**30.3%**	**30.8%**
Free floating with operational area	16	28.5%	23.8%
Free floating with pool stations	1	1.8%	7.0%
Peer-to-peer (P2P)	**8**	**14.3%**	**14.1%**
Total	56	100.0%	100.0%

Table 24: Desktop versus in-depth research – category of car sharing

3.2 Organizational form and shareholders

The results from the survey are showing 84% of the respondents are profit organizations whereas 16% are non-profit. More than 77% of the respondents indicated they are private companies. Respectively 7 and 16% stated they are public or public-private organizations.

	N	%
Public	3	6.8%
Public-private	7	15.9%
Private	34	77.3%
Total	44	100.00%

Table 25: Shareholders

Further analysis is showing all three respondents that identified themselves as 'public' have no more than one shareholder. For public-private companies the situation is different. Three indicated that they have two shareholders. Another three services have three different shareholders and one has 5 shareholders. Most of them are linked with mobility organizations. Most informative is the diversification in private shareholders. More than 30% of them have an automotive company as a shareholder. Another important shareholder seems to be the car rental industry. This answer has been given seven times which counts for almost 27%.

	N	%
Automotive industry	8	30.8%
Car rental industry	7	26.9%
Insurance industry	0	0.0%
Taxi sector	0	0.0%
Mobility sector	1	3.8%
Other	10	38.5%
Total	26	100.00%

Table 26: Private shareholders

Five car sharing services (26%) have both the automotive and car rental industry as shareholders whereas other combinations are less likely to occur. More than 47% of the respondents mentioned other types of shareholders. This mostly involved private individuals or customers.
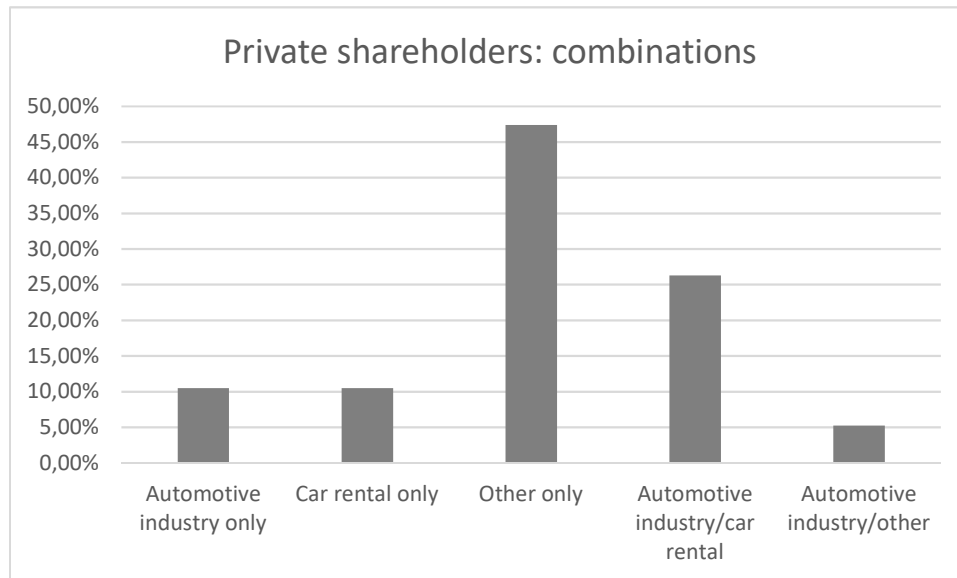
Figure 7: Private shareholders - combinations

3.3 Starting year

The date a car sharing service started in a specific city differs a lot. One in four car sharing organisations that participated in the in-depth research, started operating in a city before the year 2000. Between that year and 2013 the amount of car sharing services steadily grew. In the last 4 years a new wave of car sharing services started to rise. 39% of the respondents started operating in a researched city in that period.

car sharing services started in ..

- ...- 2000
- 2001-2003
- 2004-2006
- 2007-2009
- 2010-2012
- 2013-2015
- 2016-2018
- Total
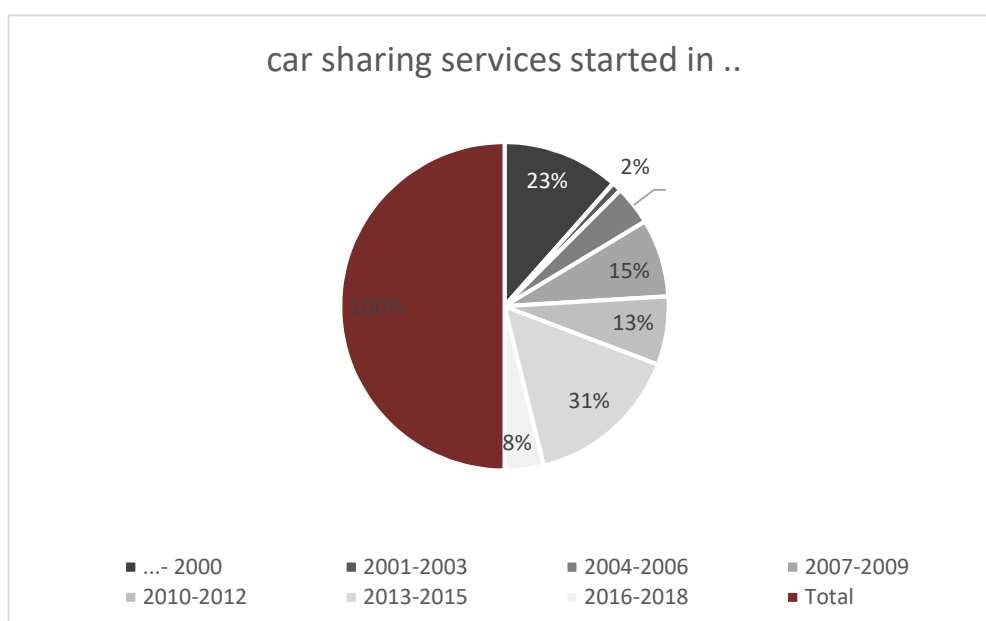
Figure 8: Starting year

There are some differences between the four European regions. The car sharing organisations in Northern and Western Europe are on average the oldest ones. In Southern and Eastern Europe car sharing services are on average almost ten years younger.

	Eastern Europe	Northern Europe	Southern Europe	Western Europe
Average starting year	2015	2003	2013	2005

Table 27: Starting year - European regions

It is also interesting to notice that big differences can be found between the categories of car sharing (see Table 28). The oldest organisations opted for a station based system or facilitated private car sharing. Organisations within both categories on average started operating in 2004. The most recent services are situated in the free floating categories and in the group of homezone based systems. The fact that those organisations use a more flexible way of parking the shared cars, and to do so depend on mobile tracking technology, can explain why these organisations only recently started operating.

	N	Average starting year
Roundtrip		
Station based	24	2004
Homezone based	3	2015
Free floating		
Operational area	16	2013
Pool stations	1	2013
Peer-to-peer	8	2004
Total	52	2007

Table 28: Starting year - Categories of car sharing

3.4 Being active in more than one city

A vast majority (81%) of questioned car sharing services is active in more than one city. 49% of these services (21) are operating in one country only, 51% (22) is present in several EU countries. It is remarkable to notice almost 70% (of the last half) is even active in 6 countries or more.

	N	%
One city	10	18.9%
More than one city	43	81.1%
Total	53	100.0%

Table 29: Activity in number of cities

Figure 9: Activity in number of countries
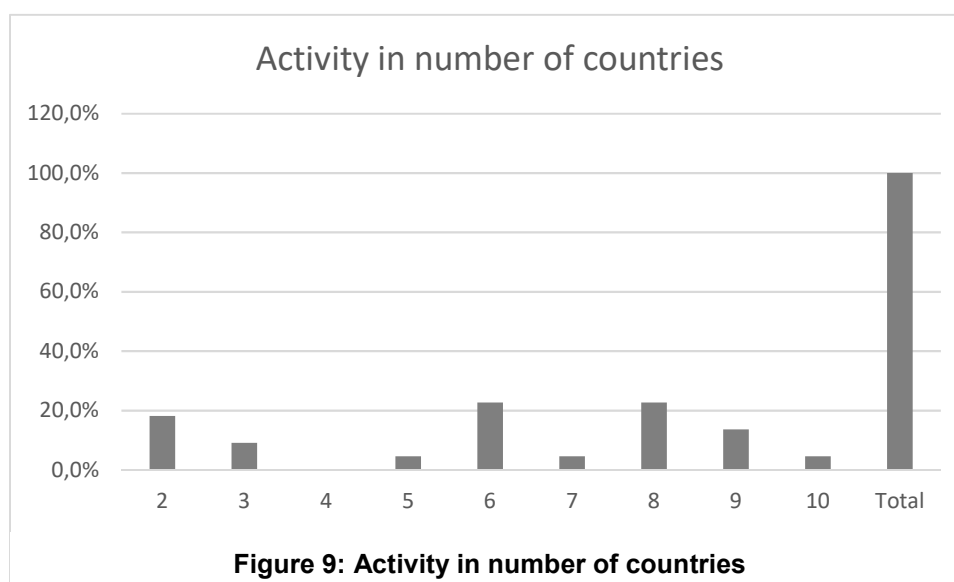
3.5 Cooperation with external partners

3.5.1 Cooperation with public transport

Thirty two (60% of the respondents) car sharing services are answering to have a cooperation with a public transport provider. Twenty of them (63%) have been negotiating special tariffs for their customers. If that's the case, mostly they succeeded also in offering one paying method for both sharing a car and using public transport. Working together in the field of marketing and communication is being done by 18 car sharing services (56%).

	N (32)	%
Cooperation in the field of marketing and/or customer service	18	56.3%
Cooperation in the field of digital integration	17	53,1%
Special tariffs for customers of (a) public transport operator(s)	20	62.5%
One key card for own services and those of (a) public transport operator(s)	16	50.0%
One app for own services and those of (a) public transport operator(s)	4	12.5%
Other	5	15.6%

Table 30: Cooperation with public transport

3.5.2 Cooperation with other partners

88% car sharing services are trying to cooperate with external partners. Firstly, 69% of the organisations are working together with local governments. The cooperation is very diverse, going from providing charging points and support with the electrification of the fleet to real local policy work. Also collaboration with all types of businesses and academic institutions is high (both 62%). 17% car sharing services indicate to be cooperating with social services and 24% with social projects to develop innovative car sharing projects (for instance projects for persons with reduced mobility).
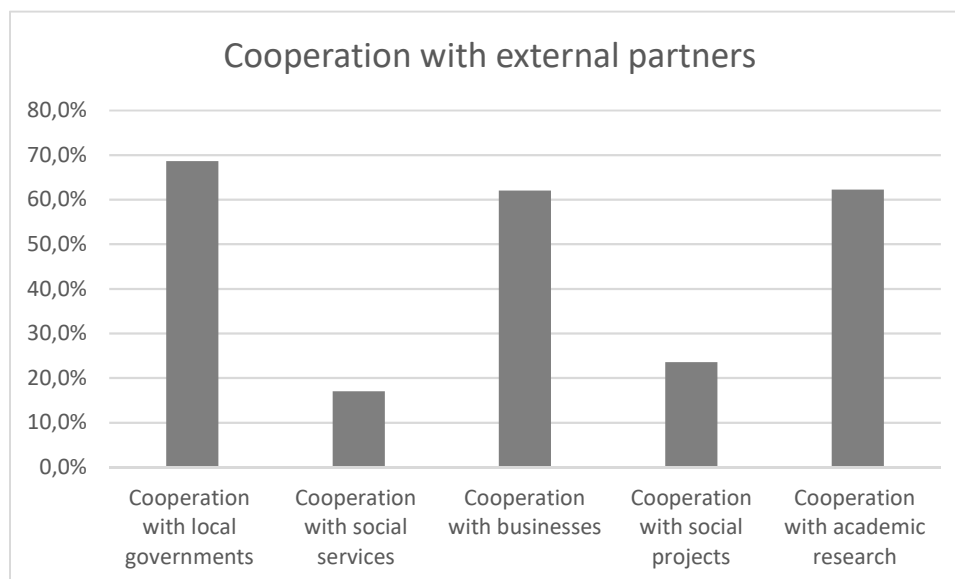
Figure 10: Cooperation with external partners

3.6 Registration

In total, 86% (48) services gave information about the registration options. In the vast majority (94%) of the questioned car sharing services, the registration process can be fulfilled via a website. Half of the times (potential) customers are able to use an app for the registration process. In times of the growing use of online tool it is remarkable 31% of the services are offering a customer service to register clients whereas 13% is still making it an option to register by phone. Other forms of registration (10%) contain written applications or registration at information sessions. 3% of the companies are including all possible options.

	N (48)	%
Via an app	24	50.0%
Via a website	45	93.8%
Via telephone	6	12.5%
At your customer service	15	31.3%
Other	5	10.4%

Table 31: Registration possibilities

3.7 Parking regulations

For station-based (and pool-stationbased) car sharing services it's a necessity to have dedicated parking spaces. Considering only these kind of services, 28% indicates the local government does not provide any fixed parking space. 36% states the city is offering parking space for some cars and 36% claims to have dedicated parking spots for all shared cars.

As far as the free-floating services with pool stations is concerned, 100% (one company) indicates the city is providing fixed parking space for all the cars of the fleet.

	Roundtrip station based		Free floating pool stations	
	N	%	N	%
No	7	28.0%	0	0.0%
Yes for some cars	9	36.0%	0	0.0%
Yes for most/all cars	9	36.0%	1	100.0%
Total	25	100.0%	1	100.0%

Table 32: Provision of parking spaces/stations on public streets by the city

3.8 Insurance models

We know from the desktop research almost every car sharing service (97%) is offering an insurance to their customers. In the in-depth survey we asked the operators if customers can lower the so called own risk (by paying an extra fee). 82% (46) organisations answered and half of the companies do offer that possibility. In 91% of the cases the own risk can be lowered to an amount between 0 and 500 euro, the other 9% is opting for an amount between 501 and 1.000 euro. Two respondents indicated the own risk is already at 500 euro, without an extra fee.

	N	%
Yes	**22**	**47.8%**
Customers can lower the own risk to an amount between € 0 and € 500	20	43.5%
Customers can lower the own risk to an amount between € 501 and € 1,000	2	4.3%
No	**22**	**47.8%**
Other	**2**	**4.3%**
Total	46	100.0%

Table 33: Possibility to lower own risk

3.9 Pricing

3.9.1 Parameters

As we learned already in the desktop research, generally, the price paid for a trip with a shared car is comprising a time or a distance component, or a combination of both. The desktop research showed the largest group of car sharing services is choosing for a combination (61%). A similar picture appears from the analysis of the survey results. However, the dominance of the 'combination'-category is even bigger here. Almost 75% of the organisations is charging their customers for both the time and the distance travelled. Furthermore, we see more than 21% is charging for the driving time only. The operators who are only considering the distance component are very rare and amount almost exact the same as in the desktop research (4%).

	N	%	% desktop research
Distance traveled with the shared car only	2	4.3%	4.4%
Time traveled with the shared car only	10	21.3%	34.4%
Combination	35	74.4%	61.2%
Total	47	100.0%	100.0%

Table 34: Pricing system

We asked car sharing services who indicated to have a time component in their price model to specify further. More than half of the companies indicates they are demanding either/both a fee per minute (56%) or/and a fee per hour (54%). 42% of the services claims a fee per day and almost one in five chooses for the other-category. The latter group indicated in most cases they offer a price per 15 minutes, per half an hour or rates and conditions vary according to different tariff plans. Since the respondents had the possibility to choose more than one time-based pricing model, it's hard to compare their answers with the results of the desktop research, where only one answer was possible.

	N (43)	%
Per minute	24	55.8%
Per hour	23	53.5%
Per day	18	41.9%
Other	8	18.6%

Table 35: Pricing system - time travelled

More than nine in ten car sharing services with a distance component in their price model is indicating to charge their customers per kilometre. 16% of the respondents (also) opts for a fee per set of kilometres. Most of the respondents who answered 'other', indicate to have a combination of both systems.

	N (38)	%
Per kilometer	35	92.1%
Per set of kilometers	6	15.8%
Other	5	13.2%

Table 36: Pricing system - distance travelled

3.9.2 Average price per trip

Besides the parameters determining the total price for a trip, we also asked respondents to give a total price for three concrete examples of journeys (excluding any fixed costs such as monthly fees)

★ **7 kilometres and 30 minute drive**

For a trip of half an hour and about 7 kilometres, EU car sharing users are paying on average € 5.03. In total 33 car sharing services answered this question. The largest group (43%) indicated they ask between € 2.1 and € 4 for this kind of trip.
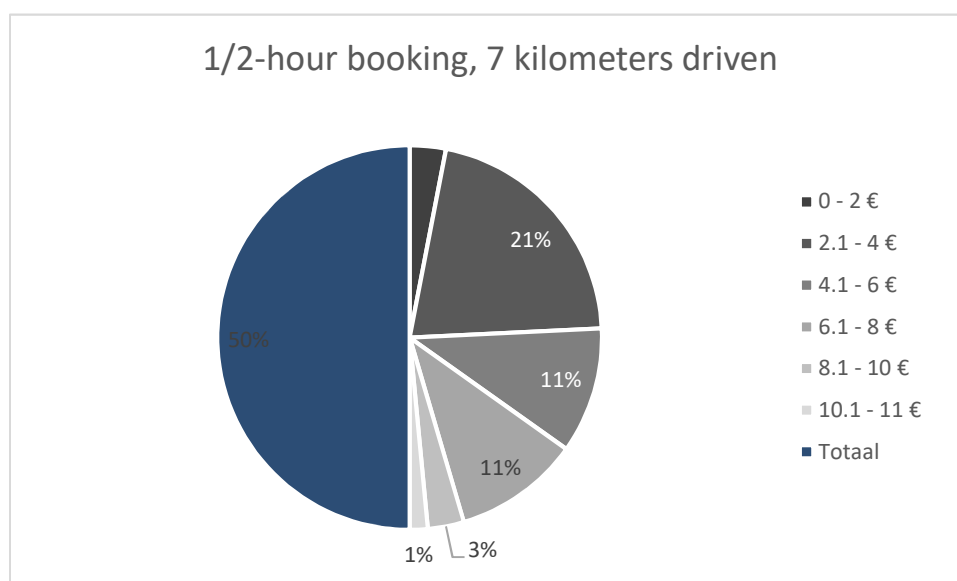
Figure 11: Pricing 7 kilometres and 30 minute drive

When we make a distinction between the different categories of car sharing (roundtrip, free floating and P2P), it is noticeable free floating systems are charging their customers more than double in comparison to the roundtrip systems (€ 7.38 vs. € 3.43). Although P2P organisations usually work with a price per (half) day, still two respondents answered this question and stated to charge an average amount of € 4.05 for this trip.

	N	Average	Minimum	Maximum
Roundtrip	18	€3.43	€2.00	€5.93
Free floating	13	€7.38	€4.00	€10.90
Peer-to-peer	2	€4.05	€2.10	€5.99
Total	33	€5.03	€2.00	€10.90

Table 37: Pricing 7 kilometres and 30 minute drive – category of car sharing

★ **150 kilometres and an 8-hour drive**

An 8-hour booking and a trip that involves 150 kilometres will add up to € 67.53 on average. Almost four out of ten car sharing services (34 answers) are charging their customers lower than average, between € 41 and € 60. 73% of these trips cost less than € 80.
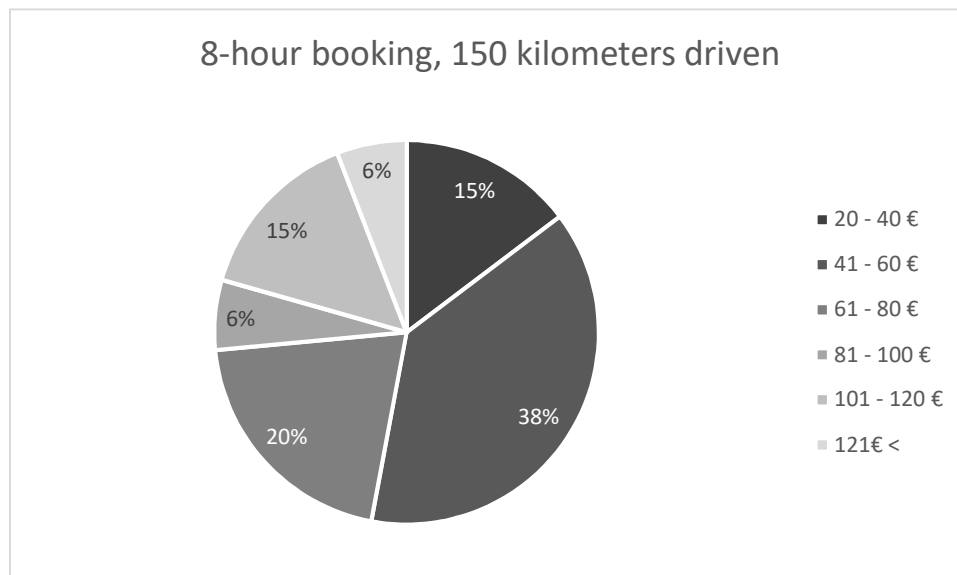
Figure 12: Pricing 150 kilometres and 8 hour drive

If we consider differences between categories of car sharing, on average using a roundtrip system will be charged € 50.05. The contrast with free floating systems is again quite large. The price is
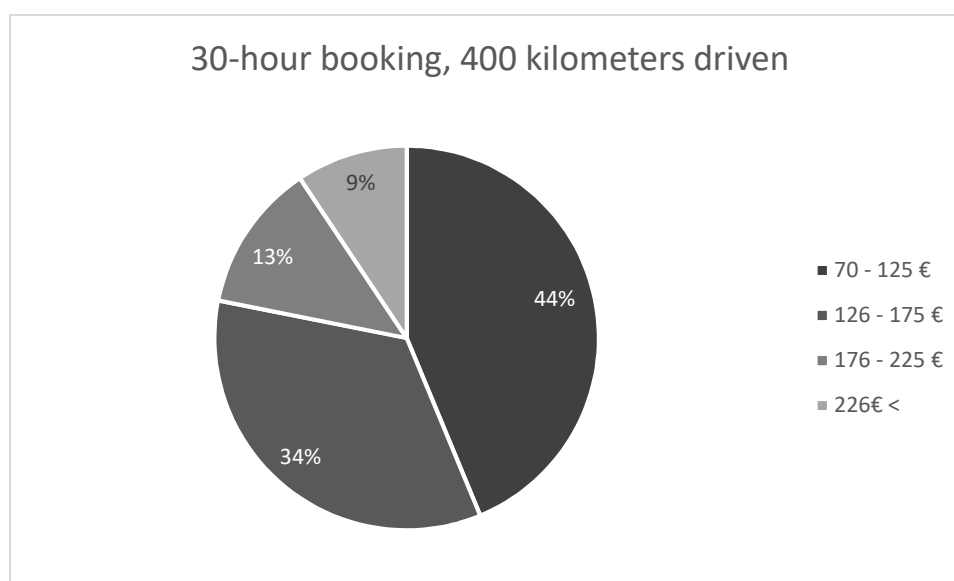
almost twice as high (€ 98.14). A P2P car is the most advantageous option. On average one will pay almost € 40 which is 20% and 60% cheaper than respectively roundtrip and free floating.

	N	Average	Minimum	Maximum
Roundtrip	17	€50.05	€10.00	€93.50
Free floating	13	€98.14	€44.99	€145.00
Peer-to-peer	3	€39.83	€20.00	€60.48
Total	33	€67.53	€10.00	€145.00

Table 38: Pricing 150 kilometres and 8 hour drive – category of car sharing

★ **400 kilometres and 30-hour drive**

Finally, a journey that takes 30 hours and 400 kilometers will cost on average €164.39. Four out of ten organisations (32 answers) are asking a price between € 70 and € 125. More than one third sets a higher price, between € 126 and € 175.

Figure 13: Pricing 400 kilometres and 30 hour drive

For the longest kind of trip, the image is quite similar to that of the two shorter journeys. A trip with a roundtrip car will cost in general about € 127. Free floating cars are most expensive and amount about € 234. Considering P2P, on average one will pay almost € 116 which is 9% and 50% cheaper than respectively roundtrip and free floating. It is good to know that peer-to-peer organisations, in most cases, don't include fuel costs in their pricing. So customers have to pay for fuel directly to the owner of the car. These costs are not included in our analyses.

	N	Average	Minimum	Maximum
Roundtrip	17	€127.06	€83.00	€214.50
Free floating	11	€234.29	€70.00	€504.00
Peer-to-peer	2	€115.91	€88.00	€143.82
Total	30	€164.39	€70.00	€504.00

Table 39: Pricing 400 kilometres and 30 hour drive – category of car sharing

3.10 Fleet characteristics

3.10.1 Type of cars

Car sharing services often are offering a wide range of different cars. Regular economy cars (96%) and family cars (64%) are most common. 8% states to limit their offer to these two types.

Furthermore, almost half respondents are offering also a minivan or a regular van. The more luxury types of vehicles are less likely to occur. We detected offers of SUV's (18%) or sports cars (14%). Only a couple of car sharing services (10%) are having wheelchair friendly cars to their fleet. Lastly, some of the respondents (3) mentioned other types of vehicles such as limousines and transporters.

	N (50)	%
Economy car (City car)	48	96.0%
Family car	32	64.0%
Sedan/Minivan	24	48.0%
Luxury vehicle/SUV	9	18.0%
Sports car/Topless car	7	14.0%
Van	22	44.0%
Wheelchair friendly car	5	10.0%
Other	7	14.0%

Table 40: Type of cars

3.10.2 Sustainability of the fleet

This part of the survey questioned about sustainability of the shared fleet and was answered by 75% (42) of the respondents. It includes two aspects: the type of fuel and the average carbon dioxide emission.
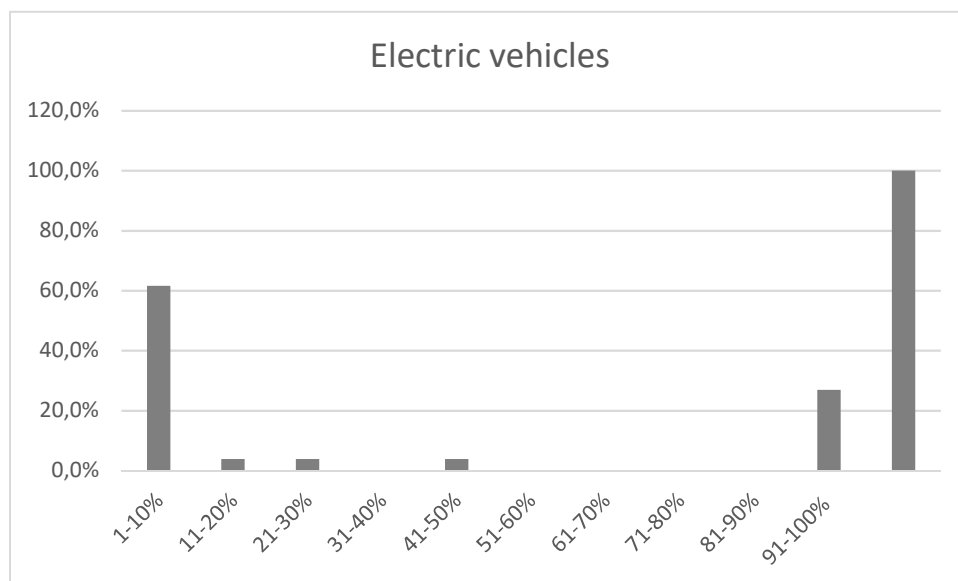
★ **Propulsion/fuel**

81% of respondents do have petrol cars in their fleet. More than half also indicates diesel cars as part of their fleet. The survey also detected nearly 62% of all car sharing services own one or more electric vehicles. Hydrogen, LPG and hybrid cars are not or less represented (respectively 0%, 5% and 21%).

	N (42)	%
Petrol/gasoline	34	81.0%
Diesel	22	52.4%
Battery electricity	26	61.9%
Hydrogen	0	0.0%
LPG	2	4.8%
Hybrid (diesel of petrol)	9	21.4%
Other	3	7.1%

Table 41: Type of propulsion/fuel

A more focused look at the presence of electric vehicles in the fleet of car sharing services reveals something very interesting. It is remarkable to see a majority (62%) has no more than 10% electric cars. On the other hand 27% is claiming to have a fleet consisting mostly out of electric cars. Whereas we see a wider dispersion in the fleet constitution for petrol and diesel cars, for electric cars it is often an all-or-nothing story: organisations are (nearly) 100% electric or (nearly) not.

Figure 14: Share of electric vehicles in total fleet

★ **Carbon dioxide emission**
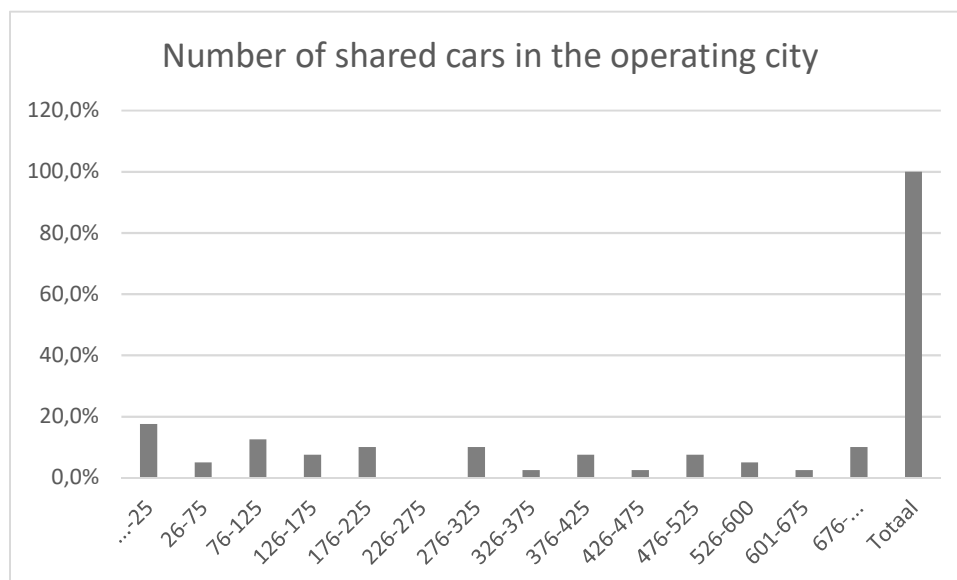
If we take a closer look at the average CO2 emissions of the respondents' car fleets, we see 90% of all shared cars are having a value beneath the average emission of the 'EU28 average CO2 emissions for new passenger cars' (118,1 gr/km)[8] and no shared car goes above 120 gr/km. However we only got 14 respondents to answer this question.

3.11 Service dimension

The answers to this section weren't exactly representative. Only concerning number of cars an acceptable response rate has been reached (70%). The other topics had a rate of 50% and lower. For transparency reasons we will give the response rate of every section.

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3.11.1 Number of cars

70% (39) of the questioned services communicated their number of cars in one city. Almost 18% of car sharing services are indicating they have less than 25 cars in their fleet. On the other side we see 10% big companies with more than 676 cars in their fleet, all of them situated in Italy. On average, a car sharing organization has 314 cars in their fleet. The median is 213.

Figure 15: Number of shared cars

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[8] http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=sdg_12_30&plugin=1

We also had a look at the differences related to the categories of car sharing. We are seeing big differences comparing the numbers with the desktop research. Although they are difficult to compare we are giving the results anyway if only to better understand the in-depth data set.

	N	Median	Average	Minimum	Maximum	Median desktop research
Roundtrip	21	150	190.6	1	675	66
Free floating	15	420	492.0	30	1,000	300
Peer-to-peer	3	111	185.7	46	400	1,000
Total	39	220	306.2	1	1,000	194

Table 42: Number of cars – category of car sharing

3.11.2 Number of members

54% (30) respondents gave information about the number of unique members in the operating city. For the analysing process, we calculated the amount of members per 10.000 inhabitants in a city. More than 41% car sharing services are having 15 or less unique car sharing members per 10 000 inhabitants. We also detected almost 14% companies are having more than 206 unique members per 10 000 inhabitants. Again, Italy (and some German companies) scored high. On average, car sharing services in EU are having 120 unique members per 10,000 inhabitants. The median is 34.
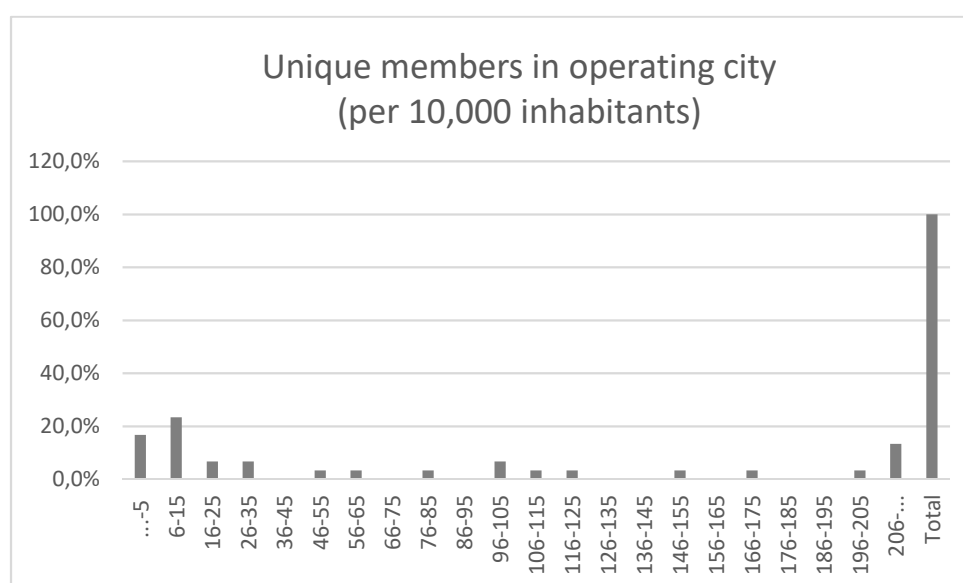
Figure 16: Number of members

Again just to be full-scale the data has been split into the different categories of car sharing.

	N	Median	Average	Minimum	Maximum
Roundtrip	17	3,000	4,425.5	1	14,000
Free floating	10	30,000	34,906.4	2,200	90,000
Peer-to-peer	3	315	560.3	125	1,241
Total	30	3,350	14,199.3	1	90,000

Table 43: Number of members – category of car sharing

3.11.3   Number of customers in 2017

The survey also questioned respondents about the number of unique customers in the operating city in 2017 (members who used at least once a shared car in the year 2017). With 32% (18) answers, the response rate was rather low. 67% counted less than 25 unique customers per 10 000 inhabitants last year. 22% even had less than one unique customer per 10 000 inhabitants in the operating city. 11% had more than 126 unique customers in 2017 going up to 453 unique customers per 10,000 inhabitants in some parts of Italy. On average, car sharing organizations had 63 unique customers in their operating city. The median is 9.
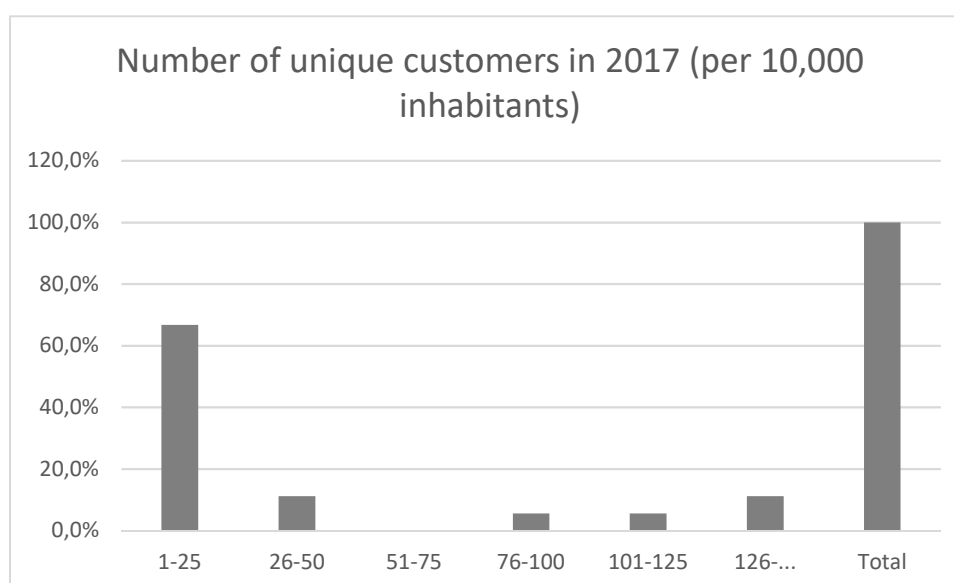
Figure 17: Number of customers in 2017

Again just to be full-scale the data has been split into the different categories of car sharing.

	N	Median	Average	Minimum	Maximum
Roundtrip	9	850	3,117.7	1	13,000
Free floating	5	10,000	25,500.0	2,500	60,000
Peer-to-peer	3	50	410.0	30	1,150
Total	17	2,000	9,222.9	1	60,000

Table 44: Number of customers in 2017 – category of car sharing

3.11.4   Number of trips

Again response rate was very low (25% or 14 answers). In general, the amount of trips is very scattered, so quantitative in-depth analysis is rather difficult. Yet there are some tendencies visible. 43% of companies registered less than 100 trips per 10 000 inhabitants in 2017. Almost all of them are situated in West or Northern Europe. On the other hand, 36% registered more than 1000 of trips per 10 000 inhabitants, going up to 20 390 single trips. Cities like Brussels, Cologne and Milan score very high. On average, respondents registered 2470 trips. The median is 114.

3.11.5   Distance and duration of the trips

Length and duration of trips are important numbers and can be linked to different categories of car sharing (see 3.9.2 Average price per trip). 22 organisations (39%) gave information on this topic.

★   **Distance driven**
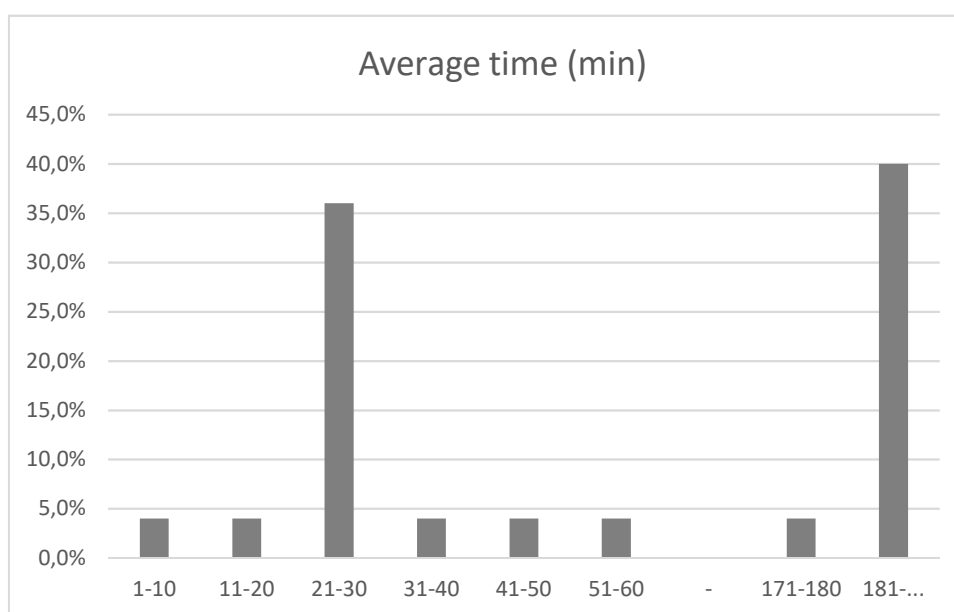
Car sharing seems to be equal popular for short-distance (<10km) and medium/long distance (>50 km) trips. Both options have been answered about 40% of the time. The rest of the numbers are more spread. The average distance is 46 km per trip, the median is 25 km.
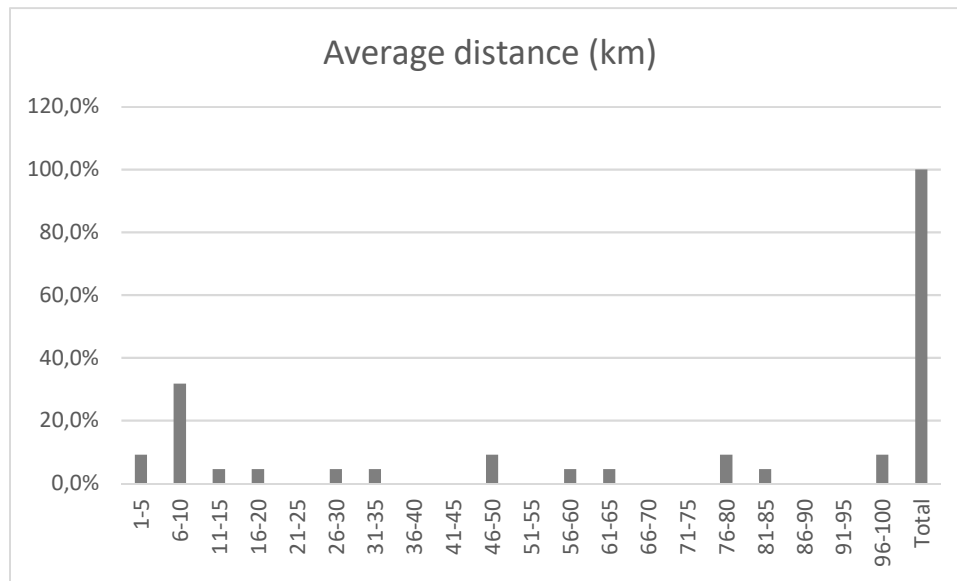
Figure 18: Average distance trip

★ **Duration of a trip**

If we take a closer look at the answers on the average duration of a trip, some significant results are visible. First of all, more than 56% is indicating on average less than 60 minutes trips. 36% state the average using time is between 21 and 30 minutes. On the other hand, in 40% of the cases, the cars are used for at least 180 minutes, going up to more than 900 minutes (15 hours) in two cases or 5040 (3,5 days) in one case. The survey is showing a clear difference between short-term and long-term car sharing. The average car sharing time is 412 minutes, the median 49.

Figure 19: Average time trip

4 Multidimensional typology of European car sharing services

Existing classifications of car sharing operators are mainly a "top-down" classification, since car sharing operators are grouped according to their external characteristics. On the contrary, in this project a "bottom-up" classification is going to be adopted.

The proposed technique allows classifying car sharing operators on the basis of particular combinations of their characteristics, which have to be identified by analysing the results of the two above introduced surveys (the desktop research and the in-depth survey). Therefore new parameters will be provided to better understand common features (and their relation) of car sharing services.

4.1 Methodological steps

Firstly, in order to obtain the mentioned classification, the results of the above introduced desktop research, with 186 cases, are used. Once defined the main profiles, the results of the in-depth survey are used to detail a bit more the classification done. Anyhow since almost all the main variables are categorical, a cross tabulation analysis will be adopted.

The method consists of multi-dimensional tables, in which the categories of one variable determine the rows of the table and the categories of another variable determine the columns. The cells of the table contain the number of times that a particular combination of categories occurred. More specifically, the cells of the table contain the number of car sharing operators that share two common characteristics (e.g. the number of users and the category of car sharing).

In this kind of analysis, it is also useful to refer to the proportion of the row or column that fall within a particular category. This can be achieved by computing the row percentages or column percentages.

Using the percentages is easier to observe if there are dominant categories for each couple of variables. When analyzing these results it is important to monitor the cardinality of each cell; in fact, it is possible to obtain high percentages but related to a low number of cases falling in a row (or column).

In addition, when a consistent number of operators show a singular correlation between two variables, a three ways cross tabulation has been built up. To better understand the results of a three

ways tab, a two ways filtered tab is made (where the filter is applied to one of the variables). All the tables analysed in this phase are built using the specific function of Microsoft Excel, "Pivot table".

At last, during the classification process, some small groups with particular characteristics have been found. Since the small number of elements, those cases are directly analysed on the main database by filtering the other options. If these cases are characterized with other common features, a new profile is defined.

4.2 Relevant variables for the classification exercise

4.2.1   The pivot variable: category of car sharing

According to the existent literature (Shaheen, Chan, & Micheaux, 2015) and (Le Vine, Polak, & Zolfaghari, 2014), the operational characteristic of the car sharing operator seems to be an important variable which allows to make a rough classification. Usually common characteristics such as business model, fleet dimension, pricing and opening technology are related to one specific car sharing scheme. Since we also want to take into account the peer-to-peer organisations, we opted to use the 'categories of car sharing' as the pivot variable. For this reason, firstly a good number of contingency tables are built keeping the category of car sharing as the first entry (row) of the table.

In order to confirm or find more specific relation between the profiles determined, other combinations of variables are then used.

It is important to note that total number of observations (total number of operators which fall in the combination analysed) of each table may vary: this is due to the fact that during the data collection activities some information was missing or not found.

4.2.2   Relationships with fleet size

One of the first analysed combinations is chosen to understand if there is a relation between the category of car sharing and the fleet size.

The fleet size variable is created from the metric variable "Number of vehicles" present in the desktop research. It is a categorical variable which assume the value "Small" when the number of vehicles of the fleet is less than 50, "Medium" if it is between 50 and 250 and "Large" if bigger than 250. The

three thresholds are chosen according the distribution of the number of vehicles related to the number of car sharing operators.

	Large	Medium	Small	Total
Free-floating with operational area	17	5	5	27
Free-floating with pool-stations	3	6	0	9
Roundtrip station-based	12	18	22	52
Roundtrip homezone-based	0	2	4	6
Peer-to-peer (P2P)	8	1	0	9
Total	40	32	31	103

Table 45: Category of car sharing – Fleet size (absolute values)

	Large	Medium	Small	Total
Free-floating with operational area	16.5%	4.9%	4.9%	26.2%
Free-floating with pool-stations	2.9%	5.8%	0.0%	8.7%
Roundtrip station-based	11.7%	17.5%	21.4%	50.5%
Roundtrip homezone-based	0.0%	1.9%	3.9%	5.8%
Peer-to-peer (P2P)	7.8%	1.0%	0.0%	8.7%
Total	38.8%	31.1%	30.1%	100.0%

Table 46: Category of car sharing – Fleet size (total percentages)

Looking at the percentages showed in Table 46, it is possible to observe that there is not a clear dimension characterizing the roundtrip station-based services. In most of the cases, there seems that a small fleet is adopted. This is more emphasized for the roundtrip homezone-based where the fleet provided by operators are mainly small. On the contrary, the free-floating car sharing system is generally constituted by a large fleet as well as the peer-to-peer system (roundtrip homezone-based with private vehicles).

	Large	Medium	Small	Total
Free-floating with operational area	63.0%	18.5%	18.5%	100.0%
Free-floating with pool-stations	33.3%	66.7%	0.0%	100.0%
Roundtrip station-based	23.1%	34.6%	42.3%	100.0%
Roundtrip homezone-based	0.0%	33.3%	66.7%	100.0%
Peer-to-peer (P2P)	88.9%	11.1%	0.0%	100.0%
Total	38.8%	31.1%	30.1%	100.0%

Table 47: Category of car sharing – Fleet size (row percentages)

	Large	Medium	Small	Total
Free-floating with operational area	43%	16%	16%	26%
Free-floating with pool-stations	8%	19%	0%	9%
Roundtrip station-based	30%	56%	71%	50%
Roundtrip homezone-based	0%	6%	13%	6%
Peer-to-peer (P2P)	20%	3%	0%	9%
Total	100%	100%	100%	100%

Table 48: Category of car sharing – Fleet size (column percentages)

The same information is clearer when considering a row percentages table (Table 47) and the column percentages table (Table 48), according to what has been explained in the above subsection where the methodology has been detailed.

4.2.3   Relationships with organization form

The second analysed combination refers to the category of car sharing and the organizational form.

	(Unincorp.) Associations	Cooperation	Corporation/ Company	Public authority	Total
Free-floating with operational area	0	1	41	0	42
Free-floating with pool-stations	0	1	12	0	13
Roundtrip station-based	8	6	66	1	81
Roundtrip homezone-based	2	1	10	0	13
Peer-to-peer (P2P)	3	2	21	0	26
Total	13	11	150	1	175

Table 49: Category of car sharing – Organizational form (absolute values)

	(Unincorp.) Association	Cooperation	Corporation/ Company	Public authority	Total
Free-floating with operational area	0.0%	0.6%	23.4%	0.0%	24.0%
Free-floating with pool-stations	0.0%	0.6%	6.9%	0.0%	7.4%
Roundtrip station-based	4.6%	3.4%	37.7%	0.6%	46.3%
Roundtrip homezone-based	1.1%	0.6%	5.7%	0.0%	7.4%
Peer-to-peer (P2P)	1.7%	1.1%	12.0%	0.0%	14.9%
Total	7.4%	6.3%	85.7%	0.6%	100.0%

Table 50: Category of car sharing – Organizational form (total percentages)

Concerning the organization form, Table 49 and Table 50 show that almost all the car sharing operators are organized in Corporation/company. In the below reported Table 51, the percentages better stress the previous assumption (in this case the percentages are influenced by the category of car sharing).

	(Unincorp.) Association	Cooperation	Corporation/ Company	Public authority	Total
Free-floating with operational area	0.0%	2.4%	97.6%	0.0%	100.0%
Free-floating with pool-stations	0.0%	7.7%	92.3%	0.0%	100.0%
Roundtrip station-based	9.9%	7.4%	81.5%	1.2%	100.0%
Roundtrip homezone-based	15.4%	7.7%	76.9%	0.0%	100.0%
Peer-to-peer (P2P)	11.5%	7.7%	80.8%	0.0%	100.0%
Total	7.4%	6.3%	85.7%	0.6%	100.0%

Table 51: Category of car sharing – Organization form (row percentages)

	(Unincorp.) Association	Cooperation	Corporation/ Company	Public authority	Total
Free-floating with operational area	0.0%	9.1%	27.3%	0.0%	24.0%
Free-floating with pool-stations	0.0%	9.1%	8.0%	0.0%	7.4%
Roundtrip station-based	61.5%	54.5%	44.0%	100.0%	46.3%
Roundtrip homezone-based	15.4%	9.1%	6.7%	0.0%	7.4%
Peer-to-peer (P2P)	23.1%	18.2%	14.0%	0.0%	14.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table 52: Category of car sharing – Organization form (column percentages)

Another point of view is given by Table 52, where the percentages are influenced by the organization form. It is interesting to observe that operators which are organized in associations rather than corporations, generally provide a roundtrip service.

It is important to highlight that the high percentage in the cell of the public authority is not reliable because only one element is present in that column.

Since most of the cases fall in the "Corporation/Company" category, the organizational form cannot be used alone to cluster the services. On the contrary, the conditioned variable related to the shareholders of the corporation or company could reveal some information.

For this reason, the following analysed relation takes into consideration the category of car sharing and the company shareholders.

Starting from now, only the most interesting/effective tables are reported. All the other tables reporting combination analysed and percentages will be reported in Appendix 5.

	Private shareholders	Public shareholder/s	Public-private shareholders	Total
Free-floating with operational area	31	2	2	35
Free-floating with pool-stations	9	0	3	12
Roundtrip station-based	44	13	8	65
Roundtrip homezone-based	7	1	1	9
Peer-to-peer (P2P)	17	0	0	17
Total	108	16	14	138

Table 53: Category of car sharing – Company shareholders (absolute values)

	Private shareholders	Public shareholder/s	Public-private shareholders	Total
Free-floating with operational area	88.6%	5.7%	5.7%	100.0%
Free-floating with pool-stations	75.0%	0.0%	25.0%	100.0%
Roundtrip station-based	67.7%	20.0%	12.3%	100.0%
Roundtrip homezone-based	77.8%	11.1%	11.1%	100.0%
Peer-to-peer (P2P)	100.0%	0.0%	0.0%	100.0%
Total	78.3%	11.6%	10.1%	100.0%

Table 54: Category of car sharing – Company shareholders (row percentages)

	Private shareholders	Public shareholder/s	Public-private shareholders	Total
Free-floating with operational area	29%	13%	14%	25%
Free-floating with pool-stations	8%	0%	21%	9%
Roundtrip station-based	41%	81%	57%	47%
Roundtrip homezone-based	6%	6%	7%	7%
Peer-to-peer (P2P)	16%	0%	0%	12%
Total	100%	100%	100%	100%

Table 55: Category of car sharing – Company shareholders (column percentages)

Considering the company shareholders, Table 53 shows that a big part of the sampled operators, who are organized in corporation/company, have private shareholders regardless of the category of car sharing. The public shareholders and the partnership of public-private shareholders seem to be not so common among the operators collected in the dataset. Moreover, Table 55 shows that both are more likely to adopt a roundtrip station-based car sharing scheme. Therefore, these categories will be analysed separately, in order to check if they contain other common characteristics.

4.2.4   Relationships with business model

Concerning the relationships between business model and the category of car sharing, both tables below (Table 56 and Table 57) show that the public fleet is a common characteristic to all the schemes, except for the Peer-to-peer car sharing system. In particular, most of the operators who provide this service, are using a private fleet.

	Private cars (P2P)	Private cars in closed community (NFP)	Public fleet	Total
Free-floating with operational area	0	0	44	44
Free-floating with pool-stations	0	0	13	13
Roundtrip station-based	0	0	86	86
Roundtrip homezone-based	0	0	16	16
Peer-to-peer (P2P)	23	3	0	26
Total	23	3	159	185

Table 56: Category of car sharing - Business model (absolute values)

	Private cars (P2P)	Private cars in closed community (NFP)	Public fleet	Total
Free-floating with operational area	0.0%	0.0%	100.0%	100.0%
Free-floating with pool-stations	0.0%	0.0%	100.0%	100.0%
Roundtrip station-based	0.0%	0.0%	100.0%	100.0%
Roundtrip homezone-based	0.0%	0.0%	100.0%	100.0%
Peer-to-peer (P2P)	88.5%	11.5%	0.0%	100.0%
Total	12.4%	1.6%	85.9%	100.0%

Table 57: Category of car sharing – Business model (row percentages)

4.2.5   Relationships with pricing

Another couple of variables analysed are the category of car sharing and the pricing. In Table 58 are reported the absolute values, while in Table 59 the percentages of row.

	Combination	Distance travelled	Time travelled	Total
Free-floating with operational area	19	2	23	44
Free-floating with pool-stations	1	1	11	13
Roundtrip station-based	69	1	15	85
Roundtrip homezone-based	9	0	4	13
Peer-to-peer (P2P)	11	4	9	24
Total	109	8	62	179

Table 58: Category of car sharing – Pricing (absolute values)

	Combination	Distance travelled	Time travelled	Total
Free-floating with operational area	43.2%	4.5%	52.3%	100.0%
Free-floating with pool-stations	7.7%	7.7%	84.6%	100.0%
Roundtrip station-based	81.2%	1.2%	17.6%	100.0%
Roundtrip homezone-based	69.2%	0.0%	30.8%	100.0%
Peer-to-peer (P2P)	45.8%	16.7%	37.5%	100.0%
Total	60.9%	4.5%	34.6%	100.0%

Table 59: Category of car sharing – Pricing (row percentages)

It is interesting to observe that, for the roundtrip schemes, in most of the cases the price is based on the combination of time travelled and distance travelled, while for the free-floating there is not such a clear-cutting indication. On one hand, in the free-floating with pool-stations the price seems based on the time travelled, even if the cardinality of this group is low (11 operators). On the other hand, the free-floating with operational area as well as the Peer-to-peer scheme are split in two main subgroups: to better understand if these differences are related to the price base (e.g. per minute fee in case of pricing based on the time travelled and hourly fee in case of pricing based on the combination of distance/time), in the following we detail an analysis with a three-ways table.

In order to show an easy view of the three-ways table, it will be built as a two-ways cross-table with a filter on the third variable. In particular the filter is applied on the pricing, making a distinction

among the combination pricing and the time travelled pricing. The other two involved variables are the category of car sharing and the prices for measurement unit.

Filter: Pricing = Combination distance travelled/ time travelled

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0	0	1	17	18
Free-floating with pool-stations	0	0	0	1	1
Roundtrip station-based	1	0	59	7	67
Roundtrip homezone-based	1	0	5	3	9
Peer-to-peer (P2P)	8	1	2	0	11
Total	10	1	67	28	106

Table 60: Category of car sharing – Time travelled price (absolute values)

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0.0%	0.0%	5.6%	94.4%	100.0%
Free-floating with pool-stations	0.0%	0.0%	0.0%	100.0%	100.0%
Roundtrip station-based	1.5%	0.0%	88.1%	10.4%	100.0%
Roundtrip homezone-based	11.1%	0.0%	55.6%	33.3%	100.0%
Peer-to-peer (P2P)	72.7%	9.1%	18.2%	0.0%	100.0%
Total	9.4%	0.9%	63.2%	26.4%	100.0%

Table 61: Category of car sharing – Time travelled price (row percentages)

	Per kilometre	Per set of kilometres	Total
Free-floating with operational area	14	4	18
Free-floating with pool-stations	1	0	1
Roundtrip station-based	63	5	68
Roundtrip homezone-based	8	1	9
Peer-to-peer (P2P)	4	7	11
Total	90	17	107

Table 62: Category of car sharing – Distance travelled price (absolute values)

	Per kilometre	Per set of kilometres	Total
Free-floating with operational area	77.8%	22.2%	100.0%
Free-floating with pool-stations	100.0%	0.0%	100.0%
Roundtrip station-based	92.6%	7.4%	100.0%

Roundtrip homezone-based	88.9%	11.1%	100.0%
Peer-to-peer (P2P)	36.4%	63.6%	100.0%
Total	84.1%	15.9%	100.0%

Table 63: Category of car sharing – Distance travelled price (row percentages)

Table 60 shows that for almost all the services having a pricing based on the combination distance/time, the time travelled price is minutes-based for the free-floating with operational area scheme. On the contrary, for the roundtrip the time travelled price is hourly while peer-to-peer services are mainly based on a daily price.

According to Table 62, for the combination pricing, the distance travelled price is based on the driven kilometres in most of the cases for the free-floating and the roundtrip station-based services. Differently, in the peer-to-peer the distance travelled price is mainly based on the set of kilometres travelled.

★ **Filter: Pricing = time travelled**

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0	0	0	21	21
Free-floating with pool-stations	0	0	4	7	11
Roundtrip station-based	0	1	13	1	15
Roundtrip homezone-based	1	0	3	0	4
Peer-to-peer (P2P)	2	1	0	0	3
Total	3	2	20	29	54

Table 64: Category of car sharing – Time travelled price (absolute values)

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0.0%	0.0%	0.0%	100.0%	100.0%
Free-floating with pool-stations	0.0%	0.0%	36.4%	63.6%	100.0%
Roundtrip station-based	0.0%	6.7%	86.7%	6.7%	100.0%
Roundtrip homezone-based	25.0%	0.0%	75.0%	0.0%	100.0%
Peer-to-peer (P2P)	66.7%	33.3%	0.0%	0.0%	100.0%
Total	5.6%	3.7%	37.0%	53.7%	100.0%

Table 65: Category of car sharing – Time travelled price (row percentages)

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0	0	0	21	21
Free-floating with pool-stations	0	0	4	7	11
Roundtrip station-based	0	1	13	1	15
Roundtrip homezone-based	1	0	3	0	4
Peer-to-peer (P2P)	2	1	0	0	3
Total	3	2	20	29	54

Table 64Table 64 is obtained by filtering the operators having pricing based only on the travelled time. The depicted results are comparable to those on Table 60, since the free-floating systems have a minute-price while the roundtrip has an hourly fee (daily in the case of homezone-based). Regarding the peer-to-peer is quite difficult confirm the results because in only 3 cases was possible find the information about the travelled time price basis (in 6 over 9 operators the information is missing).

Concerning the initial issue, different pricing (combination or travelled time) available for the free-floating systems is not depending on the time travelled price.

4.2.6   Relationships with opening technology

The following tables are built considering the combination of categories of car sharing and different opening technologies. Since each operator can adopt more than one mode, the main target of this analysis is to understand if an opening technology is more related to one car sharing category or, in case of more than one, understand what is the most commonly available.

★ **Opening technology: key swap**

	No	Yes	Total
Free-floating with operational area	42	0	42
Free-floating with pool-stations	11	1	12
Roundtrip station-based	82	3	85
Roundtrip homezone-based	12	2	14
Peer-to-peer (P2P)	1	24	25
Total	148	30	178

Table 66: Category of car sharing – Opening technology: key swap (absolute values)

	No	Yes	Total
Free-floating with operational area	100.0%	0.0%	100.0%
Free-floating with pool-stations	91.7%	8.3%	100.0%
Roundtrip station-based	96.5%	3.5%	100.0%
Roundtrip homezone-based	85.7%	14.3%	100.0%
Peer-to-peer (P2P)	4.0%	96.0%	100.0%
Total	83.1%	16.9%	100.0%

Table 67: Category of car sharing – Opening technology: key swap (row percentages)

In Table 66 is reported the number of operators that allow (or not) the key swap as opening technology. Table 67 presents the same data using the percentages of row. In most of the cases the public fleet schemes (free floating and round trip) do not allow the key swap. On the contrary, in almost all the peer-to-peer operators key swap is used because the cars are private and other opening technology is usually not available. Consequently, in the following tables it is expectable that the other opening technologies are not allowed.

★ **Opening technology: App**

	No	Yes	Total
Free-floating with operational area	5	37	42
Free-floating with pool-stations	8	5	13
Roundtrip station-based	59	26	85
Roundtrip homezone-based	4	11	15
Peer-to-peer (P2P)	22	2	24
Total	98	81	179

Table 68: Category of car sharing – Opening technology: App (absolute values)

	No	Yes	Total
Free-floating with operational area	11.9%	88.1%	100.0%
Free-floating with pool-stations	61.5%	38.5%	100.0%
Roundtrip station-based	69.4%	30.6%	100.0%
Roundtrip homezone-based	26.7%	73.3%	100.0%
Peer-to-peer (P2P)	91.7%	8.3%	100.0%
Total	54.7%	45.3%	100.0%

Table 69: Category of car sharing – Opening technology: App (row percentages)

★ **Opening technology: Chip card**

	No	Yes	Total
Free-floating with operational area	27	15	42
Free-floating with pool-stations	2	11	13
Roundtrip station-based	15	70	85
Roundtrip homezone-based	7	7	14
Peer-to-peer (P2P)	23	2	25
Total	74	105	179

Table 70: Category of car sharing – Opening technology: Chip card (absolute values)

	No	Yes	Total
Free-floating with operational area	64.3%	35.7%	100.0%
Free-floating with pool-stations	15.4%	84.6%	100.0%
Roundtrip station-based	17.6%	82.4%	100.0%
Roundtrip homezone-based	50.0%	50.0%	100.0%
Peer-to-peer (P2P)	92.0%	8.0%	100.0%
Total	41.3%	58.7%	100.0%

Table 71: Category of car sharing – Opening technology: Chip card (row percentages)

Concerning the vehicles opening through smartphone's app and chip card, observing the previous tables (Table 68, Table 69, Table 70, and Table 71) it is possible to infer some conclusions:

★ Free-floating with operational area systems mainly allow the use of the App (37 over 42) but a good number allows also the chip card (15/42);

★ For the free-floating with pool-stations schemes the opening of the vehicle by chip card is more common (11 cases against 5 which allow the app.);

★ The chip card is mostly used by the roundtrip station-based operators: 70 over 85 allow it while only 26 over 85 allow the app;

★ For the roundtrip homezone-based operators there is not a predominant technology among smartphone's application and chip card, even if the latter is slightly less common.

4.2.7 Relationships with reservation method

Similarly to the previous paragraph, the following tables have as objective the understanding if a reservation mode is more related to one category of car sharing or, in the cases where more than one are admitted, understand what is the most commonly available.

★ **Reservation method: website**

	No	Yes	Total
Free-floating with operational area	25	17	42
Free-floating with pool-stations	2	11	13
Roundtrip station-based	7	79	86
Roundtrip homezone-based	2	13	15
Peer-to-peer (P2P)	0	25	25
Total	36	145	181

Table 72: Category of car sharing – Reservation by website (absolute values)

	No	Yes	Total
Free-floating with operational area	59.5%	40.5%	100.0%
Free-floating with pool-stations	15.4%	84.6%	100.0%
Roundtrip station-based	8.1%	91.9%	100.0%
Roundtrip homezone-based	13.3%	86.7%	100.0%
Peer-to-peer (P2P)	0.0%	100.0%	100.0%
Total	19.9%	80.1%	100.0%

Table 73: Category of car sharing – Reservation by website (row percentages)

★ **Reservation method: app**

	No	Yes	Total
Free-floating with operational area	0	42	42
Free-floating with pool-stations	1	12	13
Roundtrip station-based	21	65	86
Roundtrip homezone-based	2	13	15
Peer-to-peer (P2P)	11	13	24
Total	35	145	180

Table 74: Category of car sharing – Reservation by App (absolute values)

	No	Yes	Total
Free-floating with operational area	0.0%	100.0%	100.0%
Free-floating with pool-stations	7.7%	92.3%	100.0%
Roundtrip station-based	24.4%	75.6%	100.0%
Roundtrip homezone-based	13.3%	86.7%	100.0%
Peer-to-peer (P2P)	45.8%	54.2%	100.0%

	No	Yes	Total
Total	19.4%	80.6%	100.0%

Table 75: Category of car sharing - Reservation by App (row percentages)

★ **Reservation method: phone call or call center**

	No	Yes	Total
Free-floating with operational area	36	6	42
Free-floating with pool-stations	9	4	13
Roundtrip station-based	30	56	86
Roundtrip homezone-based	12	3	15
Peer-to-peer (P2P)	23	2	25
Total	110	71	181

Table 76: Category of car sharing – Reservation by phone call (absolute values)

	No	Yes	Total
Free-floating with operational area	85.7%	14.3%	100.0%
Free-floating with pool-stations	69.2%	30.8%	100.0%
Roundtrip station-based	34.9%	65.1%	100.0%
Roundtrip homezone-based	80.0%	20.0%	100.0%
Peer-to-peer (P2P)	92.0%	8.0%	100.0%
Total	60.8%	39.2%	100.0%

Table 77: Category of car sharing – Reservation by phone call (row percentages)

★ **Reservation method: in a customer office**

	No	Yes	Total
Free-floating with operational area	41	1	42
Free-floating with pool-stations	13	0	13
Roundtrip station-based	83	3	86
Roundtrip homezone-based	14	1	15
Peer-to-peer (P2P)	25	0	25
Total	176	5	181

Table 78: Category of car sharing – Reservation in a customer office (absolute values)

	No	Yes	Total
Free-floating with operational area	97.6%	2.4%	100.0%
Free-floating with pool-stations	100.0%	0.0%	100.0%
Roundtrip station-based	96.5%	3.5%	100.0%

Roundtrip homezone-based	93.3%	6.7%	100.0%
Peer-to-peer (P2P)	100.0%	0.0%	100.0%
Total	97.2%	2.8%	100.0%

Table 79: Category of car sharing – Reservation in a customer office (row percentages)

Concerning the different means of reservation, observing the previous tables (from Table 72 to Table 79) it is possible to infer some conclusions:

★ The reservation done in the customer office is not available in almost all the cases analysed, as showed in Table 79: for this reason, this variable will not appear in the further comments as well as in the classification paragraph;

★ All the free-floating with operational area schemes allow the use of an app and some of them allow also a reservation via their website (17/42), while the reservation by phone is almost unused (36 over 42 operators do not allow it);

★ Almost all the free-floating with pool-stations schemes allow a reservation via their website as well as by an app. In few cases also a phone call reservation is accepted (4 over 13);

★ The website reservation is the most common means of reservation allowed by the roundtrip station-based operators (79 cases over 86 surveyed). For this operational scheme also the reservation through app and phone call is quite common (65/86 and 56/86 respectively). These results show a very flexible system in terms of reservation mode, which can attract different targets, different ages of customer;

★ For the roundtrip homezone-based operators there is not a predominant mean of reservation among website and app, while a phone call is rarely allowed;

★ Website reservation is always available among the peer-to-peer scheme, while only half of the cases allow the use of an app.

4.2.8   Relationships with the reservation time

The following contingency table aims to discover possible relations among the categories of car sharing and the maximum reservation time in advance without fee.

	No reserv. possible	Up to 15min	Up to 30min	Up to 2h	Up to one day	Up to one week	More than one week	Unlimited	Total
Free-floating with operational area	2	19	14	0	1	0	0	0	36
Free-floating with pool-stations	1	0	3	0	0	0	0	0	4
Roundtrip station-based	2	6	6	0	1	0	48	3	66
Roundtrip homezone-based	0	1	1	1	0	2	3	0	8
Peer-to-peer (P2P)	0	0	0	0	0	1	13	1	15
Total	5	26	24	1	2	3	64	4	129

Table 80: Category of car sharing – Max. reservation time in advance without fee (absolute values)

	No reserv. possible	Up to 15min	Up to 30min	Up to 2h	Up to one day	Up to one week	More than one week	Unlimited	Total
Free-floating with operational area	5,6%	52,8%	38,9%	0,0%	2,8%	0,0%	0,0%	0,0%	100,0%
Free-floating with pool-stations	25,0%	0,0%	75,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%
Roundtrip station-based	3,0%	9,1%	9,1%	0,0%	1,5%	0,0%	72,7%	4,5%	100,0%
Roundtrip homezone-based	0,0%	12,5%	12,5%	12,5%	0,0%	25,0%	37,5%	0,0%	100,0%
Peer-to-peer (P2P)	0,0%	0,0%	0,0%	0,0%	0,0%	6,7%	86,7%	6,7%	100,0%
Total	3,9%	20,2%	18,6%	0,8%	1,6%	2,3%	49,6%	3,1%	100,0%

Table 81: Category of car sharing – Max. reservation time in advance without fee (row percentages)

Despite the small number of answers, Table 80 and Table 81 show that the free-floating systems generally have a shorter reservation time in advance than the roundtrip schemes. In particular, most of the operators falling into the free-floating with operational area scheme allow a short reservation in advance, up to 15 minutes, while almost all the operators who provide a free-floating with pool-stations have a maximum reservation time in advance up to 30 minutes. On the contrary, the customers of both the roundtrip services and of the peer-to-peer have the possibility to reserve the vehicles well in advance, in most of the cases more than one week before.

4.2.9 Relationships with the minimum duration of booking

In the next tables relations among the category of car sharing and the minimum duration of booking or, in other words, the minimum rental time.

	1 min.	up to 30 mins	one hour	one day	Total
Free-floating with operational area	25	3	2	0	30
Free-floating with pool-stations	0	2	3	0	5
Roundtrip station-based	3	6	62	1	72
Roundtrip homezone-based	2	0	9	1	12
Peer-to-peer (P2P)	2	0	5	11	18
Total	32	11	81	13	137

Table 82: Category of car sharing – Minimum duration reservation (absolute values)

	1 min.	up to 30 mins	one hour	one day	Total
Free-floating with operational area	83.3%	10.0%	6.7%	0.0%	100.0%
Free-floating with pool-stations	0.0%	40.0%	60.0%	0.0%	100.0%
Roundtrip station-based	4.2%	8.3%	86.1%	1.4%	100.0%
Roundtrip homezone-based	16.7%	0.0%	75.0%	8.3%	100.0%
Peer-to-peer (P2P)	11.1%	0.0%	27.8%	61.1%	100.0%
Total	23.4%	8.0%	59.1%	9.5%	100.0%

Table 83: Category of car sharing – Minimum duration reservation (row percentages)

Concerning the minimum duration of booking, Table 83 shows that free-floating with operational area operators mostly have a minimum reservation of 1 minute, while the roundtrip systems usually require one hour. Regarding the roundtrip homezone-based services provided with private cars

(peer-to-peer) the minimum duration of the booking is extended to more than one hour, typically one day (Table 61 and Table 65).

Comparing Table 83 with the above Table 61 and Table 65 it is clear that the minimum duration reservation is related to the travelled time price base: in fact operators which have a travelled time price minute-based are that ones requiring one minute minimum booking (free floating with operational area). Similarly, the roundtrip schemes which have a travelled time price based on hourly basis mostly have one hour of minimum rental time.

The only exception are the free floating with pool stations operators, which usually require a minimum duration reservation of 30 minutes/one hour but in most of the cases have a travelled time price with minute basis.

4.2.10 Other interesting relationships

In this paragraph will be reported some other combinations analysed. A good number was focused on the relationship between deposit, subscription fee and the car sharing category: where the latter was not explanatory other variables, as organizational form or business model, were considered.

★ **Category of car sharing – subscription fee**

	No	Yes	Total
Free-floating with operational area	20	22	42
Free-floating with pool-stations	3	8	11
Roundtrip station-based	37	48	85
Roundtrip homezone-based	9	3	12
Peer-to-peer (P2P)	22	2	24
Total	91	83	174

Table 84: Category of car sharing – Subscription fee (absolute values)

	No	Yes	Total
Free-floating with operational area	47.6%	52.4%	100.0%
Free-floating with pool-stations	27.3%	72.7%	100.0%
Roundtrip station-based	43.5%	56.5%	100.0%
Roundtrip homezone-based	75.0%	25.0%	100.0%
Peer-to-peer (P2P)	91.7%	8.3%	100.0%
Total	52.3%	47.7%	100.0%

Table 85: Category of car sharing – Subscription fee (row percentages)

The previous tables (Table 84 and Table 85) clearly show that for the roundtrip homezone-based services (both operators and peer-to-peer fleet) the subscription fee is mostly not required as well as the roundtrip homezone-based services. In the other cases the overall tendency seems to indicate that is more likely required, even if there is not a predominant direction.

Changing the current independent variable with the organizational form and then with the business model, the results are almost the same: where the business model is based on private fleets the subscription fee is mainly not required while with public fleets, the number of operators that require a subscription fee is slightly higher than the ones do not require it. Only the table with business model is reported below, while other tables are reported in appendix 5.

	No	Yes	Total
Peer-to-peer (P2P)	20	1	21
Private cars in closed community	2	1	3
Public fleet	70	81	151
Total	92	83	175

Table 86: Business model – Subscription fee (absolute values)

	No	Yes	Total
Peer-to-peer (P2P)	95.2%	4.8%	100.0%
Private cars in closed community	66.7%	33.3%	100.0%
Public fleet	46.4%	53.6%	100.0%
Total	52.6%	47.4%	100.0%

Table 87: Business model – Subscription fee (row percentages)

Additional relations have been evaluated to come up with a sound classification scheme, and the resulting tables are reported in appendix 5. The most important characteristics are summarized below:

★ The insurance is included in the price in almost all the cases;

★ Since corporation/company is the predominant organizational form, this variable is not so much considered in the analysis;

★ Regarding the business model, the public fleets are predominant, but this variable has been used in order to distinguish operators who rent out private cars (P2P) and operators that own

the cars themselves. In the further classification, one profile exactly takes into account this small category.

Concerning the results of the in-depth survey, where few variables have been taken into account, they confirm some of the assumption defined by the desktop research results (e.g. the large fleet related to the free-floating schemes).

An interesting relation studied regards the category of car sharing and city size (in terms of number of inhabitants) where the respondent operators are providing their services. The number of inhabitants of each city has been added later; as previously done with other numerical variables, the correspondent categorical variable has been built: the city size is grouped in 5 main categories in function of the number of inhabitants.

Table 88 and Table 89 show the relation between the category of car sharing and the city size (absolute values and the row percentages respectively).

	Inhabitants ('000)					
	250-750	750-1.500	1.500-2.500	2.500-5.000	>5.000	Total
Free floating with operational area	2	9	0	4	1	16
Free floating with pool stations	0	1	0	0	0	1
Roundtrip homezone-based	1	1	0	1	0	3
Roundtrip station-based	10	8	3	5	2	28
P2P	4	3	1	0	0	8
Total	17	22	4	10	3	56

Table 88: Category of car sharing – City size (absolute values)

	Inhabitants ('000)					
	250-750	750-1500	1500-2500	2500-5000	>5000	Total
Free floating with operational area	12,5%	56,3%	0,0%	25,0%	6,3%	100,0%
Free floating with pool stations	0,0%	100,0%	0,0%	0,0%	0,0%	100,0%
Roundtrip homezone-based	33,3%	33,3%	0,0%	33,3%	0,0%	100,0%
Roundtrip station-based	35,7%	28,6%	10,7%	17,9%	7,1%	100,0%
P2P	50,0%	37,5%	12,5%	0,0%	0,0%	100,0%
Total	30,4%	39,3%	7,1%	17,9%	5,4%	100,0%

Table 89: Category of car sharing – City size (row percentages)

3-ways contingency tables are reported below: they show the previous relation with the addiction of the fleet size of the operators. Despite the small number of operators falling in different categories, Table 91 highlights that less populated cities are more inclined to adopt the roundtrip schemes with small-medium fleet. Quite populated cities, with 750'000 – 1.5 million people, seem to be the target of free floating car sharing services with large fleet even if a good number of roundtrip station-based provide their services using medium-large fleet.

Among the survey respondents only one operator stated that it provides both free floating and roundtrip services in a very populated city (more than 5 million inhabitants).

	Inhabitants ('000)					
	250-750	750-1500	1500-2500	2500-5000	>5000	Total
Free floating with operational area	1	9	0	4	1	15
Large	0	9	0	4	1	14
Small	1	0	0	0	0	1
Free floating with pool stations	0	1	0	0	0	1
Medium	0	1	0	0	0	1
Roundtrip homezone-based	1	0	0	1	0	2
Small	1	0	0	1	0	2
Roundtrip station-based	8	5	1	4	1	19
Large	1	3	0	0	1	5
Medium	3	2	1	4	0	10
Small	4	0	0	0	0	4
P2P	2	1	0	0	0	3
Large	0	1	0	0	0	1
Medium	1	0	0	0	0	1
Small	1	0	0	0	0	1
Total	12	16	1	9	2	40

Table 90: Category of car sharing – City size (absolute values)

	Inhabitants ('000)					
	250-750	750-1500	1500-2500	2500-5000	>5000	Total
Free floating with operational area	2,5%	22,5%	0,0%	10,0%	2,5%	37,5%
Large	0,0%	22,5%	0,0%	10,0%	2,5%	35,0%
Small	2,5%	0,0%	0,0%	0,0%	0,0%	2,5%
Free floating with pool stations	0,0%	2,5%	0,0%	0,0%	0,0%	2,5%
Medium	0,0%	2,5%	0,0%	0,0%	0,0%	2,5%
Roundtrip homezone-based	2,5%	0,0%	0,0%	2,5%	0,0%	5,0%
Small	2,5%	0,0%	0,0%	2,5%	0,0%	5,0%

Roundtrip station-based	20,0%	12,5%	2,5%	10,0%	2,5%	47,5%
Large	2,5%	7,5%	0,0%	0,0%	2,5%	12,5%
Medium	7,5%	5,0%	2,5%	10,0%	0,0%	25,0%
Small	10,0%	0,0%	0,0%	0,0%	0,0%	10,0%
P2P	5,0%	2,5%	0,0%	0,0%	0,0%	7,5%
Large	0,0%	2,5%	0,0%	0,0%	0,0%	2,5%
Medium	2,5%	0,0%	0,0%	0,0%	0,0%	2,5%
Small	2,5%	0,0%	0,0%	0,0%	0,0%	2,5%
Total	30,0%	40,0%	2,5%	22,5%	5,0%	100,0%

Table 91: Category of car sharing – Fleet size - City size (total percentages)

Another couple of variables from the in-depth survey are the average travelled distance and the average travelled time for each renting transaction.

Both variables report continuous metric values. Therefore, concerning the travelled distance, the following 4 categories have been on the basis of previous studies (Lopez, Semanjski, Gillis, Ochoa, & Gautama, 2016):

★ Short trips: less than 10 kilometres;

★ Medium trips: between 10 and 25 kilometres;

★ Medium-long trips: between 25 and 50 kilometres;

★ Long trips: more than 50 kilometres

The resulting cross tabulation between the categories of car sharing and average travel distance is represented in the following Table 92 and Table 93.

	<=10 Km	10.1-25 Km	25.1-50 Km	>50 Km	Total
Free floating with operational area	8	1	0	0	9
Roundtrip station-based	1	1	4	5	11
P2P	0	0	0	2	2
Total	9	2	4	7	22

Table 92: Category of car sharing – Average travelled distance (absolute values)

	<=10 Km	10.1-25 Km	25.1-50 Km	>50 Km	Total
Free floating with operational area	88.9%	11.1%	0.0%	0.0%	100.0%
Roundtrip station-based	9.1%	9.1%	36.4%	45.5%	100.0%
P2P	0.0%	0.0%	0.0%	100.0%	100.0%
Total	40.9%	9.1%	18.2%	31.8%	100.0%

Table 93: Category of car sharing – Average travelled distance (row percentages)

It is interesting to observe that the roundtrip station-based scheme can cover all kinds of trip lengths but it is generally used to cover longer distances, while the free-floating is used to cover short or very short distances, consistently with the findings of other studies (Habibi, 2017). On the other hand, through the gathered data in this survey, peer-to-peer car sharing (roundtrip homezone-based) seems used only for longer trips.

Considering the relationship between the category of car sharing and average travelled time reported in Table 94 and Table 95 below, it is clear that free floating car sharing vehicles have very short rent time. The average travelled time of the roundtrip station-based is more likely between 1 and 12 hours while, for peer-to-peer, the only answer obtained shows very long rent time (more than one day).

	up to 30 mins	30-60 mins	1-6 hours	6-12 hours	12-24 hours	>24 hours	Total
Free floating with operational area	9	2	0	0	0	0	11
Free floating with pool stations	1	0	0	0	0	0	1
Roundtrip station-based	1	1	4	4	2	0	12
P2P	0	0	0	0	0	1	1
Total	11	3	4	4	2	1	25

Table 94: Category of car sharing – Average travelled time (absolute values)

	up to 30 mins	30-60 mins	1-6 hours	6-12 hours	12-24 hours	>24 hours	Total
Free floating with operational area	81.8%	18.2%	0.0%	0.0%	0.0%	0.0%	100.0%
Free floating with pool stations	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Roundtrip station-based	8.3%	8.3%	33.3%	33.3%	16.7%	0.0%	100.0%
P2P	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Total	44.0%	12.0%	16.0%	16.0%	8.0%	4.0%	100.0%

Table 95: Category of car sharing – Average travelled time (row percentages)

The results showed in the above tables regarding the average travelled time and average travelled distance could be considered as a rough confirmation of the findings from previous studies based on the use of backend data of the providers.

4.3 Summary of results and related profiles

The above described cross-tabulation analyses allow to define some interesting different profiles that can be used to classify operators in later stages of the project. These profiles are characterized in such a way as to have at least one different characteristic from each other, but at the same time a good number of operators within them with similar characteristics. Like any classification exercise based on statistical analysis, the purpose is in fact to maximize the difference between operators pertaining to different profiles and minimize differences between operators within the same profiles. There is clearly no unique solution to such a problem, in particular achieving a good characterization of each cluster involves the definition of a non-exhaustive classification, as shown in Table 96, where it can be seen that not all the operators surveyed fall in one of the below reported profiles. In Appendix 2 a list can be found with all car sharing organisations and the profile they belong to.

Profile	Number of operators compliant to the identifying variables	
Profile 1 – Free floating car sharing systems	38	20,4%
Profile 2 – Free floating car sharing systems with pool stations	12	6,5%
Profile 3 – Peer-to-peer car sharing systems	23	12,4%
Profile 4 – Privately owned roundtrip station based car sharing systems	27	14,5%
Profile 5 – Publicly owned car sharing systems	13	7,0%
Profile 6 - Association-based car sharing systems	10	5,4%
Operators not falling in any of the above profiles	63	33,8%
Total	186	100,0%

Table 96: Number of operators falling in the classification

Each of the below subparagraphs is devoted to the analysis of a different profile and it is reporting the following information:

★ Profile number, with a self-describing title that can be used to label each profile;

★ Number of elements: the number of operators compliant with the characteristics of the identified profile;

★ Short description of the profile itself;

★ Detailed table where the categories of all variables characterising such profile are shown.

★ Main variables: those are the variables from the previous table on which a filter on the whole dataset should be set to find the list of operators belonging to the profile.

4.3.1 Profile 1 – Free floating car sharing systems

Number of elements: 38 operators

Profile 1 represents the free-floating operational schemes which are mainly composed by a large public fleet. One of the main characteristics of this group is the dependence on the use of a smartphone application: the app is the main tool allowed to reserve the vehicle and to ensure the access to it. In addition, the reservation time is really short. It is important to notice that within this group there are 12 operators whose prices scheme is based on a combination of travel distance and travel time, while 22 operators only charge the users on the basis of travel time (incidentally just one within this group has a distance-based tariff). Therefore it is important to keep into consideration in the subsequent phases of the project that this group could further be split into two subgroups to better take into consideration planning and policy issues.

Variable	Characteristic
Operational characteristic	Free floating car sharing cystems with operational area
Fleet dimension	Mainly constituted by a large fleet[9]
Business model	All the operators share a public fleet
Organisation form	Corporations/companies lead by private shareholders
Deposit	Not required
Subscription fee	Not clear
Contract	Single contract is signed at the subscription phase
Modes of reservation	App (9 cases also allow website)
Maximum term for reservation in advance	In most cases short reservation time in advance, up to 15 minutes
Minimum duration of booking	Almost all the operators have a minimum booking time of 1 min [10]
Pricing	Mostly based on travelled time, but one third of the operators implement combined fares on the basis of both travelled distance and time
Fuel	The cost of the fuel is included in the pricing model
Opening technology	App (7 cases also chip card)

Main variables: Operational characteristic, Organisation form

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[9] Relation evaluated with few data about the numbers of cars
[10] Probably are included some 0 – no minimum reservation

4.3.2 Profile 2 – Free floating car sharing systems with pool stations

Number of elements: 12 operators

Profile 2 mainly differs from the previous profile for its operational characteristic. Unlike the first profile, the reservation time in advance is a bit longer, while the other variables assume in almost all the cases the same value.

Variable	Characteristic
Operational characteristic	Free floating car sharing systems with pool stations
Fleet dimension	Medium fleet
Business model	Public fleet
Organisation form	Corporation/company, mainly lead by private shareholders
Deposit	Not required
Subscription fee	Mainly required
Contract	Single contract is signed in the subscription phase
Modes of reservation	The operators that fall in this group allow in most cases both app and website reservation
Maximum term for reservation in advance	In most cases quite short reservation time in advance, up to 30 minutes
Minimum duration reservation	Not clear
Pricing	Almost all operators in this profile have pricing based on the travel time. In particular, a price based on the driven minutes is applied
Fuel	The cost of the fuel is included in the pricing model
Opening technology	Chip card is the most allowed opening technology

Main variables: Operational characteristic, Organisation form

4.3.3   Profile 3 – Peer-to-peer car sharing systems

Number of elements: 23 operators

Profile 3 represents the only operational scheme which is composed by a large private fleet, peer-to-peer.

Another peculiarity of this profile is the form of the contract, which needs to be signed for each rent, and the opening technology, which is based on the swap of a physical key. This feature is related to the fact that the fleet is peer-to-peer: a private car rarely is equipped with technological systems which allow the access to the vehicle with a chip card or application.

Furthermore, it is interesting to observe that only within this profile there is a small group of operators (3) in which the members have to look for a private insurance. Overall, this profile groups those services that share some of the characteristics of car rental systems.

In addition, according with the previous characteristics, only in this profile the cost of the fuel is not included in the pricing model.

Variable	Characteristic
Operational characteristic	Roundtrip homezone-based (peer-to-peer)
Fleet dimension	Large
Business model	Peer 2 peer fleet
Organisation form	Corporation/company with only private shareholders
Deposit	Not required
Subscription fee	Not required
Contract	A contract is signed for each rent
Modes of reservation	The reservation by app is allowed in almost all the cases, but a good number of operators allow the website reservation as well
Maximum term for reservation in advance	In most of the cases more than one week in advance
Minimum duration reservation	The most common minimum reservation time is 60 minutes
Pricing	Based on the combination of travelled distance and travelled time. The travelled time is measured in hour or day while the travelled distance mainly per set of kilometres
Fuel	Cost of the fuel is not included in the pricing model
Opening technology	Key swap between customers

Main variables: Operational characteristic, business model

4.3.4 Profile 4 – Privately owned roundtrip station based car sharing systems

Number of elements: 27 operators

Profile 4 is representative of the roundtrip station-based car sharing systems. Historically speaking, the first car sharing systems with private shareholders knowing a relatively large diffusion, shared most of the characteristics of this group.

It is interesting to observe that operators falling in this group have a wide range of solutions to book the vehicle: 63% of the operators allow booking to be made through all three means, namely an app, website and phone call/call center reservation, while all other operators within this group utilize at least two of these options. Thus, this profile well represents the most flexible roundtrip car sharing system in terms of reservation mode, which can attract different targets, different ages of customers, as mentioned in the paragraph 4.2.7.

Moreover, most of the operators of this class offer the possibility of reserving the vehicle well in advance, more than one week, combined with a minimum rental time of 60 minutes.

Variable	Characteristic
Operational characteristic	Roundtrip Station Based Car sharing Systems
Fleet dimension	Mainly constituted by a large fleet
Business model	Public fleet
Organisation form	Corporation/company, mainly lead by private shareholders
Deposit	Not required
Subscription fee	Required
Contract	Single contract is signed in the subscription phase
Modes of reservation	Website, app and phone call/call center reservation
Maximum term for reservation in advance	In most of the cases more than one week in advance
Minimum duration reservation	The most common minimum reservation time is 60 minutes
Pricing	Combination of travelled distance and travelled time. The price of travelled time is based on the driven hours while the travelled distance mainly per kilometers
Fuel	The cost of the fuel is included in the pricing model

Opening technology	Chipcard (only 6 cases allow also an app)

Main variables: Operational characteristic, shareholders, pricing, opening technology

4.3.5 Profile 5 – Publicly owned car sharing systems

Number of elements: 13 operators

This profile, which is characterized by the variables reported in the table below, represents a small category of car sharing operators (13). This category is the only representing companies/corporations with public shareholders. Publicly-owned car sharing services are not very different in their characteristics from those listed in Profile 4. However, we deemed appropriate to dedicate a specific group to them, since their mission is somewhat different from that of private companies (e.g. pursuing some general welfare goals versus revenue generation) and this might have consequences in those service characteristics that are not easily captured by the variables included in the survey. For example, publicly-owned car sharing systems might seek to maximise their synergies with public transport services, through free registration to the owner of the public transport card, particular prices buying a trip which combines the two modes.

Variable	Characteristic
Operational characteristic	Mainly Roundtrip Station Based Car sharing Systems
Fleet dimension	Medium fleet
Business model	Public fleet
Organisation form	Corporation/company lead by public shareholders
Deposit	Not required
Subscription fee	Required
Contract	Single contract is signed in the subscription phase
Modes of reservation	Website, App and Phone call/call center reservation
Maximum term for reservation in advance	In most of the cases is up to one week
Minimum duration reservation	The most common minimum reservation time is 60 minutes
Pricing	Combination of travelled distance and travelled time. The price of travelled time is hourly based.
Fuel	The cost of the fuel is included in the pricing model
Opening technology	Chipcard (One case allows also the app)

Main variables: Organization form, shareholders, pricing

It is quite interesting that publicly-owned car sharing operators following the characteristics described in this profile are from Italy and Germany.

4.3.6 Profile 6 – Association-based car sharing systems

Number of elements: 10 operators

This profile, which is characterized by the variables reported in the table below, represents a small category of car sharing operators (10). Contrarily to the other profiles, it is the only one having as organisation form associations.

Variable	Characteristic
Operational characteristic	Roundtrip Station Based Car sharing Systems
Fleet dimension	Small fleet
Business model	Public fleet
Organisation form	Association
Deposit	Mainly a fixed amount is required
Subscription fee	Not required
Contract	Single contract is signed in the subscription phase
Modes of reservation	The reservation by website is always allowed, but in some cases also with call center and app
Maximum term for reservation in advance	In most of the cases more than one week in advance
Minimum duration reservation	The most common minimum reservation time is 60 minutes
Pricing	Combination of travelled distance and travelled time. The price of travelled time is hourly based.
Fuel	The cost of the fuel is included in the pricing model
Opening technology	Chipcard

Main variables: Organisation form, business model

4.3.7 Comparative table of car sharing operators profiles

Variables	Profile 1 - Free-floating carsharing systems	Profile 2 – Free Floating Carsharing Systems with pool stations	Profile 3 – Peer to peer car sharing systems	Profile 4 – Privately owned roundtrip station based carsharing systems	Profile 5 – Publicly owned carsharing systems	Profile 6 - Association-based carsharing systems
Operational characteristic	Free Floating Carsharing Systems with operational area	Free Floating Carsharing Systems with pool stations	Roundtrip homezone-based (Peer-to-peer)	Roundtrip Station Based Carsharing Systems	Mainly Roundtrip Station Based Carsharing Systems	Roundtrip Station Based Carsharing Systems
Fleet dimension	Mainly constituted by a large fleet	Medium-Large fleet	Large fleet	Mainly constituted by a medium fleet	Medium fleet	Small fleet
Business model	All the operators share a public fleet	Public fleet	Peer 2 peer fleet	Public fleet	Public fleet	Public fleet
Organization form	Corporations/companies lead by private shareholders	Corporations/companies mainly lead by private shareholders	Corporations/companies lead by private shareholders	Corporations/companies lead by private shareholders	Corporations/companies lead public shareholders	Association
Deposit	Not required	Not required	Not required	Not required	Not required	Mainly a fixed amount is required
Subscription fee	Not clear	Mainly required	Not required	Required	Required	Not required
Contract	Single contract is signed at the subscription phase	Single contract is signed in the subscription phase	A contract is signed for each rent	Single contract is signed in the subscription phase	Single contract is signed in the subscription phase	Single contract is signed in the subscription phase
Modes of reservation	App (9 cases also allow Website)	The operators fall in this group in most cases allow both App and website reservation	The reservation by app is allowed in almost all the cases, but a good number of operators allow the website reservation as well	Website, App and Phone call/call center reservation	Website, App and Phone call/call center reservation	The reservation by website is always allowed, but in some cases also with call center and app
Maximum term for reservation in advance	In most cases short reservation time in advance, up to 15 minutes	In most cases quite short reservation time in advance, up to 30 minutes	In most of the cases more than one week in advance	In most of the cases more than one week in advance	In most of the cases is up to one week	In most of the cases more than one week in advance
Minimum duration of booking	Almost all the operators have a minimum booking time of 1 min	Not clear	The most common minimum duration of booking is 60 minutes	The most common minimum duration of booking is 60 minutes	The most common minimum duration of booking is 60 minutes	The most common minimum duration of booking is 60 minutes
Pricing	Mostly based on travelled time, but one third of the operators implement combined fares on the basis of both travelled distance and time	Almost all the operators in this profile have pricing based on the travel time. In particular, a price based on the driven minutes is applied	Based on the combination of travelled distance and travelled time. The travelled time is measured in hour or day while the travelled distance mainly per set of kilometers	Combination of travelled distance and travelled time. The price of travelled time is based on the driven hours while the travelled distance mainly per kilometers	Combination of travelled distance and travelled time. The price of travelled time is hourly based.	Combination of travelled distance and travelled time. The price of travelled time is hourly based.
Fuel	The cost of the fuel is included in the pricing model	The cost of the fuel is included in the pricing model	Cost of the fuel is not included in the pricing model	The cost of the fuel is included in the pricing model	The cost of the fuel is included in the pricing model	The cost of the fuel is included in the pricing model
Opening technology	App (7 cases also chipcard)	Chipcard is the most allowed opening technology	Key swap between customers	Chipcard (only 6 cases allow also the app)	Chipcard (One case allows also the app)	Chipcard

4.3.8   Car sharing operators providing multiple operational characteristics

As mentioned in the paragraph 2.3.4, in the gathered data have been detected some operators which are offering different car sharing services. In particular 162 operators provide just one service based on a specific operational characteristic while 11 operators provide 23 services in total, as a combination of different operational characteristics, which are summarized in Table 97 below.

Following the methodology described above, for these operators a proper profile has not been defined since it was not clear to identify common characteristics which minimize differences between operators falling within a unique group.

Nevertheless, those operators are not completely excluded from the above classification work, so it is possible that one operator falls in more than one profile if one of its services share common characteristics with those identifying in the proposed profiles.

Variables	Multiple operational characteristics operators			
	5 operators: JEZ! mobil GmbH (Germany), Stadtmobil (Germany), Stadtteilauto Osnabrück (Germany), Stattauto eG (Germany), teilAuto Mitteldeutschland (Germany)	1 operator: Book-n-drive (Germany)	4 operators: Cambio (Belgium), Drive Carsharing (Germany), Flinkster (Germany), Stattauto München (Germany)	1 operator: GirACI (Italy)
Operational characteristics	Free floating OA + Station based	Free floating OA + Free floating PS + Station based	Homezone + Station based	Free floating OA + Free floating PS
Fleet dimension	Large-medium fleet: 2 Medium-small fleet: 2 Small-small fleet: 1	Medium(FF)-Large (SB): 1	Large fleet: 2 Medium-large fleet: 1 Medium-small fleet: 1	unknown
Business model	All operators share a public fleet	All operators share a public fleet	All operators share a public fleet	All operators share a public fleet
Organization form	Cooperation:1 Corporation with private shareholders: 3 Corporation with public shareholders: 1	Corporation with public-private shareholders: 1	Corporation with private shareholders: 2 Corporation with public-private shareholders: 1 Corporation with public shareholders: 1	Corporation with public-private shareholders: 1
Deposit	Yes: 3 No: 1 Corporation with private shareholders No: 1 Corporation with public shareholders	Yes: 1	Yes: 2 No: 1 Corporation with private shareholders No: 1 Corporation with public shareholders	Yes: 1
Subscription fee	Yes: 3 No: 1 with small fleet	Yes	Yes: 2 Yes/No: 1 No: 1 Corporation with public shareholders	No: 1
Contract	Single contract is signed at the subscription phase	Single contract is signed at the subscription phase	Single contract is signed at the subscription phase	A contract for each rent is signed
Modes of reservation	App+Website+Phonecall: 5	App+Website: 1	App+Website+Phonecall: 1 (public-private shareholders) Web+App: 2 Web+Phone: 1	App+Website
Maximum term for reservation in advance	3 up to 30 min+More than one week, 2 No possible+More than one week	More than one week+up to 30 mins	2 more than one week, 2 more than one week+not defined	up to 30 mins
Min. duration of booking	1 min (FF)+60 mins (SB): 3	60 mins: 1	60 mins: 4	60 mins: 1
Pricing	Combination: 5	Combination: 1	Combination: 2 (1 operator with private shareholder and 1 with public-private) Time travelled: 2	Time travelled: 1
Fuel	The cost of the fuel is included in the pricing model	The cost of the fuel is included in the pricing model	The cost of the fuel is included in the pricing model	The cost of the fuel is included in the pricing model
Opening technology	Only chipcard: 4 Chipcard+App: 1	Chipcard: 1	Only chipcard: 3 Chipcard+App: 1	App+Chipcard: 1

Table 97: Operators with multiple operational characteristics

5 Validation of the multidimensional typology

Since the amount of information gathered within this task 2.1 is quite extensive and the deliverable will be used as basis for further analyses within the STARS-project, an external validation process was launched after the first draft was finished. Several international experts were asked to review the report. Among others, **Alistair Kirkbride** (Executive Director of Bikeplus/Carplus), **Adam Cohen** (Research Associate at the Transportation Sustainability Research Center at the University of California, Berkeley), **Ananda Groag** (shared mobility expert at shareNL), **German car sharing experts** from academia and the car sharing sector and several **directors of Belgian car sharing organisations** provided us with very valuable feedback.

The international experts are unanimously positive about the large effort that has been done in bundling all the information on European car sharing in one report. The last overview dated from the MOMO project in 2009 and was due for an update. One expert stated "*it's something that is really important and needs doing*". A number of minor remarks that came forward were tackled immediately and leaded to adjustments in the deliverable. In essence, three main issues were detected and are discussed below.

The first important remark concerns the division of operational characteristics. At the start of the report, three business models[11] and four operational characteristics[12] were presented. No experts questioned the grouping of indicators within these variables, which are two of the most defining variables in the research. During the research, however, it became clear that one overarching variable would make analyses much easier. Otherwise, every single analysis would require at least two tables, one for the organisations with an own fleet and one for the peer-to-peer organisations[13]. At first, the peer-to-peer car sharing organisations were considered as one of the organisations with roundtrip homezone based operational characteristics. However, this division caused problems during research. The category of homezone based organisations was too heterogeneous to work with and a distinction between the two major business models was no longer possible.

In order to meet that lack, a new operational characteristic was introduced, namely 'peer-to-peer car sharing'. Although peer-to-peer car sharing is in essence not an operational characteristic, it helped us to make a distinction between car sharing operators with an own fleet and private car sharing.

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[11] Car sharing providers with an own fleet, peer-to-peer car sharing and car sharing among neighbors

[12] Roundtrip station based, roundtrip homezone based, free floating with pool stations and free floating with an operational area

[13] Since car sharing among neighbors is a very small fragment of the whole car sharing sector, we considered them together with peer-to-peer car sharing. In both systems private cars are shared amongst private persons and both are characterized by a roundtrip homezone based system.

The results of the different analyses were a lot clearer with this adjustment. However, a large share of the experts that were consulted questioned this approach. According to them, the addition of 'peer-to-peer' as a new operational characteristic made things too complicated and caused confusion.

That's why, ultimately, we opted for five categories of car sharing, based on the business models and operational characteristics (see Figure 20). Organisations that belong to one of the first four categories are all car sharing providers with own fleet. The last category, peer-to-peer car sharing, is characterised by a roundtrip homezone based system. This division made it possible to consider all car sharing organisations in one new variable, and still kept the distinction between the different business models and operational characteristics. In this way we met one of the most important comments from the experts.

Business models:
- Car sharing providers with an own fleet (A)
- Peer-to-peer car sharing (B)
- Car sharing among neighbours (C)

Operational characteristics:
- Roundtrip station based (1)
- Roundtrip homezone based (2)
- Free floating pool stations (3)
- Free floating operational area (4)

Categories of car sharing:
- Roundtrip station based (A,1)
- Roundtrip homezone based (A,2)
- Free floating pool stations (A,3)
- Free floating operational area (A,4)
- Peer-to-peer car sharing (B,C,2)

Figure 20: Categories of car sharing

The second main issue concerns the profiles of car sharing, distinguished in chapter 4. Experts question if the profiles for association-run (profile 6) and publicly owned services (profile 5) are appropriate. They see no fundamental difference between car sharing provided by a company, a public authority or an association. The reviewers doubt that the status of the owner is of the same relevance as the operational characteristic. From a theoretical point of view, these separate profiles may indeed have little added value. But the approach of this study was different. The intention was to conduct a bottom up research, starting from the observed data. Inductively we ended up with 6 profiles that, at least statistically, reflect the diversity within the car sharing sector in Europe. The cases belonging to the same profile share one or more characteristics. These differences may be not that visible in practice, or are of less importance for the functioning of the car sharing organization, but from a statistical point of view they are certainly relevant. One of the experts explicitly liked this

approach and stated "*it mines the gathered data rather than jumping to conclusions* [and] *it tries to get beneath overly simplistic categorisations of car sharing*".

Also the fact no separate profile was generated for services that combine different operational characteristics was challenged by some experts. They recommended to add combined services to the typology. The STARS project partners decided not to add a separate category or operational characteristic for these combined systems because of analytical reasons. We agree this decision can be discussed, but after redoing the analysis with a newly created 'combined characteristic', the current option came out best.

A third remark was made on the German data. Since the car sharing market in Germany is very large compared to that in other European countries, we decided to analyse only those services operating in cities larger than 50.000 inhabitants and having a fleet with more than 19 cars. Experts recommend to add these small services to a full account of car sharing in Europe anyway. They especially recommend to not exclude the small services from an overview of the total number of car sharing services in EU member states. We agreed with this proposal and added the small German services to Appendix 1 and mentioned the total number of European car sharing services in the beginning of the report.

At last, (mobility) experts from ICLEI, one of the STARS-partners, gave feedback on this report concerning the geographical differences. They paid special attention to car sharing trends in Eastern Europe. While the data presented in this report is based predominantly on countries comprising Northern, Western, and Southern Europe, it may nonetheless be useful for Eastern European countries due to the extensive information that it provides. For example, the report highlights what car sharing schemes are most commonly implemented across the EU and provides information concerning the relationship of operational characteristics with fleet size, pricing, opening technology, reservation methods, distance travelled, among others. This information can then be used by relevant actors in Eastern European countries interested in introducing car sharing to their respective countries.

When car sharing is very innovative, it may no longer be useful for Eastern Europe as this region is unfortunately not as advanced when compared to the three other European regions, who have been working on car sharing for a longer period of time. This makes the implementation and the use of such car sharing systems more difficult in this region. While peer-to-peer car sharing sounds interesting and may have potential in Eastern Europe, it is, according to the experts, important to

remember that car ownership is still highly-regarded and seen as a status symbol in the region. In addition, the level of trust among individuals is limited. As family and friendship ties are remarkably strong in Eastern Europe, the functionality and success of car sharing among neighbors might be challenged as values get in the way.

The car sharing experience in Eastern Europe is relatively new and in its initial stages. A large part of the population may not be familiar with the car sharing concept and might consider it to be a car rental scheme instead. For this reason, car sharing should be encouraged and put in place by city governments.

6 Conclusion

During the research process it became clear that our results are in line with earlier studies and that some recent tendencies come forward quite clearly. One evolution that probably strikes the most is the rising of car sharing schemes in **Eastern Europe**. In the previous broad overview of car sharing in Europe, the MOMO study, the Eastern countries weren't involved. In 2009, when the study was finished, active car sharing organisations were found in 14 countries. The STARS-research however comprises cases from 25 countries. In less than ten years the market has expanded towards the East and also towards the Balkan countries. In those 'new' countries the number of organisations is still minimal, but the fact that car sharing services found their way in there, shows that shared mobility hasn't reached it limits yet. Still in three European Union countries no car sharing services were found (Greece, Cyprus and Malta), although some signals indicate that organisations will start there soon. The largest group of organisations that started operating in Eastern Europe opted for a free floating system with an operational area. This trend is visible in the rest of Europe also. The most recent services are more likely to choose for a free floating system.

In the time the MOMO study was launched, **free floating car sharing operators** were taking their first steps in Europe. A lot has changed since then. Both in the desktop research and in the sample for the in-depth study, free floating systems account for 30% of the total car sharing organisations population. Most of them started operating quite recently. Free floating systems on average started in 2013, station based organisations in 2004, just like the peer-to-peer platforms. The homezone based systems are on average even more recently founded, in 2015 to be precise. This division between older and younger systems has much to do with the availability of new technology. The free floating and homezone based systems apply less strict parking rules than station based systems, which enables customers to park the shared car on another spot than the place where they found it. This way of operating requires **new technologies**, not in the least to be able to locate the car. Via GPS-trackers and mobile applications that visualize the location of the car, customers are able to find, book and even open the shared car. Among other things, the increase in the use of smartphones has made this evolution possible. In ten years, free floating systems have grown from almost non-existent to a major, undeniable player in the car sharing field. It is expected that their position will strengthen in the coming years, certainly with regard to their share in the total fleet of shared cars. The fact that big international car manufacturers like Daimler (Car2Go) and BMW (DriveNow) specifically invest in this type of car sharing, supports this thesis.

Based on a division between the main categories of car sharing, some patterns can be distilled. Concerning the **trip length and distance**, free floating systems generate on average very short trips. More than 80% of all trips with cars from a free floating with operational area system, do not last longer than half an hour and do not go beyond 10 kilometres. On this point, the contrast with roundtrip and peer-to-peer organisations couldn't be more clear.

When the **opening technology** is considered, also there a distinction between the different categories becomes apparent. Free floating systems with an operational area and roundtrip homezone based systems both have less strict parking regulation than the other categories. This implies that customers don't know on beforehand where the shared car can be found and thus are in need of the most recent location information. This data is provided most of the times via an app, with which the car can often also be opened. Free floating systems with pool stations and roundtrip station based services place their cars on fixed parking spots and are still more in favour of a chip card to open the car. Almost all peer-to-peer services, at last, depend on a personal interaction between the owner and user of the car and thus still hold on a physical key swap. The differences between the categories are quite significant, but since a large share of the organisations already offer an app to their customers (for instance to book a car), one could expect that in the near future more and more operators will also enable the use of an app to open the shared car.

A last striking difference between the categories can be found in their **pricing models**. Roundtrip station based operators for instance use in more than 80% of the times a pricing model where both time and distance are charged. Free floating systems with an operational area, on the other hand, place much more emphasis on the time aspect only. This choice is reflected in the driving pattern of their customers, where the latter on average make much shorter trips than the former.

Experts on shared mobility expect that the gap between the different categories of car sharing will become smaller over time. We already see that some organisations are experimenting with various operational systems, sometimes even in the same city. It will be interesting to see in which direction this trend will continue.

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APPENDIX 1: Number of investigated car sharing organisations per country

	N	%	RT SB[14]	RT HZ	FF OA	FF PS	P2P
Austria	5	2.69%	2	0	2	0	1
Belgium	16	8.60%	4	5	3	0	4
Bulgaria	1	0.54%	0	0	0	0	1
Croatia	1	0.54%	0	0	1	0	0
Czech Republic	5	2.69%	3	0	0	0	2
Denmark	3	1.61%	0	1	1	0	1
Estonia	1	0.54%	0	0	0	0	1
Finland	4	2.15%	0	0	1	1	2
France	11	5.91%	3	1	0	5	2
Germany	53	28.49%	37	3	10	1	2
Hungary	1	0.54%	0	0	1	0	0
Ireland	2	1.08%	2	0	0	0	0
Italy	21	11.29%	12	0	6	2	1
Latvia	2	1.08%	0	0	1	0	1
Lithuania	1	0.54%	0	0	1	0	0
Luxemburg	1	0.54%	1	0	0	0	0
Netherlands	24	12.90%	9	4	5	1	4
Poland	5	2.69%	1	0	4	0	0
Portugal	3	1.61%	0	0	2	0	1
Romania	1	0.54%	0	0	1	0	0
Slovakia	1	0.54%	1	0	0	0	0
Slovenia	1	0.54%	1	0	0	0	0
Spain	8	4.30%	3	1	3	0	1
Sweden	4	2.15%	0	1	1	2	0
UK	11	5.91%	7	0	1	1	2
Total	186 (288)	100.00%	86	16	44	13	26

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[14] RT SB = Roundtrip station based // RT HZ = Roundtrip homezone based // FF OA = Free floating operational area // FF PS = Free floating pool stations // P2P = peer-to-peer

[15] We only took into account the German car sharing organisations active in cities with more than 50.000 inhabitants and having more than 19 cars. Without this restriction 155 German organisations were identified.

APPENDIX 2: Inventory car sharing organisations per profile

PROFILE 1: free floating car sharing systems			
Car2Go	Austria	Carguru	Latvia
DriveNow	Austria	Spark	Lithuania
DriveNow	Belgium	Car2Go	Netherlands
Poppy	Belgium	Ioniq	Netherlands
Zipcar	Belgium	Witkar	Netherlands
Spin City	Croatia	4mobility	Poland
DriveNow	Denmark	Easyshare	Poland
DriveNow	Finland	Traficar	Poland
App2Drive	Germany	Panek	Poland
Car2Go	Germany	DriveNow	Portugal
drive by	Germany	CityDrive	Portugal
DriveNow	Germany	Pony	Romania
JEZ! mobil GmbH	Germany	Car2Go	Spain
Stadtmobil	Germany	Emov	Spain
teilAuto Mitteldeutschland	Germany	Zity	Spain
GreenGo	Hungary	DriveNow	Sweden
AddumaCar	Italy	DriveNow	United Kingdom
Car2Go	Italy		
DriveNow	Italy		
Enjoy	Italy		
Share'ngo	Italy		

PROFILE 2: free floating car sharing systems with pool stations

Ekorent	Finland	BlueTorino	Italy
Arcachon Blue Club	France	Giraci	Italy
Autolib	France	Amber	Netherlands
BlueCub	France	Sunfleet	Sweden
Bluely	France	Move about	Sweden
book-n-drive	Germany	BlueCity	United Kingdom

PROFILE 3: peer-to-peer car sharing systems

Drivy	Austria	Drivy	Germany
CarAmigo	Belgium	SnappCar	Germany
Drivy	Belgium	Auting	Italy
CarAmigo	Bulgaria	Autolevi	Latvia
SmileCar	Czech Republic	MyWheels	Netherlands
HoppyGo	Czech Republic	SharePlanet	Netherlands
SnappCar	Denmark	SnappCar	Netherlands
Autolevi	Estonia	CarAmigo	Portugal
Autolevi	Finland	Drivy	Spain
CityCarClub	Finland	Drivy	United Kingdom
Drivy	France	EasyCar Club	United Kingdom
Koolicar	France		

PROFILE 4: privately owned roundtrip station based car sharing systems

Stadtauto	Austria	Stadtmobil Südbaden AG	Germany
Caruso	Austria	stadt-teil-auto Car-Sharing	Germany
Ubeeqo	Belgium	Stadtteilauto Münster	Germany
Ubeeqo	France	Stattauto Bonn	Germany
Cambio	Germany	Stattauto Kassel	Germany
Flexicar	Germany	Stattauto München	Germany
Ford Carsharing	Germany	teilAuto Mitteldeutschland	Germany
Greenwheels	Germany	GoCar	Ireland
Grüne Flotte Freiburg	Germany	Toyota Yuko Ireland	Ireland
Grünes Auto Göttingen	Germany	Playcar	Italy
JEZ! mobil GmbH	Germany	Hertz 24/7	Netherlands
Scouter/Sharegroup	Germany	Bluemove	Spain
Stadtmobil	Germany		

PROFILE 5: publicly owned car sharing systems

Bundeswehr Carsharing	Germany	Automia (ICS)	Italy
Flinkster (DB Carsharing)	Germany	AVM carsharing	Italy
Flinkster (DB Carsharing)	Germany	Roma Car Sharing	Italy
Stadtteilauto Osnabrück	Germany	Carsharing Padova (ICS)	Italy
Stadtteilauto Osnabrück	Germany	Carsharing Palermo (ICS)	Italy
swa Carsharing/Stadtwerke	Germany	Carsharing Parma (ICS)	Italy
		Tper	Italy

PROFILE 6: association based car sharing systems

Ecomobiliteit Gent	Belgium	Ökomobil Pfaffenwinkel	Germany
Car4way	Czech Republic	Ökostadt Renningen e.V.	Germany
Autonapůl	Czech Republic	Vaterstettener Autoteiler	Germany
BodenseeMobil	Germany	Ci.Ro.	Italy
Ökobil Bamberg	Germany	Göteborgs bilkoop	Sweden

Operators not falling in any of the above profiles

Bolides	Belgium	E-vai	Italy
Cambio	Belgium	Genova Car Sharing (Giraci)	Italy
Cambio	Belgium	Giraci	Italy
Cozycar	Belgium	Ubeeqo	Italy
Dégage	Belgium	Carloh	Luxembourg
Partago	Belgium	Buurauto	Netherlands
Stapp.In	Belgium	CAReCAR	Netherlands
Wibee	Belgium	ConnectCar	Netherlands
Zen Car	Belgium	Deelootoo	Netherlands
AJO	Czech Republic	Drive CarSharing	Netherlands
Delebilen Hertz	Denmark	Elektrip	Netherlands
Citiz	France	Flexcar	Netherlands
Communauto	France	Greenwheels	Netherlands
Mobilycar	France	Juuve	Netherlands
Zipcar	France	MobielGedeeld	Netherlands
Autohaus Vorndran	Germany	Shared Wheels	Netherlands
BeeZero	Germany	Stapp.in	Netherlands
book-n-drive	Germany	StudentCar	Netherlands
book-n-drive	Germany	Vereniging voor Gedeeld	Netherlands
Drive Carsharing	Germany	Wattcar	Netherlands
Drive Carsharing/Ruhr Auto-e	Germany	WeDriveSolar	Netherlands
E-WALD	Germany	Omni	Poland
Hertz 24/7	Germany	Up!	Slovakia
my-e-car	Germany	Avent2go	Slovenia
Share a Starcar	Germany	Eccocar	Spain
Stattauto eG	Germany	Ubeeqo	Spain
Stattauto eG	Germany	Zipcar	Spain
Stattauto München	Germany	Co-cars	United Kingdom
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Ubeeqo	Germany	E-car Club	United Kingdom
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(Landkreis Bamberg)	Germany	Practical Car Club	United Kingdom
		Ubeeqo	United Kingdom

APPENDIX 3: List of variables desktop research

- Organization name
- Country
- City/Cities
- Url website
- Business model
  - Public fleet
  - Peer-to-peer (P2P)
  - Private cars in closed community
  - Other, please specify
- Organization form / Shareholders
  - Cooperative
  - (Unincorporated) Association
  - Corporation / Company
    - Public shareholder(s)
    - Public-private shareholder(s)
    - Private shareholder(s)
- Category of car sharing
  - Roundtrip station-based
  - Roundtrip home zone-based
  - Free-floating with pool stations
  - Free-floating with operational area
  - Peer-to-peer (P2P)
- Deposit
  - Yes, fixed amount
  - No, but credit card to guarantee
  - No
  - In case of fixed amount: between ...€ and ...€
  - In case of credit card to guarantee: minimal credit card limit
- Subscription fee
  - Yes
  - No
  - In case of yes: between ...€ and ...€

- Contract
    - Single contract
    - Sharing car = new contract
- Modes of reservation
    - Website
    - App
    - By phone / Call center
    - In a customer office
- Maximum term for reservation in advance
    - No reservation possible
    - Up to 15min
    - Up to 30min
    - Up to 2h
    - Up to one day
    - Up to one week
    - More than one week
    - Unlimited
- Maximum term for reservation in advance without fee
    - No reservation possible
    - Up to 15min
    - Up to 30min
    - Up to 2h
    - Up to one day
    - Up to one week
    - More than one week
    - Unlimited
- Minimum duration reservation
- Pricing
    - Distance traveled
    - Time traveled
    - Combination
    - In case of 'distance traveled' or 'combination'
        - Per kilometer
        - Per set of kilometers
    - In case of 'time traveled' or 'combination'

- Per minute
- Per hour
- Per half day
- Per day
  - o Fuel inclusive
  - o Fuel exclusive
- Opening technology
  - o Physical key swap
  - o Chip card
  - o App
- Insurance model
  - o Insurance included
  - o Customers have to look for insurance
- Number of cars

APPENDIX 4: List of questions survey research

SURVEY CAR SHARING SERVICES

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 were 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

INFORMED CONSENT

This survey is conducted as part of the EU Horzion 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.
- 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.

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

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:

- Does your organization formally have a profit or not-for-profit character?
    - Profit
    - Not-for-profit
- Which legal form applies to your organization?
    - Cooperative
    - (Unincorporated) Association
    - Corporation / Company
    - Other form, please specify …
- 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:

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

Business model:

- 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
- In what year did your car sharing organization started to operate?
    - ….
- 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?
- What is the average number of inhabitants of the cities your organization is operating in?
    - …. inhabitants

Cooperation:

- 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
- Does your organization cooperate with (local) governments to develop innovate car sharing projects?
    - Yes, please indicate which projects ….
    - No
- Does your organization cooperate with social services to develop innovate car sharing projects?
    - Yes, please indicate which projects ….
    - No
- Does your organization cooperate with businesses to develop innovate car sharing projects?
    - Yes, please indicate which projects ….
    - No
- Does your organization participates in social projects?
    - Yes, please indicate which projects ….
    - No
- Does your organization cooperate with academic research in car sharing?
    - Yes, please indicate which projects …
    - No
        - Would you like to?
            - Yes
            - No

QUESTIONS ON SERVICES IN ONE SPECIFIC CITY

Operational characteristics:

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
  - 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
  - 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
  - What is the minimum booking-time for this cars?
    - 60 minutes or less
    - One day or less
    - More than one day
  - 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
  - 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
  - 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
  - o 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
  - o 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
  - o 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
  - o What is the minimum booking-time for this cars?
    - 60 minutes or less
    - one day or less
    - more than one day
  - o 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
  - o 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
  - o 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
  - o 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:
- Which types of vehicles do you offer to your customers? You can pick more than one option.
  - o Economy car (City car)
  - o Family car
  - o Sedan/Minivan
  - o Luxury vehicle/SUV
  - o Sports car/Topless car
  - o Van
  - o Wheelchair friendly car
  - o Other, please specify
- Can you indicate what share of your cars uses one of the propulsion/fuel types below?
  - o Petrol/gasoline
  - o Diesel
  - o Battery electricity
  - o Hydrogen
  - o LPG
  - o Hybrid (diesel or petrol)
  - o Other, please specify
- Can you give an estimation of the average CO_2 emission of your car fleet?

Registration & reservation procedure:
- How do new customers register for your car sharing service? (more than one option is possible)
  - o Via an app
  - o Via a website
  - o Via telephone
  - o At your customer service
- Do customers have to pay a subscription fee?
  - o Yes
    - Between ……. € and ………..€
  - o No
- Do customers have to pay a deposit before using your car sharing service?
  - o Yes, a fixed amount
    - Between ……. € and ……€
  - o No, but they need a credit card to guarantee the deposit
    - Minimal card limit: ………€

- o No
- We want to know more about the contract your customers sign. Which statement applies the most to your organization?
    - o Our customers sign a single contract with our organization at the start
    - o Our customers sign a contract every time they rent a car
- How do customers make a reservation for a shared car of your organization? (more than one option possible)
    - o Online via a website
    - o Via an app
    - o Via a call center
    - o Visit at the customer service
    - o Other, specify

Insurance model:

- How does your organization cope with the insurance of the cars? Please indicate which statement applies the most to your situation.
    - o Insurance is included in our price
    - o Our price doesn't include insurance (customers have to look for an insurance themselves)
- If you offer an insurance, is there a possibility for the customers to lower the own risk?
    - o Yes, customers can lower the own risk to an amount between 0 and 500 euro
    - o Yes, customers can lower the own risk to an amount between 501 and 1.000 euro
    - o Yes, customers can lower the own risk to an amount higher than 1.000 euro
    - o No
    - o Other, please specify

Opening technology:

- In which way the shared cars can be opened by the customer? Please indicate all technology you use at least with one car.
    - o With a physical key swap
    - o With a chip card
    - o With a smartphone
    - o Other, please specify
- What is the opening technology used for most of the cars you offer? (more than one answer possible)
    - o With a physical key swap
    - o With a chip card
    - o With a smartphone
    - o Other, please specify

Pricing:

- How is a customer charged for using your service? (more than one answer is possible)
    - o Customers pay directly (after a ride) for the services we offer
    - o Customers pay periodically for the rides they made
    - o Customers pay a periodical service fee
- Which parameters determine the price of a ride with your services? (more than one answer possible)
    - o Distance traveled with the shared car
        - ▪ Per kilometer
        - ▪ Per set of kilometers (example: price for every 100 kilometers)

- Other
  - o Time traveled with the shared car
    - Per minute
    - Per hour
    - Per day
  - o Other parameter(s), please specify …
- Does the price for a ride with your service include all energy-costs (fuel, electricity, gas etc.)?
  - o Yes
  - o No, energy costs are charged in addition
- 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):
  - o 1/2-hour booking, 7 kilometers driven; price: …
  - o 2-hour booking, 10 kilometers driven; price: …
  - o 8-hour booking, 150 kilometers driven; price: …
  - o 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.

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

Role of car manufacturer(s):
- 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?
  - o Yes, with one specific manufacturer or distributor, namely …
  - o Yes, with more than one, namely …. …. …. …. …. ….
  - o No

- How are the cars financed?
  - By a vehicle manufacturer finance company
  - By an independent finance company
  - By own finance
- 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'
- 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 …
- 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
- Do you have a maintenance deal with (a) car manufacturer(s) or a distributor of (a) car brand(s)?
  - Yes
  - No

Cost structure:
- 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

- o …% Maintenance (fueling, cleaning vehicles…)
- o …% Insurance contracts
- o …% Municipality taxes
- o …% Customer services
- o …% Personnel costs
- o …% 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**.

- 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
- Why will the overall number of active car sharing users evolve in the way you indicated above?
    - …
- How do you expect the number of car sharing operators will change?
    - Extremely decrease
    - Slightly decrease
    - Unchanged
    - Slightly increase
    - Extremely increase
- Why will the number of car sharing operators evolve in the way you indicated above?
    - …
- 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
- Why will the number of free floating car sharing operators evolve in the way you indicated above?
    - …
- 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
- Why will the number of free floating car sharing operators evolve in the way you indicated above?
    - …
- 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
- Why will it evolve in that way?
    - …

- 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
- Why will it evolve in that way?
  - …
- How do you expect the overall number of privately owned cars will change?
  - Extremely decrease
  - Slightly decrease
  - Unchanged
  - Slightly increase
  - Extremely increase
- 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)
- 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.

- 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%
- 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%
- How is your fleet size going to change?
  - Decrease of more than 5%
  - Decrease up to 5%
  - Status quo
  - Increase up to 5%

- o Increase of more than 5%
- Which kind of vehicles are not yet part of your fleet but are likely to become part of it in the future?
    - o Economy car (City car)
    - o Family car
    - o Sedan/Crossover SUV/Minivan
    - o Luxury vehicle
    - o Sports car
    - o Off-road car
    - o Van
    - o Other, please specify
- Are you going to operate in other cities in addition to the ones where you are already present?
    - o Unlikely
        - ▪ Why is it unlikely that you will expand your network to other cities?
    - o Likely
        - ▪ Why is it likely that you will expand your network to other cities?
- How is your operating area going to change?
    - o Including suburban areas
    - o Including countryside
    - o Unchanged

- To what extent the **diffusion of green vehicles** (electric, hydrogen cars) is going to impact your organization?
    - o Very negatively
    - o Negatively
    - o No impact
    - o Positively
    - o Very positively
- To what extent the **diffusion of autonomous vehicles** is going to impact your organization?
    - o Very negatively
    - o Negatively
    - o No impact
    - o Positively
    - o Very positively
- To what extent the **diffusion of Mobility-as-a-Service-applications** is going to impact your organization?
    - o Very negatively
    - o Negatively
    - o No impact
    - o Positively
    - o Very positively
- To what extent **a better integration with public transport service** (e.g. fare integration, transit hubs, …) is going to impact your organization?
    - o Very negatively
    - o Negatively
    - o No impact

- o Positively
- o Very positively
- To what extent the **diffusion of smartphones** is going to impact your organization?
  - o Very negatively
  - o Negatively
  - o No impact
  - o Positively
  - o Very positively
- To what extent the **rising costs of fuel** is going to impact your organization?
  - o Very negatively
  - o Negatively
  - o No impact
  - o Positively
  - o Very positively
- To what extent the **worsening of congestion** is going to impact your organization?
  - o Very negatively
  - o Negatively
  - o No impact
  - o Positively
  - o 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.

- 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					

- 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, …
    - ……
- Describe at least one current policy option in your country or city that, according to you, represents a barrier for car sharing.
    - ….
    - ….
    - ….
    - ….
    - ….
- If you could propose one policy rule which would be most effective to boost car sharing, which one would that be?
    - ….

APPENDIX 5: List of contingency tables

	Private cars (P2P)	Private cars in closed community (NFP)	Public fleet	Total
Free-floating with operational area	0,0%	0,0%	23,8%	23,8%
Free-floating with pool-stations	0,0%	0,0%	7,0%	7,0%
Roundtrip station-based	0,0%	0,0%	46,5%	46,5%
Roundtrip homezone-based	0,0%	0,0%	8,6%	8,6%
Peer-to-peer (P2P)	12,4%	1,6%	0,0%	14,1%
Total	12,4%	1,6%	85,9%	100,0%

Table 98: Category of car sharing – Business model (total percentages)

	Private cars (P2P)	Private cars in closed community (NFP)	Public fleet	Total
Free-floating with operational area	0%	0%	28%	24%
Free-floating with pool-stations	0%	0%	8%	7%
Roundtrip station-based	0%	0%	54%	46%
Roundtrip homezone-based	0%	0%	10%	9%
Peer-to-peer (P2P)	100%	100%	0%	14%
Total	100%	100%	100%	100%

Table 99: Category of car sharing – Business model (column percentages)

	Combination	Distance traveled	Time traveled	Total
Free-floating with operational area	10,6%	1,1%	12,8%	24,6%
Free-floating with pool-stations	0,6%	0,6%	6,1%	7,3%
Roundtrip station-based	38,5%	0,6%	8,4%	47,5%
Roundtrip homezone-based	5,0%	0,0%	2,2%	7,3%
Peer-to-peer (P2P)	6,1%	2,2%	5,0%	13,4%
Total	60,9%	4,5%	34,6%	100,0%

Table 100: Category of car sharing – Pricing (total percentages)

	Combination	Distance traveled	Time traveled	Total
Free-floating with operational area	17%	25%	37%	25%
Free-floating with pool-stations	1%	13%	18%	7%
Roundtrip station-based	63%	13%	24%	47%
Roundtrip homezone-based	8%	0%	6%	7%
Peer-to-peer (P2P)	10%	50%	15%	13%
Total	100%	100%	100%	100%

Table 101: Category of car sharing – Pricing (column percentages)

	Per kilometer	Per set of kilometers	Total
Free-floating with operational area	13,1%	3,7%	16,8%
Free-floating with pool-stations	0,9%	0,0%	0,9%
Roundtrip station-based	58,9%	4,7%	63,6%
Roundtrip homezone-based	7,5%	0,9%	8,4%
Peer-to-peer (P2P)	3,7%	6,5%	10,3%
Total	84,1%	15,9%	100,0%

Table 102: Category of car sharing – Pricing: combination - distance (total percentages)

	Per kilometer	Per set of kilometers	Total
Free-floating with operational area	15,6%	23,5%	16,8%
Free-floating with pool-stations	1,1%	0,0%	0,9%
Roundtrip station-based	70,0%	29,4%	63,6%
Roundtrip homezone-based	8,9%	5,9%	8,4%
Peer-to-peer (P2P)	4,4%	41,2%	10,3%
Total	100,0%	100,0%	100,0%

Table 103: Category of car sharing – Pricing: combination - distance (column percentages)

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0,0%	0,0%	0,9%	16,0%	17,0%
Free-floating with pool-stations	0,0%	0,0%	0,0%	0,9%	0,9%
Roundtrip station-based	0,9%	0,0%	55,7%	6,6%	63,2%
Roundtrip homezone-based	0,9%	0,0%	4,7%	2,8%	8,5%
Peer-to-peer (P2P)	7,5%	0,9%	1,9%	0,0%	10,4%
Total	9,4%	0,9%	63,2%	26,4%	100,0%

Table 104: Category of car sharing – Pricing: combination - time (total percentages)

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0,0%	0,0%	1,5%	60,7%	17,0%
Free-floating with pool-stations	0,0%	0,0%	0,0%	3,6%	0,9%
Roundtrip station-based	10,0%	0,0%	88,1%	25,0%	63,2%
Roundtrip homezone-based	10,0%	0,0%	7,5%	10,7%	8,5%
Peer-to-peer (P2P)	80,0%	100,0%	3,0%	0,0%	10,4%
Total	100,0%	100,0%	100,0%	100,0%	100,0%

Table 105: Category of car sharing – Pricing: combination - time (column percentages)

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0,0%	0,0%	0,0%	38,9%	38,9%
Free-floating with pool-stations	0,0%	0,0%	7,4%	13,0%	20,4%
Roundtrip station-based	0,0%	1,9%	24,1%	1,9%	27,8%
Roundtrip homezone-based	1,9%	0,0%	5,6%	0,0%	7,4%
Peer-to-peer (P2P)	3,7%	1,9%	0,0%	0,0%	5,6%
Total	5,6%	3,7%	37,0%	53,7%	100,0%

Table 106: Category of car sharing – Pricing: travelled time (total percentages)

	Per day	Per half day	Per hour	Per minute	Total
Free-floating with operational area	0,0%	0,0%	0,0%	72,4%	38,9%
Free-floating with pool-stations	0,0%	0,0%	20,0%	24,1%	20,4%
Roundtrip station-based	0,0%	50,0%	65,0%	3,4%	27,8%
Roundtrip homezone-based	33,3%	0,0%	15,0%	0,0%	7,4%
Peer-to-peer (P2P)	66,7%	50,0%	0,0%	0,0%	5,6%
Total	100,0%	100,0%	100,0%	100,0%	100,0%

Table 107: Category of car sharing – Pricing: travelled time (column percentages)

	Per kilometer	Total
Free-floating with operational area	2	2
Peer-to-peer (P2P)	3	3
Total	5	5

Table 108: Category of car sharing – Pricing: travelled distance (absolute values)

	Fuel exclusive	Fuel inclusive	Total
Free-floating with operational area	0	42	42
Free-floating with pool-stations	0	12	12
Roundtrip station-based	3	81	84
Roundtrip homezone-based	0	13	13
Peer-to-peer (P2P)	19	5	24
Total	22	153	175

Table 109: Category of car sharing – Fuel (absolute values)

	Per kilometer	Per set of kilometers	Total
Free-floating with operational area	0,0%	24,0%	24,0%
Free-floating with pool-stations	0,0%	6,9%	6,9%
Roundtrip station-based	1,7%	46,3%	48,0%
Roundtrip homezone-based	0,0%	7,4%	7,4%
Peer-to-peer (P2P)	10,9%	2,9%	13,7%
Total	12,6%	87,4%	100,0%

Table 110: Category of car sharing – Fuel (total percentages)

	Per kilometer	Per set of kilometers	Total
Free-floating with operational area	0,0%	100,0%	100,0%
Free-floating with pool-stations	0,0%	100,0%	100,0%
Roundtrip station-based	3,6%	96,4%	100,0%
Roundtrip homezone-based	0,0%	100,0%	100,0%
Peer-to-peer (P2P)	79,2%	20,8%	100,0%
Total	12,6%	87,4%	100,0%

Table 111: Category of car sharing – Fuel (row percentages)

	Per kilometer	Per set of kilometers	Total
Free-floating with operational area	0,0%	27,5%	24,0%
Free-floating with pool-stations	0,0%	7,8%	6,9%
Roundtrip station-based	13,6%	52,9%	48,0%
Roundtrip homezone-based	0,0%	8,5%	7,4%
Peer-to-peer (P2P)	86,4%	3,3%	13,7%
Total	100,0%	100,0%	100,0%

Table 112: Category of car sharing – Fuel (column percentages)

	No	Yes	Total
Free-floating with operational area	23,6%	0,0%	23,6%
Free-floating with pool-stations	6,2%	0,6%	6,7%
Roundtrip station-based	46,1%	1,7%	47,8%
Roundtrip homezone-based	6,7%	1,1%	7,9%
Peer-to-peer (P2P)	0,6%	13,5%	14,0%
Total	83,1%	16,9%	100,0%

Table 113: Category of car sharing – Opening technology: Key swap (total percentages)

	No	Yes	Total
Free-floating with operational area	28,4%	0,0%	23,6%
Free-floating with pool-stations	7,4%	3,3%	6,7%
Roundtrip station-based	55,4%	10,0%	47,8%
Roundtrip homezone-based	8,1%	6,7%	7,9%
Peer-to-peer (P2P)	0,7%	80,0%	14,0%
Total	100,0%	100,0%	100,0%

Table 114: Category of car sharing – Opening technology: Key swap (column percentages)

	No	Yes	Total
Free-floating with operational area	2,8%	20,7%	23,5%
Free-floating with pool-stations	4,5%	2,8%	7,3%
Roundtrip station-based	33,0%	14,5%	47,5%
Roundtrip homezone-based	2,2%	6,1%	8,4%
Peer-to-peer (P2P)	12,3%	1,1%	13,4%
Total	54,7%	45,3%	100,0%

Table 115: Category of car sharing – Opening technology: App (total percentages)

	No	Yes	Total
Free-floating with operational area	5,1%	45,7%	23,5%
Free-floating with pool-stations	8,2%	6,2%	7,3%
Roundtrip station-based	60,2%	32,1%	47,5%
Roundtrip homezone-based	4,1%	13,6%	8,4%
Peer-to-peer (P2P)	22,4%	2,5%	13,4%
Total	100,0%	100,0%	100,0%

Table 116: Category of car sharing – Opening technology: App (column percentages)

	No	Yes	Total
Free-floating with operational area	15,1%	8,4%	23,5%
Free-floating with pool-stations	1,1%	6,1%	7,3%
Roundtrip station-based	8,4%	39,1%	47,5%
Roundtrip homezone-based	3,9%	3,9%	7,8%
Peer-to-peer (P2P)	12,8%	1,1%	14,0%
Total	41,3%	58,7%	100,0%

Table 117: Category of car sharing – Opening technology: Chipcard (total percentages)

	No	Yes	Total
Free-floating with operational area	36,5%	14,3%	23,5%
Free-floating with pool-stations	2,7%	10,5%	7,3%
Roundtrip station-based	20,3%	66,7%	47,5%
Roundtrip homezone-based	9,5%	6,7%	7,8%
Peer-to-peer (P2P)	31,1%	1,9%	14,0%
Total	100,0%	100,0%	100,0%

Table 118: Category of car sharing – Opening technology: Chipcard (column percentages)

	No	Yes	Total
Free-floating with operational area	13,8%	9,4%	23,2%
Free-floating with pool-stations	1,1%	6,1%	7,2%
Roundtrip station-based	3,9%	43,6%	47,5%
Roundtrip homezone-based	1,1%	7,2%	8,3%
Peer-to-peer (P2P)	0,0%	13,8%	13,8%
Total	19,9%	80,1%	100,0%

Table 119: Category of car sharing – Reservation mode: Website (total percentages)

	No	Yes	Total
Free-floating with operational area	69,4%	11,7%	23,2%
Free-floating with pool-stations	5,6%	7,6%	7,2%
Roundtrip station-based	19,4%	54,5%	47,5%
Roundtrip homezone-based	5,6%	9,0%	8,3%
Peer-to-peer (P2P)	0,0%	17,2%	13,8%
Total	100,0%	100,0%	100,0%

Table 120: Category of car sharing – Reservation mode: Website (column percentages)

	No	Yes	Total
Free-floating with operational area	0,0%	29,0%	23,3%
Free-floating with pool-stations	2,9%	8,3%	7,2%
Roundtrip station-based	60,0%	44,8%	47,8%
Roundtrip homezone-based	5,7%	9,0%	8,3%
Peer-to-peer (P2P)	31,4%	9,0%	13,3%
Total	100,0%	100,0%	100,0%

Table 121: Category of car sharing – Reservation mode: App (total percentages)

	No	Yes	Total
Free-floating with operational area	0,0%	23,3%	23,3%
Free-floating with pool-stations	0,6%	6,7%	7,2%
Roundtrip station-based	11,7%	36,1%	47,8%
Roundtrip homezone-based	1,1%	7,2%	8,3%
Peer-to-peer (P2P)	6,1%	7,2%	13,3%
Total	19,4%	80,6%	100,0%

Table 122: Category of car sharing – Reservation mode: App (column percentages)

	No	Yes	Total
Free-floating with operational area	19,9%	3,3%	23,2%
Free-floating with pool-stations	5,0%	2,2%	7,2%
Roundtrip station-based	16,6%	30,9%	47,5%
Roundtrip homezone-based	6,6%	1,7%	8,3%
Peer-to-peer (P2P)	12,7%	1,1%	13,8%
Total	60,8%	39,2%	100,0%

Table 123: Category of car sharing – Reservation mode: Phone – Call center (total percentages)

	No	Yes	Total
Free-floating with operational area	32,7%	8,5%	23,2%
Free-floating with pool-stations	8,2%	5,6%	7,2%
Roundtrip station-based	27,3%	78,9%	47,5%
Roundtrip homezone-based	10,9%	4,2%	8,3%
Peer-to-peer (P2P)	20,9%	2,8%	13,8%
Total	100,0%	100,0%	100,0%

Table 124: Category of car sharing – Reservation mode: Phone – Call center (column percentages)

	No	Yes	Total
Free-floating with operational area	22,7%	0,6%	23,2%
Free-floating with pool-stations	7,2%	0,0%	7,2%
Roundtrip station-based	45,9%	1,7%	47,5%
Roundtrip homezone-based	7,7%	0,6%	8,3%
Peer-to-peer (P2P)	13,8%	0,0%	13,8%
Total	97,2%	2,8%	100,0%

Table 125: Category of car sharing – Reservation mode: Customer office (total percentages)

	No	Yes	Total
Free-floating with operational area	23,3%	20,0%	23,2%
Free-floating with pool-stations	7,4%	0,0%	7,2%
Roundtrip station-based	47,2%	60,0%	47,5%
Roundtrip homezone-based	8,0%	20,0%	8,3%
Peer-to-peer (P2P)	14,2%	0,0%	13,8%
Total	100,0%	100,0%	100,0%

Table 126: Category of car sharing – Reservation mode: Customer office (column percentages)

Other variables:

	Customers have to look for insurance	Insurance included in price	Total
Free-floating with operational area	0	42	42
Free-floating with pool-stations	0	11	11
Roundtrip station-based	0	86	86
Roundtrip homezone-based	0	14	14
Peer-to-peer (P2P)	5	21	26
Total	5	174	179

Table 127: Category of car sharing – Insurance (absolute values)

	Sharing car = new contract	Single contract	Total
Free-floating with operational area	2	40	42
Free-floating with pool-stations	1	12	13
Roundtrip station-based	3	83	86
Roundtrip homezone-based	1	14	15
Peer-to-peer (P2P)	22	4	26
Total	29	153	182

Table 128: Category of car sharing – Contract (absolute values)

	No	No, but credit card to guarantee	Yes, fixed amount	Total
Free-floating with operational area	22	6	6	34
Free-floating with pool-stations	3	6	2	11
Roundtrip station-based	50	4	28	82
Roundtrip homezone-based	6	2	4	12
Peer-to-peer (P2P)	13	6	3	22
Total	94	24	43	161

Table 129: Category of car sharing – Deposit (absolute values)

	No	No, but credit card to guarantee	Yes, fixed amount	Total
Peer-to-peer (P2P)	13	6	1	20
Private cars in closed community	0	0	2	2
Public fleet	81	18	40	139
Total	94	24	43	161

Table 130: Business model – Deposit (absolute values)

	No	Yes	Total
(Unincorporated) Association	8	5	13
Cooperation	7	4	11
Corporation / Company	72	72	144
Public authority	1	0	1
Total	88	81	169

Table 131: Organization form – Subscription fee (absolute values)

	Combination	Distance traveled	Time traveled	Total
Private shareholders	60	3	41	104
Public shareholder(s)	11	0	4	15
Public-private shareholders	9	1	4	14
Total	80	4	49	133

Table 132: Corporation/Company shareholders - Pricing (absolute values)

	Combination	Distance traveled	Time traveled	Total
Fuel exclusive	12	0	10	22
Fuel inclusive	94	8	50	152
Total	106	8	60	174

Table 133: Fuel - Pricing (absolute values)

	Combination	Distance traveled	Time traveled	Total
Peer-to-peer (P2P)	11	1	9	21
Private cars in closed community	0	3	0	3
Public fleet	99	4	53	156
Total	110	8	62	180

Table 134: Business model - Pricing (absolute values)

	(Unincorp.) Association	Cooperation	Corporation/ Company	Public authority	Total
Peer-to-peer (P2P)	0	2	21	0	23
Private cars in closed community	3	0	0	0	3
Public fleet	10	9	130	1	150
Total	13	11	151	1	176

Table 135: Business model – Organization form (absolute values)