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# SHARED MOBILITY REWARDS (ID: 20045)

# DELIVERABLE #01:

## QUALITATIVE STAKEHOLDERS NEEDS ANALYSIS

MAY 15TH, 2020

| | |
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# Contents

# 1. Introduction

## 1.1. About the Share-More project

The overall objective of SHARE-MORE is to optimize the added value of car-sharing services and promote a portfolio of transport services that enable and encourage sustainable urban mobility. The effectiveness and sustainability of car-sharing integration into the bundle of transportation services will be achieved by understanding the needs of the three main stakeholders: travellers, transport authorities, and service providers, and by analysing the need for personalised incentives tailored to the needs of all the three stakeholders. The incentives will be designed to increase car-sharing efficient use while contributing to the integration with the existing overall transportation system and its sustainability. An example of such incentives is an advanced booking option for recurrent trips to and from transport hubs for users whose travel patterns indicate activities matching such origins and destinations.

The project will balance the needed knowledge base through its consortium consisting of universities, cities and car-sharing commercial companies to understand the underlying mechanisms of potential incentive designs, develop a specific incentive scheme, and pilot the proposed scheme within a real car-sharing service. Figure 1.1 reviews the activity purpose of Share-More in four major stages:

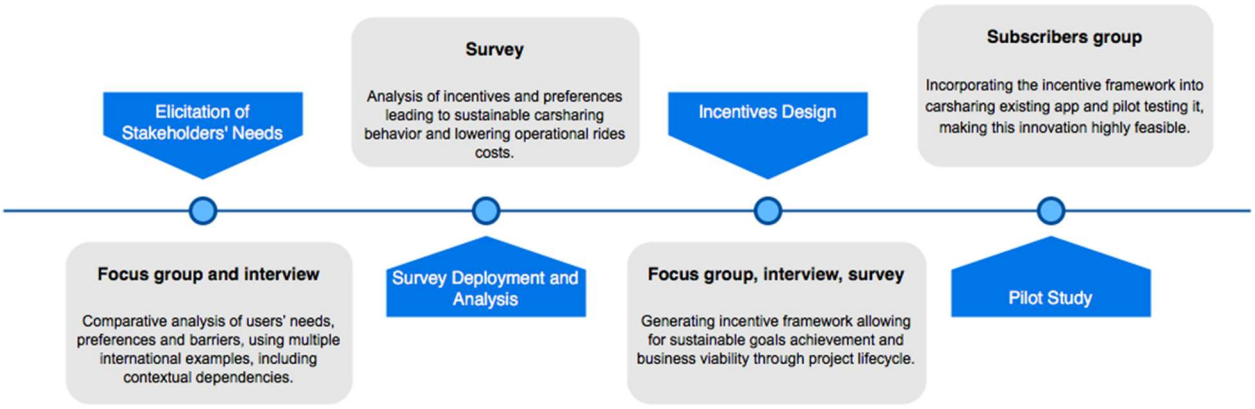


*Figure 1.1 - Share-More activities and purposes*

## 1.2. About this report

This report, as a part of SHARE-MORE project, aims at providing in-depth elicitation of car-sharing users' needs and provision of the initial list of potential user-directed and stakeholder-directed incentives. This is achieved through exploratory focus groups and interviews with existing and future/prospect car-sharing users, service providers, and city officials from three cities of Tel Aviv, Munich, and Copenhagen. The initial list of users' incentives was obtained from the existing literature (Millard-Ball and Program 2005; Firnkorn and Müller 2011; Xie et al. 2019; Matyas 2020). First, a preliminary structure was designed for the interviews and

focus groups, and then, the collected qualitative data were analysed to identify the key attributes.

The identified key attributes from the focus groups and interviews discussions will be used as a basis to design and conduct a wider social survey, to collect qualitative and quantitative data about individuals and household socio-economic characteristics, mobility tool ownership, travel patterns, and attitudes towards car-sharing, as well as stated preference data about willingness to use car-sharing. The report is structured as follows. The next chapter introduces the methodology that has been used to identify the three stakeholders' needs. Chapters 3, 4, and 5 introduce context and analysis for Munich, Copenhagen, and Tel-Aviv-Yafo, respectively. The decision of having a dedicated chapter for each city depends on the adopted methodology and will be discussed at the end of Chapter 2. Finally, Chapter 6 presents our recommendations.

# 2. Methodology

The methodology section describes all stages to design and organise the focus group and interview studies, as well as the approach to handle and analyse the data.

## 2.1. Methodology: Focus Groups

Focus groups (FG) are group interviews that allow researchers to achieve a deeper understanding of potential incentives while keeping the cost low (Krueger 2014). SHARE-MORE utilised focus group study to engage the existing and potential car-sharing users. In this report, the group discussions with 8-10 participants were organised to be conducted in Tel Aviv, Munich, and Copenhagen. The FG was scheduled for a duration of 100 minutes in each city. The following steps describe the methodology for the design of focus groups:

**Sampling Methods:**

Sampling methods and market segmentation are the keys to users' needs, when employing focus groups. What appeals to a young parent may be different from what is persuasive to a senior citizen. As traditional techniques like random sampling have been proved not to be suitable for similar problems (Nagle and Williams 2013; Krueger 2014), SHARE_MORE deploys appropriate Convenience sampling techniques to identify the potential participants from the population groups who are conveniently available to take part in the study. The purpose of the focus group, as well as the knowledge of the project objectives, is employed to select the most appropriate participants, based on the criteria defined hereafter.

**Composition of the Group:**

- *Step 1. Set Selection Criteria*: The existing and potential users of car-sharing services are the target groups of this study. Therefore, some criteria need to be considered in identifying individuals to participate in focus groups. The characteristics of the target group has been identified as:
    - holding a driver licence
    - being over the age of 18
    - Users – existing/potential/past (4-5/4-5/1-2 indicative members)
    - Residential area – city centre/neighbourhoods in between/suburb (3-5/3-5/2-3 indicative members)
    - Occupation - students/working professionals/retirees (2-3/3-5/2-3 indicative members)
    - Gender – men/women/other (4-6/4-6/0-2 indicative members)
    - Ownership of cars (4-6/4-6 indicative members)
- *Step 2. Potential Target Groups:* Working professionals, college and university campus students, retirees, past use of car-sharing services, residents living within a geographic area (e.g. area of operation of car sharing services or non-operation areas) or living in a limited traffic zone, ownership of cars (50/50).
- *Step 3. Strategies to Recruit Participants:* Use the existing lists of clients from the car-sharing providers (if applicable), members, employees or those who use car-sharing services in the organisation, announcement in the bulletin of the involved universities and organisations, nomination of participants by colleagues or neutral parties (this might lead to a random sampling, if the number of nominated participants is high),

announcements through Non-Governmental Organisations (NGOs) and city residents clubs, and social media posting. Another source is using existing lists of potential participants who were taking part in surveys with focus on sharing mobility and indicated to be available for further interviews. These channels are adopted to recruit potential users and account for their preferences.

**Recruitment Procedure:**

Two times the number of potential participants should be over-recruited in anticipation of no-show up cases. The aim of the focus group discussion, as well as the organisation collecting the data must be explained to potential participants, as well as confidentiality procedures. The strategies and procedure to contact the potential participants is specified in the Table in section 2.4.

**Questions Development Strategy:**

After brainstorming, **five main questions**, aligned with the study purpose, are proposed for the focus group discussion. All questions are open-ended, while the dichotomous questions are avoided. **'**Prompt' and 'Probe' questions are also provided to extend the discussion (Nagle and Williams 2013), if needed:

- *Main question*: Aiming at opening the discussion on the topic.
- *Prompt*: These questions are developed to facilitate the discussion, when participants have difficulties initiating a conversation on this topic.
- *Probe*: This question explores an issue more in-depth.

The questions are listed in Table 21 of the Appendix.

**Approval and review:**

The developed questionnaire needs to be approved by the ethics committee of each participating organisation. Prior to administration, a pilot phase is recommended, where the questions should be tested with people who are not involved in the SHARE-MORE project. The finalized scripts for the focus group and interview should be provided after approval/revision of the questions in the pilot test.

## 2.2. Methodology: Interviews

Interviews were used mainly to engage stakeholders, such as city officials and service providers. As previously mentioned, we suggest in this report to conduct approximately 10 separate interviews with experts and stakeholders for each city. However, as Tel Aviv, Munich, and Copenhagen represent three different realities, this is an indicative number that might change from city to city. The methodology for designing interviews is closely aligned to the one described in the previous section, with some major distinctions reflecting the difference between focus group and interview.

### 2.2.1. Sampling Methods:

As for focus-groups, convenience sampling is suggested. Relevant stakeholders have been contacted in each city, including city officials and service providers, and asked to participate in the survey.

#### 2.2.2. **Composition of the Group:**

City officials, service providers, and stakeholders who are the target of these interviews. Special attention should be devoted to balancing opinions between policy makers and service providers. For this purpose, a list of potential stakeholders nominated to be interviewed in each city can be made.

#### 2.2.3. **Recruitment Process:**

Stakeholders should be privately contacted by means of phone calls or e-mails. The channels mentioned in section 2.1.2 can also be adopted in this phase. The networks of the SHARE-MORE partners will be also extensively used to recruit stakeholders.

#### 2.2.4. **Question Development Strategy:**

In this case, five main questions, aligned with the study purpose, are also proposed, specifically designed for organisational stakeholders. These five questions need to be open-ended to avoid influencing the interviewer's answers. ‘Prompt’ and ‘Probe’ questions will also be adopted if needed (see section 2.1.4). The list of questions for stakeholders’ interviews appear in Table 22.

## 2.3. Facilitation and Arrangements

Once viable recruits have been established, the following steps should be followed to arrange and facilitate the studies' implementation:

#### 2.3.1. **Focus Groups:**

1. Set personal to serve as moderator and assistant
2. Arrange the meeting room in a convenient location. Room setting should allow all participants to sit around one table, and room should be facilitated by a projector.
3. Set time and date of the session. Then, invite participants to select one of the sessions. The date and time of the session should have no conflict with significant events, activities, etc. (to the degree possible).
4. Beverage/cookies arrangement
5. Make contacts with potential participants
6. Provide the necessary material for the session:
    - Stationery: Notepads, pens, flip charts or easel paper, markers, etc.
    - Focus group script
    - Recording device
    - Beamer/projector
    - List of participants, sign-in sheet, background questionnaire, and consent form (an example of the form provided is showed in the Appendix). All necessary forms, data privacy and protection documents, and General Data Protection Regulation (GDPR) needed for the study should be prepared.
    - Name tags: Each participant should have a name tag so that he/she can be easily recognized. Fake names are allowed for privacy concerns.
    - If necessary, other researchers from the local team can join the focus group and help with taking notes.

7. Pre-session: Meeting participants and engaging in a small talk with them prior to the session. A non-focus-group related discussion would help participants to feel more comfortable.
8. Background questionnaire: Ask participants to provide basic socio-demographic information (nationality, age, gender, etc.). (The background questionnaire can be found in Appendix)
9. Presentation of car-sharing services (free-floating and station-based), car-pooling, and incentive.
10. Session: Lead the focus group discussion
11. At the end, participants are asked to rank a series of incentives – a set list and any new incentives that came-out in the discussion.
12. Incentives for participation: There is no budget allocated for incentives in the SHARE-MORE project. Participants have the opportunity to share their opinions, experiences, and expectations in a research project, where their opinions will be of particular value. However, for follow up studies, it is recommended to consider incentives in order to avoid no show-up and recruit a more representative sample.

#### 2.3.2. **Interviews:**

1. Set time and location for the interview. Participants have the possibility to choose time and location within a set of dates.
2. Coffee and refreshment, in case the participant chooses to visit the dedicated location.
3. Necessary material for the session:
   - Notepads, pens, flip charts or easel paper, markers, etc.
   - Interview script
   - Recording device (Use backup devices, i.e. not a single phone, or recorder, but two, so if one fails, not all is lost).
4. Consent form (the consent form can be found in Appendix)
5. Session: lead the individual interview.

#### 2.3.3. **General Notes on the moderator and moderator assistant:**

The following traits should be considered, while selecting the moderators and moderator assistants for leading the focus groups and interview sessions:

1. The focus group moderator should be able to appropriately cover all prepared questions within the allocated time (Eliot 2005), and ask probing for detailed answers when needed.
2. The moderator is responsible to engage all participants in the discussion and fully explain their answers (Eliot 2005). Ensure that everyone can participate and that the group stays on task.
3. The moderator ought to paraphrase and summarise long, complex, or ambiguous comments. This can clarify the comments for all participants, and help them to be fully engaged in the group discussion (Eliot 2005).
4. The moderator must remain neutral during the discussion (Eliot 2005).
5. The assistant moderator must run the recording device during the session, and take notes during the discussion.
6. The moderator statements and questions should be identified, as well as the name/number of each speaker followed by her/his comment.

#### 2.3.4. Language Discrepancies in Performing the Focus Groups and Interview:

In this project, the focus group and interview discussions are conducted in three different cities/countries/languages (Germany, Denmark, and Israel), and thus, the local languages are adopted in performing the studies. For this reason, the focus group and the interview scripts, as well as the all necessary forms (including background questionnaire, invitation letters, and consent forms) are provided in German, English, and Hebrew. Further, the correspondence with the participants should be made in the local languages. Accordingly, the moderators and moderator assistants must be either native speakers, or fluent in the local language and capable of communicating like a native speaker. It is important to mention that the strategy of language flexibility is to tackle the language barriers for participating in the studies. Below, some indications on the logistics of the project, which represent and adaptation from those proposed in Nagle and Williams (2013).

## 2.4. Logistics

Following the framework proposed in the table below shows time to consider for each activity (note – the table is an adaptation of the original proposed in (Nagle and Williams 2013):

*Table 1 - Framework adapted from Nagle and Williams (2013)*

| Steps | Time before/after the session |
|---|---|
| Develop the study purpose | 8 weeks |
| Develop the questions/script | 6 weeks |
| Prepare necessary forms | 6 weeks |
| Select the moderator/interviewer/moderator assistant | 5 weeks |
| Approval from ethics committee | 4 weeks |
| Identify the potential participants | 4-5 weeks |
| Pilot test questions/scripts to check whether the script properly serves the purpose. Revise if necessary.<br>Train the moderator/interviewer | 4 weeks |
| Arrange the date and location of the session | 3 weeks |
| Invite the participants | 2-3 weeks |
| Verify invitation to participants by phone-call/email | 2 weeks |
| Finalise the room arrangements for the session | 1 week |
| Send a follow-up email to participants | 1 week |
| Organise all required materials for the session | 2 days |
| Contact participants – a reminder phone-call/email | 2 days |
| Conduct all focus group discussion/interviews | Sessions |
| Transcribing the focus group/interview discussions, and preparing the raw data | 1 week |
| Submit results from Interviews/focus groups | 2 weeks |
| Deliverable | 30.04.2020 |

However, the outbreak of Covid-19 pandemic has greatly affected the arranged date of the sessions, and thus, appropriate strategies were taken by all partners to adopt to the unprecedented circumstance.

Additional Considerations:

1. Invitation Letter: An invitation letter template is provided for recruiting participants (Example of invitation letter is provided in the Appendix).
2. Report guidelines: A suitable reporting form is provided to submit the results from the interviews and focus groups. These guidelines are described in the next section “Data Handling).
3. All partners should allocate appropriate time to each task by considering the steps required in the table.

## 2.5. Data Handling

Identifying a proper strategy for capturing data is a critical aspect in SHARE-MORE project. Focus groups and interviews are conducted in different cities, with different social and territorial characteristics, different mobility operators, and in different languages. While TUM takes leadership for the analysis, the project deploys several experts and moderators/interviewers to overcome language and geographical barriers and process data in the most effective way.

The data handling procedure is divided into two sub-sections. First, the details about the data collection is provided before, during, and immediately after the focus group/interview. Then, an analytical stage is introduced, where the data captured during the interview/focus group are transformed into manageable datasets.

### 2.5.1. **Data Handling during the Focus Group and Interview:**

Analysts: The research team at TUM takes leadership during the analysis phase. Additionally, each city that runs focus groups and interviews also deploys a local research team, composed of:

- Interviewer/focus groups moderator(s)
- Leading analyst
- Support team: If necessary, researchers can join the focus group to support the moderator (accompanying participants, taking notes, noticing if participants are changing their minds). This does not apply to interviews.

Questions: Due to significant differences between the three cities, the local research team should identify those questions that are most relevant for the specific context. This should be done before and after the focus group/interview.

Strategies for data capturing: Both audio recording devices and field notes should be used to capture data during the sessions.

Debrief: Each research team should organize a short debrief (15-30 minutes) shortly after the focus group. This does not apply to interviews.

Data storing: Create copies of the material (audio recording) and make sure that field notes are machine readable (word, excel, txt, …).

### 2.5.2. Data processing after the Focus Group/Interview

The following four forms of data have been considered within the project, as they are the most common data forms for qualitative analysis:

- Transcript: Word-for-word written (machine-readable) record of the interview, based on the audio recording.
- Abbreviated Transcript: Abbreviated transcripts are created by listening to the audio recording and developing an abbreviated version (between 30% and 60% of the full transcript), which includes only the relevant parts of the conversation.
- Note-based: Note-based approach uses field notes to identify the most relevant topics during the discussion. No transcript is required.
- Memory: This approach relies solely on the memory and experience of the interviewer/moderator.

In the case of SHARE-MORE, memory-based approaches cannot be considered, as interviews and focus groups are performed by different moderators. Considering the remaining three options, transcripts entails a level of detail that is not necessary for the scope of the project. Considering that the leading research team (TUM) works on a translated version of the discussion, SHARE-MORE will adopt abbreviated transcripts as they can provide a similar level of detail.

SHARE-MORE uses thus abbreviated transcripts to achieve a high level of detail in understanding the most effective incentives for car sharing.

Each research team conducting focus groups and interviews is in charge of providing the leading team (TUM) with the abbreviated transcripts and field notes, both in machine readable format. It is also advised to code the data (see 2.6.1 section “Coding topics”) to transfer the experience of interviewers and moderators to the leading team in TUM.

## 2.6. Analysis

The topics and main ideas discussed during the focus group should be summarised in order to create manageable concepts that would assist report development. This utilises “the classic technique” as proposed in (Krueger 2014). This technique, shortly described below, is divided into two phases.

### 2.6.1. Coding Topics

For each focus group or interview, field notes and abbreviated transcripts are divided into *quotes*. Each *quote* represents an answer or comment of one participant to one specific topic/question. Each *quote* receives a code/label that describes it. Different quotes that express similar concepts should receive similar codes. Also, a list of labels will be provided together with the quotes. It is important to highlight that codes should not be simply associated with words - e.g. similar words equal similar codes. The same word can be used to express opposite feelings. Thus, codes should represent similar comments and not similar words. An example of how a quote should be provided - from transcript or field note - is the following in Table 2. Note that the empty fields in the table will be used during the analysis phase.

*Table 2: Adopted labels*

| Topic | Participant | Quote | label |
|---|---|---|---|
| Topic 2<br>Question 4<br>Time 00:15:09 | Alex | In the morning I need to spend some time by myself. The problem is not owning the car, but I do not want to have anybody around! | Prefer Private space |
| Topic 3<br>Question 7/8<br>Time 00:16:12 | Unknown | That would be a great idea! I can save money and time! | Positive Economical |

It is important in this phase to have strong interaction between the leading and local teams. Local teams provide the first code. This code is modified by the leading team, which takes care to assign similar codes to all focus groups and interviews. The leading team then sends the modified code to the local team for validation. These procedures continue until leading and local teams agree on the coding.

### 2.6.2. **Analysing Topics:**

For each focus group and interview, quotes are grouped and assigned to their original topic. Then, quotes should be classified as follows:

- The quote does answer the question/is relevant for the topic:
  - Keep the quote;
- The quote is relevant for the topic as well as to another or new topic:
  - Keep quote and move/copy the quote to all correct topics;
- The quote does not answer the question but answer another question:
  - Move to the correct topic;
- The quote does not fit any question or topic:
  - If relevant, create new topic.

The output of this process is a list of quotes and their respective codes. Topics do not necessarily match the original questions. Codes represent feelings and sensations toward the topic. Two examples are given in Table 3.

*Table 3: Sorted quotes*

| Topic | Participant | Quote | label | Correct topic(s) | Incentives | Note |
|---|---|---|---|---|---|---|
| Topic 2… | Alex | In the morning… | Prefer Private space | Topic 2 Question 5/9<br>Topic 3 Question 7/8 | Car Pooling (Negative) | |
| Topic 3… | Unknown | That would be… | Positive Economical | Topic 2 Question 5/9<br>Topic 3 Question 7/8 | Car Pooling (Positive) | Impossible to identify the respondent, due to the lively debate |

Once an extensive report has been written for each topic, a final report can be prepared to conclude the analysis, in which the main findings for each topic is summarized.

### 2.6.3. **Analysing techniques**

The above-mentioned method is widely adopted and can be performed manually or by using computers. This includes commercial software like NVivo or ATLAS, as well as open access libraries for programming languages, such as Gensim (topic modelling in Python). These systems help manage large sets of data and process them quickly. However, these software and tools do not make more accurate analysis, instead simply help with handling large datasets. If erroneous codes or topics are provided, software will provide unreliable results. Additionally, this software mostly uses computers to speed up the classic procedure described earlier. They can only make a substantial difference for analysis that are not reasonably possible with other strategies, such as nest codes.

Therefore, SHARE-MORE first uses the conventional approach to identify the main topics from the abbreviated transcripts for each city, while software (Python more specifically) will be used to perform quantitative analysis in a second phase. For the first phase, content analysis to identify the main topics is based on the "list of potential incentives", as well as additional incentives that are raised by the participants during the discussions. These inputs are used to process the tables, such as Table 3. The second phase of analysis utilises Python program codes to process the labelled data. The analysis of these labels was used to identify some of the stakeholders needs presented in the next chapters.

## 2.7. Aim of the report

Car-sharing is an alternative to the private car and a complement to alternative transport modes, such as public transportation, cycling, and walking. Car-sharing alone cannot compensate for auto-oriented policies or context-specific barriers. High population density, a good pedestrian environment, and public transport-oriented policies are all elements that help car-sharing to succeed.

As car-sharing only makes sense as a part of a wider network of mobility services, it only makes sense to provide different recommendations for different cities. Each city described in this report represents a different reality, with a different morphology, different regulations, and different barriers. Similarly, cultural differences can lead to different users' needs. As such, Chapter 3, 4, and 5 introduces context-specific results for the three cities under study (Tel-Aviv, Munich, and Copenhagen). Each chapter is a standalone section that includes a short description of the geographical context as well as the available transport alternative. While these chapters follow a similar structure, some differences emerged when describing the local context as well as the results.

Concerning the results, it should be stressed that the analysis is not limited to a list of incentives. The goal of this qualitative analysis is not to identify a set of incentives, as the number of respondents is not representative of the entire population nor their preferences. The travel survey that follows this study will identify these preferences. The goal of this qualitative study is to understand the "why". Each respondent is not just asked whether he/she uses car-sharing or not, but "why" he/she is making this choice and "which" incentives can help to change his mind. As such, the findings from Focus Groups and interviews are presented in this report as they were presented to us.

No incentive is a panacea for all problems. Respondents identified a series of criticalities, such as car-availability, car-sharing coverage, or negative experiences with car-sharing and pointed out that incentives should focus on solving them. Both users and stakeholders suggested

some incentives, which are summarized in this report. However, understanding context-specific needs for users and stakeholders is the key to designing good incentives. The aim of this report is thus not to provide an exhaustive list of incentives, but to create an initial list of potential incentives and to provide recommendations for the upcoming travel survey. Following this vision. Chapter 3, 4, and 5 introduces the city-specific findings in terms of user needs and context-specific potential incentives. Chapter 6 presents a comparison between cities, a list of initial incentives, and some recommendations for the design of the travel survey.

Finally, we mentioned since the beginning that distinguishing between user and stakeholders incentives is not always straightforward. For instance, when talking about on-street parking cost, parking-related incentives focus mostly on operators. Usually, operators make contracts with the municipality and pay for the possibility to use public parking spots. This cost can be between 5% and 15% of the overall cost for a car-sharing system, based on our interviews. The rental price is influenced by this cost, but the user pays for the ride and not for the parking spot. In these settings, this incentive clearly targets the operator. On the other hand, creating mobility stations can be considered as a form of incentive for both users and operators. For the user, mobility stations increase accessibility and make car-sharing more integrated with other transport modes, such as public transport. For the operator, it increases visibility and, potentially, market share. To capture these complex dynamics, instead of focusing on the incentives, we focus on users' and stakeholders' needs. Based on these needs, a list of potential incentives for both of them is created. However, some of the incentives could be in both lists.

# 3. Munich

## 3.1. Context – Munich mobility landscape

Munich is the capital of the state of Bavaria and Germany's third largest city. It is of great economic importance as a strategic hub in the south of Germany, and as a consequence, it needs to accommodate large traffic volumes. It has about 2.6 million inhabitants with about 50% living in the city area and the other 50% living in suburban districts. The city area covers approximately 310 km$^2$. Its old centre is encircled by the Altstadtring (Old City Ring Road); the wider inner city area is encircled by the Mittlerer Ring (Middle Ring Road); the city area is encircled by the Autobahnring (Motorway Ring Road) (see Figure 3.1).

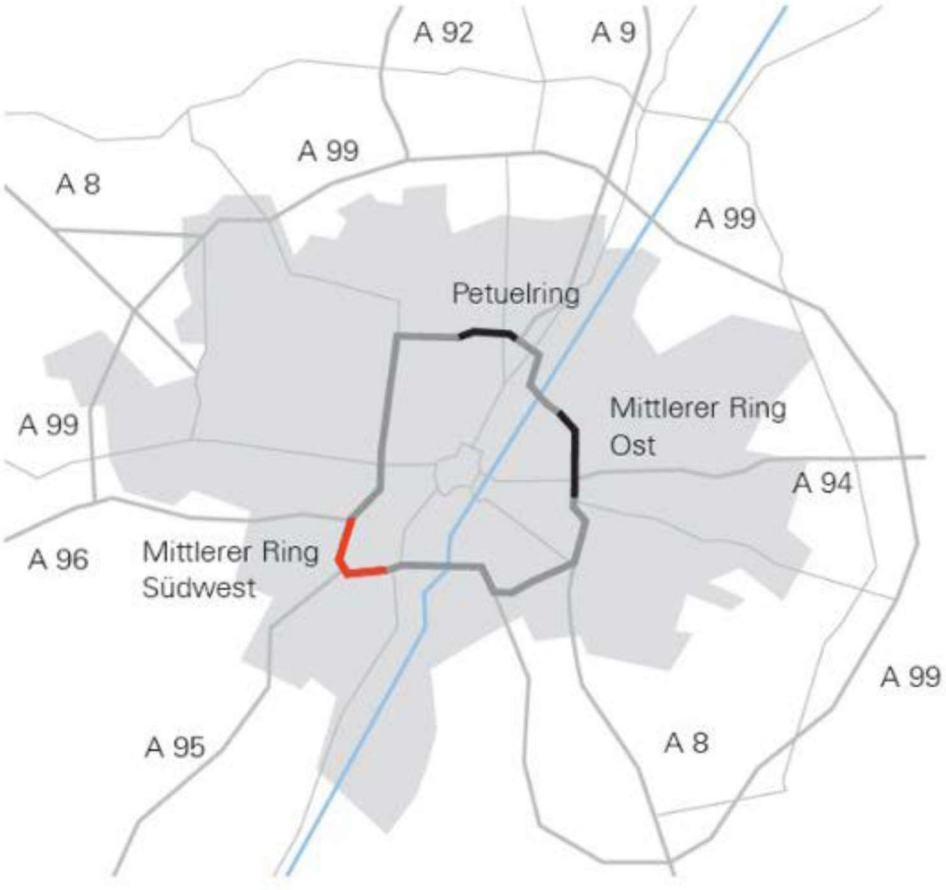


*Figure 3.1 - Major roads in the Munich city area: Altstadtring (inner circle), Mittlerer Ring (middle circle, dark grey) and Autobahnring (outer circle) (Source: City of Munich website, accessed 31 January 2019)*

### 3.1.1. **Public Transport**

Munich has an impressive public transport infrastructure that, according to the Munich Transport Company (MVG) serves around 38% of the total mobility demand in the Munich area ("Munich Transport Corporation (MVG) Sustainability Report," n.d.). At the moment, the

transportation system includes trams (72 km of infrastructure), 94 bus routes (with a total of 2083 stops), and a 100km underground system (U-Bahn, 8 lines, 96 stations), and it is fully integrated with the regional light-railway (S-Bahn), which connect Munich with other satellite cities in Bavaria. According to MVG, this impressive infrastructure is used every day by more than a million people.

### 3.1.2. **Cycling**

Together with Berlin, Munich is one of the German's most bike-friendly cities. A special "Bicycle Traffic Development Plan" coordinates the inner city planning of bicycle routes with Munich's surrounding communities in order to improve the city's regional integration. The main routes radiating out from the city centre are complemented by an inner and outer ring route ("Transport Development Plan" 2006). With more than 20% of mode share and a network that cover approximately 1200 km, cycling is part of the daily life in Munich. In addition, bike-sharing is extremely popular in Munich, services offered both by public operators (MVG, Deutsche Bahn) as well as private ones (Jump, Donkey Republic).

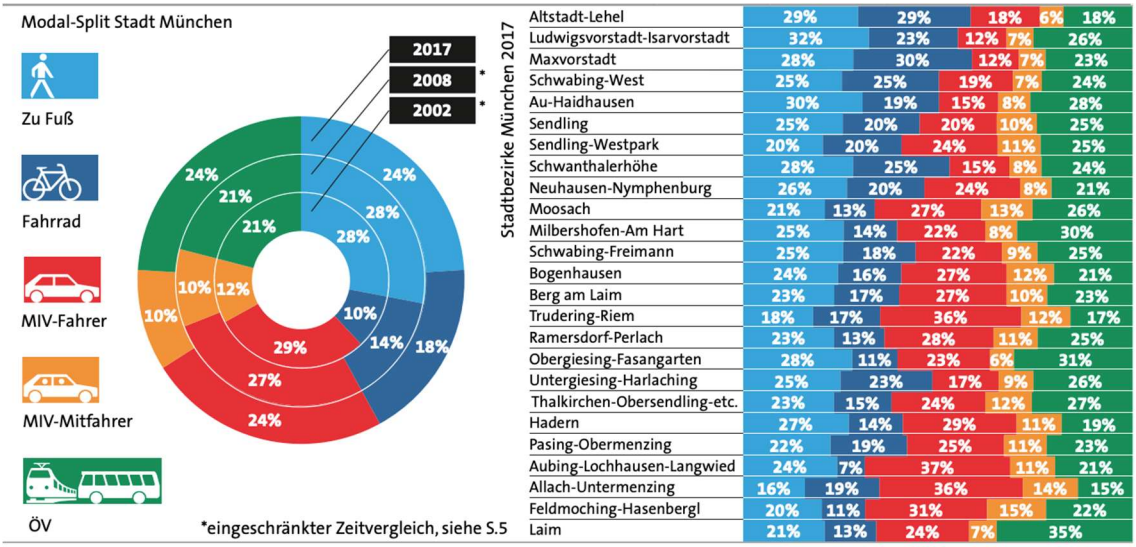


*Figure 3.2 - Modal split in Munich according to https://www.muenchen-transparent.de/dokumente/5499206/datei*

### 3.1.3. **Taxation on Car Ownership**

The private ownership of cars for traffic on public roads complies with the motor vehicle tax obligation (Kraftfahrzeugsteuergesetz) in Germany. The tax rates vary depending on the vehicle type and generally payable one year in advance. For cars with a first registration date until 30 June 2009, the following parameters are decisive in addition to the first registration date: engine type (petrol, diesel, wankel engine), engine displacement (in cc), and emission (according to EURO Standard). The $CO_2$-oriented taxation is applied to cars with a first registration date from 1 July 2009. In this way, cars with low $CO_2$ emissions are taxed more favourably than cars with high $CO_2$ emissions. The annual tax is made up of a basic amount based on the engine displacement of the vehicle and a $CO_2$-oriented amount.

The tax is for cars with petrol and wankel engines:

- 2.00 euros basic amount per 100 cc displacement started plus.
- 2.00 Euro $CO_2$ dependent amount per g / km.

For the first time registration until 31 December 2011, 120 g / km of the $CO_2$ value remain tax-free. For first registrations from 1 January 2012, this value is reduced to 110 g / km. With first registration from 1 January 2014 to 95 g / km.
The tax is for cars with a diesel engine:

- Basic amount of EUR 9.50 per 100 cc displacement started plus.
- 2.00 Euro $CO_2$ dependent amount per g / km.

The motor vehicle tax law provides for a temporary tax exemption for purely electric vehicles. After the tax-exempt period, pure electric vehicles are subject to weight-based taxation with the same rates used for passenger cars. However, tin support of the environment, the motor vehicle tax for electric vehicles calculated on the basis of these tax rates is reduced by 50 percent. A gradual tax rate is applied in the calculation of the annual tax for all cars, if the permissible total weight of the motor vehicle exceeds 2,000 kilograms (German customs agency).

#### 3.1.4. **Other Mobility Alternatives**

*Electrical scooters*: Next to the bike-sharing system and to complete them, shared electrical scooters are also available in Munich. There are currently 7 different providers active in Munich.

*Taxi and car-Hailing services:* Munich has several taxi operators available. Uber is also present in Munich. However, in Munich only professional drivers can operate as Uber drivers. There are also two on demand mobility providers, CleverShuttle and MVG IsarTiger. CleverShuttle is an eco-friendly ridepooling service that provides door to door services. MVG IsarTiger works in a similar way but belongs to the public transport operator MVG.

#### 3.1.5. **Multimodal Journey Planner App and App-Based Information**

Mobility offer in Munich is not only complete but – to a certain extent – also integrated. Next to its public transport offer, MVG also provides e-scooters (TIER), bike-sharing and ride-pooling (IsarTiger). These services are integrated within one APP (MVG More) that integrates regional railway (S-Bahn), underground (U-Bahn), tram-stops, bus-stops, e-scooters, bike-sharing (electric and conventional vehicles), car-sharing (ShareNow and Stattauto) and Taxi. The app also includes the location of the charging stations available in Munich. While quite impressive, some limitations still exist. First, the app mostly includes MVG services. Car-sharing services represents perhaps the only mobility service offered by a private operator. Second, probably due to the complexity of the system, only a few private operators are included in the platform. As a consequence, other private operators created similar apps on their own. The application developed by the car-rental (and car-sharing) operator Sixt, for example, includes car-sharing, car-rental, e-scooters, and Taxi within one single app. Similarly, the application from Uber is also available car-hailing, scooters, and bike sharing under one single app. Next to the diversity of journey planner and mobility applications, it is also important to stress that most of the services integrated within MVG More still require the

user to install and register to other platforms. For instance, in order to use ShareNow (car-sharing), users still need to install the proprietary application from ShareNow and to register to the service.

### 3.1.6. **Available Carsharing Services and Products being Offered**

Car-sharing is extremely popular in Munich and several operators exist. In this report, we report the seven most popular options. Car2Go, DriveNow, and SixtShare are free-floating car-sharing systems. Their characteristics are quite similar. The rental is based on the number of minutes and there is no registration fee. For longer durations – more than one hour – operators offer some discount. More information on the pricing policies is provided below. It should also be stressed that Car2Go and DriveNow merged and use a common platform called ShareNow. However, vehicles and prices are still different, as one is operated by Mercedes and the other one from BMW. Flinkster and Stattauto represent traditional, station-based services. Finally, Miles and Oply are located in the middle. While still station based, they provide more flexibility to the user, as registration is free. On the other hand, they are slightly more expensive than traditional station-based car-sharing services. Also, it should be noted that in February 2020 Oply went out of business. The reason the car-operator is still included within the list is that it was quite popular in Munich and users were very familiar with their business model. The service was offering the following types of cars: Ford Fiesta, Ford Focus, Maxda MX5 (sport car), Renault Traffic (transporter).

*Table 4 - Service Characteristics*

**Vehicles by operator 01/2020 (Source: Department of Public Order - KVR)**

| Operator name | Vehicles in total | E-vehicles | ICE vehicles |
|---|---|---|---|
| Car2Go (now ShareNow) | **441** | 0 | 441 |
| DriveNow (now ShareNow) | **837** | 217 | 620 |
| SixtShare | **1048** | 93 | 955 |
| Miles | **171** | 0 | 171 |
| Oply* | **123** | 0 | 123 |
| Flinkster (DB Rent) | Currently 81, from 01.11.2019 only **14** | 0 | 81, resp. 14 |
| Stattauto | **410** | 3 | 407 |
| Total | **3111** | 313 | 2798 |

### Coverage of different car-sharing services (12/2018)

| Operator name (plus additional coverage within walking distance) | Residents as per 31.12.2017 | Area in km² | % of residents reached | % in area covered |
|---|---|---|---|---|
| **City of Munich** | **1.560.531** | **310,7** | **-** | **-** |
| Business area Car2Go | 860.704 | 89,4 | 55% | 29% |
| Within 400 m linear distance to business area Car2Go | 152.675 | 29,6 | 10% | 10% |
| Business area DriveNow | 869.119 | 91,4 | 56% | 29% |
| Within 400 m linear distance to business area DriveNow | 152.124 | 33,5 | 10% | 11% |
| Business area Oply | 461.551 | 26,7 | 30% | 9% |
| Within 400 m linear distance to business area Oply | 679.724 | 33,6 | 15% | 11% |
| Business area Flinkster | 362.383 | 22,5 | 23% | 7% |
| Within 400 m linear distance to business area Flinkster | 118.423 | 16,2 | 8% | 5% |
| Stattauto with 400 m radius | 490.023 | 44,4 | 31% | 14% |
| Business areas of all 4 operators plus 400m radius for StattAuto (station-based provider) | 1.025.704 | 115,4 | 66% | 37% |
| **Business areas of all 5 operators incl 400 m linear walking distance** | **1.130.049** | **140,3** | **72%** | **45%** |

Note: The business area of Sixt Share covers around 80km² and largely corresponds to ShareNow. Oply has developed additional areas in 2019 but ceased operation in March 2020.
Database: business areas of operators as per end of 2018; own calculations by LHM based on own datasets

### Pricing

| Pricing | | | | | |
|---|---|---|---|---|---|
| **Operator name** | **Membership** | **Minute** | **Hour** | **Day** | **Km** |
| Car2Go (now ShareNow) | | 0.19-0.31 €/min | 13-18 € x 2/hours | 49-79 €/day | 0.19 €/Km after 200 km |
| DriveNow (now ShareNow) | | 0.31 €/min | 16-18 € x 2/hours | 59-69 €/day | 0.19 €/Km after 200 km |
| SixtShare | | 0.21-0.23 €/min | | 76-98 €/day | |
| Miles | | | 35 € x 6h | 59 € | 0,89 €/Km |
| Oply* (Examotive) | | | 6-9 €/Hour | 35-45 €/Hour | 0,25 €/Km after 200 km |
| Flinkster (DB Rent) | 9 € | | 1,5-1,90 €/min | 33-48 €/day | 0,25 €/Km |
| Stattauto** | 40 € + 500 € Deposit | | 2,30-4 €/Hour | 23-40 €/day | 0,18-0,39 €/Km after 100 km |

* Terminated

** Also offers for weekend (46-80 €/we) and week (115-200 €/week).

## 3.2. Data collection and Methodology

To recruit participants, the opportunistic sampling procedure described in Section 2 was followed. In this subsection, we provide some details on how this methodology has been implemented in Munich, with a specific focus on the sampling and the interviewing process. In 2019, the municipality of Munich conducted a household survey on mobility-related issues with over 3000 participants. After the survey, a large number of participants indicated that they were willing to participate in further studies on mobility. The research team has thus contacted 150 potential candidates and asked them to complete a simple questionnaire about their age, gender, education, income level, and experience with car-sharing services. A total of 17 participants were selected after this process.

The focus group in Munich was supposed to take place on March 16th in the facilities predisposed by the City of Munich, Department of Urban Planning and Building Regulations. Due to the COVID-19 crisis, the free state of Bavaria initiated a full-lockdown on March 13th, so all activities and public events, including the focus group, have been cancelled and put on hold.

As a consequence of this extreme scenario, the team decided to switch to an online environment. For the focus group, the video-conferencing platform Zoom was selected, as it showed to be intuitive and stable (in terms of connection), and it does not require to download and install external software. These characteristics are crucial to avoid jeopardizing the quality of the focus group, as it is important to remember that not all participants are used to having online meetings. For the interviews, Microsoft Skype was the adopted platform. The reason is that this platform is already very popular, and, like Zoom, it has a built-in function to record conversations. However, other platforms have been used upon request.

With these new settings, a second focus group was organized and successfully held on March 26th. From the initial number of candidates, only 7 agreed to perform the Focus Group online. The characteristics of the participants can be seen in Table 5. While the participants have differing characteristics, the sample is not meant to be representative of the entire population. However, it shows a certain diversity in terms of education and gender, as well as in terms of car-sharing usage. Among the limitations, we report the lack of respondents with an under-bachelor's degree and the fact that all respondents live in Munich center.

The Covid-19 crisis disrupted the interviews process. Similarly, all interviews were conducted, using online platforms, in approximately two weeks and concluded on April 10th.

*Table 5 - Focus Group - List of Characteristics*

| Characteristics | Group | Number of participants |
|---|---|---|
| Gender | Male | 4 |
| | Female | 3 |
| Education | Under bachelor | 0 |
| | Bachelor's degree | 3 |
| | Master's degree | 1 |
| | Above Master | 2 |
| | Other | 1 |
| Age | 18-29 | 1 |
| | 30-39 | 1 |
| | 40-49 | 1 |
| | 50-59 | 4 |
| | 60+ | 0 |
| Family status | Children yes | 3 |
| | Children no | 4 |
| Home location | In the center of a village | 0 |
| | In a subdivision of a village | 0 |
| | In the center of a small town | 0 |
| | In a subdivision of a small town | 0 |
| | In the center of a big city | 7 |
| | In a neighbourhood located between the center of a large city and its suburbs | 0 |
| | In the suburb of a big city | 0 |
| | Your home is isolated | 0 |
| What is your current employment status? | Employed full-time | 5 |
| | Employed part-time | 2 |
| | Unemployed | 0 |
| | Student | 0 |
| | Retired | 0 |
| | Unable to work | 0 |

A list of companies and entities that agreed to participate in the interview sessions is provided. The interviewees represent a good coverage of the relevant stakeholders, including operators, municipality, and NGO.

Interviews - List of participants:

**Interviews 1**
Name Stakeholder: *MVG*
Stakeholder Type: *Public Transport Operator*

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**Interviews 2**
Name Stakeholder: *Share Now*
Stakeholder Type: *Car sharing operator*
Contact Person: Not reported

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**Interviews 3**
Name Stakeholder: *Statt Auto*
Stakeholder Type: *Car sharing operator*

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**Interviews 4**
Name Stakeholder: *Sixt Share*
Stakeholder Type: *Car sharing operator*

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**Interviews 5**
Name Stakeholder: *Green City*
Stakeholder Type: *Non-profit organisation environmental organisations*

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**Interviews 6**
Name Stakeholder: *City of Munich*
Stakeholder Type: *Municipality*
Notes: Expert in Car Sharing

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**Interviews 7**
Name Stakeholder: *City of Munich*
Stakeholder Type: *Municipality*

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**Interviews 8**
Name Stakeholder: *Miles-mobility*
Stakeholder Type: *Car-sharing operator*

## 3.3. Analysis and contextualizing findings

As discussed in the context section, Munich represents a special case when it comes to mobility. Serving as world headquarters for the automaker BMW since 1973, Munich has a high car-ownership rate. At the same time, Share Now vehicles are well integrated into the urban landscape and represent a widely accepted alternative to taxi and car-hailing services. In Munich, for example, the Uber car-hailing company operates but it only uses professional drivers and it does not represent a common choice. This is also confirmed from some of the car-sharing operators participating in the study, who mentioned how car-sharing and car-

hailing are often competing in the same market: “Where ride-hailing is strong, car-sharing suffers”.

Munich hosts several car-sharing operators and offers a wide range of alternatives to the user. Despite this diversity, and despite demonstrations that car sharing is reducing car-ownership in Germany (Giesel and Nobis 2016; Buehler et al. 2017), this analysis shows how car-sharing in Munich still face challenges, as described by one user who reports how difficult is to find a vehicle during the weekend: “We actually need a car more in our free time, for weekends, also for holidays and it is getting more and more difficult to get a car (with a Car sharing operator)”.

The remaining of this section is thus divided into two. First, we present some findings from the focus groups, and then the major challenges that emerged from the interviews are presented. Once again, we should remind the reader that the purpose of this study is not simply to understand current usage and limitations of the car-sharing system but to understand which role incentives play into the car-sharing market and how they can change the current situation.

### 3.3.1. **Focus Groups - User needs**

As discussed in the methodology section, a short presentation has been shown before the beginning of the focus group to illustrate basic concepts such as “station-based car-sharing”, “free-floating car-sharing”, “flexible pricing” and other concepts the users might not be familiar with. Then, after the focus group, users were asked to rank a series of incentives on a scale from 1 to 5, with one the lowest score. This procedure has been conducted after the discussion, in order to avoid influencing the respondent's opinion. Results are shown in

Table 6 and Table 7. Each cell indicates how many respondents selected that specific answer.

From the table, it quickly emerges how users are prioritizing elements such as cost transparency (fix or clear price) and car availability, while options such as combining car-sharing and carpooling or car-sharing for business do not seem so relevant. While this "quantitative" analysis is not representative, it helps to provide an overview of the general feelings about car-sharing. In principle, almost all incentives are positively evaluated. However, car-sharing for business is perceived as secondary mostly because car-sharing needs to replace private cars first "(Car sharing vehicles) *are always very busy on weekends and during the week it is easier to get a car", "(*Reason not to use Car Sharing) *I would like to have a car available as quickly and comfortably as possible".*

*Table 6 - Rating of the incentives*

| Rating of the incentives | Not Important | Slightly Important | Moderate Important | Important | Very Important |
|---|---|---|---|---|---|
| Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling | 1 | 0 | 0 | 1 | 5 |
| Electric vehicles/environmentally friendly vehicles | 1 | 0 | 0 | 1 | 5 |
| Clear and consistent price regulation / Fixed prices | 0 | 0 | 1 | 2 | 4 |
| Dedicated parking lots | 0 | 0 | 1 | 2 | 4 |
| Monetary incentives from the city: Keep cost of the car-sharing low | 0 | 1 | 0 | 3 | 3 |
| Information for parking availability at the destination area beforehand | 0 | 0 | 1 | 5 | 1 |
| Third party validation about location data storage and usage to make sure that it is anonymized and stay private | 2 | 0 | 0 | 1 | 4 |
| Clear explanation about how location data is stored and handled | 1 | 1 | 0 | 2 | 3 |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) | 0 | 1 | 1 | 4 | 1 |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs | 0 | 1 | 1 | 4 | 1 |
| Mobility credits from car-sharing use: to be able to spend them for public transport modes | 0 | 0 | 3 | 3 | 1 |
| Coverage outside the cities for longer trips/ connectivity between big cities | 0 | 0 | 3 | 3 | 1 |
| Option to switch drivers | 0 | 0 | 3 | 2 | 2 |
| Guaranteed price beforehand for a given trip | 1 | 0 | 2 | 3 | 1 |
| Off-street parking close to Public Transport | 1 | 0 | 2 | 2 | 2 |
| Parking-related credits | 2 | 0 | 1 | 2 | 2 |
| Information about vehicle condition/cleanliness beforehand | 0 | 1 | 3 | 2 | 1 |
| Booking in advance (e.g. previous day) | 1 | 0 | 3 | 2 | 1 |
| Guaranteed availability | 0 | 1 | 3 | 1 | 2 |
| Reduced fares when car sharing combined with carpooling | 2 | 2 | 0 | 3 | 0 |
| Group packages/accounts (e.g. business packages, colleagues' packages, friend packages) | 1 | 2 | 1 | 3 | 0 |
| Promotional incentives: no registration /renewal fees/ first rides for free | 1 | 1 | 3 | 1 | 1 |
| Transit passes and membership; family packages | 2 | 0 | 3 | 0 | 2 |
| Work-related car sharing: Free car-sharing for business trips | 2 | 0 | 4 | 1 | 0 |
| High occupancy lanes/dedicated lanes | 2 | 1 | 3 | 0 | 1 |
| Availability of car-seats for kids | 4 | 0 | 1 | 1 | 1 |
| Additional in-car features included e.g. sound system | 1 | 3 | 2 | 1 | 0 |
| Credits that can be exchanged for goods: supermarkets discounts etc | 5 | 0 | 2 | 0 | 0 |
| Daily fees instead of hourly or distance-based fees | 3 | 2 | 2 | 0 | 0 |
| Option of choosing the same vehicle type/brand (consistency, security) | 5 | 0 | 2 | 0 | 0 |

*Table 7 - Ranking of the incentives*

| Rating of the incentives | Average Score |
|---|---|
| Clear and consistent price regulation / Fixed prices | 4.4 |
| Dedicated parking lots | 4.4 |
| Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling | 4.3 |
| Electric vehicles/environmentally friendly vehicles | 4.3 |
| Monetary incentives from the city: Keep cost of the car-sharing low | 4.1 |
| Information for parking availability at the destination area beforehand | 4.0 |
| Option to switch drivers | 3.9 |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) | 3.7 |
| Mobility credits from car-sharing use: to be able to spend them for public transport modes | 3.7 |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs | 3.7 |
| Coverage outside the cities for longer trips/ connectivity between big cities | 3.7 |
| Clear explanation about how location data is stored and handled | 3.7 |
| Third party validation about location data storage and usage to make sure that it is anonymized and stay private | 3.7 |
| Guaranteed availability | 3.6 |
| Off-street parking close to Public Transport | 3.6 |
| Guaranteed price beforehand for a given trip | 3.4 |
| Information about vehicle condition/cleanliness beforehand | 3.4 |
| Parking-related credits | 3.3 |
| Booking in advance (e.g. previous day) | 3.3 |
| Promotional incentives: no registration /renewal fees/ first rides for free | 3.0 |
| Transit passes and membership; family packages | 3.0 |
| Group packages/accounts (e.g. business packages, colleagues' packages, friend packages) | 2.9 |
| Work-related car sharing: Free car-sharing for business trips | 2.6 |
| Reduced fares when car sharing combined with carpooling | 2.6 |
| High occupancy lanes/dedicated lanes | 2.6 |
| Additional in-car features included e.g. sound system | 2.4 |
| Availability of car-seats for kids | 2.3 |
| Daily fees instead of hourly or distance-based fees | 1.9 |
| Credits that can be exchanged for goods: supermarkets discounts etc | 1.6 |
| Option of choosing the same vehicle type/brand (consistency, security) | 1.6 |

More generally, users summarized the following four main considerations when approaching car-sharing, which might be targeted by appropriate incentives:

1) The need to have easy access to the vehicle

2) The possibility to use car-sharing for spontaneous trips or specific needs

3) Access to a variety of vehicles, from family cars to small van

4) Car-sharing reduces the cost and the stress of having a car if you do not use it too much.

It is also important to stress that almost all respondents pointed out how the environmental aspects are an important factor for all those who select car sharing over private cars. However, the choice of using it or not over a car still depends on the quality of the service, number of kilometres, and in general on the cost. For instance, many users reported that they use car-sharing mostly on some convenient route, like going to the airport, while it might not be convenient for short trips during the weekend "*Well I agree. Visit the airport and hardware store. For trips in the mountains or a week's holiday. I find it much more practical and sometimes cheaper to rent a car with better cars at Budget or Avis"*.

Following these preliminary considerations, the analysis of the transcript highlighted eleven different topics that are relevant for Car-Sharing incentives:

**CS diversity:** Fleet diversity can be an important incentive to attract users. Participants reported that having access to different vehicles is associated with several positive factors, such as the possibility to try different vehicles or to get a vehicle that is more appropriate for performing specific activities.

- "*So I've basically already driven everything possible with them from the Audi A3 to a Tiguan to a Renault Zoe, so these electric vehicles",*
- *"We are here in Sendling and we are very lucky that* [operator name] *has a wide range of vehicles and I think it is really good that you can get a transporter when you need one"*

**CS availability:** The greatest form of incentive emerged is definitely car availability, in terms of availability in the neighbourhood, but also the reliability of the overall system. Often booking systems are unavailable, meaning that the user might not have a car when he needs it or - worse - the only car available might have a problem:

- "*The car is not there. Yes, I had the idea because I didn't see it. And then I get 20 minutes credit. I'm really happy about that, but then I'm on the train for about an hour".*

**CS Parking:** Parking pressure and population density help - in principle - car-sharing to succeed. However, it can also become a major problem if not properly supported. One respondent reported that parking is a major deterrent in some neighbourhoods, due the scarce availability combining with time pressure:

- *"That was always a big problem for us. We are with* [car operator] *for about 10 years now. There it was always so that one had to get the car first. Then you couldn't leave it anywhere in front of the door or you had to find a parking space to fix the child seat and those are all things"*
- "*Normally they don't have a designated area, so I have to find a parking space with my car as well*"

**CS Pricing:** Pricing schemes can encourage both long and short-term rentals, and give the operator a powerful weapon to fight car-ownership. Respondents pointed out that pricing is in fact the first criteria to use car-sharing or not. First, users face the economical decision based on how many kilometres they do travel every year. Another important aspect reported during the interviews is transparency. The possibility to easily calculate the actual cost plays an important role in doing this decision whether to use the service or not.

- *"We have looked at* [the total cost] […] *and we have in the year with everything we have had about 3000 euros of pure rental costs"*
- *"The combination of time price and kilometre price was always the case* [with this operator] *and that was relatively transparent."*

**CS car settings:** Car-settings have been described as the car-diversity evil twin. Even drivers who enjoy driving different vehicles agree that changing the settings of the car at each rental is quite unpleasant, especially for those with families.

- *"So far this works quite well. Until 1.5 years ago when I had a child. It is a little more effort to carry the child seat to a car-sharing car"*

**CS reservation:** Related to car availability, overnight parking and booking systems have also been positively evaluated as an incentive to increase availability and promote car-sharing.

- "*I had inquired at the [local authority] if one would like to have such a rental car standing somewhere overnight if one could get a parking space for residents but that is probably not possible because they are bound to the [private] car number*"

**Collaborative Car Sharing and real estate (Spontaneous concept):** During the focus group, it emerged that users would be in favour of peer-to-peer car-sharing services, where citizens can share their own private. Some of the respondent reported a positive experience – even better than private car-sharing – with these peer-to-peer services in other countries. Other participants commented that they would not feel safe in sharing their car, and there was a general agreement on the fact that real estate and tax–incentives could provide the kick to promote this type of services.

- *"I leave it for example at my workplace, then it is available for 8 hours and then another user puts it there again"*.
- *"You have a personal contact with the owner of the vehicle. […] So it was agreed beforehand how long we would have the vehicle, how much we would pay for it, that we would return the vehicle with the same tank level and that was exactly the scenario that you say you have a car from someone"*.
- *"But as a private user I would have a little bit of a stomachache if I were a private user and had to make my car available".*

**CS uncertainty related to liability:** While not described as a major concern, some users reported stress related to liability issues. However, for the majority of users, the main advantage of using car-sharing (or rental) is to avoid dealing with insurances and maintenance.

- *"With* [operator] *you first have to go around the car, see if there is any new damage, compare it with the board book, see if there is new damage, of course, you have to report if the car is dirty"*
- *"I am at the point today where I just don't feel like dealing with these things in detail"* [insurance].

**CS cleanness – CS stress – Quality of service:** Following the previous concern, many users showed to be very sensitive to the condition of the vehicle. One user described to us how this was the main reason to abandon car-sharing. Also, car sharing is often chosen for specific trips where it is convenient, such as travelling from and to the airport. However, these trips are associated to high time-pressure, and each problem with the vehicle can translate into a source of stress.

- *"We have this experience that vehicles were either not available at all or in questionable conditions. Even in the classic case from the airport to the city or from the city to the airport. And that actually led to the fact that we have cancelled the service and we no longer use it*"
- *" And now if you know the location in the airport in the parking deck you know that the internet is not really available there. That means that you are standing there now and then you run more or less through half of the airport until you have a network somewhere and a service hotline calls to confirm*".

**CS electric cars - car-sharing vs. bicycle - car-sharing vs. e-scooters (Environmental incentives):** When it comes to the environment, two incentives have been discussed. One, is to promote emission-free vehicles. The other - better discussed in the next paragraph – is the integration with active modes and shared services.

- "*So I use it* [car-sharing] *regularly but not weekly. And I'm a fan of it, too. I think it's just great. I have electric vehicles and also small what for me now not exactly talented parker is quite good*"
- *"I want to have a provider and use the possibilities that are given. Which offer themselves. Whether it is an E-scooter or a car or the OEPNV I don't care".*

**Integrated platforms:** Related to the previous point, integration of services has also been indicated as a main limitation of the current system. On the one hand, digital integration is still perceived as extremely futuristic from most of the users. On the other, almost all users – members and not – pointed out that this would be an important incentive to reduce car-ownership in the city.

- *"So I imagine it would be like Google maps and I see the different providers and I click on them and have an account in this superordinate system and they charge each other. That would then perhaps take up the problem. Probably I just talked out a great business idea, right?"*
- *"What it fails at are the payment hurdles and the organisational hurdles".* Users eagerly asked for integrated services and showed a strong willingness to adapt to it *"I think a big thing is always this organisation history. I need an app, I need an account, I need this, I need that. I think if you have it once, once you are inside, once you have wised yourself up, it will work."*
- *"Yes, I think that if I get a day ticket in Munich today I can go by bus, subway and tram. If one would increase the offer and say one sees now mobility as a whole and if I take a car or one of these e-scooters now if I have the possibility to use all this, it would give an enormous range also in the transferred sense that one"*

Based on these elements, the incentives presented in Table 6-7 should be re-organized based on the actual users' needs. For instance, the incentive *"Information about vehicle condition/cleanliness beforehand"* has been described as "moderately important". However, during the discussion, the user explained how vehicle condition can actually be one of the main reasons to leave the system for good. Similarly, *Tax-incentives* and *electric vehicles* have been classified among the most important form of incentives. However, during the discussion, users provided limited information on these incentives. While they admitted that

these incentives are important, the analysis suggests that these incentives are perceived as an added value on top of the Car-Sharing system. However, if vehicles are not accessible, properly maintained, or do not cover basic user needs, these incentives are likely to provide no significant effect. This is an element that should be considered when preparing the Survey, as stated preference experiments might show similar limitations.

### 3.3.2. **Interviews – Stakeholder needs**

With their experience with the car-sharing business, the respondents provided various insights into the main existing barriers for car-sharing and how incentives can help to mitigate these barriers. In this subsection, we present verbatim quotes (our translation of them, if they were in German) from the respondents. Several themes appeared that could be of high relevance when introducing incentives. When respondents referred to the topics (categories) that are relevant for Car-Sharing incentives as emerging from the focus groups (in all 3 cities), the topics appear in bold (e.g. **CS ownership**).

*Regulations and Incentives*

The effectiveness of the incentives depends entirely on the regulatory framework, the vision of the authorities, and the vision of the operator. Incentives can in fact also appear in the form of regulations, providing the proper condition to drive less, tackling legal barriers, or reducing the attractiveness of the car. Some respondents also stressed that incentives are an important tool that authorities can use to fulfilling their own mobility goals

- *"It does not matter if you are a car renting operator or a car sharing service itself or even a hotel that offers car to rent, legal barriers are the point. There are very different and very specific conditions and there is no overall legal system, and that makes it very complicated from their side" [JB-4].*
- *"*[car sharing] *is not sustainable commercially unless it is considered in a larger scheme [N-22]"*.
- *"It depends on the aim. It is the company's perspective. But do we want to make planning for citizens, planning for cities, nation-wide planning for sustainable development - what is the best for our users that they use less cars - then we need this integrated prospective [JB-17]"*.

The most important aspect is that, despite not always sharing the same objectives, operators and authorities agree on the fact that a highly regulated market can support car-sharing. In this quote, one operator describes how important it is to have a regulated, and even closed, market:

- *"Milan for example had a close market, you had to apply for it and nobody else could join the market. They did this every few years. Milan is a very progressive example, as they learned a lot over time, and it is one of the few cities that was dictating business area, driver, age, and policies [N-10]"*.

From the public authority point of view, two aspects emerged. First, that incentives should be used moderately and mostly to solve social issues and targeted goals.

- *"The challenge for the station-based car sharing is that you have offers for people that are really substituting the car [CH-3]".*

**CS ownership:** the second aspect emerging from the public authority point of view, is that car sharing – and more specifically station-based car sharing – is regarded as the most powerful instrument to fight car-ownership.

- "*The easiest* [solution] *is a bilateral agreement without incentives. But if there is a specific goal, such as equity, then you can put incentives but they need to be used moderately to get as much demand as possible* [CH-24]".

Incentives to integrate car sharing

Incentivizing integration is also an important aspect, as stressed by both public stakeholders and private operators:

- "*As a city, we try to integrate it* [car-sharing] *[...]. We implemented mobility hubs, where different mobility options are integrated*"
- "*We are interested in joining a common platform as we already collaborate quite closely with public authorities and public transport operators* [N-16]"

However, some of the respondents reported that several limitations exist, the biggest of which is the resistance of the public operator, which often sees car-sharing as a competitor.

- *"I see that bigger companies are not capable of doing integration* [MI-17]"
- "[Integration with public transport] *But often it is a bit slow* [N-17]".

A series of incentives have been discussed and reported as particularly successful to address this problem.

**CS integration:** the possibility to sell integrated tickets (public-transport and car-sharing), the possibility to integrate private services while excluding public operators to speed up the process, pricing strategies, creating mobility hubs, using digital marketing. Some examples are reported in the quotations below.

- "*It would make sense to build a subscription which is on Top of this aggregation platform from Public Transport* [MI-17]*"*
- "*We are acting also as a service provider ourselves* [as a private operator]*. We have car sharing, but our app also includes car rental, e-scooter, and taxi* [N-19]"
- *We avoid short trips. If you travel a 2km distance it is really expensive to go with us. There are so many other options for those trips, which are less harmful for the environment* [MI-13]"
- "*We implemented mobility hubs, where different mobility options are integrated. And this is not only Car-Sharing, but bike-sharing, electric vehicles, and they can be combined with public transport by creating a very rich transport node. But this integration should be also digital, which is even harder* [CH-5]"
- "*There are also many promotions and information is distributed to existing customers by email. In the app you can see messages about new options* [SB-10]"

Finally, still on the topic of the integration, the possibility to use mobility credits has also been evaluated positively, but it does require more integrated services. Also, carpooling and car-sharing integration has been described as impossible at the moment by nearly all the participants

- "*(Mobility credits) This is the entire MaaS idea. I believe in this idea. I do not think we can use mobility credits in the supermarket, probably, or outside the transport system. But because I think we are not there yet* [CH-32]*"*
- "*This is very difficult with car sharing, initially legally, because the driver does not have a license or does not have a taxi license* [SB-4]"

Direct and indirect incentives

Whether we are talking about existing services or about new ones, car-sharing has enormous initial costs, including fleet acquisition, management, and insurance costs.

- *"It is a fix cost model. Which means that there is a lot of cost in the beginning that you need to cover before covering it* (i.e. before the service becomes profitable)*. It is a chicken and egg problem, you are not attractive and you have no customer, but without customer you have not money"* [N-3]
- *"Depending on the city, the cost is between 5 to 15% of our cost* [N-10]*"*
- "W*e should have as many customers as the availability of our vehicles. Too many customers are not wanted* [SA-10]".

These difficulties can be harnessed by planning authorities to incentivize providers, helping business profitability in exchange for imposing conditions, such as covering areas of the city that are not profitable.

When it comes to users' incentives, respondents differentiated between two main forms of incentives that can be used to promote car-sharing. Direct incentives represent incentives that directly reduce the cost and/or improve the service. These include for example the parking cost. Indirect incentives are instead related to external factors, such as the availability of charging stations or integration between services.

**CS electric cars:** "*Electric cars have restrictions due to the charging infrastructure* [SB-1]" [Indirect]

**CS Integration:** another problem is integration with other services. Public stakeholders reported that, similarly to what already happens with public transport, direct incentives can also be a way to promote this integration. However, some private operators prefer to keep completely separate business models and they see this sort of direct incentives as unnecessary.

- *"If the public authority wants to have shared-mobility we also have to consider funds, and co-funds, and incentives. Same as for public transport [CH-20]"*
- *"Cannibalization between each mode is normal, it is important. Public transport is a backbone of the city, so we do not want to cannibalize it with price. Car Sharing should be between Public Transport and Taxi [N-30]"*.

**CS pricing, CS parking, Tax incentives:** Completing the picture, forms of direct and indirect incentives that are positively perceived from both sides include tax-incentives, parking incentives, and pricing schemes.

- *"Tax-incentives work very well for promoting electric vehicles and emission fee taxis* [CH-29]*"*
- *"Many public parking spaces for electric vehicles are currently being set aside, but are currently empty, and access technology is also important; there are more innovative ways to offer parking spaces in underground car parks* [*SA*-5]*"*
- *"The price varies between the vehicle models, from smart to 5-seater, but also depending on the city.*[SB-1]*"*

Marketing and communication strategies were also recurrent forms of incentives mentioned during all the interviews, as respondents reported that the public at a large is often not aware of the available services, and a large pool of unaware potential users exist.

- *"We have some cooperation like marketing cooperation, e.g. with Ikea if you come with [operator name] you get a hotdog free* [MI-32]*"*

Incentives to promote equity

According to both private and public stakeholders, incentives should be mostly used to address social issues and ensure equity.

- *"It is just based on cities, there are very rare offers in the countryside or rural areas, so you always need this critical mass to bring this system, like in the city* [JB-4]*"*
- "*Subsidies are needed for bringing the vehicles to the area where is not profitable. The problem is not the demand, but the fact that cars stay there after* [N-12]".

**CS coverage, CS pricing, CS parking and CS integration:** Incentives are thus needed to compensate for this imbalance, but pricing policies alone might not be sufficient, as one respondent explained to us. Next to pricing, positive incentives comprise parking policies – including different pricing schemes between different areas of the city, and mobility hubs/stations that integrate public transport.

- "*If it is a price problem, let's bring the price down as it is convenient for us. Still, people do not bring the car back in the morning. This means it is not a price problem, it is something else. Probably public transport works better in the morning* [N-14]"
- "*from city planning perspective, is on spatial regime so that trips in the inner city are more expensive because there is public transport and you don't need car, whereas, in a disperse built environment, lower price to make it more attractive vs private cars.*"
- "*I believe in privileged parking lots. But you also need to reduce access to private cars* [CH-25]"
- "*We try to come up with concepts that make sense in private or public spaces. Our concern is to implement mobility concepts sensibly within neighbourhoods* [MV-5]"

Other themes that have been covered by some of the respondents include:

User-centred approach:

A large number of respondents pointed out that new forms of incentives should adopt a user-centred approach and tailor-made incentives.

- *"The next step is the public sharing system in general and the user-centred prospective. For me as a user, I want to have the special offers for my special needs at this moment. This is the next step in the development* [JB-16]*"*

CS uncertainty related to liability:

Some of the respondents reported insurance problems related to user mishandling the vehicle.

- "*The insurance side is also a big topic. […] Because if you don't have the ownership of something, you treat the product in another way* [MI-6]

Free-floating vs Station based:

Despite station-based car-sharing being described as more effective in reducing car-ownership, some respondents reported how now most of the incentives are actually focusing on the free-floating market

- **"***Most of the incentives for free-floating car-sharing, and stationary car-sharing got less attention in terms of incentives* [JI-2]"

Finally, to conclude this section, the list of incentives discussed during the interviews is provided:

*Table 8 - Summary of incentives*

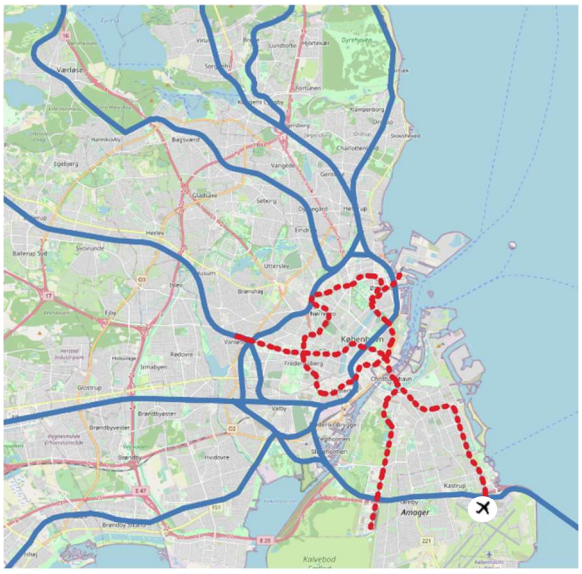
| POSITIVE INCENTIVES |
|---|
| Mobility stations and mobility hubs |
| MaaS-like services |
| User-centred mobility services |
| Transit passes and membership/ family packages / Integrated Services/ticketing |
| Marketing and communication strategies |
| Tax incentives (Electrification, zero-emission fleets, and environmental incentives) |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs |
| Guaranteed availability |
| Taxation of car ownership |
| Dedicated parking lots |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) |
| Close/regulated car-sharing market |
| Parking-related incentives |
| Car-free zones |
| Daily fees instead of hourly or distance-based fees |
| Electric vehicles/environmentally friendly vehicles |
| Time and economic incentives to match the demand and the supply, decrease the operational effort for car-sharing companies for redistribution of cars. |
| APP incentives (technology, reminders/notification) |
| Reservation/Advance booking systems |
| Incentives to homogenize the car-sharing service |
| Coverage outside the cities for longer trips/ connectivity between big cities |
| Women-only parking spaces |
| **NEGATIVE INCENTIVES** |
| Reduced fares when car sharing combined with carpooling |
| Tax-incentives (reduction of VAT) |
| Personalised incentives* |

Note:

* While personalised incentives have been overall positively evaluated, some respondents pointed out that personalization only works as an added value but that the overall business model should not only focus on personalised services "*There is a trend in personalization. You focus on one class of users, but users change all the time, depending if you get kids or move to another city. So we need to be careful about it [N-30]*".

# 4. Copenhagen

## 4.1. Context – Copenhagen Mobility Landscape




**POPULATION AND DENSITY**
(Statistics Denmark 2020)
**Copenhagen + Frederikisberg:**
Pop: 736,645 habitants
Area: 98.8 km$^2$
Density: 7,455.92 hab/km$^2$

**Copenhagen metropolitan area:**
Pop: 1,846,023 habitants
Area: 2,562.80 km$^2$
Density: 720.31 hab/km$^2$

*Figure 4.1 - Rail-based infrastructure in Copenhagen metropolitan region*

### 4.1.1. Public Transport

There are both buses and harbor buses in Copenhagen (CPH). It also has driverless metro trains that get you to the city center from the airport in just 20 minutes. The metropolitan area has long-distance and intercity-trains that can either be high-speed trains or regional trains. The metro only covers central CPH and has 4 lines with a total of 41 stations. The urban-suburban rail (S-train) serves the Greater Copenhagen and has 7 lines, 85 stations and an average distance between stations of 2.0 km, shorter in the city core. There is a train line that connects CPH to Sweden (Malmö). All public transport networks use a common system for fare zones and tickets at the national level.

### 4.1.2. Cycling

Cycling in CPH in many cases is the easiest and fastest way to get around: 49% of the population commute by bike to work or education in CPH and 63% of school kids in CPH bike or walk to school. This is the result of many years of political and administrational focus on improving the conditions for cycling in Copenhagen. A crucial element is the comprehensive network of dedicated bicycle infrastructure with separated tracks and safe intersection design (Københavns Kommune 2020). There are 382 kilometres of cycle tracks and the traffic lights are coordinated in favour of cyclists during rush hour (Visit Copenhagen 2020). It is possible to board the metro, train and harbor bus with bikes (you need a bike ticket, though, except for the S-trains).

### 4.1.3. Other Mobility Alternative

Shared bikes and e-bikes are available both in free-floating and station-based schemes in Copenhagen and in part of CPH metropolitan area costing 1-1.6 dkk/min; discount packages and monthly memberships are also available.

Shared electrical scooters are available in CPH costing 10dkk (starting fee) + 2-3.5dkk/min.

CPH metropolitan area has several taxi operators available: 29-39 dkk (starting fee) + 8.50-9 dkk/km + 6.25-7 dkk/min.

Uber does not operate in Denmark.

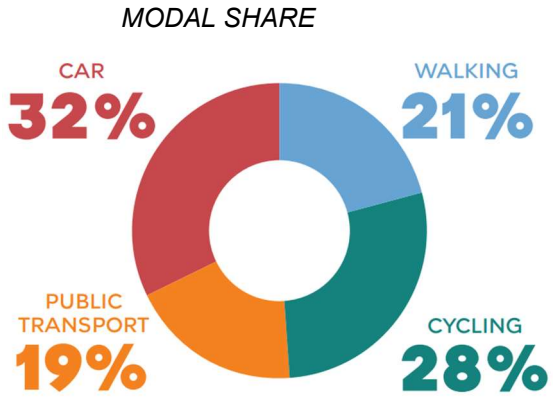



*Figure 4.2 - Modal share of Copenhagen (considering trips to, from and in Copenhagen in 2018)*
*Source: (City of Copenhagen, 2019)*

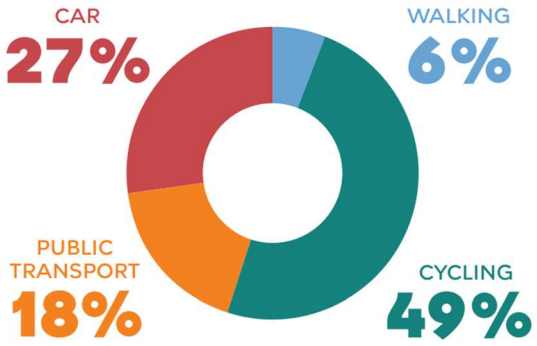



*Figure 4.3 - Modal share of Copenhagen (considering only trips to work and education in Copenhagen in 2018)*
*Source: (City of Copenhagen, 2019)*

Considering all trips regardless purpose, in 2018, Copenhagen's modal share reveals that 49% of all trips are made by soft modes (cycling or walking), 19% by public transport and 32% by car (City of Copenhagen, 2019). Observing only trips related to work or study, in 2018, 55% of these trips are made by soft modes, 18% by public transport and 27% by car (City of Copenhagen, 2019).

### 4.1.4. Taxation on Car Ownership

When you buy a car in Denmark, you need to pay registration tax, which is 85% of the taxable value (of the car) up to DKK 185,100 and 150% of the taxable value (of the car) for those above DKK 185,100. Until the 1st of January of 2016, electric cars were exempt from registration tax. After that by registering between 2016-2020, a person would pay 20% of the calculated vehicle registration tax. For 2021, a person pays 65% of the calculated vehicle registration tax, while in 2022, the amount to pay is 90% of the calculated vehicle registration tax, and from 2023, the amount is 100% of the calculated vehicle registration tax. Also, between 2016 and 2018, the registration tax of electrical vehicles had a further reduction of DKK 10,000 and between 2019 and 2020, this reduction was of DKK 40,000 (Skat - Danish Customs and Tax Administration 2020).

#### 4.1.5. Parking

Electric cars, hydrogen cars, and electric motorcycles can park for free at street level on public parking spaces. Parking fine = 750 dkk (~100 €).

#### 4.1.6. Multimodal Journey Planner App and Car-Sharing Information

In 2018, MinRejseplan app (My travel planner app), the Danish multimodal journey planner app, started to include information about travel with all modes of public transport, combined with the private (e.g. car-sharing, bike sharing) transport services for the residents of North Denmark Region (Hvid, Sørensen, and Rasmussen 2018). This integrated information was made available in the Copenhagen region in 2019.

#### 4.1.7. Available Carsharing Services and Products being Offered

The first organized car-sharing scheme in Denmark was established in 1997 in Odense. The year after, in 1998, Hertz car rental offered a car-sharing scheme in Copenhagen at the request of the City of Copenhagen (Københavns Kommune). Subsequently, many car-sharing schemes have been established, typically in association form. Free-floating Car-sharing (CS) was introduced in Copenhagen in September of 2014 (Car2go), followed by DriveNow (current ShareNow) in September of 2015 and by Green Mobility in January of 2016. Car2go has withdrawn from Denmark in 2016 (Københavns Kommune 2017). Selected car-sharing services available in Copenhagen metropolitan region are presented in Table 9 to give an overview of the current car-sharing system. As for dedicated parking spaces for car-sharing cars, currently, there are 192 parking spaces reserved for station-based car-sharing cars, 7% of those being destined to electric cars.

*Table 9 - Car sharing services available in CPH and its metropolitan area*

| | Information on fleet | Where they operate | | Products offered | | | Pricing | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CPH | Metropolitan region | Car sharing | Ride sharing | Rental/ Leasing | Membership | Minute | Hour | Day | Km |
| **Multinational car-sharing providers** | | | | | | | | | | | |
| **ShareNow/DriveNow (Free-floating)** | Electric and petrol cars | X | X | X | | | 90 dkk (credits for use) | 2 – 4 DKK/min | 300dkk /3h 400dkk /6h | 500dkk /day | |
| **GoMore (Peer-to-peer)** | Petrol, diesel, hybrid and electric | X | X | | X | X (daily, monthly or yearly) | | | | 195-3500 dkk /day | |
| **Green Mobility (Free-floating)** | 400 cars (Electric) | X | X | X | | | Free | 2 – 4 DKK/min | | 595dkk/ day | |

* Payment is a combination of hours and km.

*Table 10 - Car sharing services available in CPH and its metropolitan area - cont*

| | Information on fleet | Where they operate | | Products offered | | | Pricing | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CPH | Metropolitan region | Car sharing | Ride sharing | Rental/ Leasing | Membership | Minute | Hour | Day | Km |
| **Local car-sharing organisations** | | | | | | | | | | | |
| **LetsGo (Station-based)*** | 250 cars (Electric and petrol) | X | | X | | | 950dkk + 50, 270 or 490 dkk/mo | | 0-29.00 dkk | | 2.65 – 2.85 dkk (1st 100 km) then 1.35-2.85 dkk |
| **Albertslund Delebil (Station-based)*** | Petrol cars | | X | X | | | 1000dkk + 130 dkk/mo | | 15.00 dkk | | 2.15 – 2.90 dkk (1st 100 km) then 1.90-2.65 dkk |
| **Islandsbrygge Delebil (Station-based)* - around 30 members** | 4 cars | X | | X | | | 2500dkk + 200 dkk/mo | | 18.00 dkk | | 3.25 – 4.00 dkk/km |
| **Lyngby Delebiler (Station-based)* - around 70 members** | 17 cars (Petrol and diesel) | | X | X | | | 2000dkk + 200 dkk/mo | | 12.00 dkk | 228.00 dkk | 1.20 – 2.50 dkk/km |
| **Køge Delebiler (Station-based)* (Partnership with LetsGo)** | 5 cars (Petrol and hybrid cars) | | X | X | | | 1000dkk +120dkk/mo | | 20.00 dkk | 250.00 dkk | 2dkk/km |

* Payment is a combination of hours and km.

## 4.2. Data collection and Methodology

In Copenhagen, two focus groups and seven interviews were conducted between the 27th of February and the 26th of March of 2020. While the first focus group and the first two interviews were conducted face-to-face, the second focus group and the last five interviews were performed online because of the lockdown imposed in Copenhagen from the 12th of March due to the COVID-19. A brief summary of how they were conducted and the adaptations with respect to the main guidelines are presented below.

### 4.2.1. **Focus group**

The first focus group happened at DTU on the 27th of February for a duration of around 2 hours. We recruited the 5 participants internally at DTU's Transport Division. Only audio was recorded on this occasion. The second focus group was conducted using WebEx on the 12th of March for a duration of around 2 hours. The use of WebEx online platform facilitated the recording of image and audio, which allowed us to easily identify the speakers during the data processing and analysis. To recruit participants for the second focus group, we have sent emails to several companies in Copenhagen metropolitan area asking them to share our invitation with their employees, and we also have published the invitation in social media groups related to car clubs and associations. Moreover, we have sent invitations through DTU email groups and advertised the focus group on DTU's inside platform.

Overall, both focus groups had the following flow:


*Figure 4.4 - Flow of the focus groups activities*

Both focus groups were moderated and assisted by the same three researchers. Initially, we have presented introductory slides about the project, which also included the definition of concepts that were relevant to the discussion (e.g. definition of CS, differences between station-based vs. free-floating CS services, car-sharing vs. carpooling). We also clarified on data confidentiality and anonymization. In the second focus group (online) the slides were presented through shared screen functionality.

Then, we asked participants to fill the consent form and background questionnaire (paper sheet for the face-to-face focus group and Google form for the online focus group - link sent via WebEx chat). After that, participants were invited to present themselves and the discussion (as well as the recording) started. Having the methodology presented in section 2 and the semi-structured script showed in the Appendix as a guideline, only the questions related to high occupancy vehicle lanes were excluded from both focus groups discussion, because they are not applicable to the Danish context.

By the end of the discussion, we asked participants to rate a list of incentives, that comprised the incentives that were compiled in the literature review, that based the experiment, as well as incentives that arose during the discussion. For the rating, we have used a 5-point Likert-scale from “Not important” to “Very important”. For the face-to-face focus group, a paper-based list was presented, while for the online focus group a link to a google form was sent via WebEx chat.
Comparing both focus groups, we highlight that it was more challenging to keep participants’ attention in the online environment and it required an extra effort compared to the face-to-face FG.

*Table 11 - Respondents’ characteristics CPH*

| Characteristics | Group | Number of participants |
|---|---|---|
| Gender | Male | 11 |
| | Female | 4 |
| Education | Under bachelor | 2 |
| | Bachelor's degree | 1 |
| | Master's degree | 9 |
| | Above Master | 3 |
| | Other | - |
| Age | 18-29 | 5 |
| | 30-39 | 6 |
| | 40-49 | 3 |
| | 50-59 | 1 |
| | 60+ | 0 |
| Family status | Children yes | 5 |
| | Children no | 10 |
| Home location | In the center of a village | 1 |
| | In a subdivision of a village | 0 |
| | In the center of a small town | 1 |
| | In a subdivision of a small town | 0 |
| | In the center of a big city | 4 |
| | In a neighbourhood located between the center of a large city and its suburbs | 5 |
| | In the suburb of a big city | 4 |
| | Your home is isolated | 0 |
| What is your current employment status? | Employed full-time | 11 |
| | Employed part-time | 1 |
| | Unemployed | 1 |
| | Student | 2 |
| | Retired | 0 |
| | Unable to work | 0 |
| Car Sharing user type | User | 11 |
| | Potential User | 4 |

Table 11 presents the characteristics of respondents from both focus groups combined. Women and the elderly are underrepresented in our sample, which was a partial consequence of the short notice that the change from face-to-face to online environment had on the second focus group, i.e. last-minute cancellations happened. Most of the respondents use CS system rarely, but only 4 have never used it.

#### 4.2.2. **Interviews**

The seven interviews were conducted between the 9th and 26th of March. In total, 13 relevant stakeholders were contacted and invited to be interviewed, ranging from service providers, governmental institutions, to public transport providers. Of these, 7 agreed to be interviewed (see Table 12) for more information on the stakeholders interviewed).

*Table 12 - Stakeholders interviewed in CPH*

| Stakeholder's name | Stakeholder Type | Date of the interview |
|---|---|---|
| Passenger Pulsen | Consumer Council | 9th March |
| Region Hovedstaden - Mobility and education unit | Greater CPH authority | 10th March |
| GoMore | CS company | 12th March |
| DSB | Public transport operator (rail) | 17th March |
| Drive Now | CS company | 19th March |
| Gate 21 | Green Association | 19th March |
| Lets go | CS company | 26th March |

As already mentioned, the first two interviews were conducted face-to-face, while the last five interviews were performed online because of the lockdown imposed in Copenhagen due to the COVID-19. While services providers clarified on business operations, consumer's preferences and viability of incentives, public transport providers expanded on issues and potentials for integration between CS solutions and public transport. Adding to that, governmental institutions elucidated on past experiences related to CS problems and solutions for cities, as well as current

and future policies implemented in the CPH area. The interviewees held high level positions in their organisations, such as head of analysis, managers and business developers.
Each stakeholder was interviewed individually, and the interviews took between 1h and 1h30, according to the interviewee's availability. All the interviews had the same lead interviewer and one assistant that took notes during the interview and intervened when further clarification was needed for some topics.
The two face-to-face interviews occurred at the workplace of interviewees and the interviews performed online were done via Skype, Google hangouts, and WebEx, according to interviewees' preferences. From all the interviews, only audio was recorded, despite all online interviews being performed with audio and video.

Overall, all interviews had the following flow:


*Figure 4.5 - Flow of the interviews*

Initially, we have presented the project in more detail and clarified on data confidentiality and anonymization. Then, we asked the interviewee to fill the consent form and a background questionnaire (paper sheet for the face-to-face interviews and Google form for online interviews). After that, we started the interview by asking the interviewee about their role in the CS system context (started recording). Having the document A2002 as a guideline, the content of each interview was adapted according to the stakeholder, i.e. non-applicable questions were removed, for example, governmental authorities were not asked about specific features of CS services (CS fleet diversity, car additional settings).

## 4.3. Analysis and contextualizing findings

The analysis of the stakeholders' needs and the list of potential incentives for the city of Copenhagen is presented in this section. The chapter is divided into two subsections, the first one presenting analysis and results from the focus group while the second one showing a detailed description of the main themes that emerged during the interviewing process. In the quotes, the number refers to the quote number and not to the respondent ID, as this is kept anonymous.

### 4.3.1. **Focus Groups – Users' needs**

The analysis of the transcripts revealed that respondents evaluated incentives for car-sharing (CS) according to ten main categories. Each of these categories is described here, and quotations are provided to illustrate how these themes are correlated.

**Car-ownership:** A frequently recurring theme in the discussion on incentives for CS was related to car ownership versus CS usage. One user reported that for specific trips, such as traveling to

the airport, car-sharing is simply more convenient "*I think that for a lot of people, who live in cities, isn't so cost-effective to own a car […] other conditions are to go and pick someone at the station or in the airport… so that is always when I think I would use car-sharing, because of the convenience of having a car available when needed* [2]".

On the other hand, non-users of CS reported that unfamiliarity with the different cars available in the CS services is a source of stress and the main reason for not considering CS: *"One thing for me is the convenience of owning a car instead of [using] CS, because it is my car, I know where it is parked […]. There is a lot of unknowns for me. The same thing for the driving itself, I mean, I have driven my car for many years, I know how it behaves, I know exactly how it drives… jumping around from car to car, I think that it would put me off a little bit… I know where my car fits, I know where it doesn't, I know how it behaves* [10]*"*. This comment also includes some interesting insights about safety and availability, which will be discussed in a separate paragraph.

Focusing on the car-ownership issue, several users highlighted the problem of car-sharing in the countryside, as CS cars availability is limited or non-existent there: "*If you live out in the countryside, I don't think that the concept of CS would work there, just because you are so spaced out from everything* [11]". Also, some respondents that are car owners reported convenience issues in areas where car-sharing exists and works, which seems to be a barrier for modal shift. One participant said "*for me to adopt that model, it would need to offer convenience that is bigger than what I have at the moment as a car owner. Of course, the price is also very important, but I think that for me the convenience is definitely a key point for the CS mode [22]"*, and other participant stated that "*If there were more stations, hubs or whatever, I would use it more… we are 2 people using a car and sometimes, I don't have a car, because my husband has it. So, this is a problem [distance to CS hotspot station of free-floating service], that I have to take the bus or I have to walk a long way, which will cost me time in order to go and get a CS [32]".* While the former reported that CS services have to offer availability and accessibility levels similar to car ownership in order to be as convenient as it, the latter informs about CS usage to replace the need of a second car in the household and argue that accessibility is a main issue for CS usage.

Another aspect that have been reported by a user with children relates to the specific needs that are characteristic of children and are easier to address by having a private car than by using CS cars: "*If you have small kids, you have to always put and remove the chairs [child seats] and all that stuff, not to mention the mess that they make and you prefer that they mess in your own car than in someone else's car* [6]".

**CS diversity:** Another topic that has been widely discussed is the diversity of the car-sharing fleet. The respondents pointed out that fleet diversity is a main incentive for car-sharing. All users that enjoy driving, including car owners, reported that they do enjoy driving different vehicles and this is a possible incentive for using car-sharing instead of their own vehicle. One respondent said "*I like driving. Of course, people who like driving tend to want car ownership… but there is a cool thing about CS, which is you get to try different cars* [12]" and other participant stated that *"I don't get to drive a fun car, I drive a really boring car, so it is much more fun to drive different cars and try EVs, for example. So that is the reason primarily why I use [car-sharing] [17]".*

Another advantage of fleet diversity is the possibility to accommodate different user needs. For instance, one respondent reported that he/she can only drive automatic cars and that having automatic vehicles in the fleet is a major element for choosing car-sharing "*Type of car, for me, does actually matter, because growing up in Canada, I only learnt how to drive automatic cars, so I can't drive a lot of cars in Denmark, so it has been quite nice that a lot of CS cars are electric, which means that they are automatic, which makes it easier for me to drive* [37]". Another participant said that "*For me, having a diverse range of cars is definitely a plus. Because sometimes you go to IKEA and you end up buying something very big, so you need to make sure that you have the boot space for that [34]"*, which highlights that by offering different car sizes, the CS services can broader the situations where CS usage is a good fit.

However, some users also reported that car diversity is a secondary aspect. One participant said "*For me, it doesn't matter actually [having different types of cars available]. I think in most of the cars there can be 4-5 persons… I never used for like buying stuff or carrying big things… so for me it doesn't matter that much [36]*". Also, one participant commented on the negative aspect of car diversity, that is related to how vehicle settings can change dramatically from one vehicle to the other, creating discomfort, and even dangerous situations: "*The other day, I was driving a* [CS company name] *car and I was going to the airport.* […] *I was getting late, I just got the closest car… the problem was that I was with a very hot jacket, I did not have the time to sit down and take it off… I was driving and the heating of the seat was in maximum and it was a nightmare for me. I was starting to burn… and with frustration also, because I was trying to get where it was the button. Of course, I finally found the button after had parked and it was next to my foot or something like that. It is the other side of trying different cars* [13]".

**CS availability:** For meeting the demand for CS cars availability at high demand areas, users reported to like the idea of using pricing scheme to balance this problem "*Any kind of discounts that you can get… if somehow you get a discount if you take a car from a less popular area to a more popular area… if there is a problem that many cars are there [less popular areas] for too long* [49]". In general, connecting car-availability and pricing was perceived as a good incentive from many users, specifically due to the fact that users reported that accessibility is a major problem when approaching car-sharing services *"I have a hot spot on the station, so I need to walk, and either to the station or to the hot spot is more or less the same, there is a lot of times where there is no availability of cars there… I would also access a train [and] I can perfectly know when the train is coming and I can plan towards it, then, it's [car-sharing] for me is not beneficial [6-p]"*.

**Tax incentives:** During the focus group, there was a heated discussion about tax incentives. Two users reported that, while tax-incentives sound very promising from the perspective of the user, these incentives probably should not be deployed as they would penalize public transportation and not be a good use of tax payers' money: "*I would find odd if there was government money spent on subsidizing private companies in the transport sector, while it is fairly expensive to use public transport. We as citizens do not own [CS companies names], so if our tax money is going to be spent helping these companies to flourish, I don't think that is a good idea.* [39]".

**Parking:** Parking has been described as a major source of stress from nearly all respondents. Users described how difficult it is to find a parking spot in Copenhagen. However, the most important aspect in terms of incentives, is that users seemed not to perceive a real benefit when using car-sharing compared to private cars, reporting similar levels of discomfort when using a shared or a privately owned vehicle. "*I use CS a lot, when I have meeting in CPH (city center). The main reason for that is because public transport is 3 times slower… However, it is extremely difficult to park in CPH, [which is] another source of stress. If I have a meeting in CPH, I have to always have 15 minutes just to find the parking [place] and also to make sure that the place where I left the car have no risk of get a parking ticket* [7]". Considering that users need to pay the vehicle for the entire rental period as well as worry about the parking ticket, this comment shows how parking availability is a major limitation in Copenhagen. Dedicated parking spots are an important incentive to avoid this phenomenon. However, users stressed that in Copenhagen there are only limited parking spots at the moment "*There are some, but not many… in Copenhagen, if we are competing with the normal cars, then certain times is very complicated* [45]".

**CS uncertainty, liability, and safety:** During the focus group, users reported several concerns about safety and liability issues. Some users reported that, as the price of the trip depends on the rental period, they try to drive as fast as they can, sometimes triggering dangerous situations "*you don't pay per kilometre, but per minute, so sometimes to save money I just drive as fast as I can to save money, which is very irresponsible, but I know a lot of young people actually do it, which is dangerous and something that should change* [8]". Some users reported also discomfort related to the uncertainty of the conditions of the car as well as liability "*I don't trust that much sensors. Sometimes I can feel that the car is safe… But there is always a little bit of uncertainty about whether the basic things, like pressure [of tires], brakes, level of oil and circuits are taken care of... That is the part where I do not feel safe sometimes* [16]". However, it emerged that not taking care of the insurance as well as the maintenance is one of the positive aspect of dealing with car-sharing "*[but by using car-sharing you have a car] without the problems… that was the nightmare that I have with my previous car [owned]… maintenance, insurance… I feel like it [car-sharing] as my own car right now* [4]".

**Privacy:** Some of the respondents reported discomfort with the current data protection settings. Specifically, one user reported how data ownership should be more transparent, given the large amount of data collected by the operator "*This for me it is an issue, it is a matter of principle… I worry about the ownership of my data* [23]". Other users reported that providing more information on data privacy is probably not a good strategy, as the general tendency is not to read all the information in detail. One user pointed out that having a third-party validation would be a good incentive to make users feel safer "*From the moment I am using, I am agreeing to share this with that company. But I want to make sure that only the company [I agreed with] uses it [the data] for wherever I have consent. Your location can be a really sensitive issue. […] I want to see some sort of third-part validation* [25]".

**Integrated platforms:** Integrated mobility services have the potential to significantly improve the performance of the system. Users reported that integrating car-sharing pricing with other mobility

services would allow a better user experience *"It would be great if you can agree to MaaS [package] and pay one ticket for all. But right now, unfortunately, you need to keep both* [27]*"*.

**Carpooling:** Another user stressed how integrating a carpooling service within the car-sharing platform would also provide benefits in terms of cost and environment "*I think it is a good idea [car-pooling and CS], it could be an incentive for a lot of people. It could be nice to have more people in the car, it could be quite good for a lot of people that are very environmentally conscious* [29]". However, integration of these two services was not positively perceived by all participants, as this would compromise the flexibility of the car-sharing system or make people uncomfortable by sharing the car with strangers: *"I don't think that I would be so happy if I was planning to take a CS to go from one place to another, just one time on a Sunday evening and some guy also want to go in the same direction. I doubt that I probably picked that guy up, I just think that it would seem a bit odd. But if I was going to work or up to [place of study], then I would definitely do it [*28*]".*

**CS Pricing:** Users reported that they use car-sharing mostly because it is cheaper and, in some cases, more convenient than driving a private car. Even car-owners described car-sharing as more convenient for specific situations than private car: "*Although we have our car, usually, I take car-sharing with my husband when we travel together and we have a lot of luggage and we want to go to the airport. It is very convenient and I think that is the fastest and cheapest way to do that [3]*". However, for some, the price is still too high at the moment. One user stressed how price uncertainty can create a significant amount of stress as unpredictable issues can dramatically change the trip cost: "*[An incentive for me to use more CS would be] having certainty of price. Because… sometimes you just jump into an event or something that you didn't forecast… an accident on the highway, and suddenly what you planned is no longer valid* [18]". It is worth mentioning that, as discussed (in the topic CS uncertainty, liability, and safety), the payment per minute is a source of stress and triggers unsafe behaviour.

Another user also reported that the actual price is too high to imagine using this service to replace his car "*I think that the price is too high per minute for the trips that I am doing and I am not even considering the hourly packages because I have my own car. [The price] has to be really low… to beat my own car, because it is low maintenance and I own it anyway.* [21]". In general, users stressed that a guaranteed price combined with mobility packages can attract more people to the car-sharing platform. One participant pointed out that car-sharing should provide better packages so that users can be always certain to pay the least amount and can better organize their mobility needs *"It is the same that someone said about the ski [packages] that you are always certain that you only going to pay the least amount of money, then it probably be better* [49]".

By the end of the focus group, users were asked to rank the existing list of incentives on a scale from 1 to 5, with 1 the lowest score (Not Important) and 5 the top score (Very Important). This helped us complementing the analysis of the user needs and preparing a list of incentives, ranked according to the users' needs. The list of incentives included the incentives identified during the literature review and was updated after each discussion with incentives that emerged. Note that some incentives were rated only for the participants of the focus group 2, because they emerged during that discussion.

*Table 13 - Rating of the incentives*

| | Focus group 1 | | | | | Focus group 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Not important | Slightly important | Moderately important | Important | Very important | Not important | Slightly important | Moderately important | Important | Very important |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) | 4 | 1 | | | | | 1 | 4 | 3 | 1 |
| Clear and consistent price regulation / Fixed prices | | 2 | 2 | | 1 | | | 1 | 5 | 3 |
| Guaranteed price beforehand for a given trip | | | | | | | | 3 | 1 | 5 |
| Monetary incentives from the city: Keep cost of the car-sharing low | | 1 | 1 | | 3 | 2 | | 1 | 2 | 4 |
| Promotional incentives: no registration /renewal fees/ first rides for free | | 1 | 1 | 2 | 1 | | 2 | 3 | 4 | |
| Work-related car sharing: Free car-sharing for business trips | 1 | | 1 | 2 | 1 | | 2 | 2 | 4 | 1 |
| Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling. | 1 | | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 3 |
| Reduced fares when car sharing combined with carpooling | 1 | | 3 | 1 | | 2 | 2 | 1 | 3 | 1 |
| Transit passes and membership; family packages | 1 | 2 | 1 | | 1 | 2 | | 3 | 4 | |
| Group packages/accounts (e.g. business packages, colleagues packages, friend packages) | | | | | | 1 | 1 | 4 | 2 | 1 |
| Mobility credits from car-sharing use: to be able to spend them for public transport modes | 2 | 3 | | | | | | 2 | 5 | 2 |
| Credits that can be exchanged for goods: supermarkets discounts etc | 3 | 2 | | | | 6 | | | 1 | 2 |
| Parking-related credits | 2 | | 2 | | 1 | 2 | 3 | | 2 | 2 |
| Daily fees instead of hourly or distance-based fees | 2 | 1 | 1 | 1 | | 2 | 1 | 2 | 3 | 1 |
| Guaranteed availability | | | 1 | 2 | 2 | | | 1 | 4 | 4 |
| Dedicated parking lots | 1 | 1 | 1 | 1 | 1 | | 1 | 2 | 4 | 2 |
| Off-street parking close to Public Transport | 2 | 1 | | | 2 | 1 | | 4 | 3 | 1 |
| High occupancy lanes/dedicated lanes | 3 | | 2 | | | 1 | 4 | | 4 | |

Cont. Table 13 - Rating of the incentives

| | Focus group 1 | | | | | Focus group 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Not important | Slightly important | Moderately important | Important | Very important | Not important | Slightly important | Moderately important | Important | Very important |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs | 2 | 2 | | | 1 | 2 | 1 | 1 | 3 | 2 |
| Electric vehicles/environmentally friendly vehicles | 1 | | 2 | 2 | | | | 2 | 3 | 4 |
| Option of choosing the same vehicle type/brand (consistency, security) | 2 | 2 | | 1 | | 3 | 1 | 2 | 2 | 1 |
| Coverage outside the cities for longer trips/ connectivity between big cities | | 1 | | 2 | 2 | | 2 | 1 | 2 | 4 |
| Information about vehicle condition/cleanliness beforehand | 2 | 3 | | | | 2 | | 2 | 1 | 4 |
| Additional in-car features included e.g. soundsystem | 4 | 1 | | | | 4 | | 1 | 3 | 1 |
| Booking in advance (e.g. previous day) | 1 | | 3 | | 1 | | 4 | 2 | 1 | 2 |
| Information for parking availability at the destination area beforehand | 1 | 2 | 1 | | 1 | | 1 | 2 | 2 | 4 |
| Clear explanation about how location data is stored and handled | | | | | | 3 | 1 | 2 | 1 | 2 |
| Third party validation about location data storage and usage to make sure that it is anonymized and stay private | | | | | | 2 | 1 | 1 | 1 | 4 |
| Option to switch drivers | | | | | | 2 | | 1 | 4 | 2 |

*Table* 14 - *Ranking of the incentives*

| Rating of the incentives | Average Score |
|---|---|
| Guaranteed availability | 4.3 |
| Guaranteed price beforehand for a given trip | 4.2 |
| Monetary incentives from the city: Keep cost of the car-sharing low | 4.1 |
| Coverage outside the cities for longer trips/ connectivity between big cities | 3.9 |
| Clear and consistent price regulation / Fixed prices | 3.8 |
| Electric vehicles/environmentally friendly vehicles | 3.8 |
| Dedicated parking lots | 3.5 |
| Information for parking availability at the destination area beforehand | 3.5 |
| Promotional incentives: no registration /renewal fees/ first rides for free | 3.4 |
| Third party validation about location data storage and usage to make sure that it is anonymized and stay private | 3.4 |
| Work-related car sharing: Free car-sharing for business trips | 3.4 |
| Option to switch drivers | 3.4 |
| Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling | 3.2 |
| Booking in advance (e.g. previous day) | 3.1 |
| Group packages/accounts (e.g. business packages, colleagues' packages, friend packages) | 3.1 |
| Mobility credits from car-sharing use: to be able to spend them for public transport modes | 3.1 |
| Off-street parking close to Public Transport | 3.1 |
| Information about vehicle condition/cleanliness beforehand | 2.9 |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs | 2.9 |
| Reduced fares when car sharing combined with carpooling | 2.9 |
| Transit passes and membership; family packages | 2.9 |
| Clear explanation about how location data is stored and handled | 2.8 |
| Parking-related credits | 2.8 |
| Daily fees instead of hourly or distance-based fees | 2.7 |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) | 2.6 |
| High occupancy lanes/dedicated lanes | 2.4 |
| Option of choosing the same vehicle type/brand (consistency, security) | 2.4 |
| Additional in-car features included e.g. sound system | 2.1 |
| Credits that can be exchanged for goods: supermarkets discounts etc | 1.9 |

### 4.3.2. **Interviews – Stakeholder needs**

The analysis of the transcripts revealed that respondents focused on 6 main topics when discussing car-sharing incentives. In this sub-section, verbatim quotes from the respondents are presented. These quotes have been divided in order to reflect the themes emerged from the transcript analysis. When respondents referred to the topics (categories) that are relevant for Car-Sharing incentives as emerged from the focus groups (in all 3 cities), the topics appear in bold (e.g. **CS ownership**).

Regulations and Incentives

During the interview, it emerged that regulations play a central role in defining the effectiveness of different incentives. Respondents described a scattered reality where discussion between different operators – public or private – is intrinsically difficult *"The issue here is that we have so many authorities involved in this (Public Transport –Car-Sharing integration). We should make it (the benefits) clear to everybody, including the politicians* [A-70]*"*. One of the reasons, as explains another respondent, is that there are different political entities who are trying to achieve different goals at a regional level "*So they [politicians] want a green region. They want less pollution. They want less congestion, they want better health. They have ambitions and visions for the region as a whole* [B-1]". While this shows how the Danish government is interested in promoting important topics such as sustainability and public health, this complex scenario penalized the car-sharing system, which struggles in providing efficient and viable services. In this quote, one of the respondents shows how frustrating it was to contact the authorities when they started operating "*At the very beginning it was a barrier to start it out in terms of insurance and in terms of getting the permission to do it. Nobody knew who really to contact so we were contacting different authorities* [C-22]". The respondents also indicated a series of actions that have been taken – or can be deployed – to mitigate this problem. From the perspective of the authorities, one responded explained how Danish and Swedish authorities are collaborating to promote innovative mobility solutions in the region "*Another project […], includes both Danish and Swedish municipalities. One of the themes is multimodal stations, we want to make the stations more resilient and more future oriented… to support a more multimodal traveling.* [F-4]".

**Car-ownership:** one respondent stressed that as long as regulators do not increase the cost for car ownership, car-sharing is doomed to fail "*In Denmark compared to how rich people are in general it's not really such a big obstacle to buy a car. If it was more expensive to drive the car and park the car in the city then people would think more highly of maybe sharing their car [*C-35]".

**Collaborative CS and real estate:** from the point of view of the operator, companies say that the easiest way to organize a good service is to directly collaborate with big corporations and provide car-sharing for business.

**CS parking:** operators report that there is limited support from the government, which means a more expensive and less efficient (or equitable) service "*For example, we also find it very hard to make agreements about parking. If you see areas where our customers have problem parking.*

*Until now it's not been possible for us to find any agreement that would actually be room for our vehicles because we are seen as just more cars, it relates to the perception that we are not green* [E-11]".

**CS electric cars:** In contrast, the respondent explains that there is not enough infrastructure to use only electric vehicles "*Number of charging stations is a barrier in order to the complete transition to electric vehicles as well* [E-12]".

Incentives to integrate car-sharing:

Integration between different transport modes is often described as the panacea for urban mobility. However, integration is only possible if service providers agree to collaborate. In the case of Copenhagen, the analysis of the transcripts suggests that barriers still exist and that more incentives are needed to promote integration. One respondent stressed that as long as car-sharing is operating within the city borders, it is always going to compete with public transport "*CS is of course a competitor to PT, you can own your car, you can lease your car, you can share your car whatever, it's a competition. [Using CS to get from PT station to a business area] has a strong potential. It has been tested in Denmark that you have CS companies allowing you to either buy it as an integrated part of your ticket or whatever* [ A-14, A-16]".

**CS parking and CS integration with public transportation:** one incentive to avoid the problem just mentioned would be to create dedicated parking spots next to suburban public transport stations "*I think that it could be great that you have these cars services outside CPH at the stations so you could go the last mile with this car. That would be a good support of the public transport network* [F-12]".

**Integrated platforms:** Some respondents stressed that some private business already started this integration, developing applications where car-sharing, micromobility solutions, and even public transport are integrated "*We also see of course that many who use public transportation use our service combined and then of course, we also see bicycles. For the future development our biggest competitor is the private car.* […] *when you go in this map function, you can actually choose the* [operator name] *vehicle and then you'll be pushed to our app. So that's one incentive* [E-16, E-21]". However, one participant stated that the integration between CS and public transport can be complicated due to differences in the level of digitalization of services and, in this sense, CS companies should help in the solution for compatibilization: "*CS companies are very advanced with their apps and the digitization of their services. So I think [they could] use their abilities in that area in order to make… something that really works for customers* [D-17]*".* About the integration between car-pooling and car-sharing services, the vision varies depending on the respondent. For station-based car-sharing operators and for public transport operators this would make sense, while for free-floating this is a less appealing option as it reduces the flexibility of the system. "*We thought about it but it's not something that we do. It's not a really big thing we think. Often when you do this carpooling then you have to drive extra kms to pick up a person and*

*each km costs. So I don't know how a big incentive it is really but people are free to use it* [G41-42]".

**CS pricing:** On the other hand, loyalty programs and – more in general – MaaS like solutions are regarded as extremely promising. Respondents suggests that it become easier to work into the mindset of the costumer and easier to provide mobility solutions for everybody: "*So no we don't have a loyalty program yet. My professional opinion is that it could help us in some way to get more from each user. MaaS is something that we are quite committed to if such a solution or such a possibility should come up because this would be the strongest incentive to use us, because then you would know the final price from the beginning no surprises* [24-25]"

Direct and indirect incentives

Direct and indirect incentives can play a fundamental role. Specifically, in the case of Copenhagen, some respondents reported that small direct incentives would hardly promote any significant shift of the demand "*It (fare reduced incentives) should be (an interesting incentive). It needs to be a considerable discount, I don't think it will change a lot. If it's just a small discount or a little like if you can save 300 dkk or something and that's the only saving you have it will not make a change* [B-37]".

**Car-ownership:** On the other hand, several respondents highlighted that marketing and communication strategies could be an important asset, as many people are simply not familiar with the product "*I think that some people don't know about the [CS] system. You have to invite new users into the system to get it more used* [F-8]". Other interviewee said that: "*What I want to emphasize is that a lot of people don't know. Awareness is in general low* [A-62]".
Other respondents explained how different companies can cooperate in order to help each other having more visibility "*We have made a lot of agreements with these organisations. They promote us towards their members, and then they get a discount* [G-40]". Another incentive, as mentioned, is related to parking.

**CS parking:** as parking is a problem in Copenhagen, interviewees proposed that collaboration with urban planners and real-estate can be a promising incentive to promote car-sharing.

**CS diversity:** Fleet diversity has also been described as an important element, even if often people limit their choice to a few types of vehicles "*I think it's important to have different types of cars in the service for example we have the vans and some special cars. But I think that mainly people are just interested in having 2 choices small or big car* [G-84]".

**CS pricing:** Another important incentive is dynamic pricing. Car-Sharing operators find themselves in a very difficult position, as low prices translate in cannibalization of public transport while high fees lead to losing customers. Car-sharing operators should define appropriate prices, so that car-sharing becomes an alternative next to public transport, instead of a competitor. In this sense, the payment pricing per minute helps to not increase congestion: "*I think there it should be a stronger public transport and then it [CS] should be a second choice. Something that you*

*can do if the public transport is not running at these hours… in the peak hours we should not go by CS car, for example. The pricing in CS cars is really good, because is per minute, so if you go in the peak hour, you will stand still and it will cost you money, while sitting there still. So, we should have some incentives that shows when we want people to use the CS cars and when to not use them* [F-22]".

Incentives to promote equity:

Car-sharing operators reported that the main problem with equity in Copenhagen is the lack of support from the authorities.

**CS Availability and CS Pricing:** operators are not necessarily interested in covering all areas in Copenhagen, and incentives can help to avoid this differentiation "*We see not all areas obviously are good areas even in Copenhagen, so a price differentiation to hit better between demand and supply in certain areas is also a strong incentive* [E-21]". This is particularly important as, as pointed out from one of the respondents, car-sharing is not always profitable without incentives. This means that car-sharing without support from the authorities will hardly promote social equity "*So why we implemented our own system here is because these companies can't earn money outside Copenhagen* [B-15]". According to the transcripts, outside the city is where the car-sharing system suffers the most to profit.

Environmental incentives

Environment has also been described as an important topic. Almost all operators who participated reported similar comments on this topic. Despite describing how car-sharing reduces the number of cars in the city, so even conventional fuel cars in CS services could be better than private cars, the promotion of electric CS cars should be pursued. One respondent stressed that there are still too many cars in the city and by reducing their number we could recover urban space "*I live in the center of the city, the west part of the city, and I think there are too many cars in the streets and I'd rather see the streets being used for other purposes for example trees, playgrounds and so on* [G-7]".

**CS electric cars (Environmental incentives) and Parking:** In terms of incentives, they all mentioned mostly two solutions. First, to promote emission-free vehicles "*When you take a car, even if you take a CS car, you still pollute the same and even if you are one passenger in it, it is the same [as private cars]. So, the incentives should be other places, on road pricing and it doesn't matter what kind of car. Or it should be on fuel, so you support the electrical cars*[G-45]". Second, station-based car-sharing is more suited for environmentally friendly solutions, as it can more easily adapt to the infrastructure. As one responded stressed, electric vehicles should only be introduced when the system will be able to accommodate the needs of the users "*It's just very important to know that CS with a fixed parking spot can be the solution to introducing EV cars to people that live in the city but it shouldn't be a forced thing. It should happen when the technology is ready and when you can pay for the charging points as well. The cars need to able to meet the needs of the members so we are waiting a bit to introduce EV cars* [G93-37]".

The complexity of CS ecosystem

A recurring element emerging is that, in the current state, the car-sharing ecosystem is too complex. Incentives should be deployed to decreases its complexity. Even when users are aware of CS systems, many innovative services such as peer-to-peer car-sharing (where private citizens share their own vehicle) present a quite complicated interface "*One of the hard things when you operate a peer-to-peer (CS) it's something that people do secondary. They have a normal job and they just do this on the side. (In peer-to-peer CS) you have to update your own calendar, otherwise people request your car and it is not available*" [C-2,3]. To really achieve a good service, which is essential for integrated platforms, authorities and service provider need first to develop software that is suited for the scope. For instance, one respondent reported that there are technological barriers related to how difficult is to integrate different operators – and their needs – in a unique platform "*I started a dialogue with them and it took 8 years before they integrated* [service]*. These processes take too long. Now we have to import the software from Germany* [C-38]".

Finally, based on the analysis of the transcripts, a list of potential incentives has been prepared. Respondents also pointed out to some incentives that should not be considered. Please note that some similar incentives have been reported both as positive as negatives. In cases like that, quotations are provided to explain when not to use this incentive

*Table 15 - Incentives according to the stakeholders*

| POSITIVE INCENTIVES |
|---|
| Transit passes and membership/ family packages / Integrated Services/ticketing |
| MaaS-like services |
| Dedicated parking lots |
| Incentives to homogenize/integrate the car-sharing services |
| Coverage outside the cities for longer trips/ connectivity between big cities |
| Marketing and communication strategies |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs |
| Tax incentives (Electrification, zero-emission fleets, and environmental incentives) |
| Guaranteed availability |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) |
| Close/regulated car-sharing market |
| Car-free zones |
| Parking-related incentives |
| Daily packages to complement hourly or distance-based fees |
| Time and economic incentives to match the demand and the supply |
| APP incentives (technology, reminders/notification) |
| Coverage outside the cities for longer trips/ connectivity between big cities |
| Car Sharing for First/Last mile |
| Parking facilities close to public transport stops |
| Parking incentives for electric vehicles |
| Peer-to-peer Car-Sharing for business |
| **NEGATIVE INCENTIVES** |
| Reduced fares when car sharing combined with carpooling |
| Tax-incentives (reduction of VAT) |
| Daily packages* |
| Marketing (Car ownership cheaper than CS) |

**Notes:**

* Daily packages can push people to keep the car for a longer period, so it is recommended to make packages from 6 to 20 "*Before we had a discount for using the cars during the week, for example for business usage. But we took it away because it didn't really have any effect. Five years ago we stopped having 24 hours rental discount. We don't do that because instead we have a discount between 8 in the evenings to 6 in the mornings (free hours you only pay the km). This does not apply to the cheapest membership* [G75-78]"

# 5. Tel Aviv-Yafo

This section captures the research process and products in the city of Tel Aviv, and the context related to carsharing.

## 5.1. Context – Tel Aviv-Yafo Mobility Landscape

This section captures the research process and products in the city of Tel Aviv-Yafo, and the context related to carsharing.

### 5.1.1. **Tel Aviv Metro Area Population and Density (2018)**

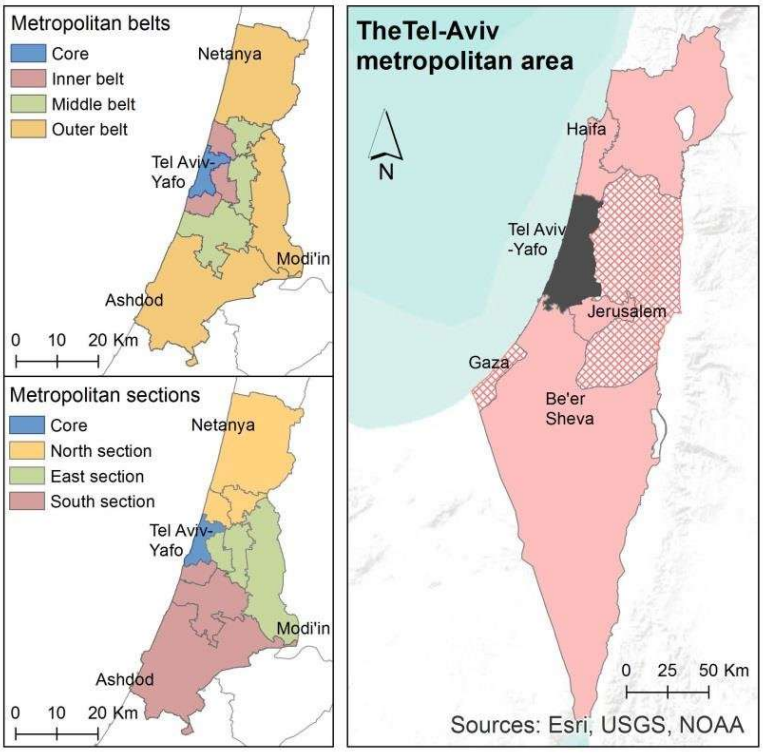



*Figure 5.1 - Tel-Aviv Metropolitan Area Belts and Sections.*
*Source (map): Modai-Snir, Tal & van Ham, Maarten. (2017).*

Tel Aviv-Yafo has a population of over 450,000 people and is the second largest city in Israel. The city is the core of the largest metropolitan area in Israel with a population of about 4,000,000 inhabitants. A built area, relatively dense, extends around the city and covers the metropolitan Inner and Middle Rings, has a population of about 2.6 million inhabitants. Most of the city is up to 6 km from the city-center while a range of about 10 Km also covers most of Inner Ring cities, and a range of 20 km covers most of the Middle Ring cities.

*Table 16 - Tel Aviv Metro Area Population, Annual Growth and Density*

| | Localities (#) | Total Population (thousands) | Annual Growth (%) | Population Density (per sq. km) |
|---|---|---|---|---|
| Tel Aviv-Yafo (Core) | 1 | 451.5 | 1.7 | 8,718.6 |
| Inner Ring | 13 | 975.6 | 1.4 | 8,097.0 |
| Middle Ring | 31 | 1,219.8 | 1.6 | 4,157.4 |
| Outer Ring | 258 | 1,338.0 | 2.0 | 1,052.9 |
| Total | **303** | **3,984.9** | **1.7** | **2,361.4** |

Source: Israel Bureau of Statistics (2019) localities, population and Density per sq. km by Metropolitan Area and Selected Localities.

### 5.1.2. **Transportation, Public Transport and other Shared Mobility Services in Tel Aviv-Yafo**

*OVERVIEW – According to latest metropolitan travel habits survey, which was carried just before electric micro mobility became a trend, it is estimated that 46% of the trips in Tel Aviv Yafo are done by private cars (10% out of the 46% are done by passengers), 30% are of pedestrians, 10% are done by public transport, 7% by bicycles, and 3% by motorcycles.*

The Tel Aviv Metro area and the City of Tel Aviv-Yafo are the hub of Israel transport network. Most of the major routes of the national road network, as for now all inter-metropolitan rail lines, and the International Airport are either centred in the city or are around the city.

According to the Israel Central Bureau of Statistics, in 2017, residents living in Tel Aviv owned over 232,000 private cars, which means every second resident of Tel Aviv-Yafo is owning a car. Taxation on most of the cars imported to Israel (no local manufacturing) reaches 83%. Hybrid cars are currently taxed at 30%, a policy that is on the process of termination. Gas in Israel is heavily taxed as well – about 65% of its value.

*ISRAEL RAIL – Israel rail implemented a multi-billion development plan in the last two decades. A major objective of this plan (that is still undergoing and extended to the year 2040) is to connect Israel periphery to the center. However, most of the implementation was focused in the Tel Aviv Metro area. As a result, the four Tel Aviv Yafo's train stations are the busiest in the country, with over 120,000 passengers a day.*

*LIGHT RAIL – In August 2015, the construction of the first light rail line - the red line – began. The red line connects five cities: Petah Tikva, Bnei Brak, Ramat Gan, Tel Aviv-Yafo and Bat Yam. The line is scheduled to begin operation by the end of 2021. In December 2018, the construction of the Purple Line began, while the construction of the green line began in January 2020. These two lines are expected to start operating in 2026-2027.*

*BUBBLE DAN – An on-demand van-service in Tel Aviv-Yafo and the surrounding cities of Ramat Gan and Givatayim. A partnership of Via Transportation Inc. and Dan Transportation public transit operator. The service began as a pilot in April 2019, operates 100 vehicles, and is financially supported by Israel Ministry of Transport.*

*CYCLING – According to latest metropolitan travel habits survey, it is estimated that there are about 137,000 bicycle trips in Tel Aviv-Yafo a day. About 90% of all bicycle trips are done by residents of the city. According to the survey, bicycle trips account for about 7% of trips.*

Tel-O-Fun – Tel-O-Fun is a municipal bicycle rental service (schedule to terminate in summer 2020). The service is available to residents, visitors and tourists, and operates 24 hours a day. Throughout the city there are about 200 active stations, providing around 2,200 bicycles.

*E-BIKES AND E-SCOOTERS – The use of various electric micro mobility vehicles (mostly E-Bikes and E-Scooters) has evolved tremendously in recent years. E-Bikes are extremely popular, and it is estimated that more than 50% of the 300,000 Electric Bike users in Israel are living in the Tel Aviv Metro area. E-Scooters usage in Tel Aviv-Yafo has increased in an exponential level in the last two years as a result of introducing E-Scooters sharing services by 4 private providers, It is estimated that in total these providers provide 8,000 vehicles, that are being used for 1,300,000 trips a month.*

### 5.1.3. Car Sharing Providers and Services in the Tel Aviv Yafo Metro Area

*AutoTel* is a joint Car Sharing venture initiated by the Tel Aviv-Yafo Municipality and the Tel Aviv-Yafo Economic Development Authority Ltd. For the establishment, operation and service delivery, the Tel Aviv-Yafo Economic Development Authority Ltd. is collaborating with Car2Go, a Car Sharing provider (see below). Launched in October 2017, AutoTel operates 260 Hyundai i10 vehicles and has 520 dedicated parking spaces across the city, allowing subscribers to pick up a vehicle from one point in the city and return it at another point. The AutoTel vehicles can be parked in one of the 520 designated parking spaces or in any regulated, "blue and white", parking space in the city. For such, the operational model is a combination of the A2B and the free-floating model. The service is provided only within the municipal area of Tel Aviv-Yafo, while users can make trips beyond this area. The main components of the service cost consist of monthly subscription fees (10 or 40 NIS in 2 tracks) and travel costs per minute (1.7 0r 1.2 NIS). Higher rates are charged outside the municipal area. Business tracks are also available.

*Car2Go* ("Car to Go") is a Car Sharing company founded in Israel in 2008. Car2Go offers Car Sharing services for private and business use. Within the Tel Aviv metro area, the service is currently provided in 5 cities of the inner ring – Tel Aviv-Yafo, Ramat Gan, Givatayim, Herzeliya, and Raanana; and is planned to expend to additional cities. In the Tel Aviv metro area Car2Go operates a fleet of around 300 vehicles under the A2A operational model. The main components of the service cost (for private subscribers) consist of monthly subscription fees (20-50 NIS in 2 tracks), an hourly fee (17-50 NIS) up to the sum of a daily rate (160-500 NIS), and travel costs per KM (1-2 NIS). Several types of cars are offered, including small, family, small trucks, and “prestige” vehicles. Weekend supplement fees apply.

*Table 17 - Car sharing services available in TelAviv and its metropolitan area*

| | Types of cars | Where? | | Products | | | How much to pay? | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TLV | Metro region | Car sharing | Ride sharing | Rental/ Leasing | Membership | Minute | Hour | Day | Km |
| ***Municipal provider*** | | | | | | | | | | | |
| ***AutoTel*** | 260 Petrol cars | X | | X | | | 10-40 NIS (Monthly fee) | 1.2-1.7 NIS | - | - | - |
| ***Local car-sharing organisations*** | | | | | | | | | | | |
| ***Car2Go*** | ~300 Petrol Cars | X | X | X | | | Private account 20-50 NIS | - | 17-50 NIS | 160-500 NIS* | 1-2 NIS * |
| | | | | | | | Company account 50-190 NIS | | 13-46 NIS | 117-460 NIS | 1.7 NIS |

## 5.2. Data collection and Methodology

This section outlines the major differences with respect to the main guidelines provided in the focus group and interview protocol.

### 5.2.1. **Focus Group**

To recruit participants for the focus group, the Tel Aviv-Yafo team collaborated with AutoTel. AutoTel – the major car sharing provider in the city as well as a project partner – has a substantive data regarding their users (including socio-demographic characteristics). Based on the opportunistic sampling procedure described in the Section 2, AutoTel marketing department reached out to potential participants. Due to the low number of participants in a focus group, and according to the current traits of the Car Sharing service in the city, we prioritized during the recruitment process reaching a balance in the following four categories: Gender, Age, Family Status, and place of resident (city center vs. outer city neighbourhoods).

*Table 18 - Focus group – Participants Characteristics*

| Characteristics | Group | Number of participants |
|---|---|---|
| Gender | Male | 5 (+1) |
| | Female | 3 (+2) |
| Education | Under bachelor | 0 (+1) |
| | Bachelor's degree | 5 |
| | Master's degree + Above | 3 (+2) |
| | Other | 0 |
| Age | 18-29 | 2 |
| | 30-39 | 3 (+1) |
| | 40-49 | 0 (+2) |
| | 50-59 | 2 |
| | 60+ | 1 |
| Family status | Children yes | 4 (+3) |
| | Children no | 4 |
| Home location | In the center of a village | 0 |
| | In a subdivision of a village | 0 |
| | In the center of a small town | 0 |
| | In a subdivision of a small town | 0 |
| | In the center of a big city | 4 |
| | In a neighbourhood located between the center of a large city and its suburbs | 4 (+3) |
| | In the suburb of a big city | 0 |
| | Your home is isolated | 0 |
| What is your current employment status? | Employed full-time | 7 (+2) |
| | Employed part-time | 1 (+1) |
| | Unemployed | 0 |
| | Student | (2) |
| | Retired | 0 |
| | Unable to work | 0 |
| Car Sharing user type | User | 7 |
| | Potential User | 1 (+3) |

Note: the numbers in brackets refer to interviews with potential users.

Since we reached out to potential participants based on their socio-demographic characteristics we did not have to ask them to complete the socio-demographic questionnaire. However, they did complete the survey during the focus group for an additional information beyond the four categories. In total we reached out to about 40 potential participants, out of them 10 conformed their participation, and 8 showed up.

In addition, 4 potential-users were supposed to participate in the focus group. As a last-minute decision we decide to interview the potential users, and not to include them in the focus group. This decision was made based on a protocol trial with a potential user (with no prior detailed knowledge of the service), and the realization that almost half of the time would have to be spent on explaining terms and concepts. The results of s interviews with potential-users are merged into the focus group analysis.

### 5.2.2. **Interviews**

As a consequence of the COVID-19 crisis, the interviews were conducted on-line via Zoom or by the phone.

Interviews – Interviewees by Type:

**Interview 1**

Stakeholder Type: Developer – a large real estate developer operates nationwide.

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**Interview 2**

Stakeholder Type: Developer – a medium housing developer.

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**Interview 3**

Stakeholder Type: Israel Ministry of Transportation

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## 5.3. Analysis and contextualizing findings

Before further elaboration of the focus group and interview results, it is important to contextualize these results. Six main issues are worth mentioning:

1. Tel Aviv-Yafo Car Sharing services is limited compared to local car ownership. The two service providers operate around 550 vehicles in the entire metropolitan area, while in the City of Tel Aviv-Yafo the number stands at around 450. This number is equal to 0.2% of the privately owned cars in the City of Tel Aviv-Yafo.
2. Parking is one of the biggest transportation issues in the City of Tel Aviv Yafo. According to some surveys, up to 50% of some city center neighbourhood will not use their cars in evenings for the risk they will not find an available parking place in later hours.
3. There is no "A to B" Car Sharing service in the City of Tel Aviv-Yafo that allows resident to travel beyond the municipal area of the city, or rather the CBD.
4. Public transport services are licensed by the MOT which dictates very limited public transport services in the CBD during the weekend (from Friday afternoon till Saturday evening). However, as of November 2019, the City of Tel Aviv-Yafo, in collaboration with some of the surrounding cities, started to operate a limited service during the weekend.
5. Cab fares are comparatively low, and they are allowed to drive on public transport lane while Car Sharing vehicles are not. For example, a cab trip would cost 46 shekels, while a bus costs 6 shekels and carsharing would go at 32 shekels.
6. Due to central government regulation there is no Ride Hailing service in Israel.

The remaining of this section is divided into two. First, we present the main findings emerging from the focus groups, and then we will present the major challenges that emerged from the

interviews. This serves to fulfill the purpose of this study – not simply to understand current usage and limitations of the Car Sharing system but to understand which role incentives play into the Car Sharing market and how they can change the current situation.

### 5.3.1. **Focus Groups – User needs**

*Perception and general feeling*

Overall, the perception and the general feeling towards the exiting Car Sharing services is very good.

- *"It solves everything".*
- *"The service gives an answer in weekends and evenings. It is a good solution, quick and available".*
- *"It is very convenient".*
- *It allows flexibility. You do not have to return from the place you parked the car, or you can choose to take a cab, if for example you were drinking alcohol".*

**Car Ownership:** Focus group participants understand Car Sharing in the context of promoting a sustainable transportation system. Mainly, reducing car ownership per household – from two cars to one, and then to none.

- *"The goal is no more private cars. Our household has gone from two cars, five years ago, to one car today".*
- *"I don't like a private car… in the past we had two cars but not anymore. Why to have a car when using it only half an hour a day?"*
- *"This is an excellent solution for situations that we need two cars at the same time, which is not much; at least for us.*
- *"In general, the idea is to encourage people to use less cars.* [when thinking about incentives] *we should not encourage people for a wasteful use. A pricing scheme that will do so doesn't contribute to the purpose of the service".*
- *"The service should be integrated with solutions to other transportation problems".*

*Availability of cars, securing parking places at the destination and coverage area*

**CS Availability:** This is one of the major barriers emerging from the focus group. It came up almost in reference to any issue that was presented and discussed in the focus group. Without any doubt this is the most important incentive for increasing the use of the service.

- *"The cars are unavailable. They are everywhere. Just not in my area".*
- *"A lot of time there are no vehicles available".*

- *"If I travel to Kfar Shalem or the Yarkon Park* [areas outside city center] *I don't know if there will be an available car to come back. So many times, I'm traveling only while there's public transportation, as a backup".*

**CS Coverage:** As described before, one of the service providers (AutoTel) operates only within the city of Tel Aviv-Yafo, while the other (Car2Go) also operates in the metropolitan area inner belt. Therefore, participants stated that the of the coverage area as one of the most important issues to be considers.

- *"Today's coverage area is quite impossible".*

When asked about localities that the service should cover, participants referred mostly to cities in the metropolitan area inner and middle belts. When participants referred to cities in the outer belt it was mainly due to the existence of High-Tech parks or academic institutions.

The following table presenting cities that the service should cover (by direction from Tel Aviv-Yafo and metropolitan belts) as emerged from the focus group.

*Table 19 - Indicated coverage*

| | **Inner belt** | **Middle belt** | **Outer Belt** |
|---|---|---|---|
| **North** | Herzliya | Ra'anana | Kfar Saba |
| **East** | Ramat Gan<br>Givatayim | Petach Tikva | Rosh HaAyin |
| **South** | Bat Yam<br>Holon | Rishon LeZion<br>Rehovot | |

**CS Parking:** As mentioned before, parking is a major issue in Tel Aviv-Yafo. Parking is also a big problem for Car Sharing services since the app does not allow to secure a parking place. Moreover, many times, an available parking marked by the app is found to be occupied by illegally parked cars.

- "*Private cars are parking in AutoTel parking".*
- *"Parking of other vehicles in the service parking places".*
- *"Guaranteed parking is important".*

*Clear and consistent pricing scheme*

**CS Competitors:** In general, there is a satisfaction regarding the pricing. Mostly in compare with alternative, comparable and available mode of transportation. In the focus group four modes of transports were considered as a potential competition for Car Sharing.

- Private cars – more available and serve also as a status symbol.
- Bubble Dan (on-demand van-service) – more available and cheaper.

- Buses – cheaper, go beyond the city limit, and use public transport lanes.
- Cabs – more available, the use is much more flexible, and operate on weekends.

As an example, one participant stated that during evenings and weekends when there is a limited, or no public transportation, Car Sharing service in general, as well as the price of a trip, should be compared with a cab. Another participant stated that the comparison with Bubble Dan should take into account the number of passengers.

Here it is important to mention that the participants see Car Sharing as one among many options for traveling – and for each trip they will use the most appropriate modes of transport. Participants also stated that Car Sharing services should be developed as complementary transport services.

**CS Pricing:** All together the participants agreed that if someone consider bus as an alternative, then when buses are available, pricing cannot be competitive.

- *"The comparison should be made with comparable alternative. If there are no buses, then the comparison should be with cabs".*
- *"In compare with cabs sometimes the price is twice as low – 12 NIS for a ride from the south section of the city to the city center, while a cab can cost 30-40 NIS".*
- *"You need to compare* [the price] *with* [the price of] *alternative trips. In times of traffic congestion cabs are also more expensive".*
- *This service is an alternative for having a second car. Annually I spend for the service less than the cost of a car insurance. Therefore, you cannot compare it with a single bus ticket".*

However, some trips can be too expensive, even if comparable trips are even more expensive.

- *"The service is good for short trips. Sometimes the price is too high. When traveling on Friday nights from Yafo to the north of the city, the price can reach 100 NIS".*

Due to the 'by-minute' pricing scheme [of AutoTel], in specific circumstances the price can be very high; mainly, in rush hours.

- *"The price is not expensive unless you are stuck in traffic… You are paying 60 NIS for 60 meters".*
- *"Pricing should be based on distance. You should not be punished due to congestion. Similar trips should always cost the same, and it will encourage the use".*

When asked about an alternative pricing scheme that may encourage the use, participants stated that the most important thing that the pricing mechanism will be simple, clear, and certain (a fixed price).

- *"I would like to know the cost* [in advanced] *in a simple and clear way, and to see that it is cheaper than a cab. No need for a sophisticated algorithms".*

- [it can create] *"certainty for young people".*
- *"Monthly membership with a fixed price. This type of membership can have different minute packages, and if you surplus the limit you will pay an additional cost for the extra use".*
- *"Maybe pre-paid packages should be considered".*

Moreover, participants stated that a reduced cost in specific times can also encourage the use.

- *"A cost-effective family subscription that will also include the old children".*
- *"Reduced price at night will encourage the use of cars at night".*
- *"First few minutes for free".*
- *"For me as casual users a package is not relevant, so a reduced cost is a good option".*

Participants also proposed to incentivize trips from low to high demand areas.

- *"In the mornings for example, all vehicles are found in a particular area and not in another area. A solution that can serve the provider and the customers is to have reduced price for trips from a specific area to another. It will also give solution the provider operational problems".*

*Car Sharing, Car Pooling and integration with public transportation*

Integrating Car Sharing services with other services was highly prioritized by the participants. When asking about combined ticketing or transit passes there was a unison call for promoting such solution (see also in the 'perception and general feeling' section above).

When asking specifically regarding integration of Car Sharing and Carpooling participants replied the following.

- *"The service should be extended beyond the service subscribers – Car Sharing for Carpooling… it should be integrated in the app".*
- *"Everyone who lives in the city will be able to use it. This can shorten the registration process. If the additional user pays the relative travel price, there is no problem to deviate from my route for picking him/her up".*
- *"I'll agree to leave 15 minutes early to save costs".*
- *"My neighbor uses the same AutoTel. We should allow to share the cost".*

When asking about the potential use of public transport routes lanes by Car Sharing cars, most of the participants agreed that it is not a good option since it will contradict the overall sustainable objective of the service.

- *"This is not a good option. Public transportation lanes should be used by masses".*

Another participant even stated that it is *"not clear that it will save time".*

*Cars diversity, setting, reservation and insurance*

**CS diversity:** AutoTel is only using one type of car – Hyundai i10, while Car2Go is using a variety of cars (from basic to luxury to vans). However, for the participants' perspective of their common use of the service it seems that diversity of cars is not an issue. Moreover, participants called for a use of only small and mini cars.

- *"In most travels we are only one or two people. How stupid is that the cars are not 'Smart'?"*
- [Hyundai i10 is in a] *"surprisingly good size. We are using it for the entire family. We even used the car to deliver a closet".*

In light the fact that the service in Tel Aviv-Yafo is only using petrol cars some of the participants called for the use of electric cars.

- *"The car should be green and environmentally friendly. It will make people love the service".*

However, for some it did not matter, and others mentioned that there is no good infrastructure for electric cars in the city.

Two more issues were raised by the participants (that are related to CS diversity and setting):

- *"Allowing pets cars in the cars… or at list in some".*
- *"Adjusting the cars for people with disabilities".*

**CS car settings:** In general participants are happy with the cars.

- *"There is always a booster in the cars. The accessories are satisfied and good".*

However, some participants called for personalizing the cars, so they will feel that the car is their own. This issue was connected to the following section that refers to CS App.

**CS App:** the service app was criticized multiple times during the focus group. Some of the critiques related to the app features and use while many others emphasized the shortcoming of the service.

Availability, Routes and Parking

- *"The app should let us know an estimated time when a car will be available".*
- *"We should be able to create a route in the app, get a price, and the route should immediately appear in Waze".*
- *"After creating a route, even if there is no available car, the app should indicate when a car will be available".*
- *"We should be able to report when an unauthorized car is parking in a designated parking. When the tow truck arrives, it can remove the report".*

- "*You should add a feature to the app for evaluating the number of lost trips – If there was an available car, I would have used the service*".

In reference to a question whether they will agree to share their itinerary, participants replied positively.

- *"It should be anonymous for other users. The service provider anyhow knows everything about me".*

One / Two Apps (one running on the mobile and one in the vehicle)

- *"It is better to use one app. Beyond reserving the car you should be able to manage everything on the vehicle screen, including reporting malfunctions and problems. In this way there will not be a dependency on the network coverage".*
- Another participant preferred that everything will be handled via the mobile app. "*Why do you need another app in your car? Maybe just use the mobile app? "*

Personalizing the Car

- *"The app should enable to integrate personal Spotify or Apple Music accounts, as well as should have an interface that enables to adjust the seat and the temperature. I want to feel that it is my car. I don't need a fancy car, but a car that I will feel it is if it as my own".*

Problems Reporting

- *"The app is great, but at the entrance to the car is less friendly".*
- *"The problem reporting process can take you out of your mind. Sometimes it is raining, dark or you are taking the car in an unsafe area… and you need to take photos".*

CS Tax incentive and Credit

In general, the participants did not see mobility and parking credit or credit that can be exchanged for good as an effective incentive. Regarding tax incentives, participants referred to it mostly as an indirect incentive.

- "*Punishment or taxation for people who hold private cars*".
- "*Reduction of city property tax if you do not issue a parking permit*" / "*A parking permit is an asset with a value – the valued of a parking space divided by the number of residents. If you do not use this asset you are entitled to compensation*".

When the focus group discussion has been completed, participants were asked to rank a series of incentives on a scale from 1 to 5, with one the lowest score. Results are shown in Table 20. Each cell indicates how many respondents selected that specific answer. When referring to the results of the focus group discussion as well as to the incentives ranking, four groups of incentives were prioritized by the participants:

1. Availability of cars and parking places and extending the service coverage area.
2. Fixed price or packages – following a clear and consistent pricing scheme – for trips, days, or a month (including packages for more than one person, e.g., a couple or a family).
3. Promotional incentives from the provider or monetary incentives from the city to follow the idea of clear and consistent pricing scheme, and reduce the overall cost of the service.
4. Combine Car Sharing with Car Pooling and integrate car sharing with public transportation, using integrated apps, passes and pricing.

*Table 20 - Incentive ranking for Tel Aviv-Yafo*

| Rating of the incentives | Average Score |
|---|---|
| Transit passes and membership; family packages | 5.0 |
| Guaranteed availability | 5.0 |
| Dedicated parking lots | 4.7 |
| Promotional incentives: no registration /renewal fees/ first rides for free | 4.5 |
| Information for parking availability at the destination area beforehand | 4.5 |
| Reduced fares when car sharing combined with carpooling | 4.3 |
| Coverage outside the cities for longer trips/ connectivity between big cities | 4.2 |
| Monetary incentives from the city: Keep cost of the car-sharing low | 4.0 |
| Daily fees instead of hourly or distance-based fees | 4.0 |
| Guaranteed price beforehand for a given trip | 3.8 |
| Clear and consistent price regulation / Fixed prices | 3.8 |
| Work-related car sharing: Free car-sharing for business trips | 3.6 |
| Off-street parking close to Public Transport | 3.5 |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) | 3.5 |
| Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling | 3.3 |
| Mobility credits from car-sharing use: to be able to spend them for public transport modes | 3.2 |
| Booking in advance (e.g. previous day) | 3.17 |
| Information about vehicle condition/cleanliness beforehand | 3.0 |
| High occupancy lanes/dedicated lanes | 3.0 |
| Electric vehicles/environmentally friendly vehicles | 2.7 |
| Parking-related credits | 2.5 |
| Additional in-car features included e.g. sound system | 2.5 |
| Credits that can be exchanged for goods: supermarkets discounts etc | 2.2 |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs | 1.8 |
| Option of choosing the same vehicle type/brand (consistency, security) | 1.0 |
| Transit passes and membership; family packages | 5.0 |
| Guaranteed availability | 5.0 |
| Dedicated parking lots | 4.7 |
| Promotional incentives: no registration /renewal fees/ first rides for free | 4.5 |
| Information for parking availability at the destination area beforehand | 4.5 |

### 5.3.2. **Interviews – Stakeholder needs**

The analysis of the transcripts revealed that respondents focused on four main topics when discussing car-sharing incentives. In this sub-section, verbatim quotes from the respondents are presented. These quotes have been divided in order to reflect the themes emerging from the transcript analysis. When respondents referred to the topics (categories) that are relevant for Car-Sharing incentives as emerging from the focus groups (in all 3 cities), the topics appear in bold (e.g., **CS ownership**).

## Regulations and Incentives

Car Sharing is a mobility service with a limited presence in Israel. This is a possible explanation why most regulatory measures raised by the interviewees related to either broad issues regarding the development of a sustainable transportation system or to urban design issues. In regard to the development of sustainable transportation infrastructure, a few interviewees were skeptical about the cost-effectiveness of the service:

- *"Does it really reduce car ownership?"*
- *"What would be more effective – to invest in [name of a provider] or to invest in public transport lanes?"*

In line with this skepticism regarding the service, another interviewee stated:

- *"Instead of decreasing the number of car used in the city, [name of a provider] encourage extra use of cars by people who otherwise would use public transport or cabs".*

**Car ownership**: On the other hand, the same interviews stated that Car Sharing should be regulated as a complement service, addressing challenges that the current public transportation system fails to solve. An example for such problem is the low transport service level of many localities in Israel and the difficulties to reach these places from Tel Aviv-Yafo in a timely manner:

- *"Instead of promoting [one provider] that really solve a problem, the city is promoting [another provider] that is only operates in the city and aggravates car use and parking stress in the city".*

Another example is targeting people who own private cars and are using them not on a regular basis. This policy should include complementing and incentivizing regulatory measures in both the national and municipal level (more on this in the 'direct and indirect incentives' section below).

In regard to urban design issues, four aspects were raised by the interviewees:

**Car sharing parking**: mainly, allowing only off-street parking.

**CS electric cars**: promoting infrastructure for electric cars. *"This infrastructure can support the use of electric cars in the city at large".*

**CS and real estate developments**: "[Car Sharing] should be integrated in large scale development projects as a way to decrease private cars ownership and space allocated to parking".

**CS coverage area**: *"[Car Sharing] can be used to promote renovation of declining neighbourhoods".*

## Incentives to integrate car sharing

Due to the nature of Car Sharing services in Tel Aviv-Yafo and according to the previous insights, integrating Car Sharing with other modes of transportation (mostly public) was highly prioritized by the interviewees:

- *"The development of the light rail can be used as a catalysator to develop a holistic approach to the transportation system… It is important to see how it [Car Sharing] can be used as another tool to reduce the use of private cars in the city and to increase mobility".*
- *"We must think about Car Sharing as another service, and not as an isolated service"*

Other comments were more concrete and called for action:

**CS Parking and CS availability**: *"in every mobility hub and train station there should be a few dedicated parking spots and available cars".*

**CS integration**: *"the goal is that a person will be able to use only one app to plan a trip, pay, and travel with different modes of transport [including Car Sharing]".*

**CS pricing**: *"we should create the possibility for people to purchase a ticket or to have a plan that enable them to use multiple modes of transport, including Car Sharing".*

Another interviewee raised a concern in regard to the liability (**CS liability**) and property rights (**CS parking**) of integrating parking in real estate developments or on public land.

## Direct and indirect incentives

While the role of Car Sharing in sustainable transportation occupied the better part of the discussion, when asked specifically about direct and indirect Car Sharing incentives multiple ideas were raised.

**CS parking**: sufficient number of parking should be allocated in transportation hub, commercial and High Tech zoned, academic institutions, hospitals and locations that attract a large number

of people. Private and public developers should be incentivized to promote Car Sharing in their vicinities. Moreover, due to planning regulations,

- *"It is sometimes very difficult to design and develop short and convenient paths between transit stations and parking in commercial centers… Therefore, instead of walking a few minutes to a potential Car Sharing parking it may take 10-12 minutes".*

**Car ownership**: if one of the main goals is to reduce car ownership, one interviewee claimed that:

- *"[Car Sharing] cannot achieve it due to nationwide policy that incentivizes people to own a private car by providing income benefits for car ownership. Therefore, Car Sharing is nice, and sometime people use it, but in addition to owning a car".*

Another indirect incentive that raise by one of the interviews is:

- *"To give a high price tag on on-street parking permits. It will decrease the number of cars in the city. Mainly the ones that are being used once or twice a week".*

**CS Integration**: as mentioned before this is one of the main indirect incentives that may affect people not only to use Car Sharing but not to own a private car. For that the integration should be multifaceted, from the location of parking and the availability of cars, to an integrated platform and combined ticketing.

- *"[Car Sharing] should be seen, first and foremost, as an element complement to the public transport system. If we do not see it in this way, and we refer to it as a private enterprise, it doesn't justify its negative implication".*

### Incentives to promote equity

Car Sharing is a very expensive service for many people (in comparison with public transport). When it comes to promoting equity, the service should allow low-income households, who do not own a private car, to use it when there is a need.

**CS pricing**: *"Elderly and low-income households who receive discounts on public transport, do not receive discounts in Car Sharing services. In [name of a provider], the only exception are students who receive a one-time promotional discount".* Another interviewee stated that *"monetary incentives should only be granted to low-income households".*

**CS coverage and car ownership**: *"The service should expand into localities and neighbourhoods with low car ownership level due to socio-economic conditions. I am not sure if providers will do so without the support or regulation by the city or the country".*

# 6. Discussion and Conclusions

This report focuses on identifying the main barriers in car-sharing systems implementation, and the incentives which can overcome these barriers, creating a more sustainable service for all stakeholders. As each mobility service, car-sharing has its own specific characteristics and barriers to development. The car-sharing market is extremely scattered, as it includes station-based services, free-floating services, and peer-to-peer services. When it comes to car-sharing, the public at large has a wide range of options that they often do not fully understand. Additionally, car-sharing service providers also have to deal with regulatory barriers that change from country to country, enormous upfront costs (fleets, insurance), and limited or even negative profits. Car-sharing is thus a very complex ecosystem, the characteristics of which cannot be easily defined. Additionally, carsharing might compete with sustainable modalities, creating negative system-wide impacts. The objective of this study is thus to understand which incentives can be adopted to help car-sharing business viability while at the same time promote sustainable mobility.

This chapter outlines some of these challenges and gives examples of how authorities and operators can create incentives for mitigating them. It should be emphasized that the role and effectiveness of these incentives depend on the aim/goal of the authority that deploys them. For instance, enlarging the customer base or reducing vehicle-trips might require different incentives, as some pricing incentives are likely to enlarge the customer base at the expense of public transport, thus increasing the overall number of vehicles on the road. Similarly, long term strategies such as electrification of the fleet require government incentives to take off.

Without directing incentives, car-sharing initiatives risk remaining a standalone system, with limited integration to other mobility services, missing the opportunity of MaaS provision. They also stand the risk of local failure. The window of opportunity to produce viable and fully integrated solutions (e.g. with public transport) is thus limited.

Most of the needs that were elicited in this reported activity agree with what has already been shown in previous studies (Millard-Ball and Program 2005). However, this study highlights two additional elements. First, it evaluates the needs of both car-sharing users and stakeholder for three case studies, Copenhagen, Munich, and Tel Aviv-Yafo. The analysis of the transcripts has been used to support the development of a travel survey that will identify user-needs at a population level. The stakeholders' needs will be used to as the foundations for second-year research. Second, the study did not only focus on existing barriers but also on suggestions to overcome them.

The results presented in this section build upon and integrate the city-level findings presented in the previous chapters. First, we discuss the users' needs. This subsection compares the user needs from all cities, analyses their differences, and suggests incentives that can be used to address them. These incentives will be the base to develop personalised incentives. Similarly, a second section performs the same analysis for the stakeholders. Finally, two lists of potential incentives will be presented: one for the users and one for the stakeholders.

## 6.1. Users' needs and potential incentives

In this subsection, users' needs from Chapter 3, 4, and 5 are summarized, discussed and compared. The integrated findings are presented by the same categories which emerged during city-level analysis. Additionally, the feedback from stakeholders is also included in the discussion. Finally, for each category, a list of potential incentives is presented. Some of these incentives appear multiple times, as they can impact different user needs.

The list of categories mentioned in this section explains "why" users decide whether or not to use car sharing. These categories indicate the main barriers that car-sharing operators need to overcome and the main requirements that they need to fulfil. The selection presented in this chapter describes the most critical categories across the three cities.

### 6.1.1. **Car ownership**

Respondents in Copenhagen and Tel Aviv-Yafo showed to be more sensitive to this issue than users in Munich. In Tel Aviv-Yafo, reducing car ownership was reported as the overarching objective of car-sharing. In Copenhagen, it was reported that as long as regulators do not increase the cost for car ownership, car-sharing is hardly going to become an attractive replacement option. In Munich, the car-ownership cost was not reported as a major threat to car-sharing. However, car-ownership in Munich is quite high and increasing its cost could support promoting more sustainable mobility options. Users in Munich, as well as in Tel Aviv-Yafo, also reported that the integration with other mobility services would favour a modal shift to car-sharing.

Finally, nearly all respondents reported that at the moment car-sharing is, at most, a competitor for private vehicles. While this is not a negative aspect per se, the main problem is that car-owners simply perceive the private car as a more convenient option. This can be because car-sharing is too expensive or simply because it is not a valid option for their needs. Integrating different services might help car-sharing become more attractive and change this vision.

From the side of the stakeholders, it emerged that the public at a large is often not aware of the actual car-ownership cost and that marketing activities can help to make car-users much more aware of the actual cost.

<u>Potential Incentives (p – indicates that this incentive can be personalised)</u>

Tax-incentive (For Car-Ownership)
Clear and consistent price regulation (p)
Marketing and communication strategies (p)
Coverage outside the cities for longer trips/ connectivity between big cities (p)

### 6.1.2. **CS Availability**

Strongly related to the "car-ownership" issue, availability is regarded as an important need in all cities. As mentioned before, when users are asked about their choices, answers are usually context-specific. Beyond the financial aspect, some users reported that car-sharing is simply not a valid option for them. The most common reasons are that the service is not available or, if it is

available, does not cover the needs of the user. In other cases, it is simply too expensive. Also, car-sharing users reported this as a major threat to the car-sharing system. Users suggested using advanced booking systems to guarantee car-availability (Munich) and pricing schemes to balance the number of cars available in the city (Copenhagen).

From the perspective of the operator, service providers are not interested in providing the same quality of service in all areas of the city. Pricing could work to move vehicles in and out "hot areas" (i.e. areas with the high demand), but incentives are needed when the objective is to increase the car-availability at a network level (e.g. in areas that are not profitable).

Potential Incentives (p – indicates that this incentive can be personalised)

| | |
|---|---|
| Mobility stations and mobility hubs | Reservation/Advance booking systems (p) |
| Guaranteed availability (p) | Flexible/dynamic pricing (p) |

#### 6.1.3. **CS Coverage**

When the goal is creating a strong competitor for private automobile, coverage plays an important role. In this paragraph, coverage refers to the operating area of the car-sharing operator (where it can be driven, where it can be collected, and where it can be returned). For instance, some operators offer the possibility to rent the vehicle for several days and to drive it nearly to any location – at least within the same country. However, the rental has to start and terminate within the operator's operating area. Tel Aviv-Yafo, users reported that car-sharing should cover a larger share of the metropolitan area around Tel Aviv-Yafo. For Munich and Copenhagen, this problem did not emerge. Both cities have a large number of car-sharing operators which altogether offer a wider range of options. However, in all cities, users complain that the service is mostly available within cities, and people living in the countryside (or outside the core of the metro area, in the case of Tel Aviv-Yafo) have no other option than private vehicles.

From the side of the operator, it emerges that service providers have already low profits in highly populated areas, so there is no real interest in providing services where the demand is low. However, different car-sharing operators have different business philosophy. Some of them – often traditional station-based that operates in close collaboration with the public authorities – have alternative business models. Some of the respondents explained that the service they offer does not aim at making profit but at integrating public transport and provide a valuable alternative to the private car (Munich, Copenhagen). Other operators provide platforms for peer-to-peer car-sharing, where citizens can share their vehicles with other people within the same area (Copenhagen). To increase the coverage, incentives from the authorities to operators are needed, specifically in those areas where there is not a critical mass of potential users capable of making car-sharing system profitable. Flexible pricing can be used to extend the driving limit at certain low-time periods.

Potential Incentives (p – indicates that this incentive can be personalised)

- No user-related incentive reported

### 6.1.4. **CS diversity/CS car settings**

Users in the three cities reacted differently to this category. For the users in Tel Aviv-Yafo, diversity is not perceived as a particularly appealing feature of the service, as long as the vehicle provided can accommodate their needs (e.g. five seats). In Munich and Copenhagen, where the offer is larger, the response was quite different. In both cities, the respondents pointed out that fleet diversity is the main incentive for car-sharing. Among other reasons, the possibility to drive brand-new luxury vehicles, try electric cars, and having different vehicles that can adapt to different needs (such as transporters). Some of the conflicting results may be attributed to the shorter trips taken in Tel Aviv-Yafo. While diversity may be attractive, all respondents in Copenhagen stressed out that changing vehicles all the time could be stressful and even dangerous, due to the need for changing vehicle and car settings all the time. In general, respondents from the three cities agree that, when it comes to car settings, the possibility of having personalised car settings would be an important incentive. Users would positively evaluate the possibility to have access to the same vehicle (for instance through a booking system) and to have their settings saved so that there is no need to spend time adjusting the car each time.

Operators agree that in general having a large variety of vehicle is always a good choice, as it is more likely to cover all user needs and attract them to the service.

<u>Potential Incentives (p – indicates that this incentive can be personalised)</u>

| | |
|---|---|
| Reservation/Advance booking systems (p)<br>Guaranteed availability (p)<br>Possibility to save car-settings (p) | Offer a variety of vehicles types (different brands and sizes)/choose vehicle depending on your personal needs (p)<br>Option of choosing the same vehicle type/brand (consistency, security) (p) |

### 6.1.5. **CS Parking**

In all cities, respondents reported parking-related issues. Due to the scarce parking availability, parking can be a major deterrent in those areas of the city where the driver has to spend a significant amount of time looking for a parking spot. Car-sharing users face a double penalty, as not only they have to spend time looking for a parking spot but, at the same time, they face the extra cost associated with the rental period. The situation is particularly critical in Tel Aviv-Yafo where, despite availability of dedicated parking spots , respondents reported that these are illegally used by private vehicles. One option, which has not been mentioned during the interviews nor focus groups, but provides a solution to this issue, is to include mobility credits (e.g. provided when the user is looking for a parking place) to partially compensate this penalty. Other possibilities include dedicated parking spots for car-sharing, parking use enforcement, as well as the possibility of booking in advance a specific parking location.

In Copenhagen, specifically, respondents reported how car-sharing is often considered on the same level as private automobiles when it comes to parking policies.

Potential Incentives (p – indicates that this incentive can be personalised)

| | |
|---|---|
| Dedicated parking lots/enforced parking regulation | Information for parking availability at the destination area beforehand (p) |
| Booking in advance a parking spot (p) | |

### 6.1.6. **CS Pricing**

Overall, all respondents were satisfied with the existing pricing schemes. However, some minor differences emerged. In Tel Aviv-Yafo, respondents reported that the price can become too high for certain trips, specifically when there is congestion. In Munich, one respondent reported that the combination of time price and kilometre price is the best as it allows to easily calculate the rental cost in advance. Additionally, many services in Munich decreases the price of the service when the duration of the rental increase to avoid the trip becoming too expensive (e.g. Car2Go has a price of ~19 €/min but can be set to 12 €/2hours). Similarly to Tel Aviv-Yafo, in Copenhagen user reported how the price uncertainty can create a significant amount of stress as unpredictable issues can dramatically change the trip cost.

From the service provider perspective, pricing is always regarded as a good strategy to enlarge the customer base. Together with simple pricing policies, such as reducing the direct cost associated with each trip, loyalty programs and MaaS-like solutions are also considered good strategies to reach more costumers.

Potential Incentives (p – indicates that this incentive can be personalised)

| | |
|---|---|
| MaaS-like services (p) | Daily fees instead of hourly or distance-based fees (p) |
| Flexible/dynamic pricing (p) | Guaranteed pricing (p) |
| Monetary incentives from the city: Keep the cost of the car-sharing low | |

### 6.1.7. **Integrated platforms, Car-Sharing applications, Privacy**

While not familiar with the term “MaaS”, respondents showed to be extremely familiar with the concept of Mobility-as-a-Service. Nearly all respondents in all cities stressed that car-sharing should be complementary to public transport. Respondents in both Copenhagen and Munich feel that, despite the wide range of applications already available, car-sharing is not sufficiently integrated with the public transport network and it often competes with it. Additionally, each of these platforms requires an independent and quite time-consuming registration procedure, meaning that there is no certainty that users can access all services in the platform. In Tel Aviv-Yafo, where no integration platform is offered, integrating Car Sharing services with other services was highly prioritized by the participants.

In Tel Aviv-Yafo, integrating car-sharing and car-pooling services was perceived almost as necessary. At the same time, both in Munich and Copenhagen, a minority of respondents reported that they would be reluctant to share the ride with other users, primarily for the additional travel time associated with detours. Finally, one user in Copenhagen raised some questions about

privacy regulations and data protection. While this was an isolated case, transparency and compliance in terms of privacy should always be considered as a priority when designing these systems.

From the perspective of the users, incentives should focus on integrating car-sharing and public transport, creating a more homogeneous user experience. Many users explained that they were extremely frustrated to register to different applications, as the process is too time-consuming and complicated. The easiest registration process requires each user to send a copy of the driving license together with a copy of their passport. Some operators also require paying insurance services and large registration fees before having access to the vehicle. A single payment method, a more homogeneous service, and monthly packages are a better solution able to move some of the respondents away from their own car. Even more important, if users would have the possibility to submit their documents only once, that would already serve as an incentive.

Many car-sharing service providers already embraced this MaaS philosophy. The analysis also showed that the most successful companies already integrated different services within one single application and, when this is not the case, this is an ongoing process. Many operators reported how this process is already too slow and for this reason several operators developed MaaS-like applications on their own, with partial integration. One of the main barriers for this integration is the complexity of the application per se, which needs to accommodate many different operators and mobility services with different needs. Even in the case of partial integration, this procedure is usually time-consuming.

Potential Incentives (p – indicates that this incentive can be personalised)

MaaS-like services (p)
APP incentives (technology, reminders/notification) (p)
Mobility credits from car-sharing use: to be able to spend them for public transport modes (p)
Transit passes and membership; family packages (p)
Credits that can be exchanged for goods: supermarkets discounts etc (p)
Third-party validation about location data storage and usage to make sure that it is anonymized and stay private(p)
Reduced fares when car-sharing combined with carpooling (p)
Credits that can be exchanged for goods: supermarkets discounts etc (p)

## 6.2. Stakeholders' needs, challenges and potential incentives

During the interviews with the stakeholders, four main themes received significant attention in all cities, and appear to be the most relevant topics when studying new incentives for stakeholders. These themes are "*Regulations and Incentives*", "*Incentives to integrate car-sharing*", "*Direct and indirect incentives*", and "*Incentives to promote equity*". In this sub-section, each of them is discussed and comparison across cities is provided, together with a list of challenges that incentives can help overcome them.

### 6.2.1. **Regulations and Incentives**

Between the stakeholders, several forms of relationships serve to incentivize the carsharing operations. The first form is partnerships between public authorities and private ones, the second form is regulations set by public authorities and the third form is collaboration – an ongoing dialog. Emerging from the interviews analysis, it is evident that partnership can be a convenient arrangement for both car-sharing companies and their public partners. However, public-partnership is perceived negatively by some car-sharing operators who declared that they have no interest in becoming heavily subsidized, nor becoming a new form of public transport.

Such free-market-oriented companies often use car-sharing as a sub-product within a larger business model, which contributes to the overall success of the company in various forms, such as complementing other mobility offers. These operators are typically large free-floating companies that try to compete mostly with taxis and car-hailing companies. For these type of companies direct incentives, such as parking incentives, can be adopted for example to encourage them to provide car-sharing in areas of low profitability. Other forms of incentives should focus on the integration aspect, as these companies are often quite motivated to get more visibility and more market share.

Other car-sharing operators, on the contrary, use a nonprofit business model, relying heavily on public provided subsidies. These companies are often traditional, station-based car-sharing services. While requiring high registration fee – these services proved to be quite successful in targeting drivers who are willing to get rid of their car. The success depends on the rental cost – often a combination of time and distance – being low and easy to compute in advance. Similarly, the availability of the car is also an important element of success. Differently from the first companies, these companies require more direct subsidies to keep their business alive, having no alternative business model and directly serving car-ownership reduction goal. Where available, peer-to-peer service providers have the potential to overcome some of the issues discussed before, specifically the upfront cost, as they have low initial costs. However, there are other major limitations that cannot be solved without proper support, such as regulatory barriers, which make this business model challenging if not impossible in countries like Germany. This means that regulations and integrations incentives are the main tools to promote this type of services. Without proper integration, these services stand the risk to become an Uber-like mobility services and, eventually, even increase the congestion.

These regulations and incentives issues presented themselves differently, in the three cities. In **Tel Aviv-Yafo**, where the presence of car-sharing systems is still limited, and the service is highly subsidized, respondents are concerned with carsharing sustainability contribution. They argue more incentives for public transport rather than carsharing are required towards car-ownership reduction, and that carsharing can actually increase congestion. , For such carsharing developing cities, one of the main challenges to promote car-sharing is thus to prove its effectiveness in the fight against car-ownership and draw a viable deployment road-map. Integration with carpooling and with public transport platforms can also serve a similar purpose.

Car-sharing in **Munich** is mature, being part of everyday life for every citizen that lives in the metropolitan area, achieving for many car-ownership replacement (as reported in the focus group). The car-sharing market offers a large variety of services, with peer-to-peer car-sharing services one of the few missing options. Operators reported overall a positive experience when dealing with the local authorities, which have dedicated teams working on of car-sharing and promoting its integration with the other existing mobility services. The challenge is mostly to design incentives that can support the authorities in achieving their mobility goals, specifically serving less attractive neighbourhood, reducing parking demand and shifting demand patterns.

Finally, car sharing in **Copenhagen** is extremely advanced, with multiple existing operators ranging from free-floating to peer-to-peer car-sharing services. However, from a regulatory point of view, the city still lags behind. Respondents reported difficulties in initiating a discussion with the authorities, mostly because many different offices are responsible for carsharing impacting regulations and finding the right one is challenging. The situation becomes even more complex when considering that innovative mobility solutions at a regional level often crossover Danish and Swedish authorities, adding other barriers on top of the existing ones. Integration incentives here should probably be offered in the form of integrative public body to address sharing mobility.

Based on this short description, it emerges that car-sharing clearly cannot tackle car-ownership on its own as a standalone, free-market solution. Integrating with other mobility solutions can help it become a sustainable solution. Authorities can incentives this integration by triggering this process and supporting it. From the regulatory point of view, it also emerges stronger policies to fight car-ownership are needed. If the authorities have not a clear plan, or if car-sharing is not part of it, incentives are likely to have marginal or no effect. Clear long-term strategies to promote sustainable mobility, and dedicated departments to deal with Car-sharing operators play a giant role in developing effective incentives.

Potential barriers and incentives (i – indicates that this is an incentive)

- Incentives to homogenize/integrate the car-sharing services (i)
- Close/regulated car-sharing market
- Access to right departments/authorities for permission
- Prove the Car-Sharing can support public goals

### 6.2.2. **Incentives to integrate car-sharing**

As the previous sub-section highlighted, integration with other transport modes is an important aspect for car-sharing, meriting separate discussion. Without integration, both authorities and users will consider car-sharing as a simple alternative to car. While this is not necessarily a negative attribute, authorities may be reluctant in promoting such a service and would more likely consider it similarly to private automobiles when developing new policies. This can have disastrous consequences when thinking about policies such as closing the city center to cars. Thus, it serves both operators and authorities to explore better ways to integrate car-sharing services and make urban mobility more sustainable.

On this topic, the answers were extremely consistent in all cities. Integration is a priority for all the respondents, from public authorities to service operators, to citizens associations. However, it also emerges that currently the services are not sufficiently integrated, and the integration level is inconsistent between the cities.

In **Munich**, where car-sharing is going strong, the most critical respondent stated quite frankly that car-sharing is simply not integrated with public transport. One incentive that has been deployed is to develop mobility stations close to public transport stops. However, some respondents reported resistance from the public transport operators to allow car-sharing providers using these stations. This is mostly because – based on our interviews – many car-sharing trips are replacing public-transport trips. This potential competition with public transport makes integration more challenging. Another limitation is that integration is often too slow, as it takes years to integrate all mobility services into one single application.

Similar problems have been reported in **Copenhagen**, and as discussed in the Copenhagen section, it took almost 8 years for one operator to agree on an integrated platform. In both cities, private operators reported that they are already integrating other services within their own platform in order to speed up the process. Finally, for **Tel Aviv-Yafo**, integration also emerged as a barrier that needs to be addressed, having no current integrated platform. Respondents suggested using the development of the new light rail network as catalysator for a holistic approach to transportation, where other mobility services – such as car-sharing – are not anymore considered as isolated services but as part of a larger ecosystem.

In all cities, the major solutions that have been indicated are the creation of mobility stations, integrated ticketing services, mobility packages that combine car-sharing and public transport in one unique mobility option, and mobility credits (to use in exchange of goods but mainly for mobility services).

<u>Potential barriers and incentives</u>

- Parking facilities close to public transport stops (i)
- Parking-related incentives (i)
- Car Sharing for First/Last mile (i)
- Car-free zones (i)
- APP incentives (technology, reminders/notification) (i)
- Transit passes and membership/ family packages / Integrated services/ticketing (i)
- Develop MaaS-like services
- Integration is too slow
- Integrated applications

### 6.2.3. **Direct and indirect incentives**

When it comes to incentives, respondents separated them into two main categories – direct and indirect incentives. Direct incentives directly reduce operator costs (reducing the parking cost is one example of a direct incentive), while indirect incentives, as the name suggests, consist of introducing elements, such as mobility stations, that modify the existing transport offer in favour of car-sharing. Once again, some of the incentives discussed in this section influence both the

user and the operator. As such, some of these incentives are also present in the previous section. However, in this section, we focus on the impact that these incentives may have on the operator.

#### *6.2.3.1. DIRECT INCENTIVES*

Most of the respondents focused on three main direct incentives that can make car-sharing more profitable for the operator and more attractive for the users. Parking, pricing, and tax incentives.

- **Parking:** Parking is by far the most important direct incentives, ranked highest for users as well. In Tel Aviv-Yafo, interview respondents claimed that car-sharing should always have a sufficient number of parking facilities in the most attractive areas (such as transportation hub, commercial centers and High Tech zones) to enlarge the customer base and reduce the cost associated to car-sharing (e.g. driving while searching for a parking spot). In Munich, respondents reported that parking is a significant cost for the operator that the city can use as a leverage when negotiating with the car-sharing operator. In Copenhagen, operators reported limited support from the authorities, and that parking-related incentive would support both cost reduction and higher level of service of the system. This should include dedicated parking spots to reduce the rental period and thus the overall cost of the service for the end-user.
- **Pricing:** Car-Sharing is about balance. Low prices lead to the cannibalization of public transport while high fares reduce car-sharing competitiveness with taxis and car-ownership. Some respondents stressed that car-sharing should be an alternative to private cars, car-hailing, and taxi. In this context, pricing is the main controller. As the price for these services (public transport, taxi) change from country to country, authorities should make sure that the price of the car-sharing is low enough to make it a strong competitor for private transportation, taxi, and car-hailing, but high enough to make public transport overall more convenient. Subsidies incentives should be used to help the car-sharing operator maintaining this balanced price.
- **Tax-Incentives:** Nearly all respondents agreed that tax-incentives should be only used to promote sustainable mobility options. Car-sharing should be eligible only when: (1) promoting electrification of the car-sharing fleet (or emission-free vehicles in general); (2) having the same taxation as the highly regulated taxi operators when complying to similar regulations.

#### *6.2.3.2. INDIRECT INCENTIVES*

The three most popular forms of indirect incentives are incentives for the integration, marketing and communication strategies, and incentives for promoting electrification.

- **Integration:** As highlighted in the previous section, integration is a major player in the transport market. Integration can help service providers enlarging their consumer base, develop mobility packages in collaboration with public operators and, thus, develop a

wider range of personalised incentives. Finally, it is a fundamental incentive to avoid cannibalization of public transport.

- **Marketing and Communication strategies:** Emerging from Munich and Copenhagen discussion, marketing and communication campaigns can help the service provider making customers more aware of alternatives to the private automobile, including car-sharing. By showing car-sharing as a more convenient option and organizing test-drives, the operator can not only showcase its mobility offer but also propose a personalised package to the users engaged in the activity.
- **Promoting electrification:** As emerging in all the cities, electrification can only occur with strong support from the public authorities. Some service providers are willing to switch to electric vehicles as soon as the conditions will mature. This means that (i) vehicles meeting users' needs and (ii) the city needs to have the infrastructure to support EV vehicles – e.g., sufficient number of accessible charging stations, and reasonable charging prices. The operators will naturally shift to electric vehicles once that the market is ready but will hardly push for electrification without proper support.

The list below shows the emerging direct and indirect incentives. For more details on these incentives and their relevance in each city, please refer to Chapters 3, 4, and 5. Again, some of these incentives target the users (such as *Transit passes and membership/ family packages/ Integrated Services/ticketing)*. However, these incentives can also support the service provider developing a better and more sustainable car-sharing system.

Potential barriers and incentives

| Direct | Indirect |
|---|---|
| – Transit passes and membership/ family packages / Integrated Services/ticketing (i) | – MaaS-like services (i) |
| – Dedicated parking lots (i) | – Incentives to homogenize/integrate the car-sharing services (i) |
| – Tax incentives (i) | – Marketing and communication strategies (i) |
| – Flexible/dynamic pricing (i) | – Close/regulated car-sharing market (i) |
| – Parking-related incentives (i) | – Parking facilities close to public transport stops (see integration) (i) |
| – Daily packages to complement hourly or distance-based fees (i) | – Parking incentives for electric vehicles (see electrification) (i) |

#### 6.2.4. **Promoting equity and sustainability**

Public authorities in general, try to promote greener solutions and social equity while addressing mobility improvements. When referring to equity, we mostly refer to how likely is the car-sharing system to be equally available for all users in the transport system. In a completely unregulated market, without any form of incentive, equity is not likely to happen. Car-sharing works best in highly populated, more prosperous areas and not all parts of the city are equally profitable. It is almost impossible to expect a similar level of services in both the city center and the suburbs – not to mention rural areas. While equal access to carsharing is not necessarily a goal that should

be pursued, carsharing can support equity while serving areas where mass-transit is inefficient. Stakeholders opinion on the subjects differ across types and cities. In **Tel Aviv-Yafo**, for example, policymakers showed doubts about promoting car-sharing instead of public transport and stressed that car-sharing should be accessible to low-income people. Operators in **Munich** reported their willingness to provide a good service in all areas of the network but also stressed that incentives should help to make this model more profitable. In **Copenhagen**, which offer impressive car-sharing services, operators reported that the main problem with equity is the lack of support from the authorities.

Based on the results of our analysis, it emerges that incentives, and in particular financial incentives, should mostly be used to support this goal when applicable, resulting in alignment of public and private objectives.

As to environmental sustainability, when users use car sharing, their impact on congestion, pollution, as well as their occupancy (in terms of infrastructure) is potentially the same as for any private vehicle. Therefore, incentives can – and should – be used to make car-sharing greener. This vision can be through a series of incentives discussed in the previous section, including integration, pricing, parking policies, electrification, and increased accessibility.

Potential barriers and incentives

- Coverage outside the cities for longer trips/ connectivity between big cities (i)
- Tax incentives (Electrification, zero-emission fleets, and environmental incentives) (i)
- Parking-related incentives (i)
- Parking facilities close to public transport stops (i)
- MaaS-like services packages / Integrated services/ticketing (i)
- MaaS-like services (i)
- Guaranteed availability (i)
- Flexible/dynamic pricing (i)
- Car Sharing for First/Last mile
- Parking incentives for electric vehicles (i)

## 6.3. Conclusion and recommendation for the survey

This report summarizes the first part of the SHARE-MORE project, using qualitative tools to understand barriers to sustainable carsharing for multiple stakeholders' types, and the personalised incentives that can overcome these barriers. The reported incentives feed the future project tasks and the immediately following users survey. In this section, we provide some recommendations for the upcoming travel survey. First, we shall describe some of the limitations to the current study, which should be considered when preparing the travel survey. Then, tables with lists of potential incentives are presented and some incentives are briefly discussed, as they emerged as crucial when developing personalised incentives. Finally, some concluding remarks are drawn.

### 6.3.1. **Limitations of the current study**

This report focuses on identifying the main barriers in car-sharing systems implementation. We adopted a qualitative approach (focus groups and interviews) to identify these needs and how incentives can help car-sharing systems meeting these needs.

In this sub-section we stress three limitations that should be considered when reading the results from the users' focus groups. First, in this report, focus group participants represent diverse categories of people, such as existing and potential users. However, an individual does not necessarily "represent" his or her class entirely. This is why this report is only meant to be used to support other instruments, such as travel surveys, that can better identify preferences for each class. Second, respondents of the focus group were recruited on a voluntary basis. As known, this often leads to having more respondents that are already committed to the service or to the specific problem, car-sharing in this case. During the SHARE-MORE project, participants have undergone a rigorous selection process in the attempt to avoid this issue. As a consequence, age, gender, car-ownership, and education level were used to select a "representative" sample of users. Yet, tables 5, 10, and 15 (Participants Characteristics) show that some user classes were not fully captured during the recruiting process. These classes include: (1) participants without an academic degree. Bachelor's degree was the lowest level of education in Munich and Tel Aviv-Yafo, and there is no guarantee that their preferences are aligned with users without a degree, (2), Participants living outside the city or in rural areas. Only Copenhagen reported some users living outside the city, and (3) Car-owners who use the car inside the city. There were many respondents who own and regularly use the car. However, many respondents also reported that they do use the car only when public transport is not a convenient option. In this case, the needs of users who own and drive a car into the city might not be fully represented in this report. These limitations should be considered when analyzing the user needs discussed in this report and when designing the travel survey. Also, in the case other researchers are planning to perform a similar study, we recommend to specifically address these elements during the recruiting process.

Finally, this study has been conducted during the COVID-19 crisis. Despite the best countermeasures deployed by the team, this extreme event might have influenced this study.

### 6.3.2. **Specific recommendations**

Based on the discussion performed in sections 6.2 a list of potential users' incentives for personalization to be used in the travel survey is presented in Table 20.

We stress once again that incentives are just tools to meet user needs and trigger significant modal shifts. As such, when developing the travel survey, the analyst should always connect these incentives with the needs described in Section 6.1. Similarly, it emerges in this study that user needs differ from city to city. A brief comparison is provided in Table 21. This comparison offers a preliminary analysis of cities differences which should be considered when designing the survey. To understand these differences, the reader should take into account the user needs described in section 6.1 and, more in detail, those in the dedicated chapter.

*Table 20 - List of potential users' incentives for personalization*

| List of potential users' incentives | Personalization |
|---|---|
| Clear and consistent price regulation | X |
| Marketing and communication strategies | X |
| Coverage outside the cities for longer trips/ connectivity between big cities | X |
| Guaranteed availability | X |
| Reservation/Advance booking systems | X |
| Flexible/dynamic pricing | X |
| Reservation/Advance booking systems | X |
| Possibility to save car-settings | X |
| Offer a variety of vehicles types (different brands and sizes)/choose vehicle depending on your personal needs | X |
| Booking in advance a parking spot | X |
| Option of choosing the same vehicle type/brand (consistency, security) | X |
| Information for parking availability at the destination area beforehand | X |
| MaaS-like services | X |
| Daily fees instead of hourly or distance-based fees | X |
| APP incentives (technology, reminders/notification) | X |
| Mobility credits from car-sharing use: to be able to spend them for public transport modes | X |
| Transit passes and membership; family packages | X |
| Credits that can be exchanged for goods: supermarkets discounts etc | X |
| Third-party validation about location data storage and usage to make sure that it is anonymized and stay private | X |
| Reduced fares when car-sharing combined with carpooling | X |
| Credits that can be exchanged for goods: supermarkets discounts etc | X |
| Tax-incentive (Increase the cost of Car-Ownership) | |
| Mobility stations and mobility hubs | |
| Dedicated parking lots | |
| Monetary incentives from the city | |
| Keep the cost of the car-sharing low | |

*Table 21 - Comparison of the different users' incentives across the three cities*

| Incentives compared across cities | TLV | MUN | CPH |
|---|---|---|---|
| Guaranteed availability | 5 | 3.6 | 4.3 |
| Dedicated parking lots | 4.7 | 4.4 | 3.5 |
| Clear and consistent price regulation / Fixed prices | 3.8 | 4.4 | 3.8 |
| Information for parking availability at the destination area beforehand | 4.5 | 4 | 3.5 |
| Monetary incentives from the city: Keep cost of the car-sharing low | 4 | 4.1 | 3.8 |
| Coverage outside the cities for longer trips/ connectivity between big cities | 4.2 | 3.7 | 3.9 |
| Guaranteed price beforehand for a given trip | 3.8 | 3.4 | 4.2 |
| Option to switch drivers | + | 3.9 | 3.4 |
| Promotional incentives: no registration /renewal fees/ first rides for free | 4.5 | 3 | 3.4 |
| Transit passes and membership; family packages | 5 | 3 | 2.9 |
| Electric vehicles/environmentally friendly vehicles | 2.7 | 4.3 | 3.8 |
| Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling | 3.3 | 4.3 | 3.2 |
| Third party validation about location data storage and usage to make sure that it is anonymized and stay private | +/- | 3.7 | 3.4 |
| Off-street parking close to Public Transport | 3.5 | 3.6 | 3.1 |
| Mobility credits from car-sharing use: to be able to spend them for public transport modes | 3.2 | 3.7 | 3.1 |
| Flexible/dynamic pricing (e.g. reduced prices outside rush hours or in low demand areas) | 3.5 | 3.7 | 2.6 |
| Reduced fares when car sharing combined with carpooling | 4.3 | 2.6 | 2.9 |
| Clear explanation about how location data is stored and handled | +/- | 3.7 | 2.8 |
| Booking in advance (e.g. previous day) | 3.2 | 3.3 | 3.1 |
| Work-related car sharing: Free car-sharing for business trips | 3.6 | 2.6 | 3.4 |
| Information about vehicle condition/cleanliness beforehand | 3 | 3.4 | 2.9 |
| Group packages/accounts (e.g. business packages, colleagues' packages, friend packages) | + | 2.9 | 3.1 |
| Daily fees instead of hourly or distance-based fees | 4 | 1.9 | 2.7 |
| Parking-related credits | 2.5 | 3.3 | 2.8 |
| Offer a variety of vehicles types (different brands and sizes)/ choose vehicle depending on your personal needs | 1.8 | 3.7 | 2.9 |
| High occupancy lanes/dedicated lanes | 3 | 2.6 | 2.4 |
| Additional in-car features included e.g. sound system | 2.5 | 2.4 | 2.1 |
| Credits that can be exchanged for goods: supermarkets discounts etc | 2.2 | 1.6 | 1.9 |
| Option of choosing the same vehicle type/brand (consistency, security) | 1 | 1.6 | 2.4 |

Hereafter, we provide some general recommendations concerning three forms of incentives, both to users and between stakeholders, deserving special attention.

### 6.3.3. Parking incentives

Parking related incentives deserve a dedicated section, given the amount of time that has been dedicated to it during the interviewing process. Probably the most effective source of direct incentive, according to this last indicator. Parking represents the first incentive to be adopted for nearly all the cases discussed until now. For operator companies, this is a significant cost that authorities can easily remove from their budget. Concerning equity, the authorities can use parking incentives to promote social equity. For instance, reducing parking fees in the “hot” areas in exchange for vehicles deployed in less attractive areas. Parking-related incentives can also be used to increase the visibility of the operator, thus increasing its opportunities to attract more clients. By developing mobility hubs, the municipality can use the parking to promote integration between modes, as well as to promote electrification of vehicles. These incentives and their various user offered forms should be extensively investigated during the travel survey.

### 6.3.4. Marketing and communication strategies

Marketing and communication campaigns can be an important incentive, which is often underestimated by the authorities. Munich is a city that is quite progressive on car sharing. Operators and authorities have a direct channel of communication, and the city support several communication strategies. On the website of the city, the municipality has a list of car-sharing operators and a short description about how they operate. It also prepares events and disseminate material (flyers, informative brochure) to promote awareness. Many respondents highlighted that this has a positive impact on the car-sharing, as well as promoting car-sharing as a sustainable mobility option. However, traditional communication strategies still cannot reach all users, as not all users are equally involved in the activities of the city.

The survey should investigate if users are aware of the existing offer. Aware means not only to know that the service exists, but also to make sure that the respondent knows how it actually works. This can be achieved, for instance, by investigating user habits. In terms of incentives, marketing is a perfect form of personalised information. In order to increase awareness, personalised communication strategies (through social media, authorities) should be investigates, so that all potential users can be reached with the right information.

### 6.3.5. Availability, coverage, and fleet diversity

Car availability, coverage, and fleet diversity emerged as highly ranked on users’ needs. It is, however, difficult to directly translate these needs into incentives. Some users would like to drive always the same vehicle, others would prefer to have access to a wide range of vehicles, and others prioritized instant car availability. Additionally, coverage is also a problem. Users would like to have a flexible service that allow them to have a car during the weekend or for a few hours during the week. Accommodating all these needs is quite a challenge and translating these needs into incentive can be even more complex.

From the operator point of view, most of these aspects can be integrated into fleet management strategies. Forms of incentive should thus focus on supporting this activity. From the user perspective, different users have different needs. Personalization plays an important role here. If users can indicate their preferences, personalised packages and offers can be created for each of them. Not all users need instant availability and not all users need a car during the weekend. The survey should investigate these needs, and correlation to users segments so that the operator can provide different packages for different user types, and collect better information during the registration process, for instance by asking the user about habits and car-sharing usage. This personalization can potentially also support the operator in managing the fleet and matching mobility demand and supply.

Also, free-floating car-sharing, station-based car sharing, and peer-to-peer car-sharing serve different mobility needs. These incentives should be tailor-made for the user as well as for the operators' needs.

#### 6.3.6. **Remarks and conclusions**

One of the main conclusions that can be drawn from this analysis is that car-sharing services are currently not able to replace car-ownership on their own. The analysis shows that the decision to choose car-sharing over a private car is mostly – but not entirely – an economical decision. For some users, giving up on the car means giving up on performing certain activities, as car-sharing is simply not perceived as a valid alternative. Another observation is that these needs change significantly from individual to individual. For some users, the possibility to have a shared-car over the weekend is the most important aspect, while for others instant availability is more critical. The car-sharing eco-systems present another level of inherent complexity. Free-floating and station-based systems operate differently, attract different users, and need different types of incentives. Thus, users who are better at planning often rely almost uniquely on station-based systems, while flexible users mostly adopt free-floating services. Yet, there is a large pool of users in the middle that need to be addressed. Personalised incentives present the only viable solution to satisfy all needs. As personalization may increase the otherwise complex system, care should be taken to select solutions that will not confuse the user further and deter carsharing use.

A second element, closely aligned to the first one, is that car-sharing is not sufficiently integrated with other mobility services. As such, it represents at most a poor replacement for the private car. Integration brings the added value of other mobility services, such as public transport, e-scooters, taxis, and bike-sharing, into the car-sharing model, making all services more attractive. Together with the concept of tailor-made mobility offers already introduced, this opportunity is perceived as the main way to promote car-sharing and fight car-ownership.

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# Appendix

## Focus Group Discussion Script

Participants will have 10-15 minutes of starting time prior to the focus group, in which they can fill out sign-in forms and settle in.

1. Opening and welcoming (10 minutes)
    - Introductions of moderator, assistant moderator, and possibly participants (if they want).
    - Distribute the consent forms, background questionnaires, sign-in forms, and focus group scripts.
    - Explaining the purpose of the focus group discussion, and an overview of the topic by moderator (e.g. the project/sponsor, the aim of the discussion)
2. Ground rules of the session declared by moderator:
    - Explain to participants that there is no right and wrong answer to the questions, and their opinions matter in the discussion, whether right or wrong, or you agree or not.
    - Request all participants to be engaged in the discussion.
3. Confidentiality of data: All information is confidential; however, the discussion will be recorded without identification of the speakers later in the transcribing. If someone denies, the session should not be recorded, instead the moderator assistant has to transcribe the discussion.
4. Operate recording equipment, if all participants consent to be recorded.
5. It should be clarified that the data regarding the participants characteristics (age, gender, car ownership, use of sharing services, resident district, and work district) will be used in the project anonymously.
6. Presentation of car-sharing services (free-floating and station-based), carpooling, and incentives.
7. Discussion about the list of proposed incentives. The discussion should be conducted as follows:
    - Let us consider the following list of incentives. Starting from the first on the top, what are your opinions about it?
    - Is there any other incentive you want to add to this list?
    - Every participant ranks the incentives (this can be done by writing a list)
8. Questions/Discussions (60-75 minutes)
9. Closure (2-3 minutes)
    - Thank participants (in this project, there is no incentive for participating in the study)
    - Stop recording devices/phone, and rename/save the audio file.

*Table 21 - Focus Group Questions*

| Focus Group Content - A | Main Questions | Prompt Questions | Probe/Closed-ended Questions |
|---|---|---|---|
| **Topic 1: Engagement** | Today's topic is Car-Sharing. What are your general feelings about it?<br>**Or**<br>What comes to your mind when you hear "car-sharing"? | 1. What do you already know about car-sharing?<br>2. Is there anything you would like to know about it?<br>3. How familiar are you with car-sharing? | 4. When, how, and where do you use Car-Sharing?<br>5. What do you like best about Car-Sharing?<br>6. What do you like least about Car-Sharing?<br>7. Why do you like Car-Sharing?<br>8. Why do you not like Car-Sharing? |
| **Topic 2: Demand related Incentives** | Why did you decide to use a car-sharing service? If you are not a user, why did you decide not to use this service?<br>**Or**<br>What facilities and barriers do you perceive for using car-sharing?<br>**Or**<br>What kind of incentives would make you more inclined to use more Car-Sharing? | 1. Do you consider car-sharing an alternative to public transport or to privately owned cars?<br>2. What transport mode do you think is the largest competitor to Car-Sharing? Why?<br>3. What features do you think are better in competing services?<br>4. Would you ever consider renouncing car ownership in favour of car-sharing? If so, what would it take to give you more peace of mind?<br>5. Are you familiar with the concept of car-pooling? | 6. Would you consider buying car-sharing a monthly pass (e.g. a certain number of discounted/free miles)?<br>7. Do you think car sharing is too expensive?<br>8. Would you consider travel incentives (token, reduced fares)<br>9. Would you consider combining car-sharing and car-pooling?<br>10. Would you consider combining car-sharing and Public transport in your commute?<br>11. Would you consider family car-sharing packages? Why?<br>12. How Important is vehicle size? Would you be comfortable with small vehicles?<br>13. Do you prefer the car-sharing company to offer a variety of vehicle types for you to choose depending on your needs?<br>14. Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling.<br>15. Reduced fares when car sharing combined with carpooling<br>16. What are your feelings toward registration fees? |

*Cont. Table 21 - Focus Group Questions*

| | | | |
|---|---|---|---|
| **Topic 3: Supply related Incentives** | What recommendations do you have to help promote car-sharing in your city? | 1. What is the main concern when choosing car-sharing?<br>2. How significant is this problem or concern?<br>3. How would you expect the operator to solve it?<br>4. Is there anything that has deterred you from using car-sharing?<br>5. What would make you more inclined to use car-sharing? | 6. What do you think about HOV (High Occupancy Vehicles) lanes?<br>7. What do you think about HOV (High Occupancy Vehicles) parking areas?<br>8. Would you be more satisfied with Car-Sharing dedicated parking lots?<br>9. Would it be helpful if you have knowledge/ are routed about / to free (dedicated) parking lots?<br>10. Is congestion pricing deterring you from using the car?<br>11. Would dynamic pricing influence your choice?<br>12. Would electric shared vehicles motivate you to use car-sharing?<br>13. Would you worry about running out of battery? / Would you be concerned about charging the vehicle?<br>14. What other information you need when it is to use car-sharing (i.e. availability of car-sheets for kids etc.)?<br>15. Do you see an added value in having car sharing services in the same location as other mobility services, e.g. bikesharing, public transport, so that transition between modes is possible<br>16. Would it be helpful to have coverage outside the cities for longer trips/ connectivity between big cities |
| **Topic 4: Usage** | Would you like to share more on your overall customer experience/expectations? | 1. Did you find subscribing to the car-sharing service easy? What difficulties did you face (if any)?<br>2. How has your opinion of car-sharing changed over the past three years?<br>3. How has your usage of this product changed over the past three years?<br>4. What are your expectations when subscribing to car-sharing?<br>5. Do you expect to buy/renew your subscription? Why or why not?<br>6. Did you experience that your service provider went out of business | 7. What are the best advantages of free-floating and station-based services? (Provide examples)<br>8. Which payment methods do you prefer? Day/hour/minute/mile?<br>9. What are your feelings toward registration fees? |
| **Topic 5 Exit Questions** | Is there anything else you want to add to the conversation about Incentives for car-sharing systems? | 1. Do you feel that any relevant topic or issue about car-sharing has not been addressed?<br>2. Would anyone else like to build-off of an opinion that has already been stated by another group member?<br>3. Is there a specific topic we want to circle back to from this discussion to add or expand on? | |

# Interview Discussion Script

1. Welcoming (10 minutes)
    - Introductions
    - Provide consent forms and interview script.
2. Purpose of the interview:
    - The project/sponsor.
    - The aim of the discussion and an overview of the topic
3. Ground rules of the session
    - We would like the participant to be engaged in the discussion
    - We would like to hear your opinion/experiences about the questions. The participant should be allowed to deviate from the script.
4. Confidentiality of data: All information is confidential; however, the discussion will be recorded without identification of the speaker later in the transcribing. If the interviewee denies, the session should not be recorded, instead the moderator assistant has to transcribe the discussion.
5. Operate recording equipment, if the interviewee consents to be recorded.
6. The interview is semi-anonymous, as the name of organisation/company will be stated in the study.
7. Questions/Discussions (90 minutes)
8. Closure (2-3 minutes)
    - Thank the participant
    - Stop recording devices/phone, and rename/save the audio file.

*Table 22 - Interview Questions*

| Interview | Main Questions | Prompt Questions | Probe/Closed-ended Questions |
|---|---|---|---|
| **Topic 1: Engagement** | Today's topic is Incentives for car-sharing.<br>1. Can you explain to us how you would position yourself within the car sharing Market?<br>2. Can you explain to us how you would position yourself within the car sharing Market? | 1. Do you have experience with car-sharing Incentives? | 2. Are you a car-sharing user?<br>3. What do you like best (or least) about car-sharing services?<br>4. What do you think is the greatest obstacle for car-sharing? |
| **Topic 2: Barriers** | What types of barriers exist from a business, operational or governmental point of view? | 1. What are the main concerns regarding car-sharing services?<br>2. How significant are these problems or concerns?<br>3. How would you expect the operator/transport authorities to solve it?<br>4. Different experiments showed that car-sharing is not a profitable business (US, Examotive). Do you think car-sharing can survive without public incentives?<br>5. What transport mode do you think is the largest competitor to car-sharing? Why?<br>6. What features do you think are better in competing services?<br>7. Do you think that car-sharing can help to reduce car ownership? Why?<br>8. Is the municipality supposed to help car-sharing operators? Why?<br>9. What is something that would make car-sharing a more self-standing business? | 10. What is your experience with car-sharing abonements/ monthly passes (e.g. a certain number of discounted/free miles)?<br>11. And travel incentives to improve sustainable transport modes (token, reduced fares)?<br>12. What do you think about offering car-pooling and car-sharing together?<br>13. What do you think is the best way of combining car-sharing and Public transport?<br>14. How Important is to offer different vehicle sizes to the user? |
| **Topic 3: Incentives** | What do you know about car-sharing related incentives? | *No probe questions*<br>1. Are you familiar with personalised incentives tailored to the needs of users?<br>2. Are you familiar with incentives tailored to the needs of service providers?<br>3. Are you familiar with incentives derived from the needs of transport authorities and the overall transport policy and objectives? | |
| **Topic 4: Considerations for incentives?** | What should be the main considerations for incentives and in what way? | *No probe questions*<br>1. …Incentives for service providers?<br>2. …Incentives for users?<br>3. …Incentives derived from the overall transport policy and objectives (which aims to reduce congestion and air pollution levels resulting from private vehicle travel)? | |

*Cont. Table 22 - Interview Questions*

| | | |
|---|---|---|
| **Topic 5: Enlarging customer base?** | What are your main activities to maintain and enlarge the customer base? | 1. What is your opinion regarding reduced cost incentives (up to a free ride)? Are you offering such incentives?<br>2. What do you think about incentives that refer to gifts or discounts for services or other products that may be attractive to the customer? Are you offering such incentives?<br>Can you think about examples of incentives that refer to gifts or discounts for services or other products that may be attractive to the customer? (Example for incentives that refer to gifts or discounts for services or other products are movie tickets or restaurant coupons). |
| **Topic 6: Reduced cost incentives** | 1. What do you think about reduced cost incentives for users?<br>2. What do you think about incentivizing operators to offer reduced cost incentives for users?<br>Reduced cost incentives are incentives that include travel characteristics and possible dates set as part of the incentive. For example, a ride that starts at 8:30 pm on weekdays at half of the full price of this trip (for students and young professionals). | What do you think about the following reduced cost incentives?<br>1. Travels from areas where there is a relatively large number of vehicles to areas where demand for travel is expected (this type of travel improves the match between demand and supply, without the need for dedicated personnel to carry the vehicles from one place to another).<br>2. Travels at the "first & last kilometre"; e.g., to/for train stations (are there any other related incentives beyond cost? can service providers be also incentivized for reducing the transition barriers?).<br>3. Travel during low-income periods using the service to reduce the supply-demand gap (this type of travel increases the economic sustainability of the service and reduces congestion in high traffic times).<br>4. Travel of non-active users (i.e., users who are registered on the system but in practice rarely use it). |
| **Topic 7: Other Incentives** | Can you think about other incentives…?<br>1. …for users?<br>2. …for providers?<br>3. …for real estate developers?<br>4. …for shopping mall managers?<br>5. …for public transport operators? | Providers<br>1. Are the operating vehicles equipped with all basic features? Any advanced features? Examples?<br>2. Are there any critiques regarding the vehicles?<br>Real estate developers/shopping mall managers/public transport operators<br>1. What incentive can encourage you to support car-sharing in your business decisions?<br>2. Replacing a few mandatory privately owned parking places by a Car-Sharing station?<br>What do you think about the following incentives?<br>1. Promotional incentives: no registration or renewal fees.<br>2. Work-related car sharing: free car-sharing for business trips.<br>3. Possible collaboration with public transport:<br>a. Off-street parking sponsored by the city in exchange for a closer collaboration with PT (e.g. enhance PT converge).<br>b. Joint searching, ticketing and pricing app/mechanism.<br>c. Transit passes + membership.<br>4. Tax-Incentives: Tax incentives for those commuting with sustainable transport alternatives, including car-sharing and carpooling.<br>5. Monetary incentives from the city: Keep cost of the car-sharing low.<br>6. Environmental incentives: Limiting use of traditional services.<br>7. Fixed and flexible pricing. |

*Cont. Table 22 - Interview Questions*

| | | |
|---|---|---|
| **Topic 8 Exit Questions** | Is there anything else you want to add to the conversation about Incentives for car-sharing systems? | 1. Do you feel that any relevant topic or issue about car-sharing has not been addressed?<br>2. Is there a specific topic we want to circle back to from this discussion to add or expand on? |

# Consent form

Title of Project: SHARE-MORE

Please check the box(es) to confirm you have read and agreed,

1. I confirm I have been informed about the purpose of the above study. I have had the opportunity to consider the information, ask questions, and have had these answers satisfactorily. ☐

2. I confirm I have been informed that this study complies with General Data Protection Regulation (GDPR), in which the collected data will be deleted after 2 years from the collection date. ☐

3. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. ☐

4. I understand that the information collected about me will only be used, shared, or stored anonymously (i.e. only non-identifiable information will be shared; any personal information will be deleted) ☐

5. I agree to take part in the above study. ☐

| | | |
|---|---|---|
| Name of Participant | Date | Signature |
| Name of Person taking consent | Date | Signature |

## Background Questionnaire

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To help us project the responses from this small sample to the population as a whole, we'd like to ask you a few background questions.

1. Which category below includes your age?
☐ 18-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60+

2. What level of education have you completed?
☐ Under bachelor ☐ Bachelor degree ☐ Master degree ☐ Above Master ☐ Other

3. What gender do you identify with?
☐ Female ☐ Male ☐ Prefer not say ☐ Other (specify) _____

4. Including yourself, how many people live in your household? _____

5. How many children do you have? _____

6. If so, which category below includes your children's age?
☐ <3 (Baby) ☐ 3-8 (Early childhood) ☐ 9-11 (childhood)
☐ 12-18 (Adolescence) ☐ +18 (Adult)

7. Where do you live? (*i.e.* the place where you live most of the time throughout the year)
5-digit Zip: _____ [Optional]

8. Choose the proposal that best fits to the location of your home:
☐ In the center of a village
☐ In a subdivision of a village
☐ In the center of a small town
☐ In a subdivision of a small town
☐ In the center of a big city
☐ In a neighbourhood located between the center of a large city and its suburbs
☐ In the suburb of a big city
☐ Your home is isolated

9. What is your current employment status?
☐ Employed full-time ☐ Unemployed ☐ Retired

☐ Employed part-time ☐ Student ☐ Unable to work

10. At what age did you get your driver's license? _____

11. Does anyone in your household own a car?
☐ Yes ☐ No

12. If so, please specify the numbers of cars in your household. _____

13. What is your primary mode of transportation during a typical week? (you can select more than one mode)
☐ Walking ☐ Private car ☐ Rideshare ☐ Bus ☐ Train
☐ Metro ☐ Bicycle ☐ E-Scooter ☐ Taxi ☐ Ferry

14. On a scale from 1 to 5, how often do you use any Car-Sharing service?
☐ Never ☐ Rarely ☐ 2-5 times daily
☐ 2-5 times weekly ☐ 2-5 times monthly ☐ More - please specify _____

15. If so, are you currently registered as a member of any Car-Sharing?
☐ Yes ☐ No

# Invitation letter

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Dear [*Name and address of participant here*],

We are working together with the [*City of Munich/City of Copenhagen/City of Tel Aviv*] to design incentives for promoting car-sharing usage. [*We are getting together a small group of citizens/We are interviewing selected experts*] to better understand how personal preferences and lifestyle affect the adoption of car-sharing services. We would like to get ideas about what users need.

The information and insights you will give us can help policymakers and transportation providers develop services that are more responsive to your needs. Your participation in this [*focus group/interview*] is entirely voluntary, but your feedback is extremely important to us, **even if you are not a car-sharing user**.

The [interview/focus group] will take place:

Date:_____

Time (~2 hours)

Place: _____

We will have some refreshments.

Would you be able to join us?
[instructions to how to confirm]

Sincerely,