Reducing Private Car Ownership by Switching to Shared Mobility: A Survey Among Car Owners in The Netherlands' Major Cities

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Research Thesis

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Preface

This thesis is the grand finale of an amazing period of my life. Completing a full bachelor's degree at the Delft University of Technology in 36 months, along with an Honours Programme certificate and a (to be published) paper (on perceived accessibility of long distance air transportation in a Dutch focus group context) is something that I am very proud of. Other activities like being the treasurer of student futsal club FC Tutor for 2 years and being part of the TPM faculty promotion team have also been great additions to my time as a TPM bachelor student. All in all, these have been a memorable 3 years.

Conducting a big survey and writing a thesis in times of a pandemic has proven to be quite challenging at times. Not being able to meet face-to-face with my supervisor and peers has made it more difficult to exchange ideas and talk about our work in a more casual setting. Motivating myself to start working also became more and more difficult as winter turned to spring and then summer, where I frequently encountered writing problems first experienced by Dennis Upper (1974). The university's guidance with periodic deadlines and supervisor meetings has proven helpful in that regard.

For this project specifically, special thanks go to my parents for helping me fine-tune the survey questions and its duration from a respondent point of view, and to Nikos and my project peers for their feedback and ideas on the setup of the project. My thanks also go to Shayreen Valent and Rik Salomé for their service and assistance with the survey and recruitment, and of course to all the (anonymous) respondents who took time out of their day to provide answers to my survey questions.

I hope you, dear reader, will enjoy my work and see the value in my findings.

Summary

Sharing mobility is the idea of sharing vehicles between a group of people, rather than everyone having their own vehicles. Cars take up a lot of space: research has shown that they are parked for 23 out of 24 hours every day (EenVandaag, 2018). Reducing the amount of space taken up by private cars can be achieved by sharing them, and creates space for parks and residential areas. A single car can replace up to 13 privately owned vehicles (Mobeasy, 2019). However, this change can only occur if current private car owners make the switch from private ownership to using a shared service.

The research question of this report asks which aspects of a shared mobility service need to be supported by policy to effectively reduce Dutch private car ownership. This question is answered by first forecasting the state of private car ownership for the next 20 years to evaluate the severeness of the problem. Then, survey results are analysed to research why private car owners choose to keep their private car rather than use shared mobility, which aspects of a shared mobility service are most important to Dutch car owners, and what those owners find most important to improve about shared mobility. The survey was held among car owners (n=200) living in the Netherlands' 4 largest cities. This very precise sampling unit leads to highly relevant results because car owners in big cities are the exact target market to solve this problem.

Results show that the average number of cars per household is set to increase despite a dramatic increase in the number of households, especially for people living alone. Private car owners currently prefer to keep their cars because they fear being dependent on a shared service, have hygiene concerns and are worried about the feasibility and cost of using a shared car for long trips or very frequent usage. The results further demonstrate that the price per hour of a shared mobility service is deemed most important, followed by the type of fuel (a strong preference for electric vehicles) and price per kilometer. Walking time and additional transport modes of the service do not significantly influence the results. When asked what aspects of shared mobility services need to be improved, a broad selection is mentioned. Respondents want a bigger and more diverse vehicle fleet, a bigger operating area to start and end journeys, better availability of vehicles and better car conditions in terms of cleanliness and damage.

Respondents are willing to switch to shared mobility in the far future, but are a lot less enthusiastic about doing so in the coming few years. This is an indication that the often encountered 'attitude-behaviour gap' (Hamari et al., 2015, Laya & Vyas, 2021) in sustainable innovation is present among Dutch car owners as well.

The most important aspects of shared mobility to improve are 1) a solution for high costs of longer-term or heavy use of shared mobility, 2) nationwide operating areas and 3) level of service and vehicle variety guarantees that enable users to depend on shared mobility for all their transport needs.

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1. Introduction

A shift from car ownership to shared mobility is seen as the future of urban transportation (McKinsey, n.d.) due to its advantages in freeing up space (Mobeasy, 2019), better environmental performance (Nijland & van Meerkerk, 2017) and cost savings for the average car owner (Roukouni & Homem de Almeida Correia, 2020).

Pre-pandemic research has shown that privately owned cars are unused 23 out of the 24 hours each day (EenVandaag, 2018). All these cars take up a lot of space, which could instead be used to build desperately needed housing, or create parks and other recreational areas to increase the public's quality of life. On top of that, fossil-fueled cars emit greenhouse gasses locally, which is undesirable for city life. It becomes much easier to drive electric when you are using shared mobility (Van Wee, 2020), because electric cars can be used for the majority of trips and fossil cars are there for when there is the occasional long distance trip. Finally, research has shown that the majority of users of shared mobility save money in doing so. Research in the United States found that households saved between $154-435 per month after joining car sharing services (Shaheen & Cohen, 2018).

Policymakers and shared mobility operators share common goals, which makes cooperation very likely and highly lucrative. The government wants to encourage the switch to shared mobility because of the aforementioned positive influences. The Paris Climate Agreement requires that the Netherlands reduce 49% of their 1990 greenhouse gas emissions by 2030 (Rijkswaterstaat, n.d.). Local governments are also supportive due to the positive effects on freeing up space and increasing quality of life in their cities.

The complication in this problem is that private car ownership is currently the norm when it comes to transportation, and that it is unclear how this level of private ownership can be reduced effectively. People will not like getting rid of their car (Franckx, 2017). There exists a problem in the system: it is relatively straightforward to convince someone of the benefits of shared mobility and reduction of private car ownership. However, once you ask them to get rid of their own car they will suddenly be a lot less enthusiastic about the initiative. They see the need for societal change, but would rather see that others are affected first. This is confirmed by scientific research in the field of shared mobility: Hamari et al. (2015) have found that an attitude-behaviour gap exists in collaborative consumption like shared mobility. People perceive shared mobility positively but fail to make the switch to action. The government wants to increase the use of shared mobility, but it is currently unclear which aspects of shared mobility are deemed most important by potential new users. Insight into this will help policymakers and service operators craft policy to stimulate shared mobility.

Effectively reducing private car ownership is a key question in transitioning towards shared mobility. This can obviously be achieved by making car ownership very expensive (taxes, parking costs, etc.) like Singapore has done (BudgetDirect, 2019), but encouraging the use of shared mobility in a positive manner is a more desirable approach. The question is which aspects of the service need to be backed or encouraged by policy to most effectively reduce private car ownership.

To answer this question, several sub-questions have been formulated about the expected trend of private car ownership into the future, why respondents choose to keep a private car when a shared alternative is available, which aspects of a shared mobility service are most important to Dutch car owners, and what aspects are most important to improve according to Dutch car owners.

Similar research into this topic has been conducted by Burghard and Dütschke (2019). Via online surveys (n=1558, n=947), they investigated the demographics of shared car users, how the attractiveness of shared mobility relates to that of electric driving, and what the perceptions underlying those preferences are. They found that shared mobility users predominantly come from a single socio-demographic group (younger couples without cars), that the affinity for shared mobility is very closely linked with an affinity for electric driving, and that perceived compatibility with their daily life is the most important preference.

The approach for this research to answer the research question is to conduct a survey among Dutch car owners who live in the four largest cities: Amsterdam, Rotterdam, The Hague and Utrecht. The effect of different variables of a shared mobility service that policymakers and shared mobility operators can influence will be investigated via conjoint analysis. Trend analysis will be used to forecast the development in private car ownership in cities if the government or shared mobility operators would not take any action. This information serves as a comparison baseline for the survey's main results. Along with the conjoint analysis, the survey includes statements about current attitudes and behaviours regarding shared mobility, and about improving shared mobility services. Factor analysis along with analysis of response distributions of individual statements will provide insight into the perceptions towards shared mobility of this crucial target market.

The described knowledge gap requires data collection and analysis to answer the research question. While the results can be used as input for policymaking by various levels of government and for commercial purposes by shared mobility operators, this research is not intended to directly advise a company or political entity, nor has it been commissioned by one.

The aim of this study is to discover which aspects of shared mobility services are most important to Dutch potential new users, and therefore need to be supported by policy to effectively reduce private car ownership in The Netherlands. The results of this research can be used as input for future policies, to more effectively and efficiently create policy that will contribute significantly in the reduction of Dutch private car ownership and transition towards shared mobility, to achieve the Paris Climate Agreement goals and improve quality of life in Dutch cities.

The second chapter will present the research questions and sampling technique for this research. Chapter three will discuss the methodology. Chapters four to seven are each dedicated to one research subquestion. Chapter four forecasts the private car ownership trend, chapter five discusses the factor analysis on statements about the use of shared mobility. In chapter six, the results from the conjoint analysis and factor analysis are used to calculate linear regression models, and finally chapter seven will discuss the survey results regarding the improvement of shared mobility services. Chapters eight and nine are dedicated to discussion and conclusions respectively.

2. Research Questions and Sampling

This chapter presents the research questions and conceptualisation of the study. The sampling unit and sampling technique will also be discussed.

2.1 Research Questions

The main research question of this research proposal is:

> *Which aspects of a shared mobility service need to be supported by policy to effectively reduce Dutch private car ownership?*

To answer the main research question, several subquestions have been formulated:

1) *What is the current state of Dutch private car ownership per household? How is it forecasted to develop?*
2) *What are reasons that Dutch private car owners choose to keep their private car when a shared mobility alternative is available?*
3) *Which current aspects of a shared mobility service are most important to Dutch private car owners?*
4) *Which aspects of a shared mobility service are most important to improve according to Dutch private car owners?*

Subquestion 1 is included in order to gauge what the natural trend of private car ownership would be if the government would not intervene via policies that stimulate the use of shared mobility. Subquestions 2, 3 and 4 are included to research the attitudes of private car owners towards shared mobility, and to assess what policies stimulating shared mobility should look like to be effective at reducing private car ownership. Together, the four questions can comprehensively answer the main research question.

The core of the research can be conceptualised as seen in figure 1 below. The conceptual model shows the input and output variables for the conjoint analysis of subquestion 3. The dependent variable is the score of the profile that the respondent gives. The independent variables are the prices, number of transport modes included, walking time to vehicle, fuel type of the car, age, gender and psychological factors that are derived from the results of subquestion 2.

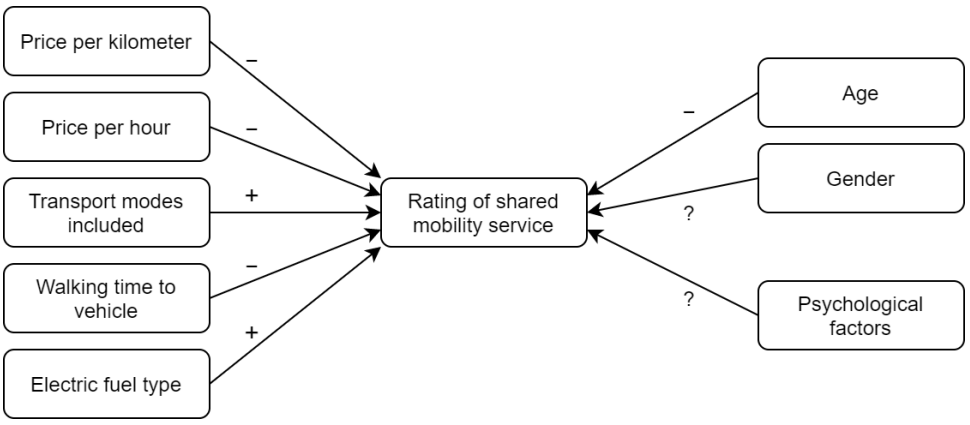

Figure 1: Conceptual Model

2.2 Sampling Unit

The sampling unit of the research is 200 Dutch private car owners that live in the 4 largest cities (Amsterdam, Rotterdam, The Hague and Utrecht, also known as the 'Randstad'). These cities could all benefit from a reduction in private car ownership, and have sufficiently developed shared mobility networks. The latter is important for 2 reasons: a well-developed network makes switching to shared mobility a real option for respondents, and a well-developed network means that some respondents have actually used shared mobility on a few occasions, and are familiar with the service. That results in more legitimate and significant research.

Respondents are recruited via platform *Respondenten.nl* using the convenience sampling technique and with the requirement that all respondents own at least 1 private car and live in one of the 'Randstad' cities. The survey is conducted in Dutch, and takes around 7 minutes to complete.

More information on the sampling can be found in Appendix B.5: Survey Respondents & Data Collection Process.

2.3 Description of the Sample

Out of the 200 respondents, 102 identify as male (51%), 96 as female (48%) and 2 preferred not to say their gender (1%). This means that men are slightly overrepresented in the sample, as they are a slight minority in society (49.67%) compared to women (50.32%) (CBS Statline, 2020-a). Overall, the sample can be considered representative of the population regarding gender.

The age distribution of the sample can be seen in figure 2 below. The youngest respondent is 22, the oldest 77. The distribution is largely uniform over the age range, with a peak between ages 32 and 40. The mean age of the sample is 48.3. This means that the sample is slightly younger than the average age of the adult population (49.6; CBS Statline, 2021), but still very representative.

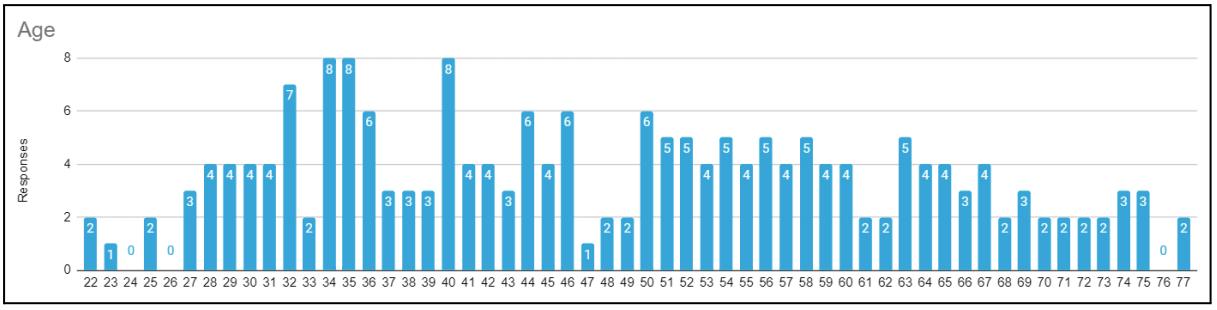

Figure 2: Age Distribution of Sample

The majority (59%) of respondents live in Amsterdam. The second largest city in the sample is Rotterdam (20.5%), followed by Utrecht (15.5%) and then The Hague (10%). Relative to the population, Amsterdam is highly overrepresented in the sample (59% vs. 35.9% in population) (CBS Statline, 2021). Utrecht is accurately represented (15.5% vs. 14.8% in population), and Rotterdam and The Hague are underrepresented, with 26.8% and 22.5% of the population respectively (CBS Statline, 2021).

All the respondents have a car, as they were selected to fit this criteria. Of the 200 respondents, 48 (24%) indicated that their household had 2 or more cars. Only 5 of the 200 respondents (2.5%) indicated that their household had an electric vehicle. 24 respondents (12%) said they owned a scooter, with the majority of them owning a fossil-fueled scooter rather than an electric one. These results show that the sample is very fossil-car dominated.

The majority of respondents (69.5%) do not use shared mobility. 20% said they used an OV-bike occasionally, and 13.5% said they used a shared car service. Of the 200 responses, 48 (24%) used shared mobility 1-10 times per year, with only 20 (10%) using it more frequently than that.

The fact that the sample is dominated by fossil-fueled car ownership and the majority does not use shared mobility (in large cities, where these mobility networks are well-developed already), confirms that this sample group is a highly relevant target market for the shared mobility industry.

More information on the description of the sample can be found in Appendix B.1.

3. Methodology

This chapter presents the methodology of this research. Each subsection will discuss the specific approaches and analytical techniques for each of the four research subquestions.

3.1 Forecasted Private Car Ownership

The research on the trend of car ownership in Chapter 4 is carried out with literature research and trend analysis. This answer will provide a baseline, to see what future car ownership would be like if the government did not take any further action to promote shared mobility.

Historical databases will be used to plot the trends of car ownership, number of households and car ownership per household. That historical basis of at least 20 years is then used to extrapolate the trend into the next 20 years.

3.2 Perceptions of Private Car Owners towards Shared Mobility

Chapter 5 is a core chapter of the research. Survey respondents are presented with eleven statements about the use of shared mobility, the results of which act as input for a factor analysis. Factor scores are created from that analysis, to be used in the conjoint analysis of chapter 6.

The factor analysis is carried out using the Principal Axis Factoring method. Orthogonal rotation is preferred so that the resulting factors do not correlate amongst themselves, leading to better interpretable results.

3.3 The Importance of Various Aspects of a Shared Mobility Service

Chapter 6 is a conjoint analysis of the importance of various aspects of a shared mobility service. Conjoint analysis has been used for a wide variety of consumer research problems for a long time (Green & Srinivasan, 1978). It is a very popular research method for marketers to research how consumers perceive trade-offs (Green et al., 2001). It is a 'Stated Preference' rather than 'Revealed Preference' research method, which makes it suited to exploring hypothetical designs, and doing predictive research into future products (Hagerty, 1985).

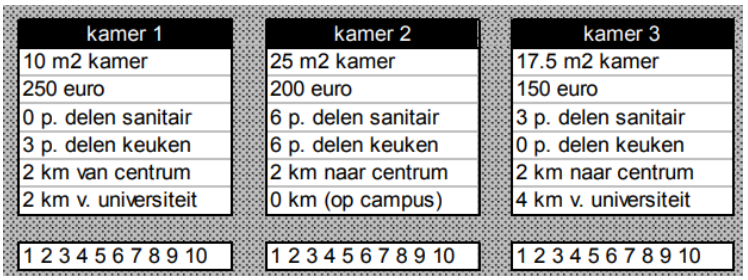

Figure 3: Example of Conjoint Analysis Profiles (Molin, 2020-b)

While this research is not about marketing, the research method does apply because, like marketing, this research looks at the perceptions of potential customers (current private car owners) towards a new product (shared mobility service).

Profiles are created using orthogonal designs so that they do not correlate. As a result, the importance of each aspect can be calculated in a linear regression model. Variables in the regression analysis will consist of the aspects of shared mobility services but also social-demographic characteristics like gender and age to control the findings for social influences. Additionally, factors from the factor analysis in chapter 5 will be converted to factor scores and then included in the final regression model of chapter 6. The dependent variable of the analysis is the respondents' rating of the shared mobility service.

3.4 Improving Shared Mobility Services

Chapter 7 is dedicated to improving shared mobility service from the point of view of private car owners. Insight into their opinions can prove to be vital in making the right policy decisions to effectively reduce private car ownership. Respondents are presented with a number of statements on various ways to improve shared mobility services, which they are able to answer on a 7-point Likert scale. Respondents also have the possibility to list any further improvements in an open question at the end.

These results will be interpreted in a rudimentary way. Conclusions will be drawn by looking at response distributions and comparing similar statements and analysing the differences in their responses.

The final section of chapter 7 asks respondents whether they are willing to switch to shared mobility in the next few years, and in the far future. Again, these two statements are answered on a 7-point Likert scale. The responses are compared to each other, and placed in a larger context with other literature.

4. Forecasted Private Car Ownership in the Netherlands

This chapter relates to research subquestion 1 and will discuss private car ownership in the Netherlands. Various online sources are used to create forecasts of the next 20 years for the number of cars and households. One of the goals of policy that supports shared mobility initiatives is that car ownership is reduced. The extrapolated trends in this chapter will show the likely development of private car ownership without any impact from the shared mobility sector.

4.1 Cars in the Netherlands

In 2020, there were 8.7 million personal cars (excluding vans, trucks, etc.) in the Netherlands, an increase of 14% compared to 2010. 1 million of those cars are currently registered to businesses, the rest are privately owned. This growth rate has been fairly constant for the past twenty years, as can be seen in figure 4 (Central Bureau of Statistics, 2021).

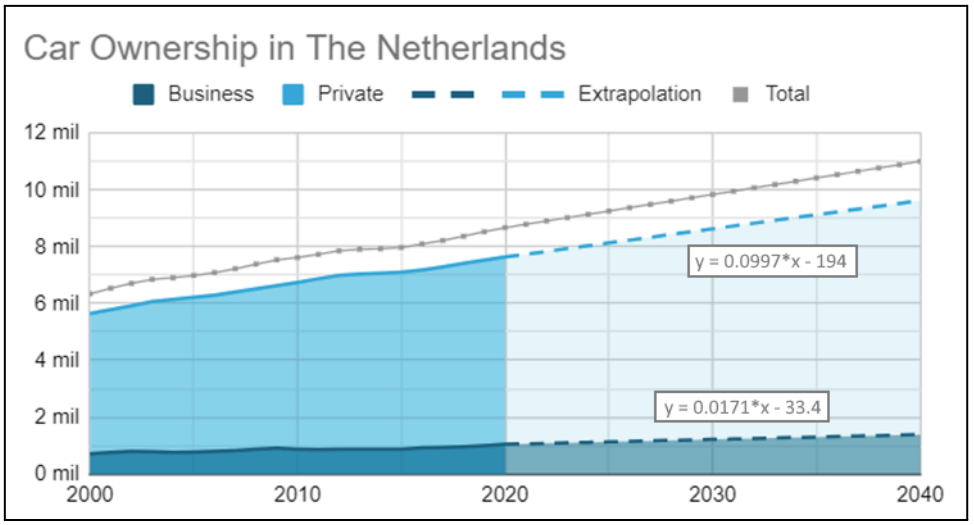

Figure 4: Personal Car Ownership in The Netherlands

When the trend of the past 20 years is extrapolated to the next 20 years, the result is that the number of personal cars on the roads is expected to reach 11 million by 2040. These cars all need to be parked somewhere, as EenVandaag (2018) research pointed out that cars are parked for 23 hours every day. This can create major trouble for life in inner cities, and is one of the reasons why shared mobility is seen as a solution.

4.2 Households and the Population

Another trend that threatens the availability of space in inner cities is the fact that the number of people per household has been decreasing over the past 60 years. On average, there are 2.14 people in a Dutch household today, a decrease of 40% compared to 1960, when there were 3.56 people per household. The amount of single households has increased by 800% (Central Bureau of Statistics, 2020), and this trend is set to continue as the convention of marrying young (or even marrying at all) continues to pass into history (CBS Statline, 2020-b). Single households in 2020 accounted for 39% of all households, a number that is set to increase to more than 42% in 2040 at the current rate.

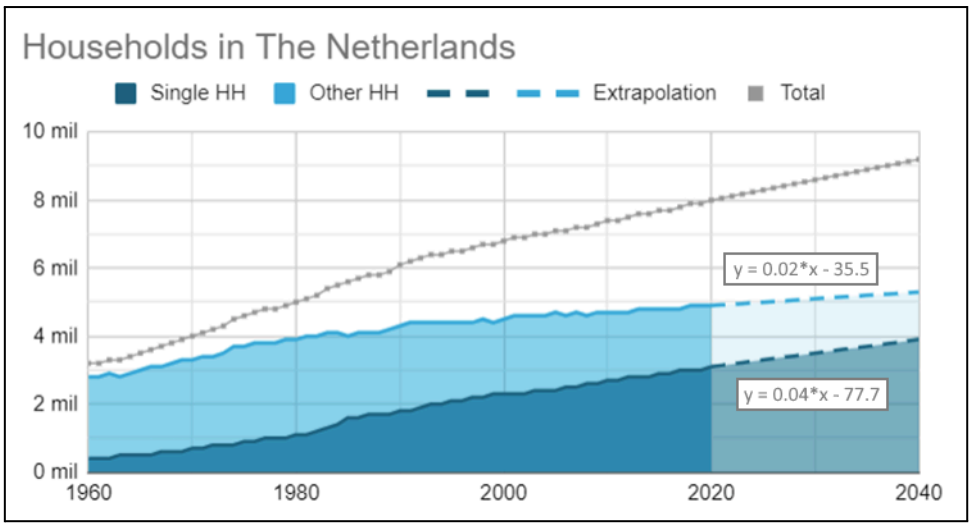

Figure 5: Households ('HH') in The Netherlands

4.3 The Trend of Cars per Household

A lower population density would decrease the number of cars in inner cities, were it not for the fact that the number of cars is outgrowing the number of households. When dividing the total number of cars in figure 4 by the total number of households in figure 5, it becomes apparent that the number of cars per household is set to increase despite the decrease in people per household.

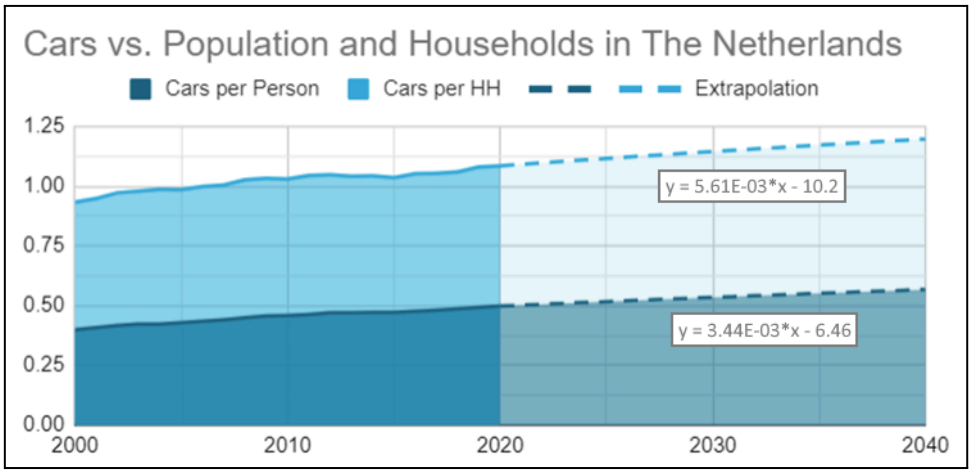

Figure 6: Personal Cars per Household in The Netherlands

From these figures, we can conclude that the number of cars per household, as well as the number of households themselves are growing. This means that available space in big cities will continue to disappear. There is real potential here for shared mobility, since cars are stationary 23 out of 24 hours per day (EenVandaag, 2018) and a single shared car can replace up to 13 privately owned vehicles according to Mobeasy (2019). Converting current private car owners into shared mobility users is crucial to realising this potential. The next chapters are dedicated to the perceptions of this target market on shared mobility.

5. Perceptions of Private Car Owners towards Shared Mobility

This chapter presents the results of a section of the survey that has been set up for research subquestion 2. Respondents were asked to rate 11 statements on the use of shared mobility, on a 7-point Likert scale. Their results will be analysed using factor analysis.

5.1 Operationalisation of Factors

The statements that each respondent was asked are displayed below in table 1, and with a little bit more context in Appendix A.2. The responses to every question can be seen in Appendix B.2.

Table 1: Statements in the Factor Analysis

	Statements in full
q1	*I have never considered using shared mobility.*
q2	*Shared mobility is not interesting to me because I already have a car.*
q3	*There are currently not enough places where I can use shared mobility.*
q4	*I find the status symbol of having my own car important.*
q5	*If I wouldn't have a car right now, I would consider using shared mobility.*
q6	*I think it is a major advantage of shared mobility that shared mobility is better for the environment than using a private car.*
q7	*I think it is a major advantage of shared mobility that I don't have to spend a large amount of money to buy a car.*
q8	*I think it is a major advantage of shared mobility that I don't have to worry about maintenance for the shared car.*
q9	*I think it is a major disadvantage of shared mobility that I cannot leave my personal belongings in a shared car.*
q10	*I think it is a major disadvantage of shared mobility that I always have to walk a short distance to the shared car.*
q11	*I think it is a major disadvantage of shared mobility that I can't predict whether a vehicle will be available when I need one.*

A factor analysis has been carried out on these statements. There is 1 respondent who answered with the same rating to all 11 statements. Due to a suspicion that the respondent did not answer the questions with enough consideration (in particular because this respondent answered with the maximum rating of 7), this case has been excluded. That means that the analysis is carried out with 199 respondents.

These statements need to have a minimum extraction communality of 0.25 to be included in the analysis. The communality of a variable is a measure of how much variance it shares with other variables. Statements *q3*, *q9* and *q11* failed to reach this condition, and thus have been excluded from the analysis. The correlation matrix and descriptive statistics of the remaining 8 statements can be seen in tables 2 and 3 below.

Table 2: Correlation Matrix for Factor Analysis Statements

	q1	*q2*	*q4*	*q5*	*q6*	*q7*	*q8*	*q10*
q1	1.000	0.630	0.322	-0.340	-0.186	-0.159	-0.119	0.152
q2	0.630	1.000	0.278	-0.249	-0.192	-0.136	-0.084	0.146
q4	0.322	0.278	1.000	-0.230	-0.211	-0.117	-0.199	0.464
q5	-0.340	-0.249	-0.230	1.000	0.407	0.499	0.421	-0.177
q6	-0.186	-0.192	-0.211	0.407	1.000	0.423	0.455	-0.070
q7	-0.159	-0.136	-0.117	0.499	0.423	1.000	0.659	-0.159
q8	-0.119	-0.084	-0.199	0.421	0.455	0.659	1.000	-0.237
q10	0.152	0.146	0.464	-0.177	-0.070	-0.159	-0.237	1.000

Table 3: Descriptive Statistics for Factor Analysis Statements

Statement	Label	N	Mean	Std. Dev.	Communality
q1	*Never considered SM*	199	4.05	2.232	0.737
q2	*Already own a car*	199	4.89	2.007	0.532
q4	*Car as status symbol*	199	3.26	2.063	0.477
q5	*Would consider if no car*	199	5.27	1.668	0.424
q6	*Better for environment*	199	4.66	1.698	0.342
q7	*No large purchase*	199	4.89	1.562	0.667
q8	*No maintenance*	199	5.36	1.501	0.648
q10	*Need to walk to car*	199	3.80	1.738	0.526

5.2 Factor Analysis

A 'simple structure', where every factor has a loading of >0.50 on one factor and <0.30 on all other factors, was able to be reached after 5 iterations with a simple orthogonal rotation (method Varimax). The loading matrix can be seen in table 4 below. Loadings lower than 0.30 have been left empty to improve readability.

Table 4: Factor Loading Matrix

Statement	Label	Factor 1	Factor 2	Factor 3
q7	*No large purchase*	0.813		
q8	*No maintenance*	0.780		
q5	*Would consider if no car*	0.572		
q6	*Better for environment*	0.552		
q1	*Never considered SM*		0.835	
q2	*Already own a car*		0.706	
q10	*Need to walk to car*			0.690
q4	*Car as status symbol*			0.635

Extraction method: Principal Axis Factoring, Varimax rotation (5 iterations)

Labeling these factors will help with interpretation of the results. The three factors show clear themes and similarities between the statements that they contain. The first four statements (*q7*, *q8*, *q5* and *q6*) can be characterised as '*Attractiveness of shared mobility'*, because they are all related to advantages of shared mobility. The statements in the second factor (*q1* and *q2*) are all about reasons why respondents are not interested in using shared mobility. Therefore this factor can be labeled '*Relevance of shared mobility'*. The third factor (*q10* and *q4*) contains statements that are about the status symbol of car ownership and walking distance to a shared car. This factor will be labeled '*Car proximity*' accordingly.

The answers of every respondent can be mapped to these factors by creating factor scores. These scores can then be used in the upcoming regression analysis of Chapter 6. Table 5 shows the descriptive statistics for these three factor scores.

Table 5: Descriptive Statistics for Factor Scores

Factor	Label	N	Min	Max	Mean	Std. Dev.
1	*Attractiveness of shared mobility*	199	-2.717	1.523	0.000	0.901
2	*Relevance of shared mobility*	199	-1.912	1.546	0.000	0.882
3	*Car proximity*	199	-1.463	1.728	0.000	0.784

Before using the factor scores in further analyses, it is important to make sure that the factors are suitably reliable. A Cronbach's alpha reliability test is used for this, and can be seen in table 6 below. The first two factors are very reliable. The third factor has a strong theoretical basis because one of the statements included in the factor (*q10: Need to walk to car*) is one of key topics in the regression analysis in the upcoming chapter. Therefore, all factors can be used in the analysis.

Table 6: Reliability Analysis

Factor	Label	Cronbach's α	N of items	Items
1	*Attractiveness of shared mobility*	0.784	4	q7, q8, q5, q6
2	*Relevance of shared mobility*	0.772	2	q1, q2
3	*Car proximity*	0.636	2	q4, q10

5.3 Analysis of Individual Statements

The response distribution of each of the statements can be seen in Appendix B.2. These distributions contain some important context that can be helpful in answering the research questions. This context would be lost in purely the factor analysis executed above. The first statement (*'I have never considered using shared mobility'*) has received a lot of responses at both extremes of the spectrum, see figure 7. This seems to indicate that responses - so private car owners in large Dutch cities - either completely disregard shared mobility, or view it as a legitimate transport option.

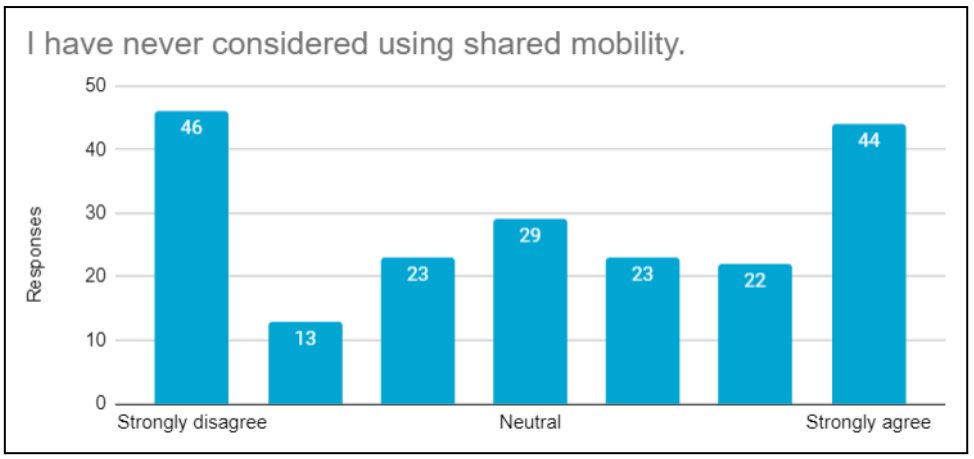

Figure 7: Result Distribution of *'Never considered shared mobility'*

When you compare statement 1 in figure 7 with the distribution of statement 5 (*'If I wouldn't have a car right now, I would consider using shared mobility'*) in figure 8 below, it appears that most current car owners would at least think of shared mobility if they did not have a car right now, with over 50% of respondents answering '*Agree*' or '*Strongly agree*'. That means that current private car owners can be a legitimate target audience for shared mobility services.

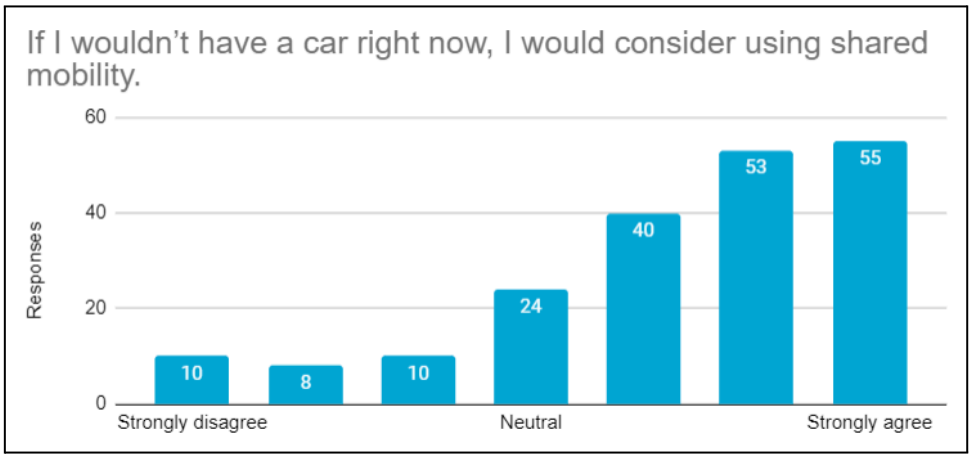

Figure 8: Result Distribution of *'Would consider if I had no car'*

Another interesting contrast to highlight is that between statements 7 and 8 (*'I think it is a major advantage of shared mobility that I don't have to spend a large amount of money to buy a car.'* and *'I think it is a major advantage of shared mobility that I don't have to worry about maintenance for the shared car.'* respectively), see figures 9 and 10 on the next page.

Both distributions of responses are decidedly in favour of the statement, but the statement about *maintenance* is much more overwhelming than that of a *large purchase* to buy a car. This indicates that by using shared mobility, respondents find much more utility in not having to deal with defects and bringing the car to garages than not needing to spend a large amount of money upfront, which is an often mentioned advantage of shared mobility (Yakovlev & Otto, 2018). It should be mentioned that the sample group could influence this result: because this question was answered by private car owners, there is a selection bias towards those who have the financial capability to buy a private car.

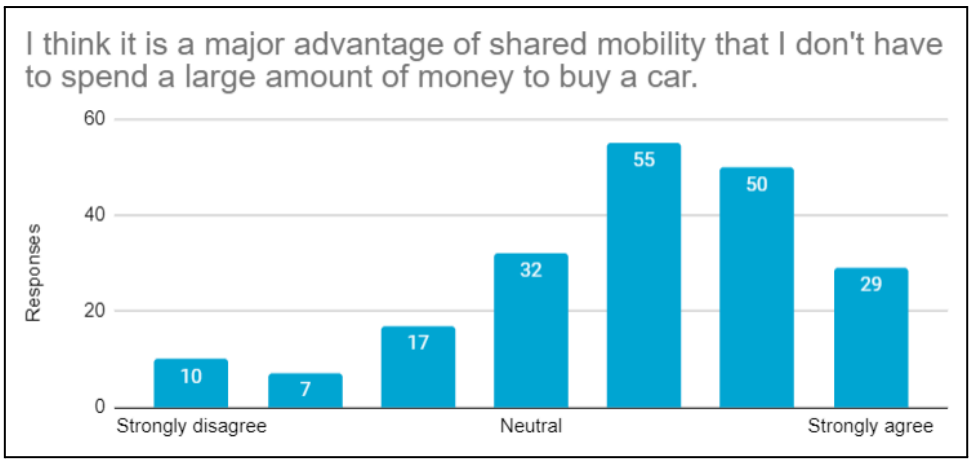

Figure 9: Result Distribution of *'No large purchase needed'*

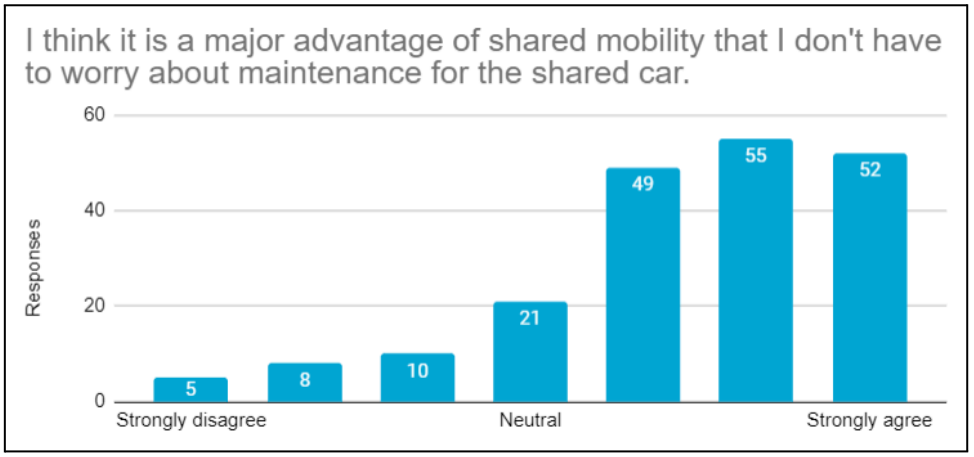

Figure 10: Result Distribution of *'No need to worry about maintenance'*

5.4 Reasons for Not Using Shared Mobility

This part of the survey also contained an open question *"Are there any other reasons why you may or may not choose to use shared mobility?"*. These responses can be found in full in Appendix B.2 but the most commonly mentioned reasons will be summarised in the table below.

Table 7: Frequently Mentioned Reasons to Not Use Shared Mobility

Reasons mentioned	Frequency (n=93)
I don't want to be dependent on a shared mobility service	15.1% (14x)
It's too expensive	10.8% (10x)
I use my car very often so it would get expensive with heavy use	9.7% (9x)
I have hygiene concerns	9.7% (9x)
The hassle is too much for me	7.5% (7x)
I already have a car	5.4% (5x)
Uncertainty about liability in case of an accident	5.4% (5x)
Limited number of places I can end my journey	4.3% (4x)
Internal space in the shared car is too low	4.3% (4x)
I have no experience with shared mobility	4.3% (4x)

Moving heavy objects	4.3% (4x)
I don't need it right now	3.2% (3x)
I'm just more comfortable in my own car	3.2% (3x)
Limited availability in my neighbourhood	2.2% (2x)
Additional costs are often way too high	2.2% (2x)
There is no issue with parking where I live	2.2% (2x)

These results show that dependency, cost and hygiene concerns are important reasons why current private car owners do not use shared mobility. 9.7% mentioned that shared mobility is simply not suitable for when they want to make a trip that takes longer than a few hours, because costs will become too high. This is something that the shared mobility sector could look to address. It is unclear whether the large amount of hygiene concerns is a result of people's heightened awareness due to the COVID-19 pandemic, or if they had these concerns in pre-pandemic life as well. The biggest reason for people to avoid shared mobility is dependency. It is not surprising that this is the most frequently mentioned reason, because owning a private car is the single best solution to not wanting to be dependent on a shared car. Just like statement 7 in the previous section, it could be the case that there is some selection bias here.

It should be noted that these concerns were brought up unprovoked. A percentage like 9.7% means that 9.7% brought it up, not that only 9.7% of respondents agree with this sentiment.

5.5 Conclusions

From the factor analysis, it emerged that 8 of the 11 statements were suitable to be collected into 3 groups; the attractiveness of shared mobility to the respondent, whether shared mobility is relevant for the respondent, and to what extent a respondent values having a car nearby their house. These factors can all be considered reliable and therefore usable in regression analysis.

What further emerged from the survey responses is that there are some interesting contrasts between the respondents' attitudes towards considering shared mobility if they do or do not have a car, and between purchase cost and maintenance alleviations that often get mentioned as major benefits of shared mobility. People are divided over both extremes of the scale when they are asked whether they have considered using shared mobility, but if they are asked if they would consider it if they would not have a car, there is a noticeable shift towards the *'Agree'* side of the spectrum. Secondly, people seem much more appreciative of the fact that they do not have to worry about maintenance of shared mobility vehicles, rather than the fact that no upfront purchase is required. This is an interesting result because the latter is an often mentioned advantage of shared mobility, while the former is rarely brought up.

When asked about the reasons why Dutch car owners keep their private car rather than use shared mobility, the major concerns are an unwillingness to be dependent on a shared service in times of need, high costs when needing the vehicle for long times, and hygiene concerns over sharing the vehicles with strangers.

6. The Importance of Various Aspects of a Shared Mobility Service

This chapter will present the results of the conjoint analysis, relating to research subquestion 3. In this analysis, 8 fictional shared mobility services were presented to the respondent, who was asked to rate them on a scale of 1 to 10. Using linear regression, the various aspects of the shared mobility service can then be analysed.

6.1 Operationalisation of Variables

The 5 variables and their attribute levels that are used to create the fictional services can be seen in table 8. All the attribute prices, walking times, fuel types and transport modes appear in real life shared mobility services today. Inspiration was sourced from shared mobility services like Hely (n.d.), Greenwheels (n.d.) and MyWheels (n.d.).

Table 8: Variables and Attribute Levels of the Conjoint Analysis

Variable	**Levels**	**Attribute levels**		
Transport modes	3	Car	Car, e-bike	Car, e-bike, e-scooters
Car price per hour	2	€3 / hr	€6 / hr	
Car price per kilometer	2	€0 / km	€0,20 / km	
Walking time to vehicle	2	<1 min	5 min	
Type of car fuel	2	Diesel	Electric	

These attributes are now combined to form profiles of shared mobility services. To measure every detail, all 48 combinations *(= 3 × 2 × 2 × 2 × 2)* would have to be presented to the respondent. This is obviously infeasible, so instead it is common practise to use so-called *'orthogonal fractional factorial designs'* (Molin, 2020-b). These designs are orthogonal so that the changing attributes (the columns in figure 11) do not correlate to each other. This means that the standard errors are as low as possible, which in turn means that the coefficients in the regression model will be the most accurate. This method ensures that results are highly accurate relative to the full factorial design, while greatly reducing the amount of profiles that need to be scored by the respondent.

BASIC PLAN 1: 4; 3; 2^7; 8 trials

*	*	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	1	1	1
1	1	0	1	1	0	0	1	1
1	1	0	1	1	1	1	0	0
2	2	1	0	1	0	1	0	1
2	2	1	0	1	1	0	1	0
3	0	1	1	0	0	1	1	0
3	0	1	1	0	1	0	0	1

*-	0	0	0
	1	2	3

Figure 11: Basic Plan 1 (Molin, 2020-a)

The orthogonal fractional factorial design that is used for this research is called “Basic Plan 1” (see figure 11). At the bottom of the figure (Molin, 2020-a) it can be seen that column 1, 2 and 3 cannot be used if column * (“star”) is used, because these first 3 columns would correlate with the * column. Therefore, the columns *, 4, 5, 6 and 7 from Basic Plan 1 are used to represent *Transport Modes* (*), *Car price per hour* (4), *Car price per kilometer* (5), *Walking time to vehicle* (6) and *Type of car fuel* (7). The proof that these variables do not correlate can be seen below in table 9.

Table 9: Correlation Matrix

	Trans. modes	*Car price / hr*	*Car price / km*	*Walking time*	*Type of fuel*
Trans. modes	1.000	0.000	0.000	0.000	0.000
Car price / hr	0.000	1.000	0.000	0.000	0.000
Car price / km	0.000	0.000	1.000	0.000	0.000
Walking time	0.000	0.000	0.000	1.000	0.000
Type of fuel	0.000	0.000	0.000	0.000	1.000

The resulting profiles are then created by linking the attribute levels from table 8 to the 0’s, 1’s and 2’s from the orthogonal design in figure 11. What results are the final profiles, which can be seen in table 10 below. Every respondent was asked to respond to every profile, culminating in 1600 responses.

Table 10: Profiles of the Conjoint Analysis

Profile	**Transport Modes**	**Price/hr**	**Price/km**	**Walk time**	**Fuel type**
Profile 1	Car	€3 / hr	€0 / km	<1 min	Diesel
Profile 2	Car	€6 / hr	€0,20 / km	5 min	Electric
Profile 3	Car, e-bike	€3 / hr	€0 / km	5 min	Electric
Profile 4	Car, e-bike	€6 / hr	€0,20 / km	<1 min	Diesel
Profile 5	Car, e-bike, e-scooters	€3 / hr	€0,20 / km	<1 min	Electric
Profile 6	Car, e-bike, e-scooters	€6 / hr	€0 / km	5 min	Diesel
Profile 7	Car	€3 / hr	€0,20 / km	5 min	Diesel
Profile 8	Car	€6 / hr	€0 / km	<1 min	Electric

Below is a representation of a profile that was used in the survey:

Service 2

Voertuigen:	Alleen auto’s
Auto prijs per uur:	€6 per uur
Auto prijs per kilometer:	€0,20 per kilometer
Looptijd naar voertuig:	Ongeveer 5 minuten
Auto brandstof:	Elektrisch

Figure 12: Conjoint Profile Example

Before a regression model can be calculated, the nominal and ordinal values first need to be recoded into dummy variables. For the variable *Type of car fuel* this is straightforward: *Diesel* will be represented by 0, and *Electric* will be represented by 1.

It is a little more tricky to apply dummy coding to a variable with 3 attributes like *Transport modes*. This variable needs to be split into two variables called *C+B* (for car + e-bike) and *C+B+S* (for car + e-bike + e-scooter), according to the following dummy coding scheme:

Table 11: *'Transport Modes'* Dummy Coding Scheme

Variable	C+B	C+B+S
Car	0	0
Car, e-bike	1	0
Car, e-bike, e-scooter	0	1

Attribute level '*car*' acts as the reference category here, and the two dummy variables '*C+B*' and '*C+B+S*' act as the difference relative to that reference category. Their coefficients will indicate the difference in appreciation (grade from 1-10) for a shared mobility service that also includes e-bikes, or e-bikes and e-scooters respectively.

The distribution of responses to all 8 profiles can be seen in Appendix B.3.

6.2 Utilities and Importance

Tables 12 and 13 below show the utilities and importance values of the conjoint analysis.

Table 12: Utilities

		Utility Estimate	Std. Error
Transport modes	*Car*	-0.086	0.116
	Car, e-bike	0.104	0.136
	Car, e-bike, e-scooter	-0.019	0.136
Price per hour	*€3 per hour*	0.658	0.087
	€6 per hour	-0.658	0.087
Price per kilometer	*€0 per kilometer*	0.443	0.087
	€0,20 per kilometer	-0.443	0.087
Walking time to vehicle	*<1 minute*	0.047	0.087
	5 minutes	-0.047	0.087
Type of fuel	*Diesel*	-0.460	0.087
	Electric	0.460	0.087
(Constant)		5.864	0.092

All of the variables with 2 attribute levels have opposite utilities, which makes interpretation ineffective. Interpretation is possible for the transport mode variable with 3 attribute levels. '*Car, e-bike*' is the only attribute with positive utility, indicating that this transport mode brings the most

utility. However, these estimates are within the range of the standard error, which means that no real conclusions can be drawn.

Table 13: Importance of Attributes

Variable	Importance (%)
Transport modes	5.577
Price per hour	38.649
Price per kilometer	26.002
Walking time to vehicle	2.749
Type of fuel	27.023

Based on the importance values, it can be concluded that the price per hour is the most important aspect of a shared mobility service. Fuel type ranks second, where electric cars are preferred over diesel cars. The third most important aspect is the price per kilometer. Walking time to vehicle and transport modes were not very important, accounting for only 8.3% combined.

In the next subsection, the results of the conjoint analysis will be used to calculate linear regression models to control these results for any underlying effects of age, gender and factor scores from the previous chapter.

6.3 Linear Regression Models

In this section, 3 linear regression models will be calculated. The models have the *rating of the service* as the dependent variable. The predictor variables will be the 6 variables discussed above: the regular 4 from table 8, and the 2 dummy variables that represent *Transport modes*.

The second linear regression model will have 5 additions in the form of control variables *Age* and *Gender,* as well as the 3 psychological factors from Chapter 5; the attractiveness of shared mobility to the respondent, whether shared mobility is relevant for the respondent, and to what extent a respondent values having a car nearby their house. Adding these variables to the regression model means that any underlying influences of a respondent's age, gender, or scores on these 3 factors on their ratings of the shared mobility services will be explicitly visible in the model.

Of the 200 respondents who rated the 8 profiles, 14 filled in the same rating for every profile. These 14 respondents have been excluded from the analysis, so n=8*186=1488. This raised the R-Squared value - the proportion of variance in the dependent variable of Model 1 from 11.3% to 14.4%, as well as improving the *p* (Sig.) scores and affecting the coefficients of the variables. Similar effects were observed in Model 2.

Table 14 on the next page shows the first linear regression model. The significance of the variables is tested against $\alpha = 0.05$, so a 95% confidence requirement. If the significance value is larger than 0.05 for a variable, then this variable has not significantly influenced the rating of the shared mobility service by the respondents. These cases have been underlined.

Coefficient B is the unstandardised coefficient, Coefficient β is the standardised coefficient; hence the 0 constant. The unstandardised coefficients B do have a non-zero *Constant* value. This constant is the rating of a service where all variables are 0. So that means: a service with shared cars only, which costs €0,- per hour and per kilometer. Walking time to this car is 0 minutes (so it is right outside your door), and the car runs on diesel fuel.

Table 14: Regression Model 1 - Conjoint Variables Only

Name	**Coefficient B**	**Coefficient β**	**Sig.**
(Constant)	7.840	-	0.000
Dummy C+B	0.192	0.034	0.182
Dummy C+B+S	0.069	0.012	0.634
Price per hour	-0.441	-0.271	0.000
Price per km	-4.442	-0.182	0.000
Walking time to vehicle	-0.023	-0.019	0.430
Type of car fuel	0.923	0.189	0.000
R-Squared = 14.4%			

Dependent variable: Rating of profile (Method: ENTER)

Three variables are not significant: both dummy variables for transport modes included in the service, and walking time to the vehicle. Therefore, these variables have not significantly influenced the rating of a service. An explanation for the variable *Walking time* could be that respondents think that 5 minutes is a reasonable walking time to get to a car. Perhaps an additional attribute value of more than 10 minutes would have made this variable statistically significant. The *Transport Modes* dummy variables might be explained by the fact that the respondents were all private car owners, and the survey was about replacing that private car. Therefore, they may not have cared very much about (or focused on) other transport modes at their disposal. Perhaps starting with e-bikes and e-scooters and adding the car in level 3 of the variable could have made this variable statistically significant. It could also be the case that respondents simply paid more attention to other variables in their valuation of the services.

Both *Price* variables and the *Type of car fuel* are significant. These can be interpreted as follows: “For every extra euro per hour that the user needs to pay for the service, their rating of the service decreases by 0.441 report grade”. The variable *Type of car fuel* is dummy coded with 0 for diesel and 1 for electric. That means that respondents overwhelmingly prefer electric vehicles: a service with that fuel type gets 0.9 report grade higher!

The standardised coefficients β can be used to compare the relative importance of the variables. The higher the absolute value of the beta coefficient, the stronger the effect of that variable on the rating of the shared mobility service. *Price per hour* has the highest absolute effect of all statistically significant variables. That means that respondents gave that the most importance in their valuation of the shared mobility service.

Table 15: Regression Model 2 - Control Variables Included

Name	Coefficient B	Coefficient β	Sig.
(Constant)	8.335	-	0.000
Dummy C+B	0.192	0.034	0.167
Dummy C+B+S	0.069	0.012	0.622
Price per hour	-0.441	-0.271	0.000
Price per km	-4.442	-0.182	0.000
Walking time to vehicle	-0.023	-0.019	0.414
Type of car fuel	0.923	0.189	0.000
Social-demographic characteristics			
Age	-0.012	-0.067	0.007
Gender	0.086	0.018	0.461
Psychological factors			
1 - Attractiveness of SM	0.488	0.166	0.000
2 - Relevance of SM	-0.297	-0.109	0.000
3 - Car Proximity	0.344	0.108	0.000
R-Squared = 20.1%			

Dependent variable: Rating of profile (Method: ENTER)

This second regression model in table 15 above is largely identical to Model 1. The coefficients for the first 6 predictor variables are the same, only their significance is ever so slightly lower. This is explained by the addition of the new variables. The R-squared value has also increased by 5.7%, indicating that Model 2 is a better predictor than Model 1.

The coefficient of *Age* is very small yet statistically significant. For every 10 years that the respondent is older, their appreciation of shared mobility services drops by 0.15 grade points (out of 10). This indicates that younger people have a higher appreciation of shared mobility services, albeit only a small effect.

The coefficient of *Gender* is not statistically significant - highly insignificant in fact -, which indicates that this variable has no significant influence on the rating of the respondent for the shared mobility services. In other words: the appreciation for shared mobility services does not differ between genders.

The three factors are all significant, and interpretation is as follows: the coefficient of 0.488 for *Attractiveness of shared mobility (SM)* means that people who find shared mobility attractive are much more likely to give a higher rating to a shared mobility profile. Respondents who score high on the factor that shared mobility is not very relevant for them, give statistically significant lower grades to the fictional shared mobility services.

6.4 Conclusions

The *Transport Modes* and *Walking time* variables do not significantly influence the rating of the services. Possible explanations for this are that the attribute levels could have been chosen differently (*Walking time* at >10 minutes, *Transport Modes* where car is added last instead of first), or simply that respondents paid more attention to other variables when determining their rating.

Respondents in general are quite reasonable in their shared mobility service ratings. According to Model 2, a 30 year old who scores averagely on the 3 indicative factors would give a profile with electric cars only, at €3 per hour and €0.10 per kilometer, a rating of 5.76 out of 10.

The R-squared value is 14.4% in Model 1, increasing to 20.1% in Model 2. This shows that the addition of *Age, Gender* and the 3 factors has greatly improved the predictive capability of the model.

The standardised coefficients β in the regression model can help to answer research subquestion 3: "*Which current aspects of a shared mobility service are most important to Dutch private car owners?"* The absolute value of *Price per hour* (-0.271) is the highest. *Type of car fuel* is deemed second most important (0.189), closely followed by *Price per kilometer* (-0.182). The factor scores are more significant contributors than a respondent's social-demographic group.

It is an interesting result that *Price per hour* is deemed more important than *Price per kilometer*. This could indicate that respondents largely consider shared mobility for short trips and city driving, where time is more important than distance. Further evidence for this is the clear preference of electric vehicles over fossil fueled-cars. Electric vehicles contribute greatly to improving the livability of cities (because they are quieter and have zero emissions), but the general public still has concerns about the range of those cars. Additional research is required to confirm this hypothesis, however.

7. Improving Shared Mobility Services

This chapter presents the results of the final part of the survey, related to research subquestion 4. Respondents were asked 7 statements about how important they considered various suggested improvements to shared mobility services. They could then add any other improvements that they deemed important. Finally, respondents were asked if they were open to the idea of selling their car and using shared mobility. A 7-point Likert scale was used for all questions. The questions in their full context can be seen in Appendix A.4, and their full response distributions in Appendix B.4.

7.1 Perceptions on Shared Mobility Service Improvements

The improvements that were provided to respondents (n=200) are listed in table 16 below, along with their mean scores. The scores are all fairly similar, varying between 5.0 and 5.5. Looking at individual response distributions gives more insight.

Table 16: Suggested Improvements to Shared Mobility Services

Statements in full		Mean
s1	*The shared mobility service needs to become cheaper.*	5.38
s2	*The shared vehicles are too far away from my home.*	5.04
s3	*I need to be able to reserve further in advance so I know I will be able to use a car.*	5.40
s4	*The amount of vehicles needs to be increased so cars are more often available.*	5.46
s5	*The amount of vehicle types that are included needs to be increased.*	5.03
s6	*I want to be able to start a journey with a shared car in more areas of the country.*	5.04
s7	*I want to be able to end a journey with a shared car in more areas of the country.*	5.43

Statements 6 and 7 (compared in figure 13 below) are about starting and ending journeys in more places. The distributions look pretty similar, indicating that respondents are overwhelmingly in favor of a larger shared mobility network. This is a sign for shared mobility operators that their networks will benefit from an increased operating area.

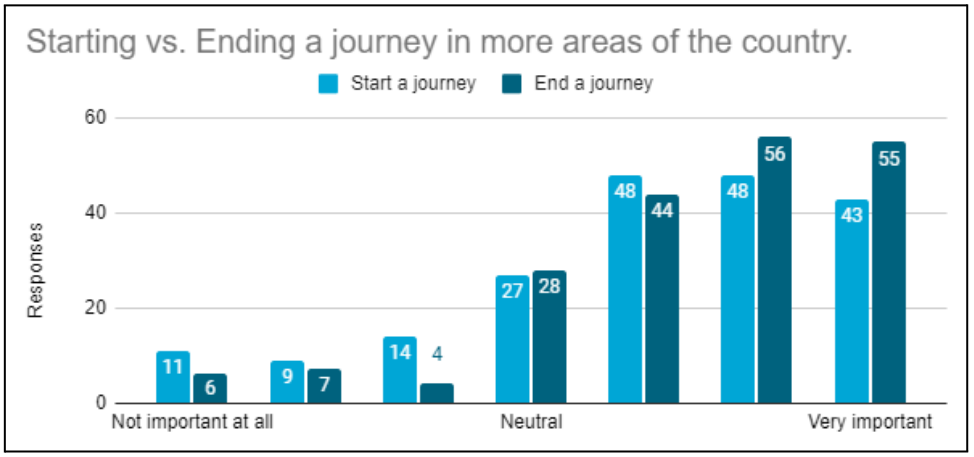

Figure 13: Starting vs. Ending a Journey

Focusing on the differences rather than the similarities, it can be seen that ending a journey in more areas of the country is deemed more important than starting one. This can easily be explained: respondents already assume that they can start the journey where they live, so they are concerned about being able to go where they want to go.

Respondents also had the ability to list any further improvements that are important to them. These results can be viewed in full in Appendix B.4, the improvements that were mentioned more than 4 times have been collected in table 17 below.

Table 17: Frequently Mentioned Improvements to Shared Mobility

Reasons mentioned	Frequency (n=32)
If I want to take the car for a longer time (for example on a trip), it should not be this expensive	15.6% (5x)
The shared mobility service has to take better care of how cars are left behind (damage, fuel, hygiene) for the next user	15.6% (5x)
Bigger/more luxurious cars and cars with a towbar should be available as well	15.6% (5x)
Need to be able to leave the car in more places	12.5% (4x)

The four improvements are quite varied, ranging from duration cost concerns to car condition, as well as car features and an expanded operating area. Like the broadly similar results from table 16, this suggests that car owners would like to see the service improve across the board.

7.2 Making the Switch

At the very end of the survey, respondents were asked if they would be open to making the switch to shared mobility. This question was split into two parts: whether they were open to do so in the next few years, and in the far future. The response distribution of this final section is presented in figure 14 below.

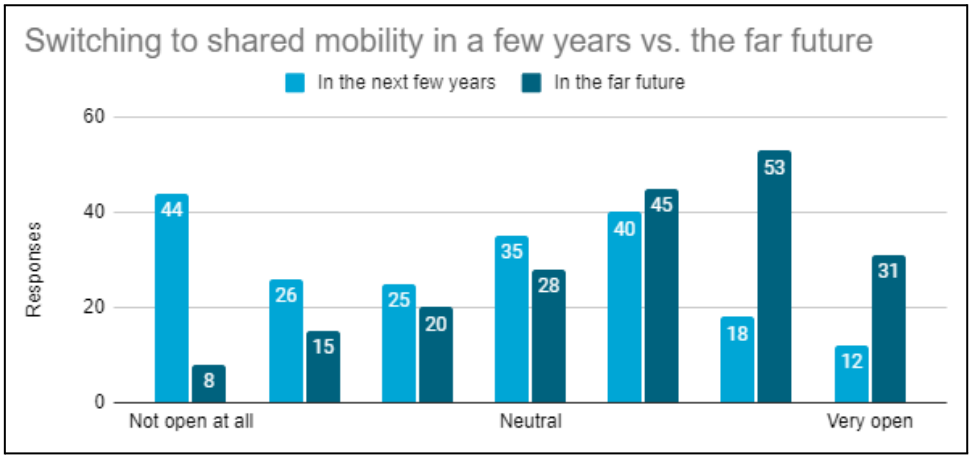

Figure 14: Making the Switch Sooner or Later?

There is an interesting distinction here. Both questions are constructed so they address the future, rather than the short term. The first question is framed as a relatively specific point in time, whereas the second question was framed in a more abstract way. The more specific question saw an

overwhelmingly negative response (mean 3.52, mode 1 '*not open at all*') whereas the second, more abstract question saw a relatively positive response (mean 4.85, mode 6 '*quite open*').

7.3 Conclusions

Overall, respondents were fairly similar and consistent in their answers to all statements. All the improvements (on average) scored '*somewhat important'* or higher. Even though there are no big contrasts between the various statements, there are conclusions to be drawn.

The majority of surveyed car owners want to see more improvements being made to shared mobility services before they make the switch, evidenced by the fact they still own a car today. Operating areas need to be expanded to make shared mobility a legitimate option for nation-wide travelling. Dependency - one of the major concerns that surfaced in chapter 5.4 - needs to be improved by a larger and more diverse fleet of vehicles that are distributed all over the city. Results from statement 1 indicate that respondents want a cheaper service as well. That indicator can be combined with insights from chapter 5.4 about concerns over the cost if a car is needed longer duration, and from chapter 6 that price per hour is more influential than price per kilometer on a service's rating, to surface the underlying worry that current private car owners are fine with the cost for short city journeys, but are hesitant about using shared mobility for holidays and other longe range, long duration journeys.

The distinction between respondents' answers to the 'next few years' and 'far future' is so interesting because it confirms the 'attitude-behaviour gap' mentioned in the paper by Hamari et al. (2015) that was discussed in the introduction. The phenomenon recently came to light again in a shared mobility context in research by Laya & Vyas (2021). People have a positive attitude towards shared mobility, but fail to make the behavioural change to support that attitude. The respondents are not inherently against using shared mobility in their lives, but the attitudes change when a timeframe is attached to that lifestyle switch.

8. Discussion

The goal of this research is to discover which aspects of a shared mobility service need to be supported by policy to effectively reduce private car ownership. This is important because the livability of inner cities is threatened by unused cars taking up a lot of space. The results indicate that cost improvements to long-term and heavy use of the service, nationwide accessibility, and dependency improvements are most important.

Some of the results of this study seem to oppose certain existing literature. The paper by Burghard & Dütschke (2019) found that younger couples without cars are much more likely to use and appreciate shared mobility, while the results of this study show that a respondent's age only has a very small effect on the rating that the respondent will give shared mobility services. Additionally, contrary to findings by Roukoni and Homem de Almeida Correia (2020), respondents did not appreciate the observed cost savings for the average car owner in their research, instead fearing the service for being expensive and placing major importance on cost improvements.

Literature agrees with these findings in other areas. One of the major findings of this research is that the price per hour and fuel type of a service are by far its most important aspects when comparing shared mobility services with similar vehicle offerings. Research by Cartenì et al. (2016) directly confirms that price is a very important attribute. Furthermore, many studies have been performed on dynamic pricing systems for shared mobility (Chemla et al., 2013; Pfrommer et al., 2014; Waserhole, 2013), which corroborates the finding.

The results of this research matter because the sampling unit respondents were sourced from a very specific and highly relevant target market. All 200 respondents own at least 1 private car and live in one of the Netherlands' four largest cities: Amsterdam, Rotterdam, The Hague or Utrecht (this group is also known as the Randstad). Shared mobility is only successful if it reduces car ownership, rather than increasing car use by people who would otherwise use public transport or take a bike (Van Wee, 2020). The specificity of the sampling unit means that any results are highly relevant to the industry.

A limitation of this research is that the vast majority of respondents naturally do not have a lot of experience with shared mobility services because they already own a private car. Results confirmed that the respondents were actually not very interested in shared mobility, precisely because they already own a car. What this means for the validity of the results is that some fears or doubts that might exist among respondents are actually incorrect, or might turn out to be non-issues. However, these prejudices apply to the industry as a whole and not just to this research. If shared mobility operators want private car owners with little shared mobility experience to switch to their service, they will have to take action to correct these preconceived ideas, should they be found to exist.

Recommendations for future research include finding practices to close the attitude-behaviour gap, how to best set up a nationwide service area (for example by connecting all services via a common app, or merging services altogether), how to best nationalise shared mobility regulations from a governance point of view, and studying fleet diversification desires in more detail to find an optimal balance between small and efficient city cars, and cars with more utility or luxury.

9. Conclusions

Results of research among Dutch car owners (n=200) living in one of the four Randstad cities show that the most important aspects of shared mobility to improve to effectively reduce private car ownership are 1) a solution for costs of longer-term or heavy use of shared mobility, 2) nationwide operating areas and 3) level of service and vehicle variety guarantees that enable users to depend on shared mobility for all their transport needs.

It is mainly up to shared mobility operators to better their services, but policymakers play a role too. Shared mobility is currently a highly localised industry where supply and regulations differ per municipality. Elevating these regulations to a national level, as well as working together with shared mobility operators to expand their fleets and operating areas will assist the shared economy to gain significant market share and thereby effectively reduce private car ownership, to improve livability and free up space in the Netherlands' biggest inner cities.

Subquestion 1 asks how Dutch private car ownership is forecasted to develop into the future if the current trend continues. A 20 year extrapolation shows that the number of cars per person as well as per household is set to increase. While the number of households - in particular single-person households - is increasing rapidly, the number of cars on the roads is outgrowing that statistic. In 2020, every household had 1.1 cars on average. In 2040, this figure is expected to rise to 1.2 cars per household; 11 million cars for 9.2 million households. This trend indicates that shared mobility and car sharing in general can make a real impact to improve space in inner cities.

In subquestion 2, the reasons why Dutch private car owners choose to keep their private car were explored using factor analysis. The main reasons mentioned by Dutch car owners to keep their cars were concerns about being dependent on a shared service, hygienic doubts about sharing cars with strangers and high costs for frequent or longer use. Simply not being interested in shared mobility because respondents already had a car was an often brought up reason as well, and results from two other questions confirm that respondents are much more likely to consider the use of shared mobility if they do not own a car today. This means that there is potential for shared mobility services to gain market share among young adults who do not yet own a car, and when car owners are considering buying a new car. 8 of the 11 statements about the use and attitude towards shared mobility services that respondents answered were able to be summarised in 3 factors: the attractiveness of shared mobility to the respondent, whether shared mobility is relevant for the respondent, and to what extent a respondent values having a car nearby their house.

Subquestion 3 is about analysing which aspects of a shared mobility service are most important to car owners. Results from linear regression models show that a service's price per hour (standardised coefficient of -0.271) is most important, followed by type of fuel (0.189) - a strong preference for electric cars - and price per kilometer (-0.182). Walking time to the vehicle - provided that it is a reasonable time of a few minutes - and the modes of transport included along with cars have no statistically significant effect on the given rating. Older people tend to give slightly lower ratings than younger people (-0.012), whereas gender shows no significant effect. The regression model explained 20.1% of the total variance. The importance of shared mobility aspects is vital information

because current private car owners are a critical target market for shared mobility if the industry is to reach their goal of reducing private car ownership to improve livability of inner cities.

The topic of subquestion 4 is which aspects of a shared mobility service are most important to improve according to Dutch private car owners. They do not use shared mobility as their main form of transport, so their opinions on what to improve are important to effectively reduce private car ownership by encouraging and enabling current car owners to make the switch to shared mobility. Results demonstrate that topics across the board are considered equally important to improve. These topics range from a vehicle fleet with more variety (cargo capacity, luxury features) and a nationwide operating area so journeys can be started and ended anywhere, to addressing major dependency, availability and hygienic concerns. Respondents also suggested that shared mobility services should offer 'long-term use' pricing options to enable the use of a shared car for longer trips like holidays.

When asked if respondents would be willing to make the switch to shared mobility, results showed that they are opposed to switching to shared mobility in the next few years, but that attitudes towards a switch in the (abstract) far future were much more positive. This confirms that the 'attitude-behaviour gap' in shared mobility that was previously discussed by Hamari et al. (2015) and Laya & Vyas (2021) exists among Dutch car owners as well. Dutch car owners perceive shared mobility positively but fail to make the accompanying behavioural change that aligns with that attitude.

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Appendix A: Survey Questions

The survey questions are presented here. While the report is written in English, the survey is conducted in Dutch. The Dutch translation of the questions can be found in [square brackets] behind the English text.

A.1 Consent, Social-Demographics and Background

1. I voluntarily consent to participate in this research. I understand that taking part in the study involves sharing my opinions and considerations, used for a data analytics study into the way car owners view shared mobility. I understand that I can contact the researcher to answer any questions I may have, before I participate in this research.
   [Ik stem er vrijwillig mee in om deel te nemen aan dit onderzoek. Ik begrijp dat deelname aan het onderzoek inhoudt dat ik mijn meningen en overwegingen deel, die dan worden gebruikt voor een data-analyse onderzoek naar de manier waarop autobezitters naar deelmobiliteit kijken. Ik begrijp dat ik contact kan opnemen met de onderzoeker (Ruben Beumer) om eventuele vragen te beantwoorden, voordat ik deelneem aan dit onderzoek.]
   a. Yes/no *(Respondents must agree in order to continue the survey)*

2. I understand that information I provide will be used for research purposes, which will include Bachelor's theses, and may include reports, articles, other publications. I understand that any information that can identify me (such as my year of birth or city) will not be shared beyond the research team.
   [Ik begrijp dat de informatie die ik verstrek zal worden gebruikt voor onderzoeksdoeleinden, waaronder bachelor scripties, maar wellicht ook rapporten, artikelen en andere publicaties. Ik begrijp dat alle informatie die mij kan identificeren (zoals mijn geboortejaar of woonplaats) niet buiten het onderzoeksteam zal worden gedeeld.]
   a. Yes/no *(Respondents must agree in order to continue the survey)*

3. What is your year of birth? [Wat is uw geboortejaar?]
   a. (dropdown with years)

4. What is your gender? [Wat is uw geslacht?]
   a. Male [Man]
   b. Female [Vrouw]
   c. Other [Anders]
   d. Prefer not to say [Zeg ik niet]

5. In what city do you live? [In welke stad woont u?]
   a. (open question)

6. How many cars are in your household? [Hoeveel auto's heeft uw huishouden?]
   a. (dropdown with amounts)

7. How many of those cars in your household are 100% electric? (No hybrids) [Hoeveel van die auto's in uw huishouden zijn 100% elektrisch? (Geen hybrides)]
    a. (dropdown with amounts)

8. Do you have a scooter?
    a. Yes, an electric scooter
    b. Yes, a scooter that runs on fossil fuels
    c. No
    d. Other: …

9. Which type of shared mobility do you use? Select all that apply. [Welk type deelmobiliteit gebruikt u wel eens? U kunt meerdere antwoorden selecteren.]
    a. None [Geen een]
    b. E-scooter [Elektrische deelscooter]
    c. Shared car [Deelauto]
    d. Shared e-bike [Elektrische deelfiets]
    e. OV-bike [OV-fiets]
    f. Other shared bike [Andere deelfiets]
    g. Other: … [Anders: …]

10. Roughly how many times per year do you use shared mobility? [Hoe veel keer per jaar maakt u ongeveer gebruik van deelmobiliteit?]
    a. 0
    b. 1-10
    c. 11-30
    d. 31-50
    e. 50-100
    a. More than 100 times [Meer dan 100 keer]

A.2 Statements on the Use of Shared Mobility

Research subquestion: *What are the reasons that Dutch private car owners choose to keep their private car when a shared mobility alternative is available?*

To what extent do you agree with each of the following 16 sentences about the use of shared mobility services? [In hoeverre bent u het eens met elk van de volgende 16 stellingen over het gebruik van deelmobiliteit?]

A 7-point Likert-scale is used for all of these statements.

1. I have never considered using shared mobility. [Ik heb nog nooit overwogen om deelmobiliteit te gebruiken.]
2. Shared mobility is not interesting to me because I already have a car. [Deelmobiliteit is voor mij niet interessant omdat ik al een auto heb.]
3. There are currently not enough places where I can use shared mobility. [Er zijn op dit moment niet genoeg plekken waar ik deelmobiliteit kan gebruiken.]
4. I find the status symbol of having my own car important. [Ik vind de status van een eigen auto belangrijk.]
5. If I wouldn't have a car right now, I would consider using shared mobility. [Als ik op dit moment geen auto zou hebben zou ik overwegen om deelmobiliteit te gebruiken.]

6. I think it is a major advantage of shared mobility that shared mobility is better for the environment than using a private car. [Ik vind het een groot voordeel van deelmobiliteit dat deelmobiliteit beter is voor het klimaat dan het gebruiken van een privéauto.]
7. I think it is a major advantage of shared mobility that I don't have to spend a large amount of money to buy a car. [Ik vind het een groot voordeel van deelmobiliteit dat ik geen grote hoeveelheid geld hoef uit te geven om een auto te kopen.]
8. I think it is a major advantage of shared mobility that I don't have to worry about maintenance for the shared car. [Ik vind het een groot voordeel van deelmobiliteit dat ik me geen zorgen hoef te maken om onderhoud aan de deelauto.]

9. I think it is a major disadvantage of shared mobility that I cannot leave my personal belongings in a shared car. [Ik vind het een groot nadeel van deelmobiliteit dat ik geen spullen in een deelauto kan laten liggen.]
10. I think it is a major disadvantage of shared mobility that I always have to walk a short distance to the shared car. [Ik vind het een groot nadeel van deelmobiliteit dat ik steeds een eindje naar de deelauto moet lopen.]
11. I think it is a major disadvantage of shared mobility that I can't predict whether a vehicle will be available when I need one. [Ik vind het een groot nadeel van deelmobiliteit dat ik niet kan voorspellen of er een voertuig beschikbaar is als ik er een nodig heb.]

12. Are there any other reasons why you may or may not choose to use shared mobility? [Zijn er nog andere redenen waarom u er wel of niet voor kiest om deelmobiliteit te gebruiken?]
    a. (open question)

A.3 Rating Shared Mobility Services

Research subquestion: *Which aspects of a shared mobility service are most important to Dutch private car owners?*

How attractive is the following shared mobility service to you? [Hoe aantrekkelijk vind u deze deelmobiliteit service?]

Respondents are now asked to rate 8 profiles on a scale from 1-10. The attributes that will be used to form the profiles can be seen in table A.1 below.

Table A.1: Variables and Attribute Levels of the Conjoint Analysis

Variable	**Levels**	**Attribute levels**		
Transport modes	3	Car	Car, e-bike	Car, e-bike, e-scooters
Car price per hour	2	€3 / hr	€6 / hr	
Car price per kilometer	2	€0 / km	€0,20 / km	
Walking time to vehicle	2	<1 min	5 min	
Type of car fuel	2	Diesel	Electric	

BASIC PLAN 1: 4; 3; 2^7; 8 trials

*	*	1	2	3	4	5	6	7
0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	1	1	1
1	1	0	1	1	0	0	1	1
1	1	0	1	1	1	1	0	0
2	2	1	0	1	0	1	0	1
2	2	1	0	1	1	0	1	0
3	0	1	1	0	0	1	1	0
3	0	1	1	0	1	0	0	1

*-	0	0	0
	1	2	3

Figure A.1: Basic Plan 1 (Molin, 2020-a)

Table A.2: Conjoint Analysis Orthogonal Design

Profile	**Trans. Modes**	**Price/hr**	**Price/km**	**Walk time**	**Fuel type**
Profile 1	0	0	0	0	0
Profile 2	0	1	1	1	1
Profile 3	1	0	0	1	1
Profile 4	1	1	1	0	0
Profile 5	2	0	1	0	1
Profile 6	2	1	0	1	0
Profile 7	0	0	1	1	0
Profile 8	0	1	0	0	1

Table A.3: Profiles of the Conjoint Analysis

Profile	Transport Modes	Price/hr	Price/km	Walk time	Fuel type
Profile 1	Car	€3 / hr	€0 / km	<1 min	Diesel
Profile 2	Car	€6 / hr	€0,20 / km	5 min	Electric
Profile 3	Car, e-bike	€3 / hr	€0 / km	5 min	Electric
Profile 4	Car, e-bike	€6 / hr	€0,20 / km	<1 min	Diesel
Profile 5	Car, e-bike, e-scooters	€3 / hr	€0,20 / km	<1 min	Electric
Profile 6	Car, e-bike, e-scooters	€6 / hr	€0 / km	5 min	Diesel
Profile 7	Car	€3 / hr	€0,20 / km	5 min	Diesel
Profile 8	Car	€6 / hr	€0 / km	<1 min	Electric

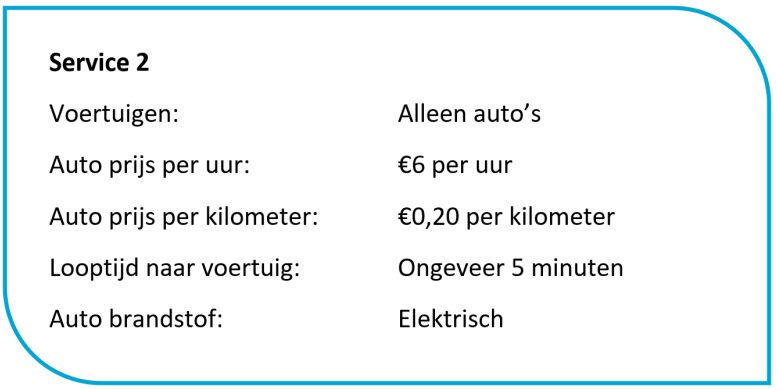

Figure A.2: Conjoint Profile Example

A.4 Statements on Improvements to Shared Mobility Services

Research subquestion: *What do private car owners find most important to change about shared mobility services?*

How important is it to improve the following aspects of a shared mobility service in your opinion? [Hoe belangrijk vindt u het om onderstaande aspecten van een deelmobiliteit service te verbeteren?]

A 7-point Likert scale, from “Not important at all” [Helemaal niet belangrijk] to “Very important” [Uitermate belangrijk], is used for these statements.

1. The shared mobility service needs to become cheaper. [De deelmobiliteit service moet goedkoper worden.]
2. The shared vehicles are too far away from my home. [De voertuigen moeten dichter bij mijn huis staan.]
3. [Ik moet verder van tevoren kunnen reserveren zodat ik weet dat er een auto voor mij is.]
4. The amount of vehicles needs to be increased so cars are more often available. [Het aantal voertuigen moet worden verhoogd, zodat auto's vaker beschikbaar zijn.]
5. The amount of vehicle types that are included (cars, electric cars, vans, bikes, e-bikes, e-scooters) needs to be increased. [Het aantal voertuigtypes dat deel uitmaakt van de service moet groter worden (bijvoorbeeld auto's, elektrische auto's, busjes, fietsen, e-bikes, e-scooters).]
6. I want to be able to start a journey with a shared car in more areas of the country. [Ik wil op meer plekken van het land een reis kunnen beginnen met een deelauto.]
7. I want to be able to end a journey with a shared car in more areas of the country. [Ik wil op meer plekken van het land een deelauto kunnen achterlaten.]

8. Are there any other things that should be improved according to you? [Zijn er nog andere dingen die volgens u moeten verbeteren?]
    a. (Open question)

9. To what extent would you be open to selling your car to start using shared mobility in the next few years? [In hoeverre zou u er voor openstaan om in de aankomende paar jaar uw auto te verkopen en deelmobiliteit te gaan gebruiken?]
    a. Likert 7 (Not open at all – very open)

10. To what extent would you be open using shared mobility at some point in the (far) future? [In hoeverre zou u ervoor openstaan om deelmobiliteit in de (verre) toekomst te gaan gebruiken?]
    a. Likert 7 (Not open at all – very open)

Appendix B: Survey Responses

This appendix contains an overview of all the responses per question in the survey. The questions themselves can be found in Appendix A.

B.1 Consent, Social-Demographics and Background

This subsection presents the results of the background questions that respondents answered at the start of the survey.

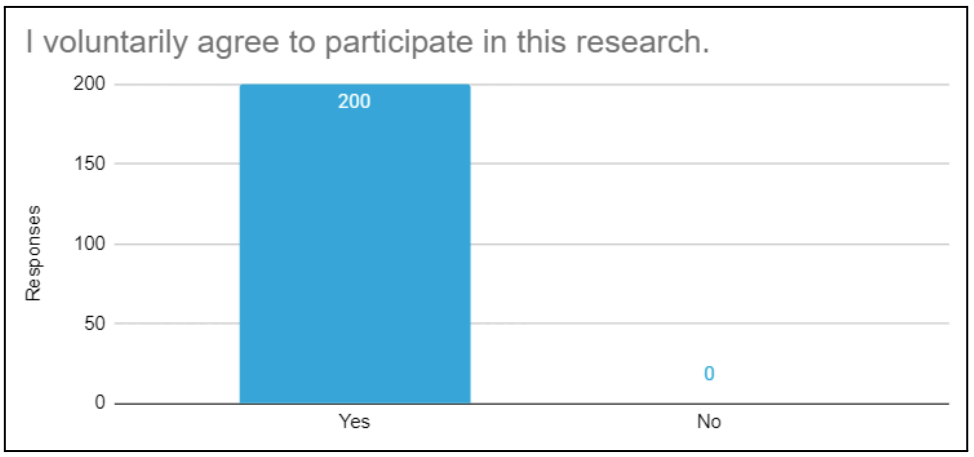

Figure B.1: Consent to Participate

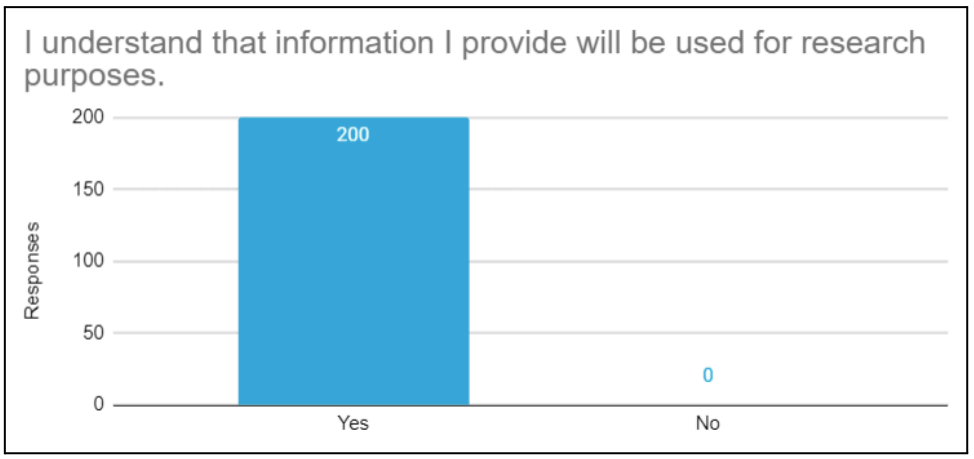

Figure B.2: Consent to Process Responses

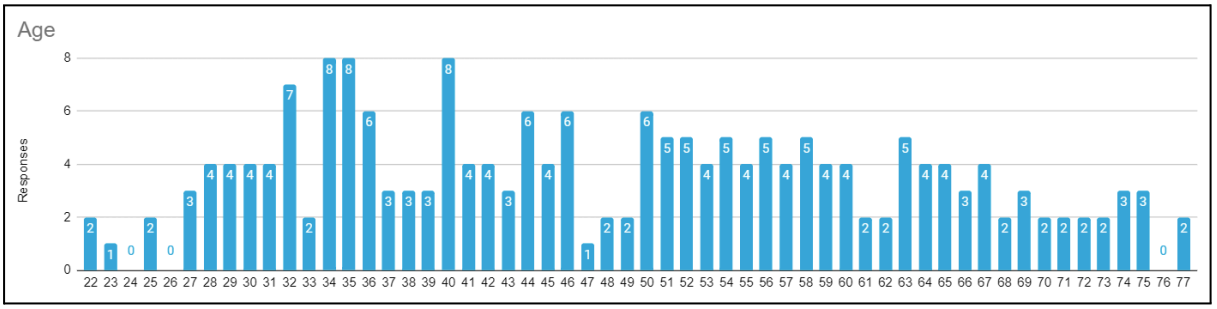

Figure B.3: Respondent Age Distribution

Table B.1: Descriptive Statistics - Age Distribution

	N	Mean	Std. Dev.	Median	Min	Max
Age	200	48.3	14.1	47.5	22	77

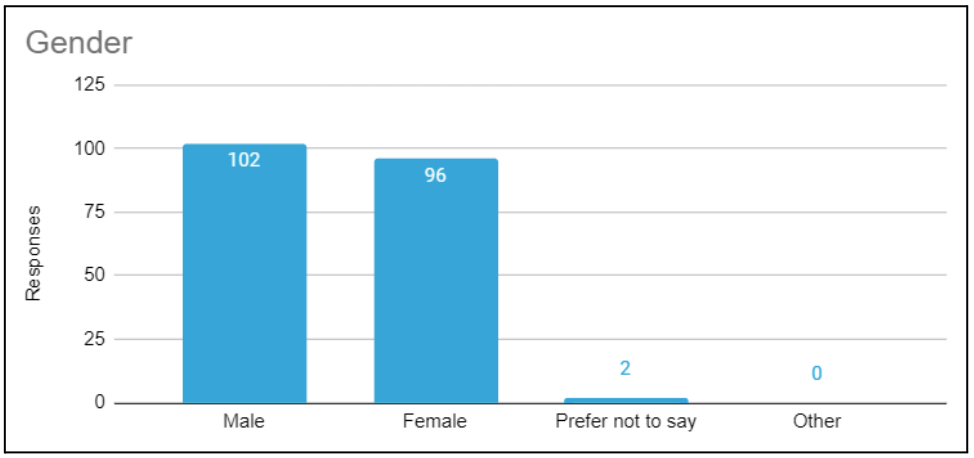

Figure B.4: Respondent Gender Distribution

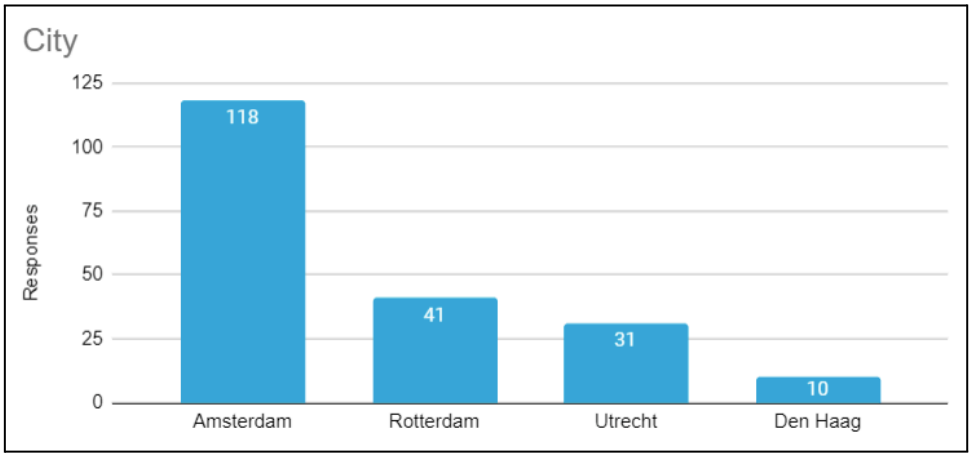

Figure B.5: Respondent City Distribution

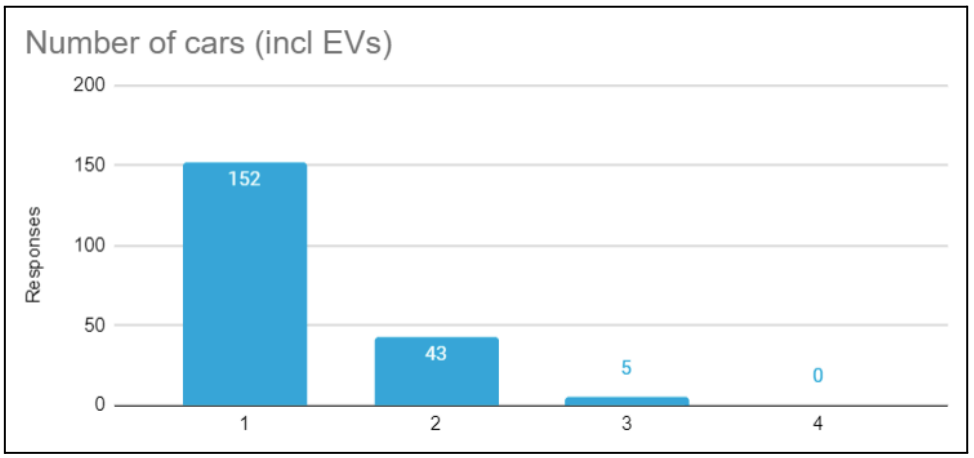

Figure B.6: Respondent Total Number of Cars

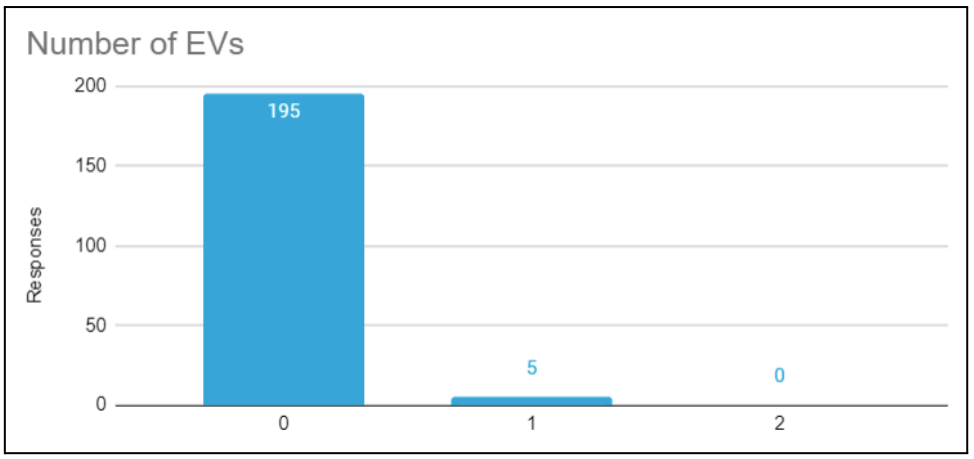

Figure B.7: Respondent Number of Electric Cars

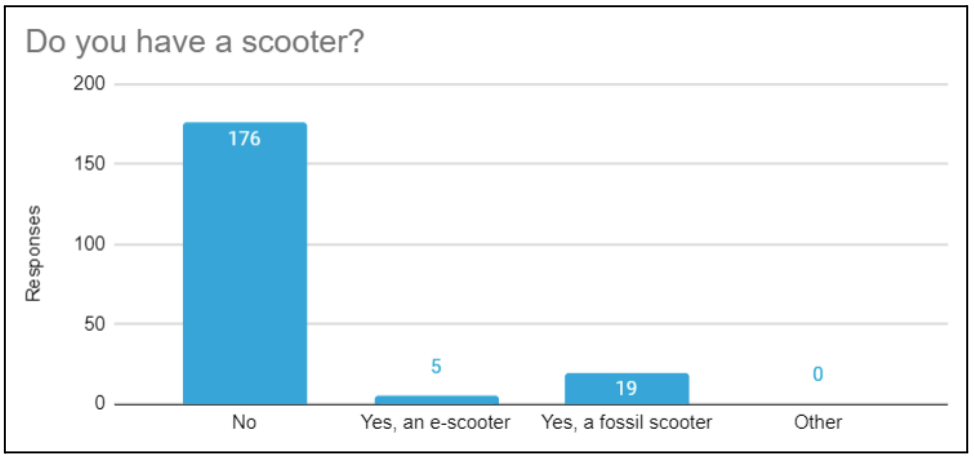

Figure B.8: Respondent Scooter Ownership

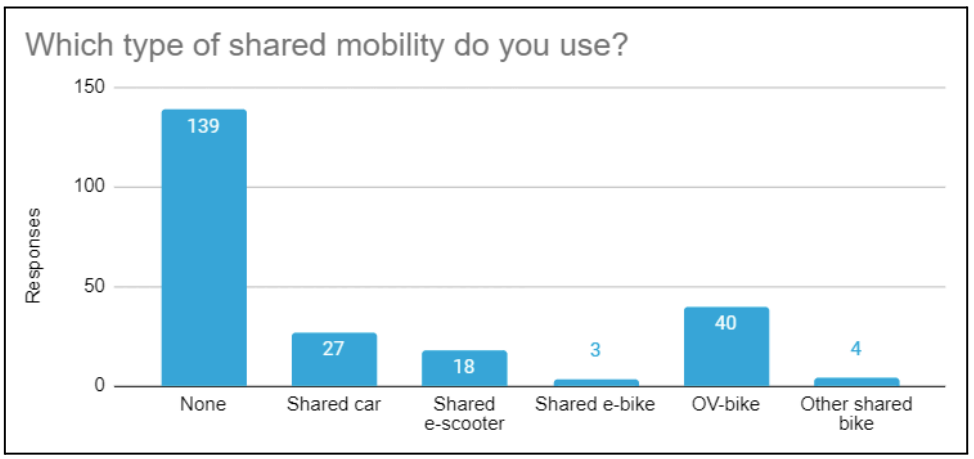

Figure B.9: Respondent Shared Mobility Usage Type

Table B.2: Frequencies of Shared Mobility Usage Type

	N	% of respondents
None	139	69.5%
OV-bike	40	20.0%
Shared car	27	13.5%
Shared e-scooter	18	9.0%
Other shared bike	4	2.0%
Shared e-bike	3	1.5%

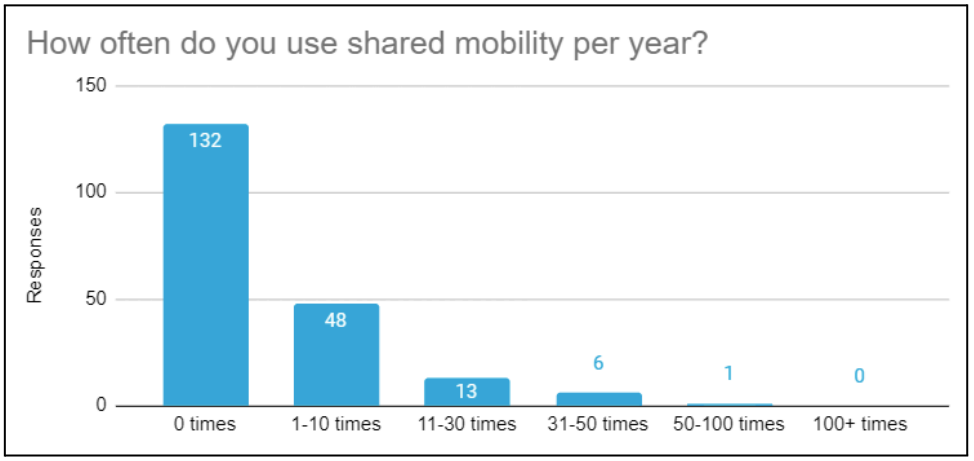

Figure B.10: Respondent Shared Mobility Usage Frequency

B.2 Statements on the Use of Shared Mobility

This subsection presents the results to the part of the survey where respondents were asked to rate 11 statements on the use of shared mobility on a Likert scale from 1 to 7 (Strongly disagree - Strongly agree). The statements themselves are included as the graph title, and further information on these questions can be found in Appendix A.2. At the end of the subsection, a list of all answers is included that were given to the survey question *"Are there any other reasons why you may or may not choose to use shared mobility?"*.

Table B.3: Descriptive Statistics - Statements on the Use of Shared Mobility

Statement	N	Mean	Std. Dev.	Median	Mode	Min	Max
Never considered using S.M.	200	4.06	2.24	4	1	1	7
No, I already own a car	200	4.90	2.01	5	7	1	7
Not enough places to use	200	4.20	1.80	4	4	1	7
Car as status symbol	200	3.28	2.07	3	1	1	7
Would consider if I had no car	200	5.28	1.67	6	7	1	7
Better for environment	200	4.67	1.70	5	5	1	7
No large purchase	200	4.91	1.56	5	5	1	7
No maintenance	200	5.37	1.50	6	6	1	7
Cannot leave belongings	200	4.41	1.85	5	5	1	7
Walk a bit to the car	200	3.82	1.75	4	4	1	7
Cannot predict availability	200	5.57	1.30	6	7	2	7

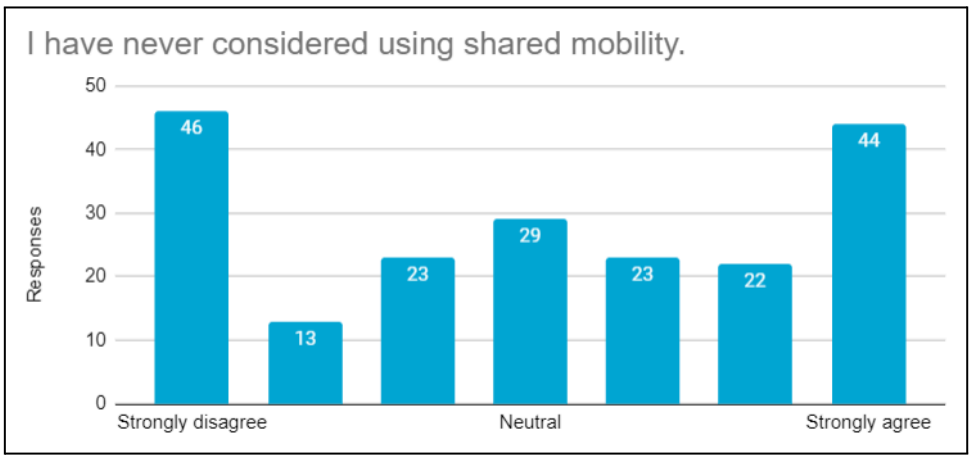

Figure B.11: Result Distribution of Use of Shared Mobility Statement 1

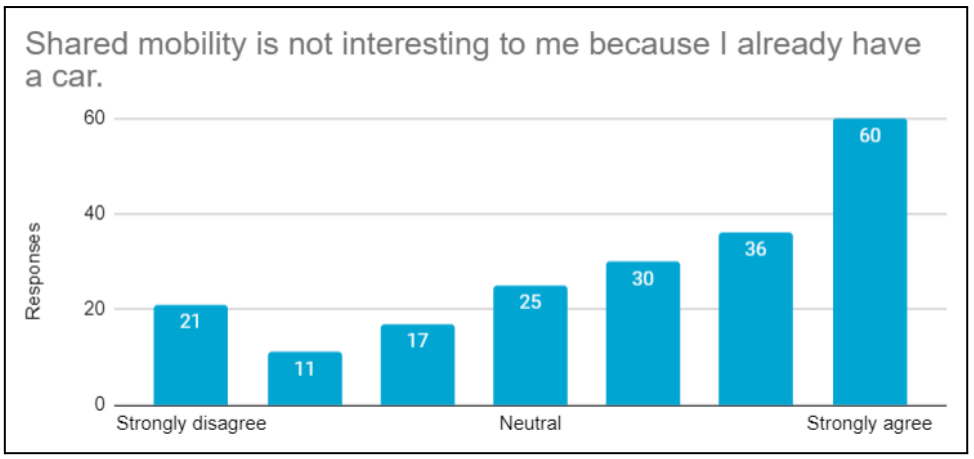

Figure B.12: Result Distribution of Use of Shared Mobility Statement 2

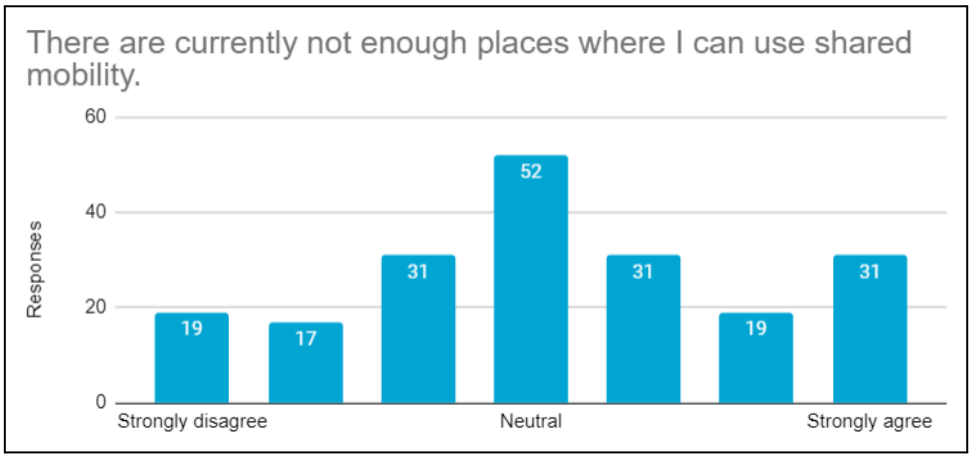

Figure B.13: Result Distribution of Use of Shared Mobility Statement 3

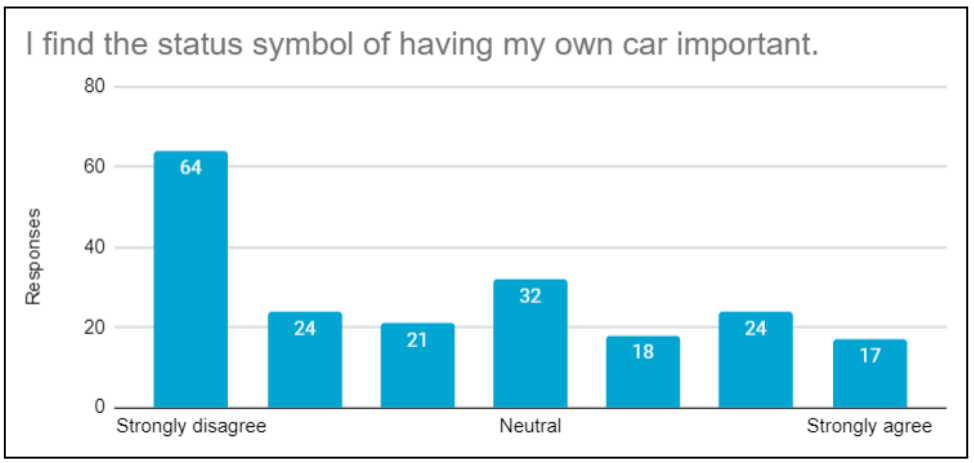

Figure B.14: Result Distribution of Use of Shared Mobility Statement 4

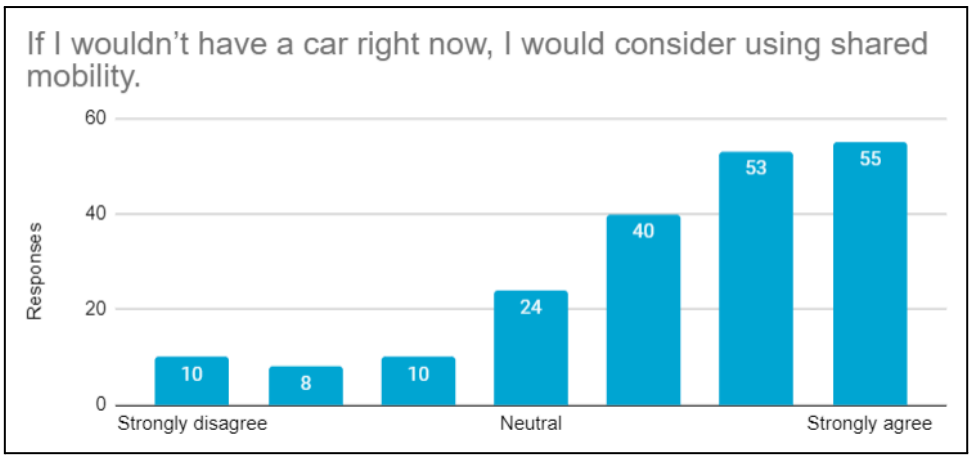

Figure B.15: Result Distribution of Use of Shared Mobility Statement 5

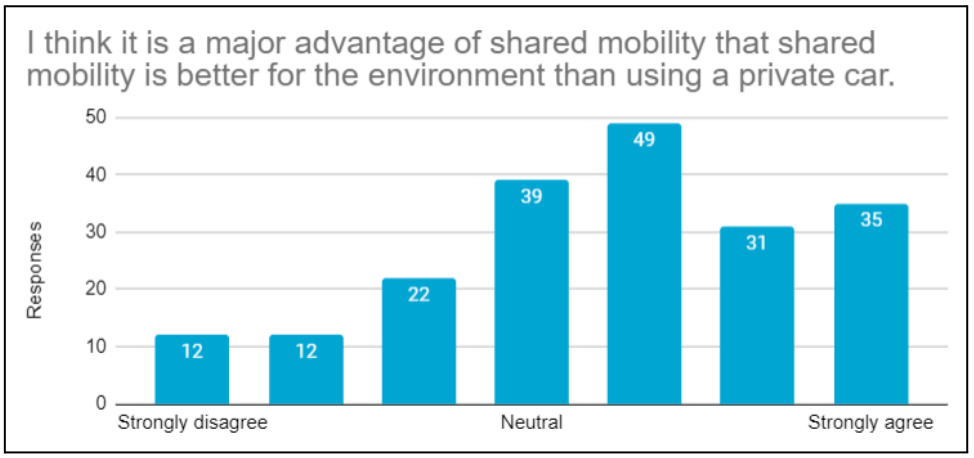

Figure B.16: Result Distribution of Use of Shared Mobility Statement 6

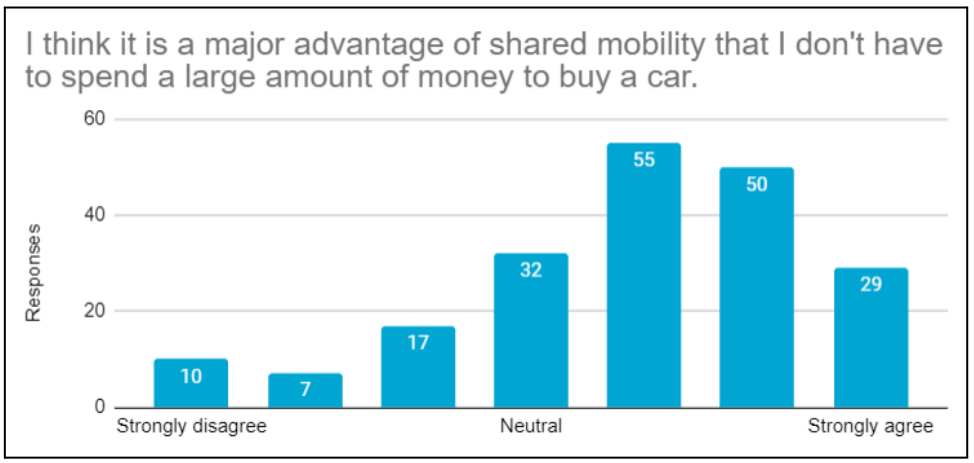

Figure B.17: Result Distribution of Use of Shared Mobility Statement 7

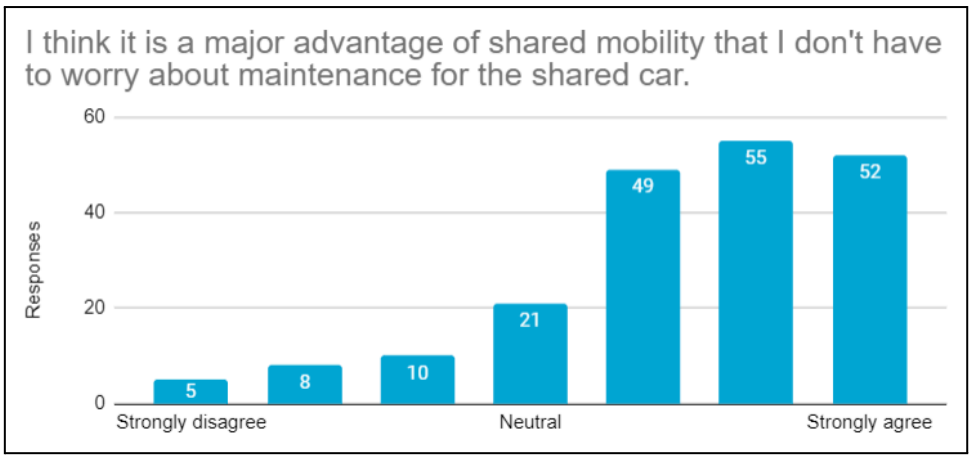

Figure B.18: Result Distribution of Use of Shared Mobility Statement 8

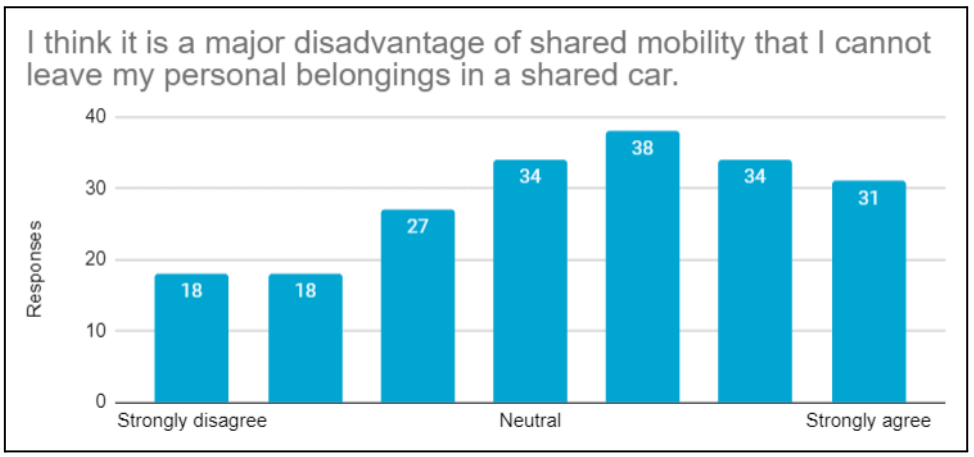

Figure B.19: Result Distribution of Use of Shared Mobility Statement 9

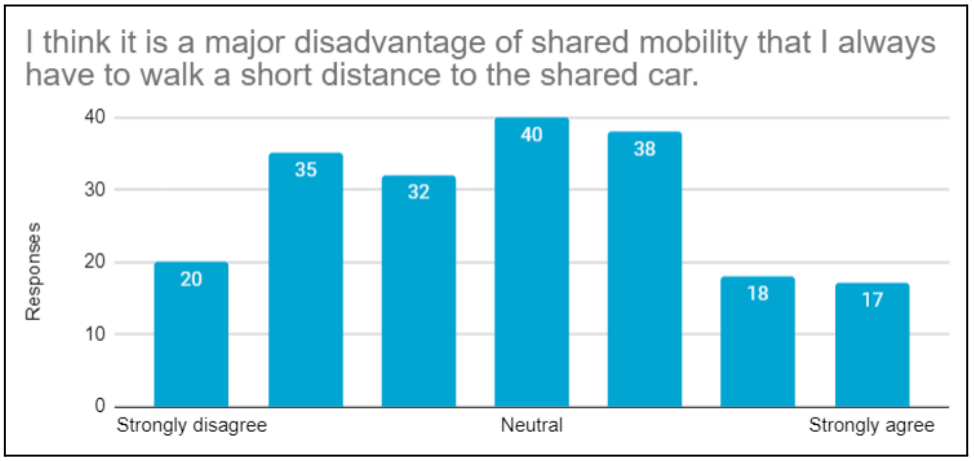

Figure B.20: Result Distribution of Use of Shared Mobility Statement 10

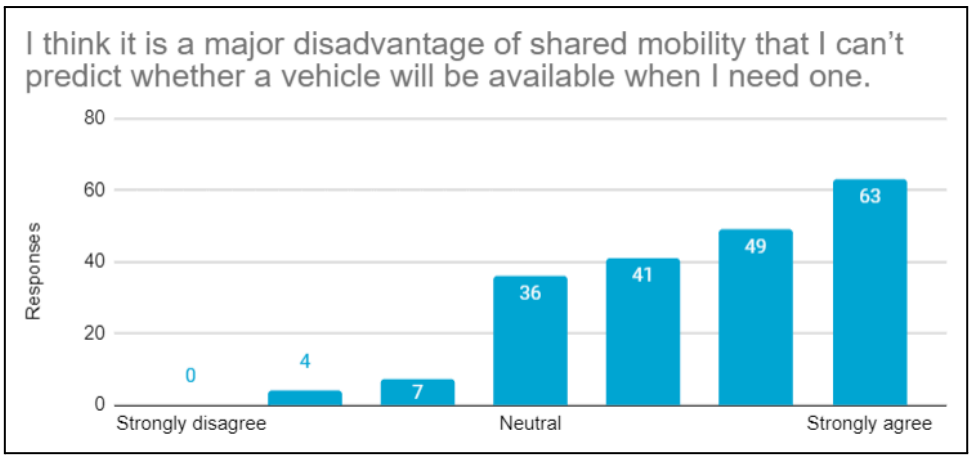

Figure B.21: Result Distribution of Use of Shared Mobility Statement 11

These answers were given to the question *"Are there any other reasons why you may or may not choose to use shared mobility?"*:
(These answers have been paraphrased, combined if there were duplicates and then translated into English. The number of duplicates - if any - is shown after the answer.)

- I don't want to be dependent on a shared mobility service [14x]
- It's too expensive [10x]
- I use my car very often so it would get expensive with heavy use [9x]
- Hygiene concerns [9x]
- The hassle is too much for me [7x]
- I already have a car [5x]
- Uncertainty about liability in case of an accident [5x]
- Limited number of places I can end my journey [4x]
- Internal space in the shared car is too low [4x]
- I have no experience with shared mobility [4x]
- Moving heavy objects [4x]
- I don't need it right now [3x]
- I'm just more comfortable in my own car [3x]
- Additional costs are often way too high. [2x]
- Limited availability in my neighbourhood [2x]
- There is no issue with parking availability where I live. [2x]
- I have very bad experiences with Greenwheels shared cars. Bought a private car again.
- I think it's a disadvantage to have to pay every time I want to drive
- I often use a trailer behind my car - I'm not sure if the shared car will have a tow bar
- A train ticket is often cheaper for a journey
- I have young children, and sometimes accidents happen. A private car is more useful then.
- I don't want to plan ahead, I often don't know in advance when I'll make a trip.

B.3 Rating Shared Mobility Services

This subsection will present the results of the conjoint analysis. Respondents were asked to give fictional shared mobility services a grade from 1 to 10. See Appendix A.3 for the profiles that respondents were presented with.

Table B.4: Descriptive Statistics - Conjoint Profiles

Profile	N	Mean	Std. Dev.	Median	Mode	Min	Max
Profile 1	200	6.21	2.62	7	8	1	10
Profile 2	200	4.93	2.39	5	6	1	10
Profile 3	200	7.28	2.40	8	9	1	10
Profile 4	200	4.45	2.25	4	4	1	10
Profile 5	200	6.42	2.38	7	8	1	10
Profile 6	200	5.07	2.50	5	6	1	10
Profile 7	200	5.53	2.43	6	7	1	10
Profile 8	200	6.07	2.38	7	7	1	10

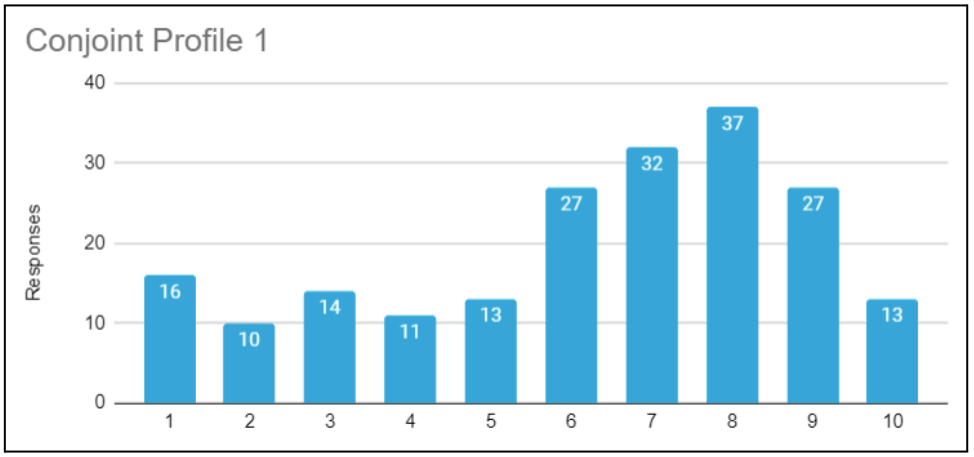

Figure B.22: Results of Shared Mobility Profile 1

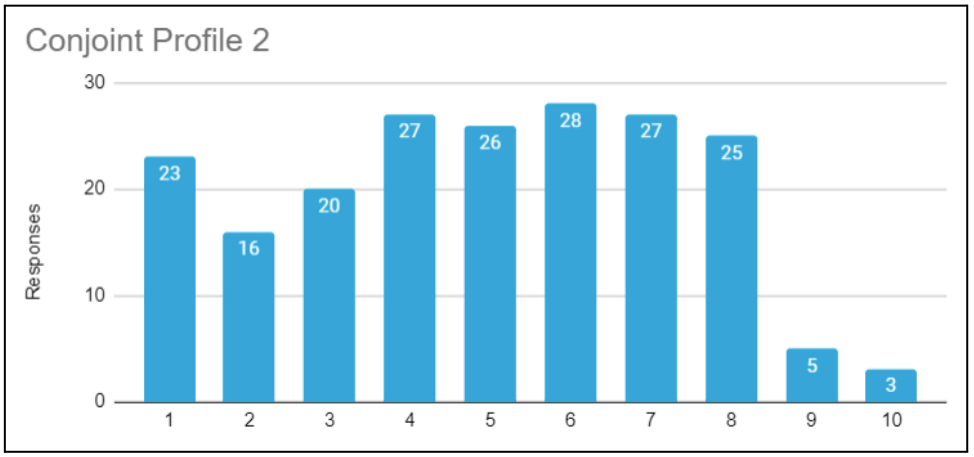

Figure B.23: Results of Shared Mobility Profile 2

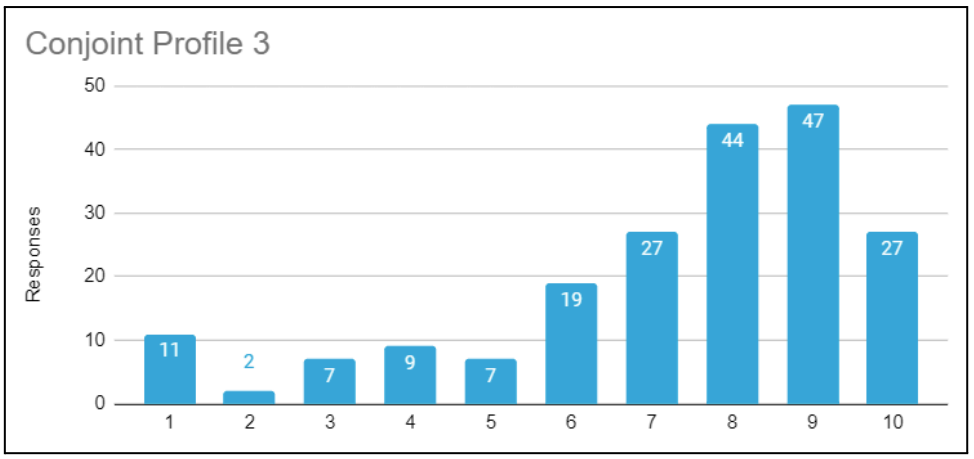

Figure B.24: Results of Shared Mobility Profile 3

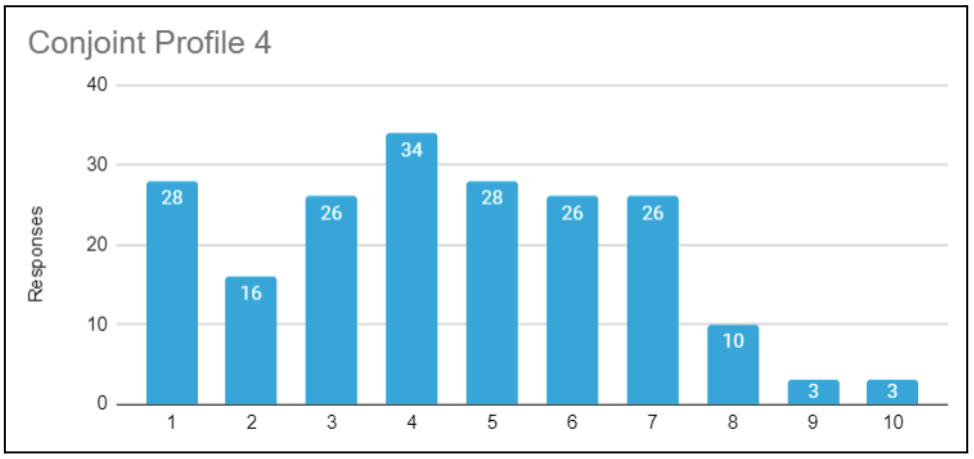

Figure B.25: Results of Shared Mobility Profile 4

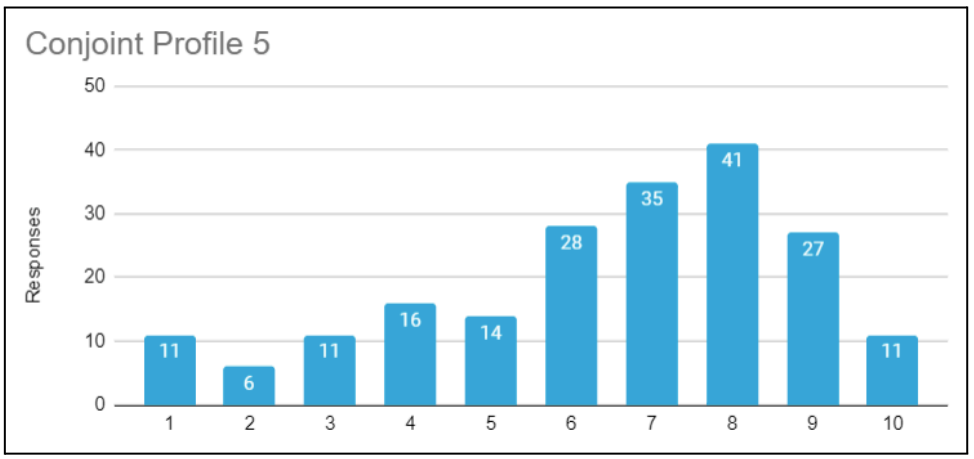

Figure B.26: Results of Shared Mobility Profile 5

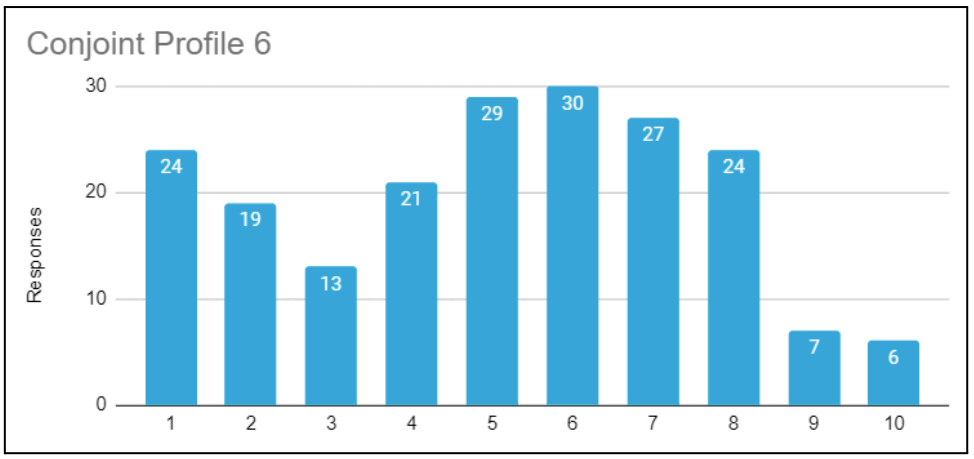

Figure B.27: Shared Mobility Service 6

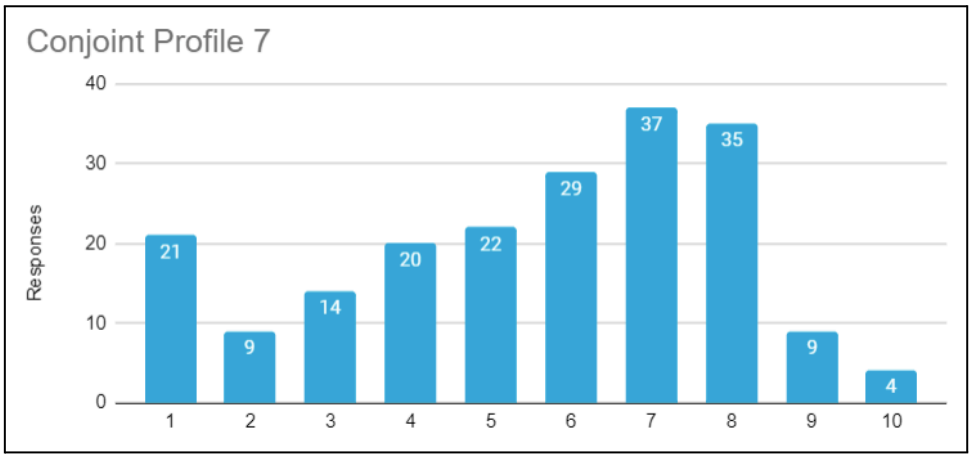

Figure B.28: Results of Shared Mobility Profile 7

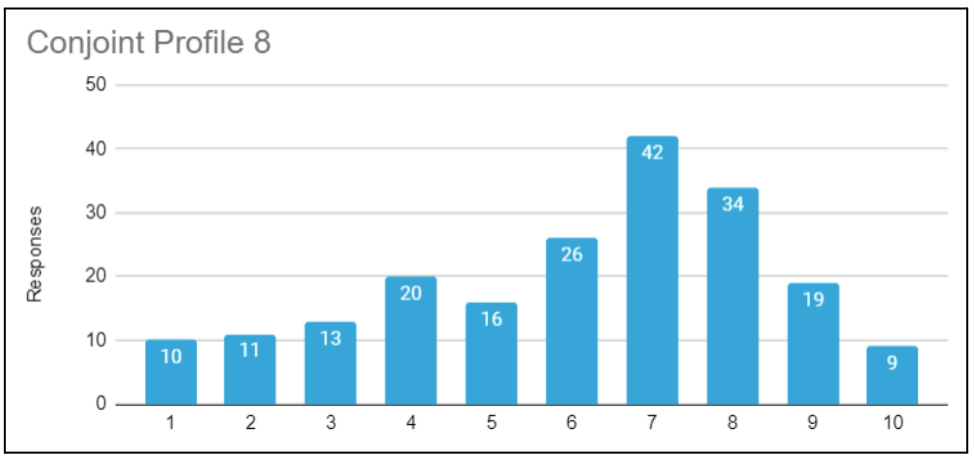

Figure B.29: Results of Shared Mobility Profile 8

B.4 Statements on Improvements to Shared Mobility Services

This subsection presents the results to part 4 of the survey, where respondents were asked to rate 7 improvements to shared mobility on a Likert scale from 1 to 7 (Not important at all - Very important). Then, a list of all answers is included that were given to the survey question *"Are there any other things that should be improved according to you?"*. Finally, 2 more statements are presented that asked respondents about their openness to use shared mobility, again with a 7-point Likert scale. The statements themselves are included as the graph title, and further information on these questions can be found in Appendix A.4.

Table B.5: Descriptive Statistics - Improvements to Shared Mobility Services

Statement	N	Mean	Std. Dev.	Median	Mode	Min	Max
Needs to be cheaper	200	5.38	1.32	5	5	1	7
Too far from home	200	5.04	1.38	5	5	1	7
Reserve further in advance	200	5.40	1.45	6	7	1	7
Amount of vehicles	200	5.46	1.24	6	5	1	7
Amount of vehicle types	200	5.03	1.51	5	5	1	7
Start in more places	200	5.04	1.68	5	5	1	7
End in more places	200	5.43	1.49	6	6	1	7
Open to using S.M. now	200	3.52	1.87	4	1	1	7
Open to using S.M. in future	200	4.85	1.65	5	6	1	7

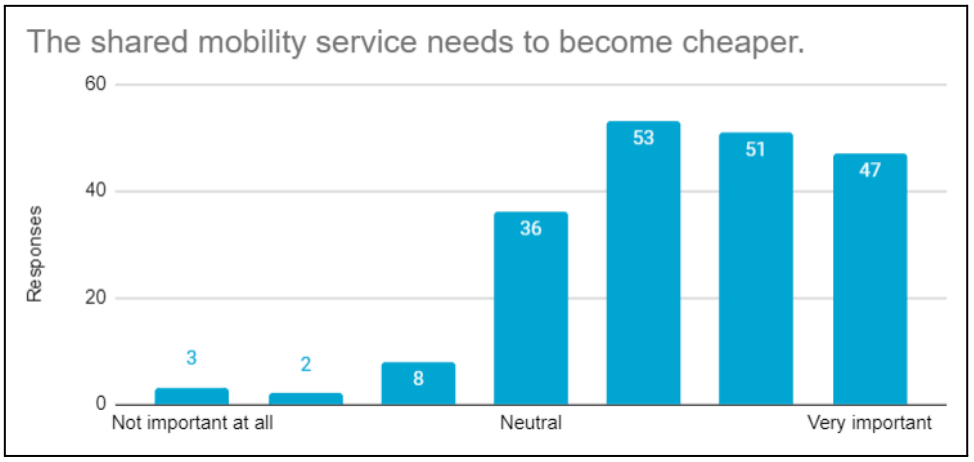

Figure B.30: Result Distribution of Improvements on Shared Mobility Services 1

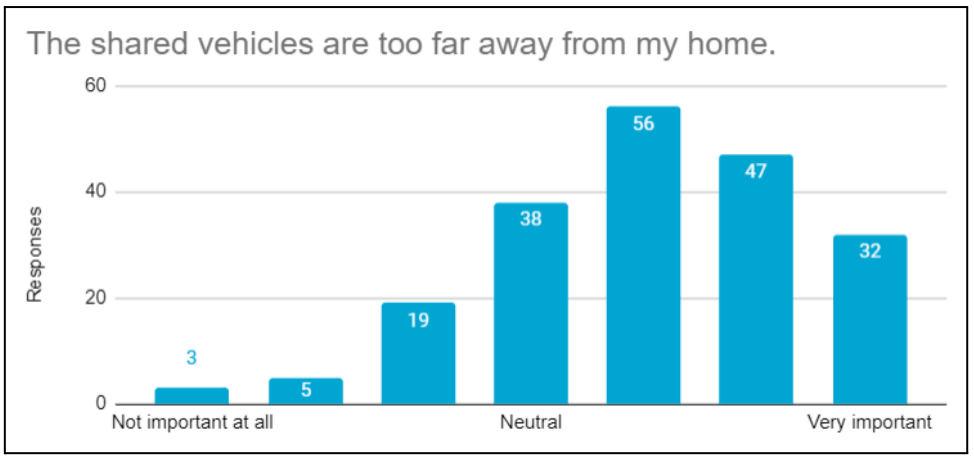

Figure B.31: Result Distribution of Improvements on Shared Mobility Services 2

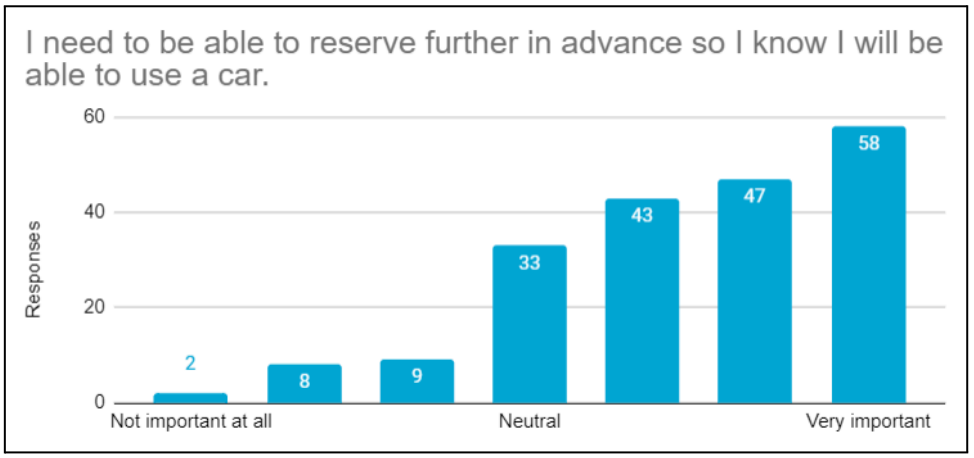

Figure B.32: Result Distribution of Improvements on Shared Mobility Services 3

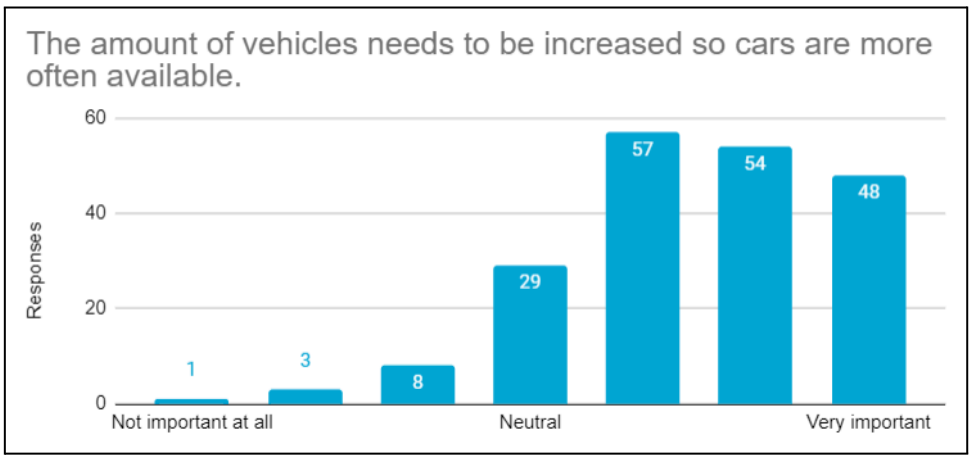

Figure B.33: Result Distribution of Improvements on Shared Mobility Services 4

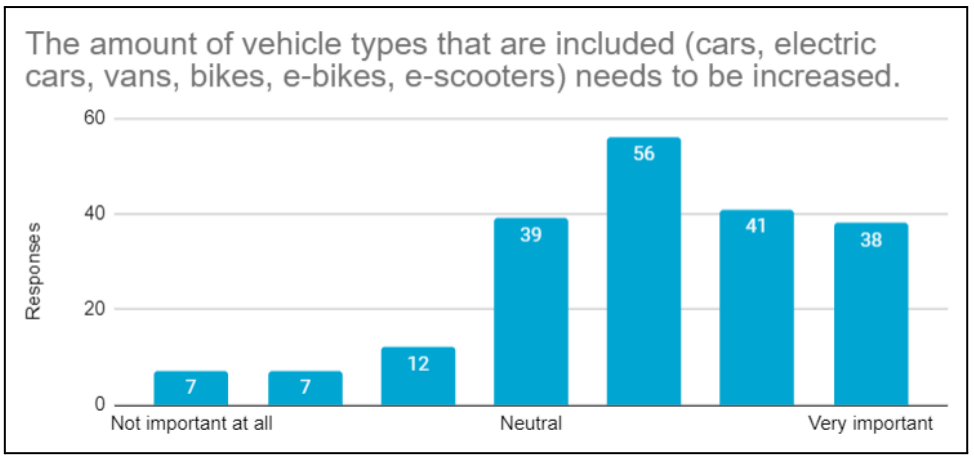

Figure B.34: Result Distribution of Improvements on Shared Mobility Services 5

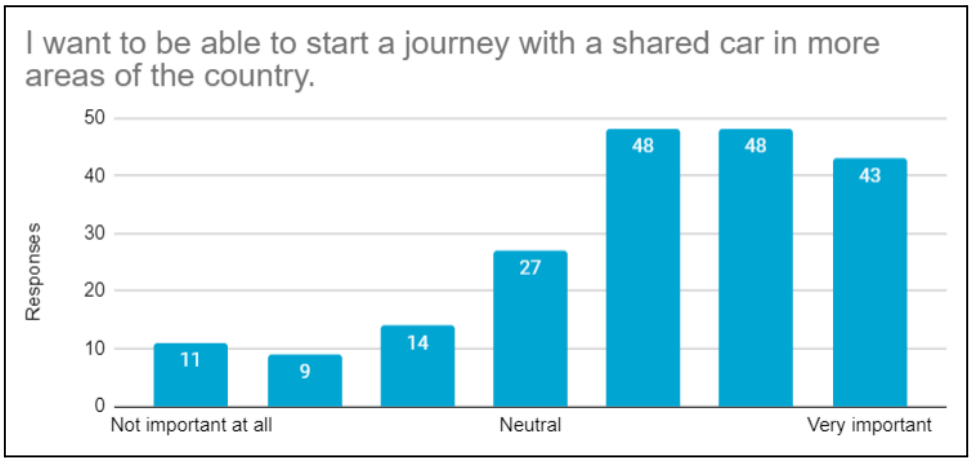

Figure B.35: Result Distribution of Improvements on Shared Mobility Services 6

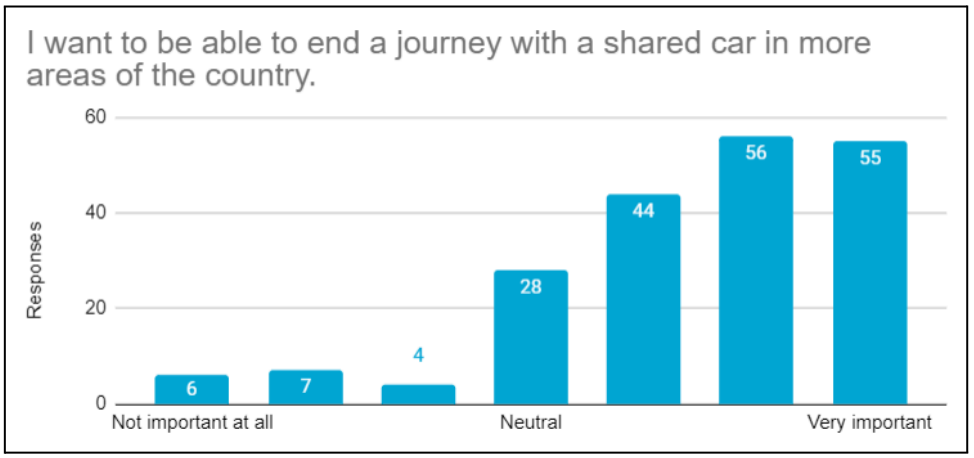

Figure B.36: Result Distribution of Improvements on Shared Mobility Services 7

These answers were given to the question *"Are there any other things that should be improved according to you?":*
(These answers have been paraphrased, combined if there were duplicates and then translated into English. The number of duplicates - if any - is shown after the answer.)

- If I want to take the car for a longer time (for example on a trip), it should not be this expensive [5x]
- The shared mobility service has to take better care of how cars are left behind (damage, fuel, hygiene) for the next user [5x]
- Bigger/more luxurious cars and cars with a towbar should be available as well [5x]
- Need to be able to leave the car in more places [4x]
- I just don't really like shared mobility to be honest
- The insurance deductible is too high
- Child seats need to be included
- The requirement of having a license for 2 years needs to be lifted. Then it can become part of the young adult lifestyle.
- If I say I want more shared cars where I live, that will hurt parking availability for me.
- Not enough availability for me
- The government should subsidize it, for example allow us to deduct shared mobility costs from income tax
- More modalities in more places! So I can take a shared bike to the station and travelling by train, and then using a shared car at my destination. During the holiday maybe a shared bike when necessary.
- Shared cars in local communities with people that you know, rather than strangers.
- The apps need to be better
- Maybe only charge (a little bit more) for kilometers driven, and have no costs per hour.
- Price per kilometer needs to be as low as possible
- Make hydrogen cars available to stimulate the use of those cars!

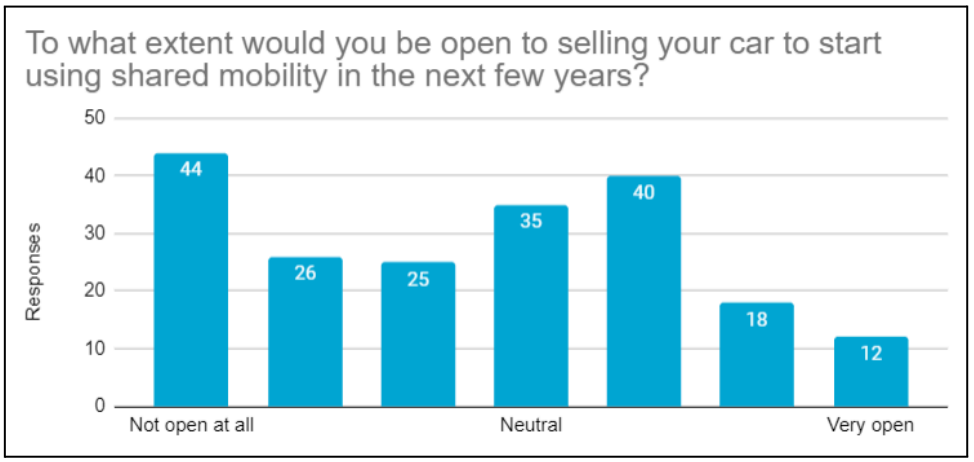

Figure B.37: Result Distribution of Willingness to Use Shared Mobility In The Next Few Years

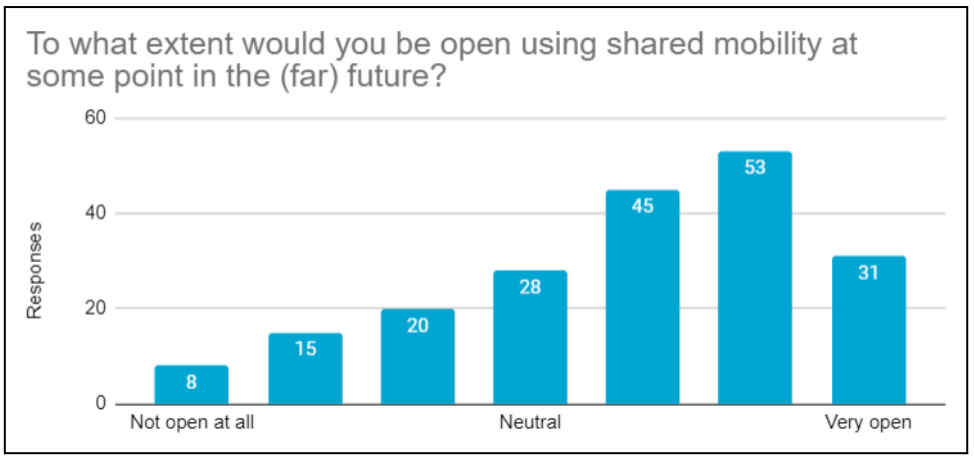

Figure B.38: Result Distribution of Willingness to Use Shared Mobility In The Far Future

B.5 Survey Respondents & Data Collection Process

200 respondents have been recruited for this research, via the platform respondenten.nl. The target audience is people who own 1 or more private car(s), and live in one of the Randstad cities (Amsterdam, Rotterdam, The Hague, or Utrecht).

Car ownership is important because this research focuses on how they perceive shared mobility services, and I only chose to go for people in the Randstad because these 4 cities have well-developed shared mobility infrastructure. That is important for 2 reasons. Firstly, it means that respondents are likely to be familiar with shared mobility, or even have some experience with it. Secondly, a well-developed infrastructure means that getting rid of one's car and switching to shared mobility is actually a feasible option for people living in these cities. Both are important details for the research context.