Radboud University Nijmegen | Master's program in Spatial Planning
Nijmegen School of Management

Smart mobility solutions for rural areas

Introducing sustainable and innovative mobility options to enhance the accessibility of car-dependent regions

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December 2020

Radboud University

ACCENT adviseurs

Keywords: sustainable mobility, smart mobility, shared mobility systems, mobility hubs, travel mode choice, behavioural change

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Submission date	14-12-2020	Organisation	Accent adviseurs

Dutch summary / samenvatting

In de Kempen regio in Noord-Brabant is het autogebruik erg hoog. Doordat het uitgestrekte en buitenstedelijke gebied geen uitgebreid openbaar vervoer netwerk kent wordt de auto hier voor veel dagelijkse reisbewegingen gebruikt. Met name de kleinere dorpen in de regio, waar enkel buurtbussen rijden, zijn slecht bereikbaar voor mensen die niet beschikken over een auto. In het kader van duurzaamheid, maar ook om het huidige autogebruik te verminderen en de bereikbaarheid van de dorpen te verbeteren is het SMARA (Smart Mobility Applications and solutions in Rural Areas) programma ontwikkeld. Dit programma bestaat uit meerdere onderdelen met zowel fysieke als meer psychologische oplossingen om de beschreven doelstellingen te bereiken. Een voorbeeld hiervan is het creëren van een fijnmazig netwerk met alternatieve mobiliteitsoplossingen zoals deelmobiliteit (Mini Hub) en een innovatief liftconcept (F'kes meerijden). Deze alternatieven moeten ervoor zorgen dat de dorpen onderling goed met elkaar verbonden worden en ook voor mensen zonder auto goed bereikbaar zijn. Doordat deze voorgestelde alternatieven nieuw zijn en er weinig vergelijkbare rurale gebieden zijn met soortgelijke mobiliteitsoplossingen, is het van belang dat er wordt onderzocht op welke manier deze alternatieven geïmplementeerd kunnen worden in het gebied. Hierbij is het met name belangrijk om potentiële doelgroepen te identificeren om te kunnen achterhalen wat hun motieven en weerstanden zijn om deze alternatieven te gebruiken.

Deze scriptie zal zich dan ook richten op het vinden van een potentiële doelgroep voor het gebruik van innovatieve mobiliteitsoplossingen in de Kempen regio, om op die manier de mobiliteit binnen de regio op een meer efficiënte en duurzame manier in te richten. Aan de hand van de casus van de Kempen regio kunnen lessen worden geleerd over het implementeren van soortgelijke mobiliteitsoplossingen in andere rurale gebieden in Nederland. Kwalitatieve onderzoeksmethoden, zoals interviews met lokale belanghebbenden en observaties van dorpen in de regio, vormden de basis voor de resultaten van dit onderzoek.

Algemene resultaten

Het belangrijkste aspect dat ervoor kan zorgen dat mensen alternatieve vormen van mobiliteit gaan gebruiken is het gevoel van noodzaak dat deze mensen moeten hebben. Dit onderzoek toont aan dat een gebrek aan noodzaak ervoor zorgt dat mensen niet bereid zijn om hun gedrag te veranderen. Met name in gebieden met een hoog auto gebruik, zoals vaak in rurale gebieden, is het erg lastig om het gedrag van mensen te veranderen zonder dat er een gevoel van noodzaak is. De auto-afhankelijkheid van een regio kan worden verklaard aan de hand van de vier factoren

van Buehler: sociaal-economisch & demografisch, ruimtelijke inrichting, transport & landgebruik en cultuur & houding. Na het analyseren van deze factoren kan tevens worden vastgesteld welke mensen er met name zullen profiteren van de implementatie van alternatieve vormen van mobiliteit. Het is van belang dat de beoogde plannen worden vastgesteld op de potentiële gebruikers en doelgroepen. Om de slagingskans van het project te verhogen en de kans op risico te verkleinen, is het van belang dat elke stap in het proces voorzichtig wordt genomen om op deze manier op maat gemaakte oplossingen te realiseren. Daarnaast is het van belang om de motieven en weerstanden van de potentiële doelgroep te achterhalen om op deze manier het beoogde proces van gedragsverandering te versoepelen. Deze motieven en weerstanden zullen per doelgroep verschillend zijn en kunnen thema's omvatten zoals bijvoorbeeld: gemak, gezondheid, kosten en tijd. Door vervolgens de motieven te versterken en de weerstanden te verminderen verhoogt de slagingskans van de gedragsverandering.

Resultaten Kempen regio

Doordat de huidige autogebruikers binnen de Kempen regio geen noodzaak hebben om van vervoerswijze te veranderen en de beoogde gedragsverandering daardoor lastig te realiseren is, worden mensen zonder auto en met name jongeren gezien als de potentiële doelgroep voor de innovatieve mobiliteitsoplossingen. Uit het onderzoek blijkt dat zij op dit moment erg afhankelijk zijn van auto's van bijvoorbeeld hun ouders om weggebracht te worden naar hun bestemming of naar de dichtstbijzijnde bus halte. Vormen van deelmobiliteit en F'kes meerijden zouden ervoor kunnen zorgen dat zij gemakkelijker zelfstandig hun reis kunnen maken. Daarnaast kan dit ervoor zorgen dat gezinnen in de toekomst geen tweede of zelfs derde auto meer nodig hebben.

Uit interviews met de mensen uit de beoogde doelgroep blijkt dat ze erg positief staan tegenover het gebruik van deelmobiliteit. Volgens hen kan dit ervoor zorgen dat ze de grote afstanden binnen de Kempen niet meer per fiets hoeven af te leggen. Voorwaarde voor hen is echter wel dat het vervoersmiddel van toegevoegde waarde voor hen moet zijn. Aangezien bijna alle jongeren al beschikken over een eigen fiets, denken ze niet dat deelfietsen een goed idee zou zijn. Deelscooters of deelauto's voegen daarentegen wel wat toe aan de huidige vervoersopties. Ook het innovatieve liftconcept F'kes meerijden werd positief ontvangen. Deze laagdrempelige manier van reizen kan volgens de doelgroep handig zijn om van dorp tot dorp te reizen. Voorwaarde voor het gebruik van dit concept is echter wel dat de veiligheid van de gebruiker gewaarborgd moet kunnen worden.

Summary

Car use is very high in the Kempen region in North Brabant. Because this outer urban area does not have an extensive public transport network, the car is used in this region for many daily travel movements. Especially the smaller villages in the region, where only local buses (*buurtbus*) run, are difficult to reach for people without a car. In order to reduce current car use and improve the accessibility of the villages within the region, the SMARA (Smart Mobility Applications and solutions in Rural Areas) program has been developed. This program consists of several parts with both physical and more psychological solutions to achieve the described objectives. An example of this is the creation of a network of alternative mobility solutions with transport options such as shared mobility (*Mini Hub*) and an innovative hitchhike concept (*F'kes meerijden*). These alternatives must ensure that the villages are well connected with each other and are also easily accessible for people without a car. Because these proposed alternatives are new and there are not many comparable rural areas with similar mobility solutions, it is important to investigate how these alternatives can be implemented in the area. It is particularly important to identify potential target groups in order to find out what their motives and resistances are to use these alternatives.

This thesis will therefore focus on finding a potential target group for the use of innovative mobility solutions in the Kempen region, in order to organise its mobility in a more efficient and sustainable way. On the basis of the case study of the Kempen region, lessons can be learned about implementing similar mobility solutions in other rural areas in the Netherlands. The research was conducted on the basis of qualitative research methods, such as interviews with local stakeholders and observations of villages in the region.

General results

The most important aspect in order to reach and stimulate people to use alternative forms of mobility is the need of urgency to do so. This research has indicated that a lack of urgency can ensure that people are not willing to change their behaviour. Especially in car-minded areas, such as rural regions, is changing the behaviour of the inhabitants very difficult without a sense of necessity. The car-dependency of a region can be explained on the basis of Buehler's four factors: socio-economic and demographic factors, spatial development, transport and land-use and culture and attitude. Based on these factors, it can be determined to what extent people are dependent on car use. Subsequently, it can be determined which people will be most likely to benefit from alternative forms of mobility. It's important that the intended plans are in line with the wishes of the potential

target group. To increase the success rate of the project and to limit the risk, every step of the process must be taken carefully to create 'tailor-made' solutions for every target group and location. In addition, in order to achieve behavioural change from the potential target group, it's important to get to know their motives and resistances to use the alternative forms of mobility. These motives and resistances will be different at various target groups, and could for example include theme's like convenience, health, safety, costs and time. Afterwards, these motives for using these alternatives can be reinforced, while the resistances must be reduced. There are different methods to do so, ranging from psychological to physical measures.

Kempen region results

Because the current car users within the Kempen region do not have a sense of urgency to change their mode of transport and the intended behavioural change is therefore too difficult to achieve, people without a car and especially the younger generation are seen as the potential target group for innovative mobility solutions. The research shows that they are currently very dependent on their parents' cars, for example, to be taken to their destination or to the nearest bus stop. Forms of shared mobility and the hitchhike concept of *F'kes meerijden* could make it easier for them to travel independently. In addition, these solutions can ensure that families no longer need a second or even a third car in the future.

Interviews with people from the intended target group show that they are very positive about the use of shared mobility. According to them, this can ensure that they no longer have to travel the long distances within the Kempen region by bicycle. However, a condition for them is that the means of transport must be of added value for them. Since almost all young people already have their own bicycle, they don't think shared bicycles would be a good idea. Shared scooters or shared cars, on the other hand, add something to the current transport options. The innovative hitchhike concept *F'kes meerijden* was also received positively. According to the target group, this way of traveling can be useful for traveling from village to village. However, a precondition for using this concept is that it must be possible to guarantee the safety of the user.

Preface

Over the past few months I have been working hard on this thesis in order to complete the Master's program in Spatial Planning. This research was conducted on the basis of, among other things, an extensive literature review, case observations and several interviews, resulting in the report that now lies in front of you.

My research was commissioned by Accent adviseurs, where I executed an internship of six months. Despite working from home due to the Covid-19 pandemic, I still got a good impression of the work of this consultancy. The subject and the research methodology of this research were established in close collaboration with Jos Wijnen, my internship supervisor. He also guided me during those months and provided me with feedback and new insights. From the Radboud University, I was supervised by Frits Verhees, who helped to find the right directions in order to ensure a smooth process.

I would like to thank my supervisors for their pleasant guidance, valuable knowledge and support while writing this thesis. In addition, I would like to thank all the participants of the interviews and the people who helped me by collecting necessary data for this research. Their input was of great importance in making this research possible.

Finally, I would like to thank my family and friends who motivated and helped me during this process.

I hope you enjoy your reading.

Tilburg, 14-12-2020
Willem van Wagenberg

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1. Introduction

In this first chapter, the topic of this research will be introduced by addressing the need for a more sustainable mobility system and less car dependency in more rural areas. Thereafter, the case of the Brabantian Kempen will be introduced, and some context will be given about the current circumstances concerning the Covid-19 pandemic. This results in the research aim and the research questions of this research. Lastly, the reading structure of this research will be presented.

1.1 A transition to more cleaner mobility

In 1972, a ground breaking book was publish d by the Club of Rome in cooperation with some researchers of the Massachusetts Institute of Technology (MIT). In this rapport, titled The Limits to Growth, attention was paid to the consequence of interactions between the earth and human systems. It was predicted that if nothing happens, the growth limits for human population on earth are reached around the year 2072, resulting in 'sudden and uncontrollable decline in both population and industrial capacity' (Meadows, Meadows, Randers & Behrens, 1972). To counter this, people's behaviour must change. Humanity has to impose limits for itself, to achieve balance between the production of goods and the population (Club of Rome, n.d.).

Nowadays the message of The Limits to Growth is still relevant. It has become increasingly common in recent years for planners to adapt sustainability strategies, which principles are based on allowing present generations to meet their needs without compromising the ability of future generations to meet theirs (Jenks & Dempsey, 2005, p.24). An important aspect of a sustainable living environment is the mobility of the people. At this moment, around 25% of the total emitted greenhouse gases in the European Union is caused by the transport sector (Eurostat, 2020). Table 1 shows how this relates to the other sectors that produce greenhouse gas emissions in the European Union.

Fuel combustion and fugitive emissions from fuels (without transport)	53%
Transport (including international aviation)	**25%**
Agriculture	10%
Industrial processes and product use	9%
Waste management	3%

Table 1: Greenhouse gas emissions in the European Union in 2018, analysis by source sector (Eurostat, 2020)

That 25% can be traced back into different forms of transport, which is showed in table 2. This table shows that a large part of the emissions comes from road transport. To get a better understanding of the context, road transport is also divided into different categories.

Road transport	**72%**	**Cars**	**60,7%**
		Heavy trucks	26,2%
		Light trucks	11,9%
		Motorcycles	1,2%
Shipping traffic	13,6		
Civil aviation	13,4%		
Railway transportation	0,5%		
Other	0,5%		

Table 2: Overview of emissions per mode of transport in the EU (European Parliament, 2019)

Remarkable about these numbers is the large part of emissions for which the car is responsible. The EU has set itself targets in order to reduce the emission greenhouse gasses in Europe. They aim to become the world's first climate-neutral continent by 2050 (Eurostat, 2020), causing a major role for sustainable forms of mobility in this plan.

Not only the EU is trying to reduce the emission of greenhouse gasses. Governments on multiple levels in the Netherlands are also trying to minimalize the use of greenhouse gasses on many different ways. The Dutch government is for example engaged in an energy transition from fossil fuels to more sustainable forms of energy like wind or solar energy (TNO, n.d.). But also on smaller scales are governments trying to find innovative ways to reduce CO2 emissions, like the implementation of a more sustainable mobility system. Achieving a more sustainable mobility system can be done in various ways, for example by reducing the need to travel, reducing the trip length, encouraging modal shift and encouraging greater efficiency in the existing transport system (Banister, 2006, p.75). The structural vision for infrastructure and space by the Dutch Ministry of Infrastructure and Water Management, describes that the national government wants to focus on possibilities to increase the existing capacity of the mobility network. By implementing and using innovative mobility solutions, the current network can be used more efficiently in order to achieve more reliable travel times (Ministerie van Infrastructuur en Milieu, 2012, p.44). To achieve this goal, the idea of the government is to focus more on the integration of public transport with the 'first and last mile' transport. When these traffic flows fit together in a proper way, a more stronger mobility chain will emerge (Ministerie van Infrastructuur en Milieu, 2012, p.44).

1.2 Car dependency in rural areas

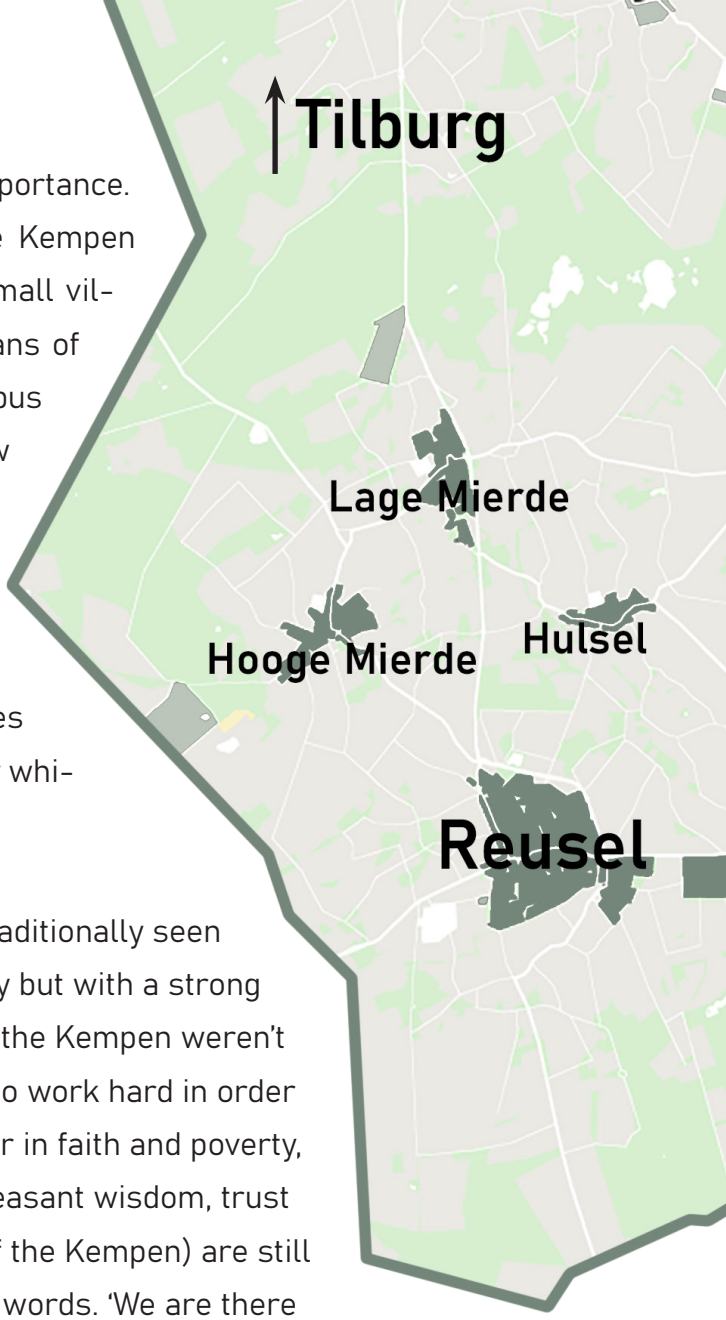
Rural public transport services in Europe are under stress. This is due to a combination of factors

like demographic change and poor connectivity in terms of public transport infrastructures. The lack of a good mobility infrastructure ensures that rural areas have become highly car dependent (SMARTA, n.d.). Main cause for poor connections of public transport for more rural areas is the population density. A low population density leads often to a lower ridership number for fixed public transport routes, and a low ridership ensures less income for transport companies, making it economically uninteresting for these companies to invest in these rural transit lines (Rural Health Information Hub, n.d.). Besides that the lack of a good public transport network causes more car use, also the increase in car use can being explained by the increasing prosperity in the Netherlands. Last year, the number of cars in the Netherlands increased more than the number of people over 18 years of age did (CBS, 2020). The inevitable outcome of a poor public transport network and a higher total amount of cars is that most people have to use a car to get around. This means that those without cars are dependent on others for rides, often meaning that they have reduced possibilities to participate in society (SMARTA, n.d.). In particular, this can be a problem for the elderly. In more developed nations, such as the Netherlands, the share of elderly in rural populations is growing, but they're less mobile than other age groups. This can be problematic since community activity can be very important for the quality of life for many older people (Shergold, Parkhust & Musselwhite, 2011).

1.3 Problem statement

1.3.1 The Kempen region

The Brabantian Kempen (figure 1), a region close to Tilburg and Eindhoven in the south of the Netherlands, is such an area that is difficult to reach without a car. The Kempen can be seen as a rural area that is highly car dependent. There is little public transport in the region causing difficulties for people without cars. But also car owners face problems due to the absence of a good mobility system. A large part of the working population of the Kempen commutes to work by car, which leads to a lot of traffic jams during weekdays on the provincial roads. In addition, cut-through traffic is created by cars that want to avoid traffic jams. In particular smaller villages in the Kempen suffer from this, since a lot of traffic affects the quality of life in those villages. Besides, the Kempen region is of great importance for the worldwide known Brainport region that's located closely to the Kempen. The Kempen are seen as a manufacturing region, which has an essential contribution to the vital economy of Brainport Eindhoven (Brainport Eindhoven, 2020). A lot of manufacturing companies located in the Kempen are directly or indirectly, for example as a supplier, connected to large (high tech) companies that are clustered in and around Eindhoven. So at peak moments, there are both busy traffic flows from the Kempen to the urban areas of Eindhoven and Tilburg and vice versa. A good mobility network between the Kempen and Eindhoven/Tilburg is therefore very important. But not only the connection between the Kempen



and cities like Eindhoven and Tilburg is of great importance. Also the accessibility of the smaller villages in the Kempen must be improved. At this moment, most of these small villages are only connected by public transport by means of a local bus (*buurtbus*). This is compared to a regular bus a smaller one with only a few seats that runs at a low frequency. Also, this local bus does not run on early mornings or in the evening, making this option not convenient for commuting traffic. Due to the lack of a proper public transport network, these villages are completely dependent of private mobility. This causes often problems for young people, students and elderly while they have not always access to a car or scooter.

According to Daenen (2018) has the Kempen region traditionally seen its own identity, which can be described as a bit quirky but with a strong sense of community. In the past, the municipalities of the Kempen weren't wealthy because of the poor soil. Therefore they had to work hard in order to get a reasonable yield. People supported each other in faith and poverty, causing that the Kempen region developed through peasant wisdom, trust and solidarity. Nowadays, *Kempenaren* (inhabitants of the Kempen) are still working hard and they want to see action rather than words. 'We are there for each other even though we do not always agree with each other. If cooperative cooperation didn't exist, it would have been invented here' (Daenen, 2018).

The SMARA program

In order to enhance the mobility and the accessibility of the inhabitants of the Kempen region, the SMARA program (Smart Mobility Applications and solutions in Rural Areas) was launched. To achieve the goal of an enhanced mobility and accessibility, a network of innovative modes of transport will be developed and tested in the coming years. This must ensure that everyone has physically and financially access to a transport mode, and to reduce environmentally harmful mobility (Zo Slim Bereikbaar, n.d.). Three sub-projects regarding the innovative forms of mobility can be distinguished in the SMARA program: *F'kes meerijden*, *Mini Hub* and *Dorpsauto*. Eventually the idea is that these three concepts will be implemented in four municipalities in the Kempen region; Bergeijk, Bladel, Eersel and Reusel–De Mierden. Firstly, the concepts of *F'kes meerijden* and *Mini Hub* will be implemented in the form of pilot studies. This to investigate if these concepts are feasible

Figure 1: The Kempen region

Figure 2: The Kempen region located within the Netherlands

and affordable, and to see whether it fits within the mentality of the Kempen region, as the region is not yet familiar with these types of mobility concepts. Later on, after about three to five years, *Dorpsauto* will also be introduced.

F'kes meerijden (literally translated: just ride along) is an innovative and social form of transport which takes advantage of the strong social cohesion of the Kempen region. The idea of this concept is that car owners help non-car owners by giving them a ride. At this moment, many vehicles in the Kempen region aren't used efficiently since many seats remain unoccupied. *F'kes meerijden* responds to this by facilitating multiple physical hitchhike spots in the form of pillars (figure 3). These pillars will be placed along main roads in the Kempen villages. These spots will be clearly recognisable for the inhabitants due to the uniform design. Also the desired location of the user will be clearly visible for the drivers passing by. In this way, a low-threshold network can arise, in which fellow villagers can meet each other's mobility needs. The second sub-project of SMARA is *Mini Hub*. This concept involves setting up and testing a network of alternative forms of transport to support current public transport. These hubs are places where multiple modes of transport, like public transport and mobility sharing systems, come together (Het KOP, n.d.). The idea is to offer shared bike or shared car facilities at public transport nodes, for example at a bus stop. Because of this, the service area of the public transport will be larger and therefore more useful for people who live further from public transport. These hubs have to make sure that people without cars are also connected to the mobility system and that people with cars will use their cars less, and instead make use of public transport or sharing systems, resulting in less private vehicles on the road and a better accessible region for people without cars. The third and last innovative concept from the SMARA program is *Dorpsauto* (literally translated: village car). This is a car-sharing system where small villages within the Kempen region will be equipped with one or more electric cars which can be used by everyone. These cars will be parked on a central place in the village, after which they can be reserved by villagers to make short trips to, for example, a neighbouring village. At this moment, a lot of households in the Kempen region have two or three private cars at their disposal. *Dorpsauto* is meant to reduce the amount of private cars per household and to offer an alternative for people without a car.

Figure 3: Early concept of a F'kes meerijden pillar (Huis van de Brabantse Kempen, 2020)

However, some important questions remain: how can it be ensured that these innovative forms of mobility will be used? How do you reach potential target groups? And is there a possibility to convince car users to also make use of these more sustainable ways of mobility? In this research I will try to find an answer to these questions in order to ensure that people will make use of innovative forms of mobility in the Kempen region.

1.3.2 Influence of Covid-19 on the research case

The Covid-19 pandemic that reached the Netherlands at the end of February 2020, meant a major change for the daily life of every single Dutchman. Measures were announced by the national government in order to prevent a quick spread of the virus. These measures and rules were initially only focused on the region of North Brabant, but not long after that, national wide rules were also imposed. An urgent advise from the government to work from home, ensures that the entire mobility network came to a standstill. Suddenly it became quiet on the national highways and public transport was hardly used anymore. This sudden change is clearly visible by the huge decrease of bus travellers in the concession of South East Brabant, as can be seen in figure 4. This figure shows that the amount of daily bus travellers in the beginning of March was over 220.000, while only a couple days later the number has dropped dramatically to below 10.000 travellers a day. This amounts to a decrease of more than 95%.

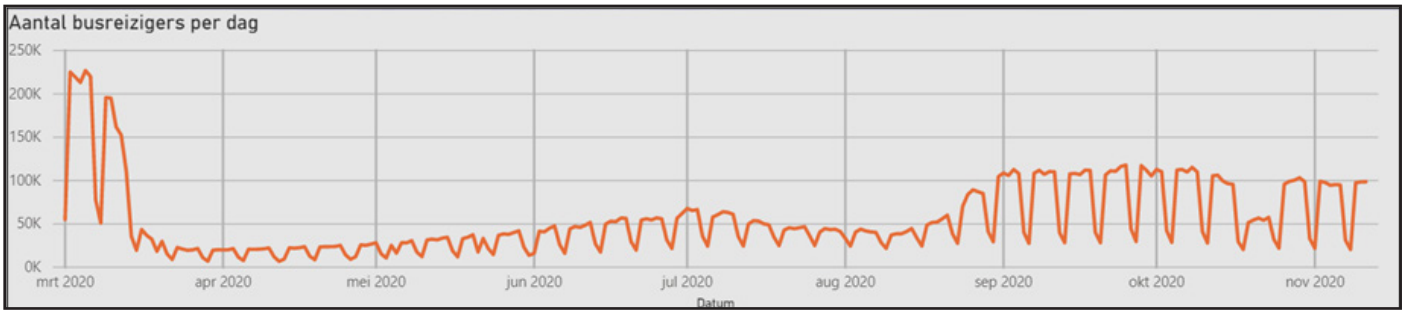


Figure 4: Amount of daily bus travellers in South East Brabant during the Covid-19 pandemic (Smartwayz, 2020)

The main reason of this dramatic decline in bus travellers is according to mobility expert Jos Hollestelle the chance of getting infected in public transport (Smart WorkPlace, 2020). He ranked the different transportation options based on the likelihood of getting an infection in the so called 'corona transport ladder' (table 3). According to this table, the use of (e-)bikes and walking ensures the smallest chance of getting infected, while the use of public transport is ranked on the last places (5, 6 and 7), meaning that the chance of getting infected is higher in public transport. This was also the main reason that traveling by public transport was not recommended by the national government.

(1)	(E-)Bike and walking
(2)	Car and motorcycle
(3)	Carpool/taxi
(4)	Vanpool/shuttlebus (where you have control over frequency, disinfection and degree of ventilation)
(5)	**Public transport outside rush hours**
(6)	**Public transport during rush hours (1st class)**
(7)	**Public transport during rush hours (2nd class)**

Table 3: 'Corona transport ladder' by Jos Hollestelle (Smart WorkPlace, 2020)

Eventually, the course of the graph in figure 4 shows that the number of daily bus travellers is slowly rising but that the number of bus users is still far from the old 'pre-pandemic' level. This contrasts with the intensity of the use of driving lanes in South East Brabant (figure 5). Although a decrease in intensity can be noticed in March 2020, the average use of the road network has already risen to the pre-pandemic level.

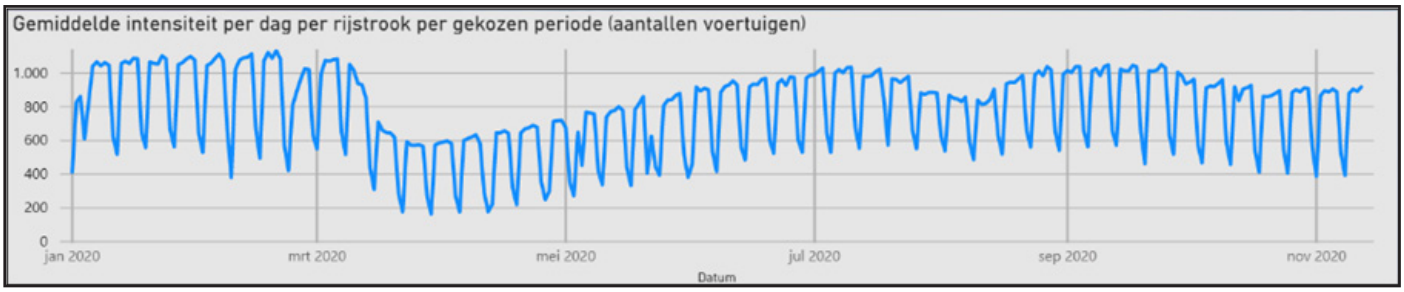


Figure 5: Average intensity of the use of driving lanes in South East Brabant (Smartwayz, 2020)

The Covid-19 pandemic has, partly due to the request from the government to work from home, a major impact on the mobility system in the province of North Brabant. At this moment it's difficult to predict when and whether the old numbers of the mobility system will be reached again. It's therefore at this moment extra difficult for policy makers to implement new policies in the field of mobility.

In addition, the Covid-19 pandemic made sure that the proposed pilot studies of the innovative forms of mobility from the SMARA program have been postponed for a year. In the current circumstances it is not justified to test mobility concepts that are relying on sharing and social cohesion. Besides that, at this moment the use of public transport is very low. As a result, there are at this moment too few people around who can test the concepts like *F'kes meerijden* and the *Mini Hub*. An advantage of this delay is however, that this extra time can give the possibility to overthink the executions of the pilot studies once more.

1.4 Research aim and questions

The proposed concepts of *F'kes meerijden* and *Mini Hub*, and eventually also *Dorpsauto*, are rather new and quit unknown to the general public. Therefore it's the question whether these innovative concepts will be used by the inhabitants of the Kempen region. To make sure the people of rural areas are aware of these new forms of mobility and their purposes, a research must be conducted on how to reach and stimulate these people. With the outcome of this research, the different target groups can be determined and therefore these people can be reached and stimulated to make use of these innovative forms of mobility.

The main research question of this research will be:
How can different target groups be reached to stimulate them to use innovative forms of mobility in a rural area, in order to organise its mobility in a more efficient and sustainable way?

In order to answer the main research question, first some sub-questions need to be answered. These sub-question address the case study of the Kempen, and are described below:

1. What can be considered as sustainable and innovative forms of mobility?
2. Which lessons can be learned from similar cases in other rural areas?
3. How can the modal split of the Kempen region be described and declared?
4. What is the target group for innovative forms of mobility, and what are their motives and resistances to use them?
5. How can the proposed mobility alternatives be applied to the Kempen region?

1.5 Relevance of this research

1.5.1 Societal relevance

Mobility can be seen as a basic human need, since it gives people the possibility to move around, reach destinations and participate in activities. It's therefore important that everyone has the opportunity to move freely whenever they want. This applies to everyone; young people, elderly, disabled, rich or poor. Due to the process of depopulation and ageing of rural areas, more and more basic services and facilities have left these rural areas. This leads to a territorial and socio-economic marginalisation of these areas. These marginalisation processes can result in a reduced liveability of these rural communities (Brovarone & Cotella, 2020). Besides that a poor accessibility of rural areas can cause reduced liveability, it can also have negative externalities in the field of sustainability. A poor accessibility leads to a higher use of private motorized vehicles which leads to more produced emissions. This ensures that the mobility of people is a great contributor to global warming and climate change. Governments and municipalities have therefore the important and complex task to make sure everyone has good access to a green and sustainable mobility system,

with less emissions and congestions.

On all levels, governments are looking for suitable solutions to organise their mobility on a sustainable way. These are often complex issues since a large part of the population, especially the part outside urban areas, is very attached to the use of their (polluting) cars. The behavioural change that is needed to make the shift to a more sustainable living environment is difficult to reach. This research tries to investigate what is necessary to realise this behavioural change, in order to create an environment where rural areas are less dependent of their cars. This in order to enhance the liveability and sustainability of these areas.

1.5.2 Scientific relevance

Smart mobility and other innovative forms of mobility are currently hot topics in the literature (Ahvenniemi, Huovila, Pinto-Seppä & Airaksinen, 2017). Over the last years many scholars wrote papers about the implementation of technological innovations in mobility. But not only about smart solutions is widely written, also sustainability is an important topic in the literature. A lot of researchers and scholars are trying to find ways to design the mobility system of the future in a sustainable way, often using smart initiatives to reach their goal. However, these papers are often only focused on urban areas were the population density is high and therefore there is a great demand for a good working mobility system. Little is written about new ways of sustainable and smart mobility in outer urban areas. These rural areas are often the places where the car dependency and car ownership is high, because of the small amount of transport alternatives. It is therefore of great importance that more research is done on sustainable and smart solutions in a more rural area, like the Kempen region. This newly generated knowledge can contribute to the already existing literature on this topic in order to inform other rural areas in the Netherlands, or even in the world, who are facing similar problems.

1.6 Reading structure

Chapter 1 described the reason for doing this research from which the research questions arose. In chapter 2, attention will be paid to existing theories and practices in the fields of sustainable mobility, smart mobility, transport mode choice and behavioural change. On the basis of this literature and these theories, a conceptual model will be drafted. This conceptual model will be the guideline for the rest of this research. In chapter 3 the methodology of this research will be explained. Central to this chapter will be the research strategy and design, the selection of respondents and the operationalisation of the theoretical concepts. Chapter 4 is all about analysing the gathered data, after which in chapter 5, the answer will be given to the main research question of this thesis. Also a recommendation for further research will be given.

2. Theoretical framework

To give an answer to the previously discussed research questions, some more detailed information is needed on the core subjects; sustainable mobility, smart mobility, travel mode choice and behavioural change. In this chapter, literature and theories about these concepts will be elaborated. Thereafter, the conceptual model of this research will be shown and explained.

2.1 Literature review

2.1.1 Sustainable mobility

According to The World Business Council for Sustainable Development (WBCSD), the concept of sustainable mobility can be described as 'the ability to meet the needs of society to move freely, gain access, communicate, trade, and establish relationships without sacrificing other essential human or ecological values today or in the future' (WBCSD, 2001, p.2). An example of sustainable mobility is public transport because of its great efficiency. This is in contrast to the car, the most used motorised vehicle in the Netherlands (CBS, 2019a). Cars have generally room for up to five passengers, but there is often only one person in the car, the driver. This driver now occupies as much 'scarce' space as the car had done with four extra passengers. Also the emissions that he produces on his own is comparable to the amount that would be emitted when the car was full. In the context of sustainability it would therefore be good if the inefficient car would no longer be used. However, that is not a realistic aim and almost impossible to achieve. Mobility planners have focused on the car in recent decades, infrastructure has been installed everywhere just for the use of the car. This is called the 'lock in effect', cities are stuck to the installed infrastructure, changing it will costs a lot of money and time. Although city centres are usually easily and good accessible by public transport, neighbourhoods and villages around city centres are often tied to the car (Jenks & Dempsey, 2005, p.19). The population density in these outer urban areas are low, causing less public transport, which causes more car users. But there is also a psychological component why implementing sustainable mobility in a society is hard to do. According to Knoflacher (2003, p.18), people have to change their behaviour to use public transport, since using their cars is much more convenient. Often they have to walk less than 100 meters to reach their car, while reaching the closest bus stop or train station takes much longer. This convenience goes beyond the need to make a sustainable decision. To counter this, the behaviour of people must change. The choice of people for sustainable ways of transport will be discussed as a form of environmental behaviour. Positive environmental behaviour can be defined as follows: 'behaviour that harms the environment as little as possible, or even

benefits the environment' (Steg & Vlek, 2009). If you want to execute environmental behaviour, it is important that people are aware of the environmental consequences and are intending to behave more environment friendly. Changing people's behaviour is a complex question. There are several ways to do this such as providing information, packaging of policy measures and through selling the benefits of sustainable mobility (Banister, 2008, p.79). But there are also cities that come with specific alternatives, like for example cycling. Municipalities are promoting and investing in order to encourage people to use the bike instead of their cars (Handy, Van Wee & Kroesen, 2014).

Another innovative way to ensure that a car is used more efficient, is by introducing hitchhiking to the people. Hitchhiking can make sure that empty seats are filled, so more people will make use of the scarce road space a car occupies during a trip. An investigation from *Stichting NederlandLift* (a Dutch hitchhinking foundation) in collaboration with the *ANWB* shows that hitchhiking is a forgotten option in the Netherlands. Almost one third of the people who have never hitchhiked says that they simply have never thought about it. In addition, many people indicate that they think hitchhiking is dangerous, because they don't know who they get into the car with. Besides, another important argument for the respondents not to hitchhike, was the idea that finding a ride takes a lot of time and that it's therefore not suitable for commuting (Stichting NederlandLift, n.d.). However, these arguments are refuted by Knippenberg, she investigated if she could hitchhike to her work every Wednesday for over two years. She discovered that hitchhiking is a safe, cheap and convenient way of transport. She did not experience unsafe situations during her research, and her average waiting time for a ride was only six minutes (Knippenberg, 2017).

In this research, a distinction will be made between sustainable and unsustainable transport modes. Private motorised transport, such as cars and motorcycles can be seen as unsustainable. Active forms of transport, like walking and cycling are sustainable ways of transport. Public transport can generally speaking also been seen as a sustainable way of transport, but this depends on the occupation level as well as the type and model of the vehicle. But in general, public transport is considered as sustainable, since it's more efficient in most cases than motorised private transport like cars or motorcycles. Besides that, public transport is more likely to become a sustainable system, mainly due to the size of vehicle fleets and the high capacity per vehicle. Since the emergence of shared mobility in recent years, the question arose whether these kind of transport systems are sustainable or not. Especially because these systems make it easier for consumers to use motorised vehicles, like cars and scooters. This convenience can ensure that the amount of trips increases, because these sharing systems are not only used as a replacement for private vehicles. It's more likely that for example a shared bike or a shared car is used in addition to the more traditional forms of mobility. But on the other hand, shared mobility systems could also be seen as a sustainable way of transport.

This is the case if shared cars and scooters don't require the more traditional and therefore polluting fuels but instead require electricity. Besides these sharing systems must be used as a transport mode instead of a large number of private cars. On this way, shared mobility can contribute to emission reduction, lower private car possession and less needed parking places for private vehicles (Firnkorn & Müller, 2011). The following modes of transport will be seen as sustainable in this research: walking, cycling, public transport and shared mobility.

2.1.2 Smart mobility

In 2011 the European Commission (EC, 2011) published a whitepaper about the future of urban mobility, they introduced the following ambition: 'urban transport should enable economic growth, but also diminish its energy use and emissions'. According to the EC, innovation and technology play a key role to achieve this ambition. They believe that technological innovations can contribute to a more efficient and sustainable transport system (EC, 2011). This thought is largely shared among researchers and scholars in recent years, and therefore there has been an increasing general agreement that improvements in the field of technology can have a positive effect on the mobility network of the future (Lyons, 2016). The idea that innovative technologies can help improving mobility systems corresponds to the concepts of 'smart mobility' and 'smart cities'. Since 2010, when the European Union started supporting smart city projects, the number of smart city programs has increased enormously (Ahvenniemi, Huovila, Pinto-Seppä, & Airaksinen, 2017). However, there is still no unambiguous definition of a smart city. It is therefore often hard for scholars to compare or criticise definitions of smart cities, but the role of technology however, seems determinative. In all definitions of smart cities and smart mobility, innovative technologies is seen as a key element (Albino, Berardi, & Dangelico, 2015). Besides the technology component of a definition of smart city or smart mobility, there are multiple other components and elements that have evolved over time (Martin, Evans, & Karvonen, 2018). According to them, the concept of a smart city has in the last years frequently been connected to the concept of sustainable cities: 'smart city visions offer possibilities to achieve social equity and environmental protection in parallel with digitally catalysed economic growth' (Martin et al., 2018). According to Papa & Lauwers (2015), the concept of smart mobility should not only focus on innovative technologies. They argue that technological innovations must be installed and deployed in order to increase the quality of life and get a more sustainable city and transport network. This is what they call 'smarter mobility'.

There are many different ways how mobility can be improved by technology, such as: driverless cars, electric vehicles, increased information, new forms of transport, services based on apps and platforms and shared mobility (Harbers & Snellen, 2016). A new trend in smart mobility is 'Mobility as a Service' (MaaS). The idea of this concept is simple: consumers buy mobility instead of investing

in transport modes. In this way, mobility becomes a service. Service providers give the possibility to make a trip according to personal needs, with different transport modes like cars, bicycles, public transport, taxi's or a combination of these modalities (Antea Group, n.d.). MaaS ensures that people have flexible access to transport options. They just have to open the app on their smartphone, enter their destination, and an array of travel options is presented. According to Harbers and Snellen (2016), "MaaS saves space and money and makes travel much more flexible than having to take your own car or bike with you all the way or having to park it somewhere". A disadvantage of these sharing systems can be the amount of different providers. It can become very confusing for the consumer when there are too many options and apps for different car sharing systems (Harbers & Snellen, 2016). It would therefore be ideal if providers work together to integrate their sharing systems in one single app. A development within the MaaS concept to make it easier for the consumer is the implementation of smart hubs or mobility hubs. Different transport modalities will be clustered on these hubs, so users can easily switch to other transport modes to continue their journey (Antea Group, n.d.).

In recent years, more use has been made of shared mobility systems. For example, the number of shared cars rose by 10.000 in the year 2019 to over 51.000 in total. And the aim of various parties is to reach an amount of 100.000 shared cars by 2021. The idea behind this is that shared cars contribute to the reduction of the number of parking spaces, a faster transition to clean fuels and a more conscious mobility behaviour; ensuring that people will cycle, walk and travel by public transport more often (CROW, 2019). The characterisation of users of shared cars was investigated by CROW (2020) and resulted in table 4.

Statement		%
Someone who uses a shared car...	**... is aged between 25 and 44**	**49%**
	... lives in an urban area	**78%**
	... is single	25%
	... has a family with young children	25%
	... is highly educated	**62%**
	... owns no car	50%
	... sees a lot of friends	45%
	... uses public transport at least once a year	95%
	... has a public transport subscription	**65%**
	... has affinity with the participation society	80%

Table 4: Characterisation of users of car sharing (CROW, 2020)

This research shows that the largest group of users of shared cars is in the age category of 25 – 44, is highly educated and lives in an urban area. In addition, most users of shared cars also regularly use the public transport, given their public transport subscription.

2.1.3 Travel mode choice

The travel mode choice of the individual is highly dependent on the supply of means of transport. When there is a lot of choice for the traveller to choose between different transport options, a well-considered choice can be made. But when the choice for transport options is little, people will be 'forced' to choose certain modes of transport. Different situations and environments can lead to a different demand of transport mode choices. This demand can for example be influenced by personal circumstances (personal preferences, disabilities, owning a driver license, etc.), the purpose of the trip (commuting, leisure, groceries/shopping, etc.), the living environment (urban or rural area) and the length of the trip (short or long distances). According to Cervero and Kockelman (1997), the travel demand is influenced by three factors: density, diversity and design, also known as 'the 3Ds'. These three factors will be explained in table 5.

Factor	Explanation	Example
Density	The population of an area, the amount of dwelling units in an area, employment rate, etc.	A high density, for example a high building density in an area, can implicate that the destinations in that area are close to each other. Because of this, walking and cycling become suitable transport options
Diversity	The variety of land-use per area, in terms of services, facilities and functions	Areas with high diversity in land-use, with for example many different functions and facilities, can ensure smaller distances for people to travel due to the proximity of their potential destination. Transport options like cycling and walking are therefore very suitable for diverse areas
Design	The spatial characteristics of an area and the prioritisation of transport modes	Areas where certain transport modes are physically prioritised can ensure that that kind of transport mode will be used more. For example, areas that are specially designed for cycling can have an positive effect on the amount of cyclists in that particular area

Table 5: 'The 3Ds' (Cervero & Kockelman, 1997)

Years later, Ewing and Cervero (2010) added four more 'Ds' to the already existing three. These new factors are: destination accessibility, distance to transit, demand management and demographics. Together with the earlier discussed '3Ds', they form the '7Ds' (table 6).

Factor	Explanation	Example
Destination accessibility	The time or the degree of convenience in which certain locations can be reached	Areas with a high destination accessibility (where different locations can be reached very easily and in a relative short amount of time) are very suitable for people to walk or cycle
Distance to transit	The distance (absolute or relative) to reach the closest public transport node, or the amount of nodes in a single area	Areas with a short distance to transit make it easier and more likely for people to actually use the public transport
Demand management	Economic and regulatory instruments that can influence the use of transport modes	Restriction zones in city centres to keep out polluting cars can ensure less car use. Another example can be the height of the parking fee in certain areas. High fees can ensure less car use
Demographics	Personal life situations and personal preferences of individuals and groups	Elderly people are for example less capable of cycling and walking long distances. In addition, young people who don't own a car are bound to walking, cycling or public transport

Table 6: The four new factors that together with the '3Ds' form the '7Ds' (Ewing & Cervero, 2010)

Also Buehler (2011) has ideas about factors that are influencing the travel mode choice of individuals. In his work, Buehler compares car use and car ownership between the United States and Germany. There are large differences between the numbers of car use and ownership in these countries, while these countries are very comparable on many other aspects. Buehler's factors (table 7) are mostly comparable to the '7Ds' of Ewing and Cervero (2010), but Buehler also added the factor 'culture and attitude'. This factor is important since the habits and intentions of individuals also are of interest in their travel mode choices. Especially when it's about alternative forms of mobility which are unknown to the general public, which is regarding the SMARA program the case in the Kempen region.

Factor	Explanation	Compares to
Socio-economic and demographic factors	The level of income, the size of households, age, gender, etc.	Demographics
Spatial development	The building density of an area, the design of streets and public places, amount of parking places, etc.	Density, design
Transport and land-use	Available space for transport modes, connection to public transport, the accessibility of various services and facilities, travel distance (absolute and relative) to destinations, etc.	Density, diversity, destination accessibility, distance to transit, demand management
Culture and attitude	Personal views on the use of different modes of transport, personal habits, social cohesion, acceptance of innovation, flexibility and adaptation, etc.	-

Table 7: Buehler's (2011) factors compared to Ewing and Cervero's '7Ds' (2010)

2.1.4 Behavioural change

Changing the travel mode choice

According to the earlier discussed literature about sustainable and smart mobility, it is clear that

there are many different ways to implement those kind of transport modes in the living environment. However, most of these options are based on densely populated areas, like cities or city centres. The Kempen region is however, more sparsely populated and it's therefore likely that inhabitants of the Kempen will not naturally choose for the use of transport modes clustered in a mobility hub, like public transport or sharing systems. In particular by the fact that people have to move longer distances to get to these hubs. Additional measures are therefore needed in order to change this, and make inhabitants behave environmentally friendly by travelling with sustainable transport modes. To make sure people behave in a sustainable way, they have to be aware about the environmental consequences. To do so, Klöckner and Blöbaum (2010) introduced the 'Comprehensive Action Determination Model' (CADM) (figure 6). This model incorporates intentional, normative, situational, and habitual influences in explaining pro-environmental behaviour, and has been successfully applied to a series of studies in different behavioural domains such as individual travel mode choice. According to this model, the personal norm (seen on the left) has a big infulence on the behaviour of the individual. In order to act in a sustainable way, in this case to use sustainable modes of transport, the individual must be aware of the need to do so, and about the consequenses of its behaviour. In addition, an important aspect according to the CADM to a sustainable travel mode choice is the 'perceived behavioural control' (seen at the bottom). This means that the person has to have a certain sense of believe to be able to do something about the situation (Klöckner & Blöbaum, 2010).

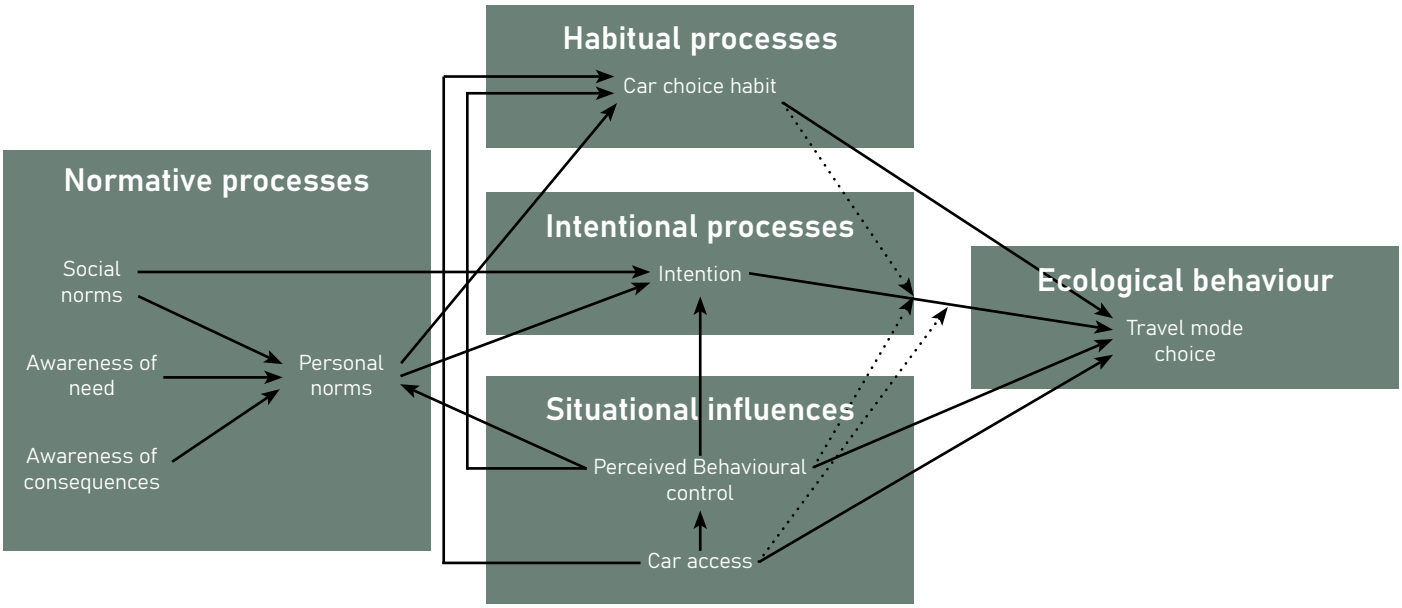


Figure 6: Comprehenisive Action Determination Model (Klöckner & Blöbaum, 2010)

Since the travel mode choice of individuals is highly dependent on the circumstances of the living environment, the 'perceived behavioural control' can be measured on the basis of the four factors of Buehler (2011). Socio-economic and demographic factors, spatial development, transport and land-use and culture and attitude can explain why people in certain areas may have a certain sense

to believe they are able and willing to use sustainable forms of mobility, or why not. Therefore, Van Dam (2019) added the four factors of Buehler as situational influences to her simplified version of the CADM model (figure 7).

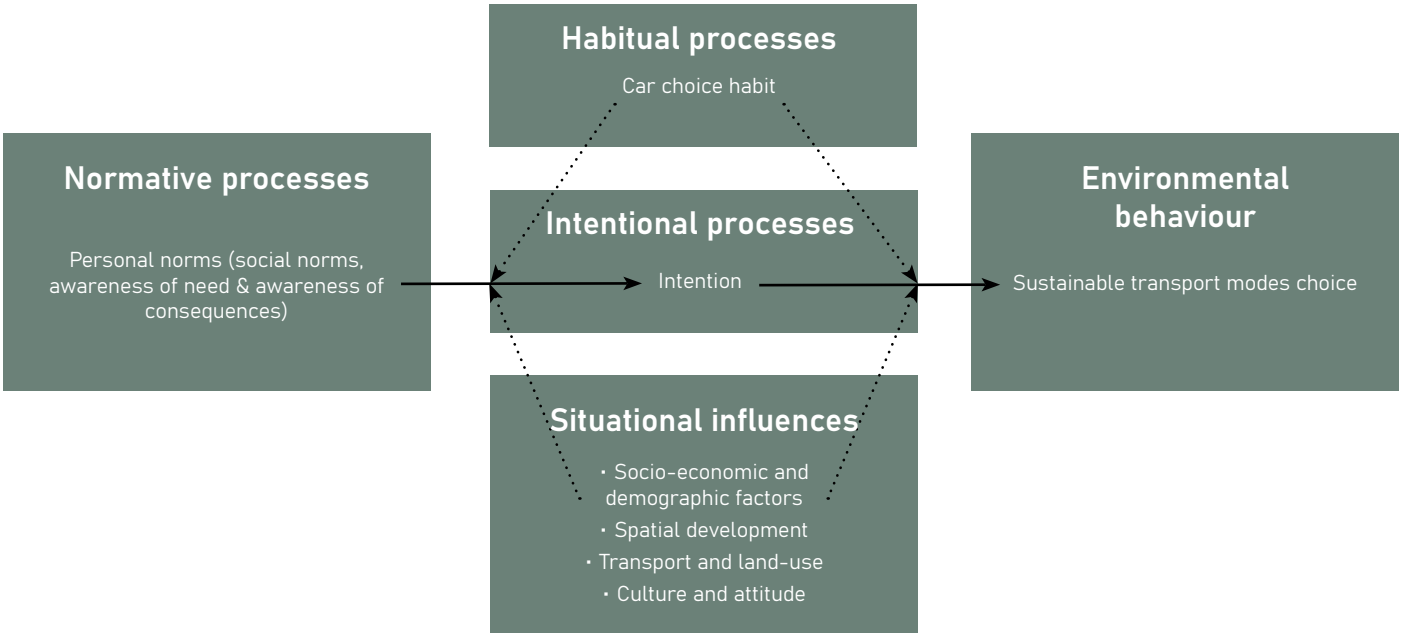


Figure 7: Simplified version of the CADM, containing Buehler's factors (Van Dam, 2019)

Motives and resistances

Influencing by stimulating behavioural change can be seen as a cyclical process in which the motives and the resistances of the potential target group(s) play important roles. After creating awareness for alternative forms of mobility and the stimulation to use those, the behaviour of the individuals of the target group must be monitored carefully. Individuals can have different motives to change their behaviour, but there also may be resistances among the target group(s). In order to achieve the desired result, it's important to strengthen these motives and to take away the resistances (Zo Brainport Smart Mobility, 2019, p.71). According to some leading psychologists, taking away resistances is even more important than the motivation of the desired behaviour. Changing behaviour will always lead to resistance since people are naturally reluctant to change. Three types of resistance can be distinguished: reactance, scepticism and inertia, which are explained in table 8 (Zo Brainport Smart Mobility, 2019, p.74).

Type	Explanation
Reactance	This form of resistance is directed against the influence attempt or change attempt itself, and often occurs when people realise that they are being affected. This resistance arises from a sense of deprivation of liberty. For example people can say things like this: 'Who are you to determine that I have to use alternative forms of mobility?' or 'You just want me to leave my car, I'm not going to do that!'
Scepticism	This form of resistance is directed against the content of a proposal or plan. One draws the truth from what is told about the need for change in doubt. This type of resistance is therefore about the cognitive component
Inertia	This type can be described as resistance to change. Humans are creatures of habit who prefer to stay with the status quo. By ignoring the problem, they think to solve it (looking away from the problem). Inertia is also common in the form of laziness, in which there is a sense of motivation but the actual behaviour is not shown. Then, the desired behaviour has simply no priority

Table 8: Types of resistance (Zo Brainport Smart Mobility, 2019)

There are various ways to decrease or take away resistances. Every type of resistance needs its own approach to ensure less resistance for particular behavioural changes. Table 9 shows some methods to reduce the three types of resistance.

Type	Method to reduce resistance
Reactance	**Acknowledge the resistance:** 'I understand it's annoying but…' This creates a sense of understanding and it instills empathy
	Redefine the relationship: Governments have to deal with resistance very often. When parties which are appreciated by a lot of people will bring the message, the resistance can decrease. The role of the party or person that brings the message is therefore important for the success of the influence attempt
	Yes-flow: By asking some easy questions of which you know that people will answer 'yes' will bring your target audience in a so-called 'yes-flow', and they will be more likely to go with your request
	Altercasting: 'You are a smart driver!'. By addressing someone with this, people will feel the responsibility to think about it, and it will be more likely that they turn this thoughts into actual behaviour
	Foot-in-the-door-technique: Start with a small request which people will easily accept. When you later on have a bigger request, people will be more likely to agree. People like to be consistent with their previous behaviour
	Stealing thunder: Is there a problem or a lack? Admit this immediately, to show your honesty and credibility. You also win sympathy and authority which can lead to a quicker acceptance of the request
	Give people a choice: This gives people a sense of freedom and autonomy and involves them in the process
Scepticism	**Offer guarantees regarding the use of the alternative:** For example, when people are sceptical about delays of the public transport, give them the following guarantee: 'More than 'X' minutes delay? You get your money back! Or you travel the rest of the week for free!'
	Gaining experience: When people experience themselves that something works well, sceptical arguments will disappear
	Formulating requests for the long term: People will accept a request for the long term more easily than a short term request. This because people are not good at planning in the long term (planning fallacy)
	Door-in-the-face: When people are sceptical about a request, it can be wise to start with asking a big request after which you ask a smaller and the actual request. With the first request you've set the expectations very high, making the second request a windfall

Table 9: Methods to reduce resistance (Zo Brainport Smart Mobility, 2019)

Type	Method to reduce resistance
Inertia	**Disrupt-then-reframe:** An unexpected message can confuse people. This makes them the seconds after hearing this message extra influenceable. For example, when you tell that a subscription costs only 100 cents a week (instead of 4 euros per month), people can get confused for a moment
	Implementation of intentions: When people have the motivation but it's still difficult to stimulate them to change their behaviour, it can help to make a concrete plan about the desired behaviour. By making the plan as concrete as possible, the threshold to actual behaviour decreases
	Self-belief: No single argument is as convincing as an argument that comes from yourself. By stimulating people to actively think about reasons to show the desired behaviour, they will convince themselves.
	Mere-exposure: People love familiarity. Therefore will people be more likely to like and use things that they can see in real life
	Social proof: Humans are social animals, who like to belong to a group. In many cases people are influenced and guided by the behaviour of others. Especially in cases which are new and still unknown, people like to copy each other's behaviour
	Increase the sense of competence (self-efficacy): When people have the feeling that they can do something, the threshold will be lower to actual display the desired behaviour
	Default option: By making the desired behaviour the default and thus the undesirable behaviour only possible if people take the effort, there is a big chance that the undesirable behaviour will decrease because of the laziness of the people.

Table 9: Methods to reduce resistance (Zo Brainport Smart Mobility, 2019)

The three types of resistance that can occur when a behavioural change is desired, can be expressed by people in different ways. These different ways of expressions can be recognised and assigned to the three categories of resistance (Zo Brainport Smart Mobility, 2019). Reactance can be recognised by fierce resistance, unruly behaviour and emotion. Scepticism can be recognised by disbelief, verbal counter-arguments, the dismissal of arguments, and the attitude of 'I believe it when I see it'. The last type of resistance, inertia, can be recognised by a lack of interest, an attitude of 'no thank you, I have to move on' and no need for further information (Zo Brainport Smart Mobility, 2019).

2.2 Conceptual model

The literature review in the previous section led to a good understanding of sustainable travel mode choice and it's complications. In figure 8, the conceptual model of this research is showed. This model is based on the earlier described Comprehensive Action Determination Model by Klöckner and Blöbaum (2010) and the more simplified version of Van Dam (2019). Just like these models, the personal norm has an important influence on the travel mode choice of individuals. This personal norm consists of the social norm, the awareness of need and the awareness of consequences. The intention of the individuals to behave like their personal norm is influenced by their habits, in this case the car choice habit. The four factors of Buehler (2011) are also influencing the travel mode choice and the car choice habit, which was discussed earlier in paragraph 2.1.3. In addition, the factors of Buehler are also influencing the motives and resistances of individuals to use

alternative forms of mobility. If there are for example sustainable mobility options available nearby (transport and land use), people will be more likely to use these options (motive). While absence of alternatives can discourage people to do so (resistance). Lastly, these motives and resistances are also influencing the sustainable travel mode choice. If there are many resistances, people will make little use of these transport modes, while many motives can create more support for sustainable travel options.

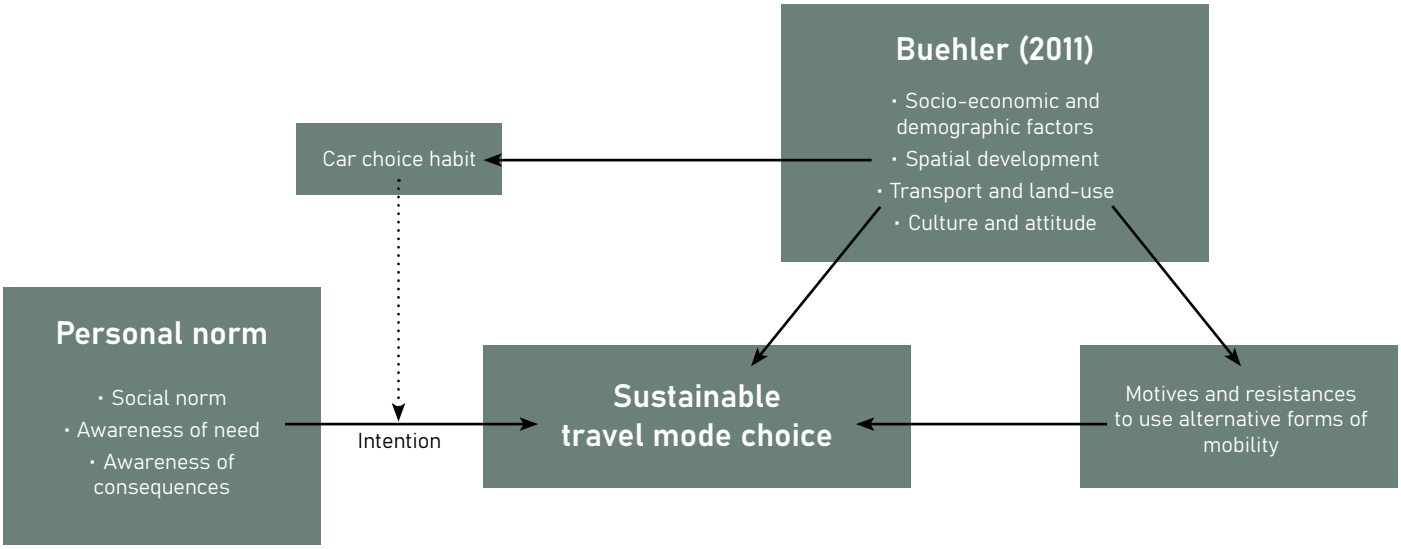


Figure 8: Conceptual model

3. Methodology

In this chapter, attention will be paid to the methodological choices of this research. These choices are crucial for the execution of this research. First the research paradigm used in this research will be introduced. This will be done by defining it's ontology and epistemology. Thereafter, the research strategy and the research design will be discussed and explained, which results in a schematic representation of this research. After that, the operationalisation process and the methods for data collection will be elaborated. Lastly, the reliability and validity of this research will be described.

3.1 Research paradigm

According to Guba and Lincoln (1994), paradigms can be described as 'basic belief systems based on ontological, epistemological and methodological assumptions'. Paradigms are representing how someone sees the world, what truth is and how the truth can be found. Since there are more paradigms, it is important to elaborate which paradigm will be used in this research. This can be done by defining the ontology and the epistemology, which is commonly referred to as a person's worldview. This will be discussed in the following section. A suitable research methodology will thereafter follow from this.

3.1.1 Ontology

In most of the research for urban planning, the researcher assumes that there is only one reality (Farthing, 2015). This means that it is assumed that the world and the living environment is seen as an objective whole. However, the living environment is built up from multiple societies that are living together. Even in a single region like the Kempen, more than one society can be found. Therefore, the assumption of this research will be that there are more realities. Although elements of these realities are often shared among social groups, these realities are still quite unique because they are constructed by individuals who experience the world on their own way (Hatch, 2002, p.15). Multiple realities corresponds to the constructivist paradigm (Guba & Lincoln, 1994), which therefore will be used as the main assumption in this research.

3.1.2 Epistemology

The constructivist paradigm assumes that knowledge is symbolically constructed and not objective, that understandings of the world are based on agreements, 'truth is what we agree it is' (Hatch, 2002, p.15). During the research phase of gathering information, the researcher and the participants are joined together in the process of co-construction. Therefore, researchers can't be

distant and objective regarding the research. According to Hatch (2002, p.15), it is through mutual engagement that researchers and respondents construct the subjective reality that is under investigation.

3.2 Research strategy and design

According to Verschuren & Doorewaard (2016, p.160), three core decisions have to be made in order to choose an appropriate research strategy. Those core decisions are the following three: (1) extensive versus in-depth, (2) qualitative versus quantitative and (3) empirical versus desk research.

Extensive versus in-depth

This research will mainly focus on the Kempen region, so it will be a more in-depth research. The region has specific characteristics like the geographic location closely to large urban areas and the great social cohesion in between villages. Using only one specific case like the Kempen ensures however that this research is less extensive and therefore the results can't be generalised (Verschuren & Doorewaard, 2016, p.156).

Qualitative versus quantitative

The research will mostly make use of qualitative research methods like case observations and case interviews. This means that this research has an interpretive approach, in which the results are reported in a contemplative manner (Verschuren & Doorewaard, 2016, p.157). The different forms of research strategies ensure that the findings of the research questions will be presented in different ways.

Empirical versus desk research

Finally, it will mainly be an empirical research. This means that a big part of the needed information to answer the research questions still has to be obtained (Verschuren & Doorewaard, 2016, p.157). Only the frameworks for the observation scheme and the interview guide will be created on the basis of a desk research in which existing theories will be studied.

3.2.1 Research design

In setting up the design of the research, the Kempen region's own identity must be taken into account. In order to conduct this research in a respective and good way, it's important to get a better understanding of the ideas and feels of the *Kempenaar*. In order to do so, this research will consist of a methodology that is strongly connected to narrative research. Narrative researchers collect stories from individuals about individuals, which tell experiences and how these people see things and themselves (Creswell, 2013, p.71). Using ideas of this research method makes it possible to

get an in-depth insight in the thoughts of inhabitants of the Kempen. This is needed in order to find research results that are suitable to the identity of the Kempen region.

In order to answer the main research question; 'How can different target groups be reached to stimulate them to use innovative forms of mobility in a rural area, in order to organise its mobility in a more efficient and sustainable way?', the following sub-questions have to be answered:

1. What can be considered as sustainable and innovative forms of mobility?
2. Which lessons can be learned from similar cases in other rural areas?
3. How can the modal split of the Kempen region be described and declared?
4. What is the target group for innovative forms of mobility, and what are their motives and resistances to use them?
5. How can the proposed mobility alternatives be applied to the Kempen region?

The sub-questions will be answered on the basis of multiple qualitative research strategies which will fit in well with the narrative research method. First of all, the literature review about sustainable mobility, innovative mobility concepts, transport mode choice and behavioural change have provided a theoretical framework, which was explained in chapter 2. On the base of that theoretical framework, the first sub-question will be answered and this framework will serve to emerge the interview guides. The operationalisation and creation of these interview guides will be discussed in paragraph 3.3.1, while the complete interview guides can be found in appendix I. Similar case interviews will provide insights in the development of comparable alternative mobility concepts which are already implemented in the living environment. With this information, the second sub-question can be answered. Also give these interviews inspiration for the 'Kempen region case' interviews. These interviews will be held in order to gather more information about the current situation in different municipalities in the Kempen region. This will give a better understanding of the local circumstances and will give an idea of who could possibly benefit from the implementation of innovative forms of mobility. In addition, three small villages in the Kempen will be observed to get an even better picture of the situation. The operationalisation of this observation scheme will be discussed in paragraph 3.3.1, while the complete observation scheme can be found in appendix II. This in combination with demographic facts of the CBS will result in an overview of the interests in the field of mobility of the inhabitants of the Kempen. This will therefore be an answer to the third sub-question of this research. Besides, the case interviews, observations and the CBS-data will expose a potential target group for the use of the proposed mobility concepts of the SMARA program. To give answer to the last two sub-questions, people from the potential target group will be interviewed to investigate what their motives and resistances are to use alternative forms of

mobility. Altogether, all these forms of data collection will contribute to answering the main research question.

Figure 9 shows this research design in a schematic way. The first phase (a) of this research consists of the literature review of sustainable mobility, innovative mobility concepts, travel mode choice and behavioural change. The second phase (b) will be interviewing represententives from similar cases to learn more about them. Phase three (c) will be the collection of multiple sources of data, like CBS-data, doing observations and conducting case interviews. The last phase of the data collection (d) will be interviewing the potential target group.

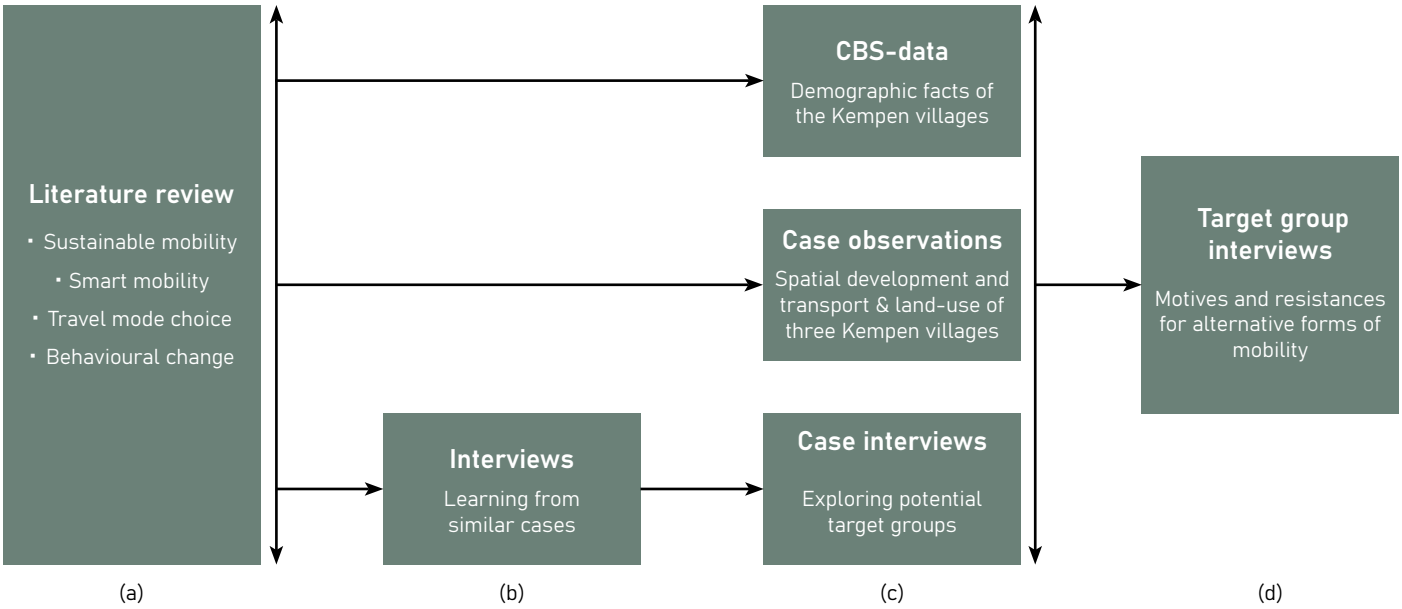


Figure 9: Research design

3.2.2 Case selection

Similar cases

In this research, the villages and municipalities of the Kempen are the main subject and therefore also the main research object. But in order to get more information about already existing concepts in the field of mobility hubs and sharing systems in rural areas, some similar cases were selected. There are not many concepts and initiatives in this field yet, so the options for case selection were rather limited. The cases were selected on three criteria (table 10).

(1)	The project must include smart mobility or sustainable mobility options in rural areas
(2)	The project must be operating
(3)	The project must be operating in the Netherlands or Flanders (Belgium), due to similarity of cultures

Table 10: Criteria for similar case selection

On the basis of these criteria, *Hoppin (Mobipunt)* and *Reis via hub* were selected. In addition, an innovative hitchhiking concept which shows many similarities with *F'kes meerijden* was selected, however no representative of this concept was willing to cooperate. In order to get still some more information about hitchhiking, an interview was arranged with the founder of the Dutch hitchhike association (Stichting NederlandLift).

Observations

In order to get a better understanding of the Kempen villages, some villages were chosen to be observed. The observation of all villages in the Kempen would be too time consuming, so it was decided to observe only three of them. The following criteria was used to select three suitable villages (table 11).

(1)	The village must have no connection to the regular transport network
(2)	The three villages must all be part of a different municipality
(3)	1 village must have less than 1000 inhabitants 1 village must have between 1000 and 2000 inhabitants 1 village must have more than 2000 inhabitants

Table 11: Criteria for villages to observe

It was important that none of the villages were connected to the regular transport network. This because of the purpose of the SMARA program to enhance the accessibility of those villages that are poorly connected to the regular transit system. In addition to this joint similarity, it was also important to get some differences between the cases. This to get a more complete view of the different villages in the Kempen region. Therefore, the three selected villages are all located in different municipalities. Besides, the size of the population of these villages has been taken into account, where there is one village with less than 1000 inhabitants, one with between 1000 and 2000 inhabitants and one village with over 2000 inhabitants. Table 12 shows the selected villages for the observations.

Village	Municipality	Population
Weebosch	Bergeijk	525 (<1000)
Knegsel	Eersel	1380 (1000-2000)
Hoogeloon	Bladel	2190 (2000+)

Table 12: Selected villages for observation

Kempen case interviews

For the Kempen case interviews, roughly three types of respondents were intended: policymakers, representatives of village councils and other stakeholders. Due to the heavy dependence on people's willingness to participate, and the limited potential candidates, there was little room to make a well founded selection based on criteria. From every municipality a policymaker in the field of

mobility was approached to participate in the research. Three of them accepted the invitation and participated. For the interviews with the village councils, several had been approached. Of these approached village councils, there were four representatives who eventually wanted to cooperate in the research. Finally, three other participants were found, who somehow play a role in the Kempen region. These participants are a policy maker in the field of mobility from the province of North Brabant, a representative from a local business association and a representative from a project organisation.

Target group interviews

Participants of the target group interviews have been contacted via the social medium LinkedIn. This platform has the ability to reach a large number of potential respondents with little effort. Eventually, only three people from the target group responded. These people were then asked if they knew any more people who might want to participate. In the end, six people from the potential target group have been interviewed.

3.3 Data collection and analysis

In this chapter will be elaborated how the data of every research method used in this research will be collected and how it will be analysed. But first, the operationalisation of the theoretical framework and conceptual model will be discussed.

3.3.1 Operationalisation

In this research, the four factors of Buehler (2011) play an important role. On the base of these factors, the travel mode choice of the inhabitants of the Kempen can be explained. That's why these factors will be the framework of all the research methods that will be used in this research. Since the factors of Buehler are rather abstract, they are hard to measure. Therefore, these factors first have to be operationalised in order to measure them. Table 13 shows which research method will be used to investigate what factor. The socio-economic and demographic factor is mainly about quantitative data. Therefore, this data will be gathered via the CBS. In particular the size of the population of the Kempen villages and it's age structure will be considered. In addition, data will be gathered about the amount of available cars per household. More information about socio-economic and demographic factors will be conducted with interviews. However, this will be done with caution. This because the sharing of personal information, such as income and level of education can be sensitive. The second and third factors, spatial development and transport and land-use, can both be described as 'visual' factors. Many aspects of these two factors can be seen in the living environment. These two factors will therefore be investigated on the basis of case observations. To gather more in-depth information about the spatial development and the transport and

land-use, interview questions will be asked about these factors. The last factor of Buehler, culture and attitude, can only be investigated on the basis of the stories and ideas of respondents during interviews.

Factor	Used research method
Socio-economic and demographic factors	CBS-data Interviews
Spatial development	Observations Interviews
Transport and land-use	Observations Interviews
Culture and attitude	Interviews

Table 13: Used research method to investigate Buehler's factors

Due to the narrative nature of this research it's important to let the respondent tell a story. This will particularly succeed when the researcher is during the interviews a good listener and to a lesser extent a questioner (Hollway & Jefferson, 2000, p.31). In order to facilitate an environment where the respondent can speak elaborately, it's useful for the researcher to ask questions which for example consists the following: 'Can you tell me something about…'. This start of a sentence ensures that the respondents will tell a story instead of giving an answer (Hollway & Jefferson, 2000). It's therefore not useful to ask specifically about the factors of Buehler, since there is a high probability that the respondent is not aware of these factors. To ensure that these factors are addressed during the interviews, these factors will be operationalised to more recognisable concepts. The operationalisation of these factors are showed in table 14. The final interview guides can be found in appendix I.

Factor	Examples of interview questions
Socio-economic and demographic factors	- Can you tell something about the age structure of the inhabitants of your village / municipality? - Can you tell something about the male/female ratio of the inhabitants of your village / municipality? - Can you tell something about the share of inhabitants with a driver license in your village / municipality?
Spatial development	- Can you tell me something about the services and facilities in your village / municipality? - How do you experience the amount of services and facilities in your village / municipality? - Can you tell me something about the design of public places in your village / municipality? - Can you tell me something about the building density of your village / municipality?
Transport and land-use	- Can you tell me something about the transport options in your village / municipality? - How you experience the accessibility of your village / municipality? - Can you tell me something about what you would like to improve in the field of mobility in your village / municipality?
Culture and attitude	- Can you tell me something about the identity of your village / municipality? - Can you tell me something about the degree of social cohesion in your village / municipality? - How do you stand against innovation, and the implementation of innovative mobility concepts?

Table 14: Operationalisation of Buehler's factors for the interviews

Also for the observations the factors need to be operationalised first. On this way, the abstract factors can be turned into more feasible aspects that can be observed easily. Table 15 shows the operationalisation of the factors spatial development and transport and land-use. The final observation scheme can be found in appendix II.

Factor	Theme	Aspect
Spatial development	Building density	High rise buildings
		Detached houses
		Terraced houses
	Functions of the space	Employment opportunities
		Recreation
		Houses
		Greenery
	Facilities and services	Restaurants / cafes
		(High) School
		Supermarket / shops
		Community building
	Parking	Free parking / paid parking
		Parking on driveways
		Parking lots
		Parking along the street
	Central point	Availability of a central place
Transport and land-use	Car infrastructure	Car-accessible streets
		Clear main road
		Connection to surrounding villages
	Bicycle infrastructure	Bicycle-accessible streets
		Separate cycle paths
	Public transport	Public transport options
		Amount of public transport stops
		Frequency of the public transport timetable

Table 15: Operationalisation of Buehler's factors for the observations

3.3.2 Data collection in similar case interviews

To learn more about similar cases that have already been implemented in the living environment, three interviews were held. These interviews were conducted in order to get a better idea about how innovative forms of mobility can work in more rural areas and which problems can be encountered. The three recorded interviews were held with representatives from the hub program in Groningen and Drenthe (*Reis via Hub*), Taxistop.be (*Hoppin / Mobipunt*) and *Stichting NederlandLift*. These interviews were semi structured, in order to achieve that these representatives were able to tell their own story. To give subtle guidance to these stories, some questions were prepared who mainly had the purpose to get to know more about how their concepts are implemented and how they work. The duration of these interviews was generally about half an hour.

3.3.3 Data collection in case observations

In order to get a better understanding of the current situation, an observation of three small Kempen villages has been made. This observation had the main purpose to get an idea on how these villages look like in the field of spatial development and transport and land-use. The complete observation scheme is added in appendix II, and is based on the situational influences of Buehler (2011). In addition, some photos of the current situation and other remarkable things were taken to support the observation scheme. Besides, during the observations the opportunity was taken to conduct a few short interviews with people on the street. The main purpose of these interviews was to gather some information about the respondents interest in the field of mobility, and about their thoughts of the implementation of innovative forms of mobility in their village. These interviews had a duration of 1 to 3 minutes and had no determined interview guide. In total 6 street interviews were conducted, of which two in Knegsel, three in Hoogeloon and one in Weebosch. The interviews were not recorded and therefore not transcribed, but during these interviews notes were made.

3.3.4 Data collection in case interviews

The case interviews were held with various types of people who know the Kempen region well, which means that these people all somehow play a role within the region. Ten recorded interviews have been held with policy makers in the field of mobility of local municipalities (3), representatives of village councils (4), a policy maker in the field of mobility from the province of North Brabant (1), a representative from a local business association (1) and a representative from a project organisation (1). In addition, also an unrecorded conversation has taken place with the regional coordinator of the Kempen. The format of these interviews were semi structured to ensure that these representatives were able to tell their own story. Some topics and questions were prepared in advance to ensure that certain important aspects of the theoretical framework were discussed. But the interview was in particular an open conversation with plenty room for input from the side of the interviewee. The duration of the case interviews was generally about half an hour, but varied from 20 to 45 minutes.

3.3.5 Data collection in target group interviews

After the case interviews a potential target group for alternative forms of mobility was identified. Six persons from the intended target group were thereafter interviewed in order to see if they are actually interested in the use of innovative forms of mobility. These interviews had generally a duration of about 20 minutes and were held on the base of a semi-structured interview guide. This interview guide was prepared in such a way that every innovative mobility concept was discussed, but with still some room for the respondents to tell their own stories. Also the interviewees were asked to give a brief description of their village in the field of mobility.

3.3.6 Data analysis

Analysis CBS-data

The gathered CBS-data about the population size of the municipalities and villages and it's age structures are displayed in absolute and relative numbers in multiple tables. In addition, the population size of the Netherlands and it's age structure is also showed. This to be able to make comparisons between the age structures of the Kempen villages and the Netherlands. Also the average car per household has been added to each table. On the basis of this information, some conclusions can be drawn about the demographic division of the Kempen villages and municipalities.

Analysis observations

The observations were analysed by writing the most remarkable and important things down. These aspects together form a summary in story form. On this way, an image is created of the village which can be experienced by the reader. The taken photos are added to strengthen this image. Thereafter, the villages were compared to each other to find similarities and differences. The most remarkable statements of the street interviews were sorted by subject and summed up.

Analysis interviews

All the conducted similar case interviews, the Kempen region interviews and the target group interviews were held via telephone and recorded. In addition, some quick notes were taken containing the most important information. Thereafter, these interviews were fully transcribed in order to analyse them. However, the interviews with the representatives of Taxistop.be (*Hoppin*) and the village council of Casteren were due to a poor sound quality not possible to transcribe. The transcribed interviews were coded in two steps, open coding and axial coding. Open coding is the process of giving labels to certain text fragments. These labels indicate the main theme of these text fragments. Then, associated labels were divided into groups with the same theme, which is called axial coding. These groups are grouped according to overarching themes, such as Buehler's factors. An overview of the outcome of the coding process can be found in appendix III. The most remarkable statements of all the interviews were sorted by subject and summed up in chapter 4.

3.4 Reliability and validity

In this section the reliability and validity of this research will be discussed. This will be done on the basis of the internal reliability, the external reliability, the internal validity and finally the external validity.

3.4.1 Reliability

Internal reliability

The internal reliability of this research is ensured because the process of transcribing, coding and analysing is done by only one researcher. Since almost all (all except two) interviews are transcribed and coded with care and on a precise way, the possible diversity in interpretation is limited. However, the non-verbal communication and the sentence intonation of the respondents could not be added to the transcriptions of the interviews. This is mainly due to the reason that these interviews were conducted via telephone. There was therefore no non-verbal communication visible. The six street interviews, conducted during the observation were not recorded. This because of the informal way of interviewing. These interviews are therefore not fully transcribed, but notes were made during the interview which contain the most important statements.

External reliability

The possibility that a research can be executed more than once with the same results relates to the external reliability. Because of the narrative nature and therefore the non-traditional way of conducting interviews and the important role of the researcher in gathering this information, this research can't be executed again in the same way. During this research an attempt was made to speak to as many people as possible who somehow play a role within the Kempen region. The availability and willingness of these respondents play a major role in this. Especially because they were asked to tell their story containing their view on particular topics. Since this research has a constructivist research paradigm, there are multiple realities (Guba & Lincoln, 1994) which makes it nearly impossible to execute this research in the same way.

3.4.2 Validity

Internal validity

The internal validity in this research is ensured by generating the data with various types of research methods, such as interviews, observations and quantitative data. This is an important part of the research design of this research and is called triangulation. This is important because these multiple sources of information ensure that its data can be compared to each other to be able to verify whether the information from the different research methods result in the same conclusions. Because of the narrative research method, and therefore the open character of the interviews, the respondents had a lot of freedom to talk about their experiences and things they consider as important. This gave very different and detailed information about the current mobility experience in the Kempen region, but it also caused that in not every interview the aspects from the theoretical framework were discussed in the same amount.

External validity

This research is largely devoted to the Kempen. Except for the three similar case interviews, all other interviews were conducted with people who live or play a role within the Kempen region. The results and the recommendations of this research are only applicable to this region, due to the unique circumstances that can be found here. Nevertheless can the results of this research be useful for other regions in the Netherlands, for example in the form of background information or as inspiration for similar projects.

4. Results

In the following chapter, the gathered information will be interpreted to answer the sub-questions of this research. Firstly some similar cases will be introduced and the results of the interviews with their representatives will be presented. Then, the demographic facts of the Kempen municipalities and their villages will be analysed to create a good understanding of the area. Thereafter, the image of the Kempen region will be completed by analysing the observations of three small Kempen villages. The combination of demographic facts and objective observations will give a good overview of the current situation. Afterwards the case interviews will be analysed in order to find possible target groups for innovative forms of mobility in the Kempen region. Once these target groups are established, individuals within these target groups will be questioned which will be analysed and presented at the end of this chapter.

4.1 Lessons learnt from similar cases

Three cases were selected in order to learn more about the implementation of alternative forms of mobility in rural areas. No single case is set up under the same conditions, since every rural region has its own strengths and shortcomings in the field of mobility. The results of these interviews will therefore not be used as a blueprint for the Kempen region. Instead, the main purpose of the interviews is to gain an insight into how certain issues are tackled, and how the Kempen region can benefit from this information.

4.1.1 *Hoppin*

Hoppin, also known as *Mobipunt* is originally a Flemish concept and can be described as 'recognisable places with a diverse range of transport options'. These modes of transport are coordinated and are preferably supplemented with extra services, such as good Wi-Fi connection, charging stations for electrical bikes and cars, a kiosk or parcel safes. The main purpose of *Hoppin* is to facilitate the combination of mobility options. *Hoppin* serves as an access point and as a transfer point between the various transport options. Examples of these transport options are regular public transport, shared mobility services and taxis (Mobipunt, n.d.). Idea behind this concept is to simplify and to make the use of mobility alternatives more convenient. With this, the Flemish government wants to contribute to the intended mobility transition of Belgium. Users can easily see in an app which means of transport are available where, what the costs are, and how long their journey will take (Vlaamse overheid, 2020). In addition to making the use of these alternative forms of mobility more convenient and easier for the potential users, *Hoppin* also has the purpose to create a better

connection between urban and rural areas. By offering shared mobility services at public transport nodes, the first and last mile of travellers are provided. This will possibly reduce the need for car use and car ownership in the future (personal communication, 30-06-2020).

The ultimate goal of the Flemish government is to realise about 1000 *Hoppin* points throughout Flanders in the coming years (Hoppin, 2020). All these different places are serving different areas. Some will be located at busy train stations while other *Hoppin* points will be located at more rural areas. It's therefore important that every single one of them will be specially designed in order to meet the local needs. It will be examined per different location which transport options are available and whether any other facilities will be added to each *Hoppin* point (personal communication, 30-06-2020).

4.1.2 *Reis via hub*

Reis via hub (travel via hub) is an initiative from the public transport organisation of Groningen and Drenthe. These two provinces are located in the north of the Netherlands and feature sparsely populated rural areas in combination with some more densely populated urban areas like the cities of Groningen, Emmen and Assen. These cities are well connected to each other and to the rest of the Netherlands by bus and train. In order to ensure a good accessibility for the more rural areas of these provinces, the public transport organisation has set up a hub program. This hub program consists of 57 hub locations distributed over the two provinces (Reis via hub, n.d.). These hubs were installed at already existing public transport nodes like bus stops and train stations in order to improve the quality of the public transport network. In addition to the improved accessibility due to implementation of the hub program, another part of this program is that those hubs become a place where people can do more than just get on the bus by adding multiple facilities to it (personal communication, 06-07-2020).

"So you should be able to carpool there, you should be able to share cars in the future, you should be able to rent bicycles, you should be able to drink a cup of coffee, get a newspaper, pick up or drop your packages (...) so there must be a toilet everywhere there must be a water tap, there must be a Wi-Fi connection, you must be able to wait neatly, well, et cetera, et cetera. So - yes, they are actually nodes that are going to be 'pimped up'"

(representative of hub program Reis via hub)

In addition to the more basic services and facilities mentioned above. The idea is also to add at some hubs more specific facilities like a space where people for instance can see a doctor. This has to result in a better accessibility for the more rural areas to services and facilities for which

they otherwise had to travel to the city.

"We are even thinking, for example, in Gieten, which is also a really busy node, which lies exactly between Stadskanaal, Emmen, Assen and Groningen - so actually right in the middle of Drenthe - to perhaps do something there with a doctor's post, or with - you know, why would people always have to drive to Groningen for a certain consultation or just to be seen, now there is the idea to create a space at the hub for things like that" (representative of hub program Reis via hub)

According to the interview with the representative of the hub program, (personal communication, 06-07-2020), the amount and type of facilities and services are different per hub. Every hub serves a different area within the provinces and therefore every hub has a different function. It's therefore important to customise each hub to the needs of the location and its users.

"So there are 57 custom solutions for 57 places. So I make sure that we get people together who have shared interests in that location, often that's the municipality, entrepreneurs, sometimes it's a local library, sometimes it is - in one village, for example, we have a multifunctional centre, a part of that multifunctional centre is now in use as a waiting area - yes, there are many different things and they are all customised to the location (...) every village, every municipality, every city actually, has different needs" (representative of hub program Reis via hub)

Testing new ideas at different hub locations is done by the principle of 'learning by doing'. New concepts are implemented on a small scale to be able to test whether the concept works without much risk. However, according to the interview (personal communication, 06-07-2020) they are not afraid to make mistakes. He believes that making mistakes is a form of creating clarity.

"Our philosophy is 'learning by doing'. We are not going to do all the research first - yes of course we will if a lot of money is involved, we cannot just say that we are going to spend a few tons on something without testing it. But the hub program was created to pioneer at these locations, so for example if we have the idea that shared bicycles could be of added value, or parcel safes or a kiosk - then we are the ones who say 'let's go for it'. I don't believe that things can go wrong, because everything that just doesn't work out is also a form of clarity. Of course we are not stupid, so we are not going to do things from which we already know in advance that it will not work. But at this moment there are no things that only costs money - or things that are money-consuming, no. So we try to do it on a small scale, for example the pilot with shared bicycles, we are going to start that pilot, most likely at one of our P&R locations. So not immediately at five or ten locations, but just at one place and then we will test it there...

... If it works, we can scale up, then we will start thinking about how we can implement this as quickly as possible" (representative of hub program Reis via hub)

4.1.3 *Stichting NederlandLift*

Stichting NederlandLift is an association for hitchhiking in the Netherlands. The main purpose of this association is to reintroduce hitchhiking as a proper way of transport in the Netherlands. They try to achieve this in various ways, for example by doing research on hitchhiking, attending and presenting at conferences, discussions with municipalities about facilitating hitchhiking in their municipalities and more (Stichting NederlandLift, n.d.). Although the association has not established any physical hitchhiking concepts resulting in actual existing cases, the interview with the founder of the association was nevertheless very inspiring and gave insight in the possibilities of this form of mobility. According to the founder of *Stichting NederlandLift*, the main reason why so little people use hitchhiking as a way of transport is because they simply don't think about it to do so (personal communication, 26-06-2020).

"I noticed that people only hitchhike when it is some kind of necessity, so when they have a broken car – or when the trains are not running that people are going to ride together. But I see hitchhiking more as a serious form of transport - one that has simply been forgotten" and *"I have set up a survey via the ANWB, and I got almost 800 respondents - I asked them about hitchhiking and their experiences with hitchhikers. I also asked the question why would you not be able or why don't you want to hitchhike to work (...) there were many reasons - also many predictable, it is dangerous - things like that, but most people just don't think about hitchhiking. So I think it is really a forgotten option"* (founder of Stichting NederlandLift)

The founder of the association herself has a lot of experience with hitchhiking, especially as a way to commute from home to work, and according to her, hitchhiking has a lot of advantages as compared to other modes of transport. An important advantage according to her is the social aspect of hitchhiking. An atmosphere often arises very spontaneously in which the driver and the passenger tell each other a lot about their personal lives. This openness creates a friendly atmosphere and provides a pleasant journey for both (personal communication, 26-06-2020).

"I think that hitchhiking setting is very special, because then something happens that makes you open up to each other - sitting together in such a small space, you have to make the most of that small ride. And I thought that was pretty cool, and then I started thinking like this is quite a cool way to get in touch with other people - from other layers of the society, from outside your own bubble. That applies to me, but it can also apply for other people...

... It's a bit of an idealistic idea from me [to reintroduce hitchhiking in the Netherlands]"
(founder of Stichting NederlandLift)

According to the interview, hitchhiking can be used by almost everyone as a mode of transport. A big advantage of hitchhiking is the low cost to travel. Hitchhiking can therefore be a very useful transport alternative for people who have little money to spend, or for example for students. But because you meet strange people you have to have some guts and dare to let go of your own control (personal communication, 26-06-2020).

"I think that anyone can do it [hitchhike to work]. In fact, you only have to indicate your destination on a sign – so yes, anyone can do that - I even know a woman who is half blind, I believe. (...) But when I was at that bus stop [the hitchhiking spot she regularly used] - the only difference between me and the people waiting for the bus is that I held up a sign with my destination on it. You don't need much for it - a place and a sign and then you can go. But you only have to dare, some people thinks it's very scary and don't dare to do it" and *"Uhm, yes I think that's very difficult to determine [main target group for hitchhiking]. Yes of course people who just don't have that much money, it will of course always stay that way. But yes, basically everyone. The motive to hitchhike is of course not always to travel from A to B, my motive was the social contact between people"*
(founder of Stichting NederlandLift)

She mostly hitchhiked in Nijmegen, a city in the east of the Netherlands with over 170.000 inhabitants. Because of the major and busy roads in Nijmegen, it was not hard for her to arrange rides to commute to her work. But according to her, hitchhiking could also be a good alternative for more rural regions. She thinks that the inhabitants of villages and places with poor public transport networks are more likely to help each other (personal communication, 26-06-2020).

"I think that in areas without public transport - it can work very well there [a hitchhiking concept]. I've also seen that in Friesland, there you have such a hitchhiking concept. They say over there that it works very well because they all know that there are no buses anymore. Therefore they are inclined to help each other. So I think it is a very good alternative especially in the areas without bus lines" (founder of Stichting NederlandLift)

The most important aspect of the reintroduction of hitchhiking in the Netherlands is the facilitation of this transport alternative by the local governments. According to the founder of the hitchhike association, help from the municipalities is needed. In order to achieve this, she contacted many municipalities to inform them about the possibilities of hitchhiking and how they can facilitate and

stimulate the hitchhiking culture in their municipalities.

"Well, I've made an appeal - for municipalities to make their areas hitchhiker-friendly. The idea is to make a hitchhikers stop at strategic points – at exit roads. Which is not more than looking for a good spot and placing a sign, so to speak. 'You can hitchhike here' or - we have already developed a traffic sign ourselves, which says 'drive together' instead of hitchhiking. Then you know that you can stand over there, but also for drivers that they know that they can stop there. (…) With only a few signs - then at least you have facilitated it for your municipality. And I think it is smart to also point out potential spots around train stations. For when the trains do not run or are cancelled - for whatever reason – then they can also continue hitchhiking. Yes, those are very simple things (…) – and of course it is always the question whether they will be used - but I think: what harm could it do to set it up like this and perhaps pay some attention to it - who knows. But yes, at least you have facilitated it properly" (founder of Stichting NederlandLift)

Lastly, it is according to the interview of great importance when implementing an innovative hitchhike concept, to avoid the word 'hitchhiking'. This word has a negative connotation and is often associated with poverty. In addition, asking for a ride should be made easy for the user by for example using technology.

"A good thing about F'kes meerijden is - because of course it has - of course, hitchhiking has a bit of a negative image - that it can be dangerous and it is a bit shabby, hitchhikers are hippies without money or students. And what I like about F'kes meerijden is that they overcome that a bit - because you don't have to write your destination on a sign and hold it up - but through a news ticker kind of thing. In this way it feels much more official or something (…) And that they don't mention the term 'hitchhiking' in the concept - but called it F'kes meerijden"
(founder of Stichting NederlandLift)

4.1.4 Conclusion

The conducted interviews with representatives of similar cases showed that using mobility hubs is rather new for most people. Especially in more rural areas is a concept like shared mobility still quite unknown for the general public and therefore not easy to implement. According to the interviewees it's therefore very important to properly attune the hubs to the location and the intended audience for the alternative forms of mobility. Every hub must therefore be 'tailor-made', from the various transport options offered, to the added facilities at each different hub. It can therefore help to develop these hubs step by step, by constantly thinking about what could be of added value for the area its located in. Hubs don't have to be delivered in one go containing various types of

transport options and facilities, but can be introduced gradually by simply start calling bus stops and train stations 'hubs' and by providing an attractive and universal design for these places. Besides, since mobility hubs are still new concepts, it's allowed to experiment to discover what can work well where. New ideas can be implemented on a small scale to be able to test whether the concept works without much risk. And if something doesn't work out well, it's not a failure, it can be seen as information to learn.

In addition, the interview with the founder of *Stichting NederlandLift* showed that hitchhiking can be a good way to move around. This because it's a cheap, sustainable and a very pleasant way to travel because of the social contact. Especially on places with a poor public transport network can hitchhiking be a good alternative for the car. The reason why hitchhiking is not widely done in the Netherlands is because of the simple reason that people don't come up with the idea to do so. It can therefore be seen as a forgotten option. Local governments can easily give hitchhiking more attention by simply making it more visible in the living environment. This can for example been done by placing road signs along main roads to indicate hitchhiking spots where people can stand safely. Because this can be implemented quite easily, hitchhiking can given the low costs for municipalities been seen as a good way of transport. To have a greater chance of success, it can be useful according to the interview to avoid the word 'hitchhiking'. This due to the negative image of hitchhiking which is often associated with poverty. In addition, making hitchhiking more convenient and easy by the use of technology can also lead to more users.

4.2 Analysis of the demographic facts of the Kempen

An analysis of the demographic facts of the four municipalities in the Kempen region (Bergeijk, Bladel, Eersel and Reusel-De Mierden) will give a good overview of these villages. The presented data consists of numbers about the population, the age structure of the inhabitants and the amount of passenger cars. In order to make well-founded statements about these demographic facts, it's important to compare this with numbers of the population, age structure and amount of passenger cars of the Netherlands. By comparing this data, the specific features of the Kempen region will become clear.

In table 16, the demographic facts of the population of the Netherlands and it's age structure are presented. Figure 10 gives a visual overview of these numbers. On the basis of table 16 and figure 10 can be seen that most Dutch people are aged between 45 and 65 years. This means that the Dutch society is aging. Aging is the process of the increase of the proportion of elderly people in a society (RIVM, 2019). Besides of the age structure of the inhabitants of the Netherlands, the number of passenger cars is shown in the table. This number shows that every Dutch household has on

average 0,9 car available.

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Netherlands	17.407.484	2.726.099 (15,7%)	2.143.743 (12,3%)	4.308.803 (24,8%)	5.043.515 (29%)	3.185.324 (18,3%)	8.530.584	0,9

Table 16: Demographic facts of the Netherlands (CBS, 2019b)

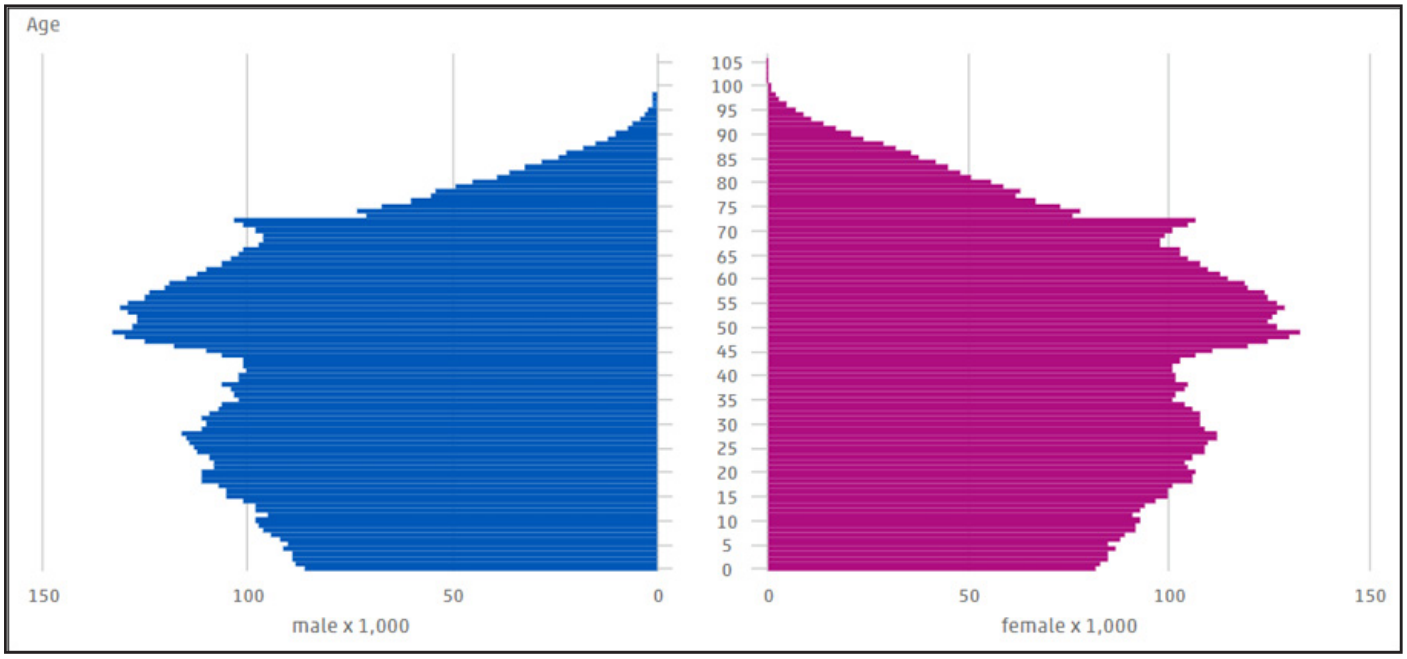


Figure 10: Age composition of the Netherlands (CBS, 2019c)

4.2.1 Municipality of Bergeijk

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Bergeijk	18.491	2.706 (14,6%)	2.240 (12,1%)	3.845 (20,8%)	5.637 (30,5%)	4.063 (22%)	10.745	1,4

Table 17: Demographic facts of the municipality of Bergeijk (Rural Data Center, 2019)

The municipality of Bergeijk has over 18.000 inhabitants. The population structure of all the villages from this municipality together does not differ much from the population structure of the Netherlands. Remarkable is the difference between the share of people older than 65. In the municipality of Bergeijk this percentage is about four percentage point higher than the national percentage. In addition, the amount of passenger cars per household is very remarkable in this table. With an average of 1,4 car per household in the municipality of Bergeijk, this average number is considerably higher than the national average of 0,9 car per household.

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Bergeijk 't Hof	8.460	1.200 (14,2%)	940 (11,1%)	1.745 (20,6%)	2.480 (29,3)	2.080 (24,6%)	4.765	1,3
Weebosch	525	80 (15,2%)	70 (13,3%)	100 (19%)	150 (28,6)	115 (21,9%)	305	1,4
Riethoven	1.820	235 (12,9%)	210 (11,5%)	325 (17,9%)	610 (33,5%)	425 (23,4%)	1.180	1,5
Westerhoven	1.925	300 (15,6%)	225 (11,7%)	435 (22,6%)	610 (31,7%)	350 (18,2%)	1.180	1,5
Bergeijk 't Loo	1.085	195 (18%)	130 (12%)	315 (29%)	290 (26,7%)	150 (13,8%)	590	1,4
Buitengebied	2.245	295 (13,1%)	340 (15,1%)	385 (17,1%)	775 (34,5%)	445 (19,8%)	1.325	1,5

Table 18: Demographic facts of the villages belonging to the municipality of Bergeijk (Rural Data Center, 2019)

The age structure of the inhabitants from the different villages within the municipality of Bergeijk is not consistent with the national age structure percentages. For example, the percentage of people over 65 is higher than the national percentage in almost all villages. In Bergeijk 't Hof and Riethoven this number differs even more than five percentage points. In Bergeijk 't Loo, on the other hand, the percentage of people over 65 is a lot lower than in the rest of the Netherlands. Besides, it's remarkable that the share of people between 25 and 44 years in the municipality of Bergeijk is generally seen much lower than in the rest of the Netherlands. Almost all villages have in percentage terms less inhabitants in that age group. The average number of passengers cars per household is between 1,3 in and 1,5, which is significantly higher than the national average.

4.2.2 Municipality of Bladel

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Bladel	20.175	3.090 (15,3%)	2.361 (11,7%)	4.429 (22%)	5.970 (29,6%)	4.325 (21,4%)	11.525	1,4

Table 19: Demographic facts of the municipality of Bladel (Rural Data Center, 2019)

Bladel is with over twenty thousand inhabitants, the most populated municipality of the Kempen region. The population structure of the municipality of Bladel does not differ much from the population structure of the Netherlands as a whole. Just like the previously discussed municipality of Bergeijk, also the share of inhabitants over 65 in Bladel is higher than in the rest of the Netherlands. In addition, the amount of passenger cars per household is very remarkable in this table. With an average of 1,4 car per household in the municipality of Bladel, this average number is considerably higher than the national average of 0,9 car per household.

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Bladel	10.465	1.575 (15,1%)	1.145 (10,9%)	2.350 (22,5%)	3.000 (28,7%)	2.380 (22,7%)	5.710	1,3
Netersel	965	175 (18,1%)	125 (13%)	210 (21,8%)	305 (31,6%)	145 (15%)	560	1,5
Hapert	5.485	835 (15,2%)	655 (11,9%)	1.185 (21,6%)	1.635 (29,8%)	1.160 (21,1%)	3.285	1,4
Hoogeloon	2.190	310 (14,2%)	295 (13,5%)	445 (20,3%)	720 (32,9%)	415 (18,9%)	1.280	1,5
Casteren	1.075	185 (17,2%)	130 (12,1%)	230 (21,4%)	305 (28,4%)	215 (20%)	635	1,5

Table 20: Demographic facts of the villages belonging to the municipality of Bladel (Rural Data Center, 2019)

The age structure of the inhabitants from the different villages within the municipality of Bladel are generally consistent with the national age structure percentages. The percentages overall do not differ much from the national percentages. However, it's remarkable that in all the villages of the municipality of Bladel the share of inhabitants between 25 and 44 is lower than in the rest of the Netherlands. Besides, the share of young people between 0 and 14 is significantly higher in the villages of Netersel and Casteren. The average of passengers cars per household in the villages of the municipality of Bladel is between 1,3 in and 1,5, which is higher than the national average.

4.2.3 Municipality of Eersel

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Eersel	19.110	2.849 (14,9%)	2.142 (11,2%)	4.038 (21,1%)	5.847 (30,6%)	4.234 (22,2%)	11.140	1,4

Table 21: Demographic facts of the municipality of Eersel (Rural Data Center, 2019)

The municipality of Eersel has over nineteen thousand inhabitants and is after the municipality of Bladel the most populated municipality of the Kempen region. The overall population structure of the municipality of Eersel does not differ much from the population structure of the Netherlands as a whole. But just like the previously discussed municipalities of Bergeijk and Bladel, has the municipality of Eersel a larger share of inhabitants over 65 than the rest of the Netherlands. In addition, the average number of passenger cars per household is very remarkable in this table. With an average of 1,4 car per household in the municipality of Eersel, this average number is considerably higher than the national average of 0,9 car per household.

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Eersel	10.195	1.585 (15,5%)	1.060 (10,4%)	2.210 (21,7%)	2.945 (28,9%)	2.400 (23,5%)	5.880	1,3
Duizel	1.970	270 (13,7%)	265 (13,5%)	390 (19,8%)	685 (34,8%)	360 (18,3%)	985	1,4
Steensel	1.425	200 (14%)	155 (10,9%)	320 (22,5%)	460 (32,3%)	295 (20,7%)	870	1,5
Vessem	2.120	295 (13,9%)	230 (10,8%)	405 (19,1%)	685 (32,3%)	500 (23,6%)	1.305	1,5
Wintelré	2.010	325 (16,2%)	255 (12,7%)	435 (21,6%)	600 (29,9%)	400 (19,9%)	1.200	1,5
Knegsel	1.380	170 (12,3%)	180 (13%)	280 (20,3%)	470 (34,1%)	280 (20,3%)	885	1,5

Table 22: Demographic facts of the villages belonging to the municipality of Eersel (Rural Data Center, 2019)

The age structure of the inhabitants from the different villages within the municipality of Eersel is not consistent with the national age structure percentages. Many percentages differ multiple percentage points from the national percentages. In all the villages of this municipality is the share of people aged between 45 and 65 and aged over 65, higher than in the rest of the Netherlands. The share of people between 25 and 44 is on the other hand in all villages lower than the national share. The average of passengers cars per household in the villages of the municipality of Eersel is between 1,3 in and 1,5, which is higher than the national average.

4.2.4 Municipality of Reusel-De Mierden

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Reusel-De Mierden	13.060	2.178 (16,7%)	1.374 (10,7%)	3.119 (23,9%)	3.844 (29,4%)	2.545 (19,5%)	7.445	1,4

Table 23: Demographic facts of the municipality of Reusel-De Mierden (Rural Data Center, 2019)

The municipality of Reusel-De Mierden is with just over thirteen thousand inhabitants the least populated municipality of the Kempen region. The overall population structure of the municipality of Reusel-De Mierden corresponds very well with the population structure of the Netherlands as a whole. Only the share of people aged between 15 and 24 is significantly lower than the national percentage of this age group. In addition, the average number of passenger cars per household is very remarkable in this table. With an average of 1,4 car per household in the municipality of Reusel-De Mierden, this average number is considerably higher than the national average of 0,9 car per household.

		Age of inhabitants in years					Amount of passenger cars	
	Inhabitants	0-14	15-24	25-44	45-65	65+	Total	Per household
Reusel	8.620	1.440 (16,7%)	925 (10,7%)	2.135 (24,8%)	2.390 (27,7%)	1.720 (20%)	4.775	1,3
Hooge Mierde	1.785	300 (16,8%)	160 (9%)	415 (23,2%)	550 (30,8%)	355 (19,9%)	1.060	1,4
Lage Mierde	1.850	290 (15,7%)	210 (11,4%)	360 (19,5%)	650 (35,1%)	330 (17,8%)	1.135	1,5
Hulsel	810	140 (17,3%)	75 (9,3%)	200 (24,7%)	245 (30,2%)	135 (16,7%)	475	1,5

Table 24: Demographic facts of the villages belonging to the municipality of Reusel-De Mierden (Rural Data Center, 2019)

The age structure of the inhabitants from the different villages within the municipality of Eersel is not consistent with the national age structure percentages. Many percentages differ multiple percentage points from the national percentages. The percentages of inhabitants aged between 15 and 24 are remarkable. The table shows that in every village of this municipality, the share of this age group is lower than in the rest of the Netherlands. The average of passengers cars per household in the villages of the municipality of Reusel-De Mierden is between 1,3 in and 1,5, which is higher than the national average.

4.2.5 Conclusion

The demographic facts of the four municipalities of the Kempen which were discussed in the previous section showed that in almost every municipality and village the share of inhabitants aged 65 or higher is larger than the national percentage. This also applies to a smaller extent for the age group of inhabitants between 45 and 65 years. These observations show that the average age of the inhabitants of the Kempen region is higher than the average age of the inhabitants of the Netherlands. But the most remarkable numbers of the previous section were the average number of cars per household. On average, a household in the Kempen region has 1,4 car available. This

is considerably higher than the national average, which is only 0,9. This difference shows that the Kempen region is very car-minded.

4.3 Case observations

The observation scheme was drawn up on the basis of the situational influences of Buehler (2011), and has been applied to three villages of the Kempen region. All three villages were visited on a weekday in July. This was during the summer holidays so the amount of people present in the villages can probably not be compared to the amount of people during normal working days. But since it was also during the Covid-19 pandemic, the situation was anyway different from the times before. The purpose of these observations was to get a better understanding of the spatial development and transport and land-use policies in these villages, as described by Buehler (2011). In addition to the observation scheme some street interviews have been held during the observation. In these street interviews, the inhabitants of the villages were asked about their thoughts of innovative forms of mobility like *F'kes meerijden* and mobility sharing systems. They were asked if they would make use of those concepts if they were implemented in their villages. Unfortunately it was difficult to find villagers who wanted to respond. This was mainly due to the lack of people that were present on the street. Besides not many people wanted to have contact with a stranger since this was a strict advice during the pandemic.

4.3.1 Observation of Knegsel (Municipality of Eersel)

Spatial development

The building density of Knegsel is low. The streets in this village are wide with lots of greenery. In Knegsel there are mainly detached houses with both a front and a back garden. A small share of the houses in this village are terraced houses. There are no high-rise buildings (higher than 3 stories) in Knegsel. The buildings have mainly the same function: living. And apart from two catering establishments, a church building, a primary school, a community house and a gas station, nearly all buildings are used as homes. There are therefore not many working places in Knegsel. The village has beyond the list mentioned above, no other noteworthy facilities like a supermarket or other kind of shops. In Knegsel there are a lot of parking spaces for personal cars. People can often park their cars along the road as well as on their own driveways. Besides, there are multiple small parking lots in Knegsel. Furthermore, in Knegsel a clear central square can be recognised. Almost all houses are located within a five minute walk from this place.

Transport and land-use policies

Almost every part of Knegsel can be reached by car. Only a few alleys in the village were only accessible for bikes and pedestrians. The structure of the village is mainly focused on the main road

that goes through the centre of Knegsel. The residential neighbourhoods are all connected to this street, where also most of the facilities can be found. Within the village itself, there are apart from those earlier mentioned alleys, no bicycle paths. Cyclists have to cycle on the road next to the car traffic. Outside of the boundaries of the village, separate cycle paths can be found. In terms of public transport, a local bus (*buurtbus*) runs only on weekdays between 8 o'clock in the morning and half past five in the afternoon once every two hours through Knegsel. But no local bus has been running since March as a result of the Covid-19 pandemic.

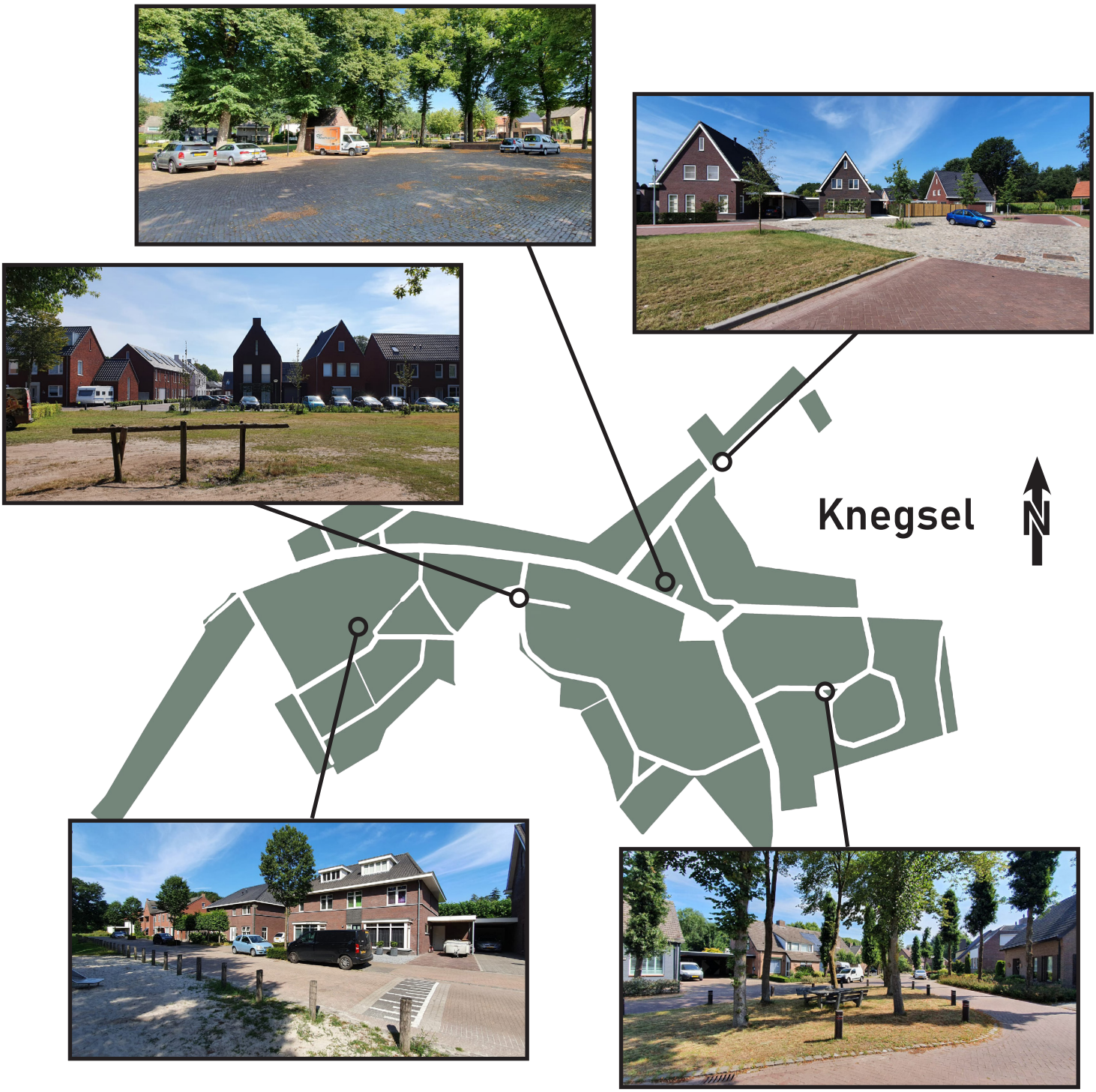


Figure 11: Map of Knegsel containing photos of the local streetscape

Street interviews

Two inhabitants of Knegsel have been interviewed in short street interviews during the observation on July 30. They were asked about their behaviour in terms of mobility and if they would use innovative forms of mobility. The answers of the two respondents in Knegsel were very similar. The inhabitants both told that they were using their cars a lot.

Respondent 1: *"We do everything by car, but every now and then we take the bike to Eersel"*
Respondent 2: *"We take the car for almost everything, it is very convenient and fast"*

They also both reported that they are happy with the current 'mobility situation' in Knegsel. According to them there is no parking pressure and no nuisance in terms of traffic in their village.

Respondent 1: *"Quite a lot of traffic during the morning but I experience little inconvenience"*
Respondent 2: *"There is no parking nuisance in Knegsel"*

Thereafter, they were asked about the implementation of mobility sharing systems in Knegsel. Both respondents think that (e-)bike sharing and or car sharing systems would not be successful in their village.

Respondent 1: *"That is not necessary over here, everyone has already a bike and a car for themselves"*
Respondent 2: *"I'm not going to use systems like that, no added value for me"*

Lastly they were introduced to the concept of *F'kes meerijden* and they were asked what they think of this idea, and if they would make use of it once it has been developed. According to them, it could work if it's implemented and introduced properly.

Respondent 1: *"It could work, everyone knows each other in this village and people are willing to help each other"* and *"I would not hitchhike myself, but I would definitely take someone with me, why not!?"*
Respondent 2: *"If they put it [the hitchhike spot] in a strategic place, it would probably work"*

4.3.2 Observation of Hoogeloon (Municipality of Bladel)

Spatial development

The building density of this village is low. In and around Hoogeloon are mainly detached houses, which contain both a front and a back garden. In addition to the many detached houses, there are

also terraced houses in Hoogeloon, but this is only a small share of the total amount of houses. There are no high-rise buildings (higher than 3 stories) in the village. Hoogeloon has a number of facilities and services in the village, such as some catering establishments, a primary school, a dentist, some shops (clothing, flowers, furniture) and a church. There is no supermarket in the village. In Hoogeloon there are a lot of parking spaces for personal cars. People can often park their cars along the road as well as on their own driveways. Besides, there are multiple small parking lots in the village, for example on *Valensplein*, a large square along the main road. Furthermore, in Hoogeloon a clear central point can be recognized around the church. Most facilities and services of the village are also clustered here.

Transport and land-use policies

Hoogeloon is easily accessible by car. Most of the streets in the village are designed for motorized traffic. Only a few alleys in the village were only accessible for bikes and pedestrians. The structure of Hoogeloon is mainly focused on the main road which passes through the village from north to south. The residential neighbourhoods are all connected to this street, where also most of the facilities can be found. Within the village itself, there are apart from those earlier mentioned alleys, no bicycle paths. Cyclists have to cycle on the road next to the car traffic. Outside of the boundaries of the village, separate cycle paths can be found. In terms of public transport, a local bus (*buurtbus)* runs on weekdays between 8 o'clock in the morning and half past five in the afternoon along the main road of Hoogeloon. Normally, this local bus stops three times in the village, but no local bus has been running since March as a result of the Covid-19 pandemic.

Street interviews

Three inhabitants of Hoogeloon have been interviewed in short street interviews during the observation on July 30. They were asked about their behaviour in terms of mobility and if they would use innovative forms of mobility. The respondents all agree that Hoogeloon is a quiet and peaceful village.

Respondent 1: *"There is no traffic pressure in the village"*

Respondent 2: *"It's a pleasant and quiet village to live in, there are no traffic or parking problems here"*

When they were asked about their car use, it was noticed that the respondents make extensive use of their cars.

Figure 12: Map of Hoogeloon containing photos of the local streetscape

Respondent 1: *"We take the car for almost everything, for grocery shopping we drive to Hapert or Bladel"* and *"It's not a problem that there are not many services in Hoogeloon, it's here therefore quiet and peaceful and the car trips are short and quick"*

Respondent 3: *"We use the car for many different purposes, in this village there is for example no supermarket"*

The respondents told that they don't make use of the public transport in Hoogeloon. This mainly due to the fact that the car is a better and quicker option for them.

Respondent 2: *"The public transport system is very poor, but for me that's not a problem, everything can be reached quickly and easily by car"*
Respondent 3: *"I never take the bus myself, the car is way faster and easier"*

One of the respondents wants a better and more frequent operating bus service. According to him, this will mainly be useful for the youth of Hoogeloon.

Respondent 1: *"A bus that runs regularly, even in the evenings and in the weekend would be nice, especially for the youth"*

Thereafter, they were asked about the implementation of mobility sharing systems in Hoogeloon. All three respondents think that (e-)bike sharing and or car sharing systems would not be successful in their village.

Respondent 2: *"I wouldn't use a shared bike or car, I already have both at home"*

Lastly, the three respondents were introduced to the concept of *F'kes meerijden* and they were asked what they think of this idea, and if they would make use of it once it has been developed. According to them, it could work, and it would in particular be a good concept for the elderly.

Respondent 2: *"F'kes meerijden sounds like a good addition to this village"*
Respondent 3: *"I would take people with me if I know them for a ride, almost everyone knows each other in this village, so hitchhiking would probably work"* and *"This could be a good solution for elderly who have to do their groceries in other villages"*

4.3.3 Observation of Weebosch (Municipality of Bergeijk)

Spatial development

Weebosch has a very low building density. In and around Weebosch there are mainly detached houses, which contain both a front and a back garden. There are no high-rise buildings (higher than 3 stories) in the village. Weebosch has a very small number of facilities and services in the village, such as two catering establishments, a church and a butcher shop. There is no supermarket in the village. In Weebosch there are a lot of parking spaces for personal cars. People can often park their cars along the road as well as on their own driveways. Furthermore, Weebosch has no clear central point that can be recognised in the village. Most of the facilities are however clustered around the church along the main road, but there is no clear village square in Weebosch.

Transport and land-use policies

All the houses in Weebosch are easily accessible by car. Most of the streets in the village are designed for motorised traffic. The structure of Weebosch is mainly focused on the main road which passes through the village. A great part of the houses in the village are also situated along this road. There is one other residential neighbourhood that is connected to this road. Within the village itself there are no bicycle paths to be found. Cyclists have to cycle on the road next to the car traffic. Outside of the boundaries of the village, separate cycle paths can be found. In terms of public transport, a local bus (*buurtbus*) runs on weekdays between 8 o'clock in the morning and half past five in the afternoon along the main road of Weebosch. Normally, this local bus stops two times in the village, but no local bus has been running since March as a result of the Covid-19 pandemic.

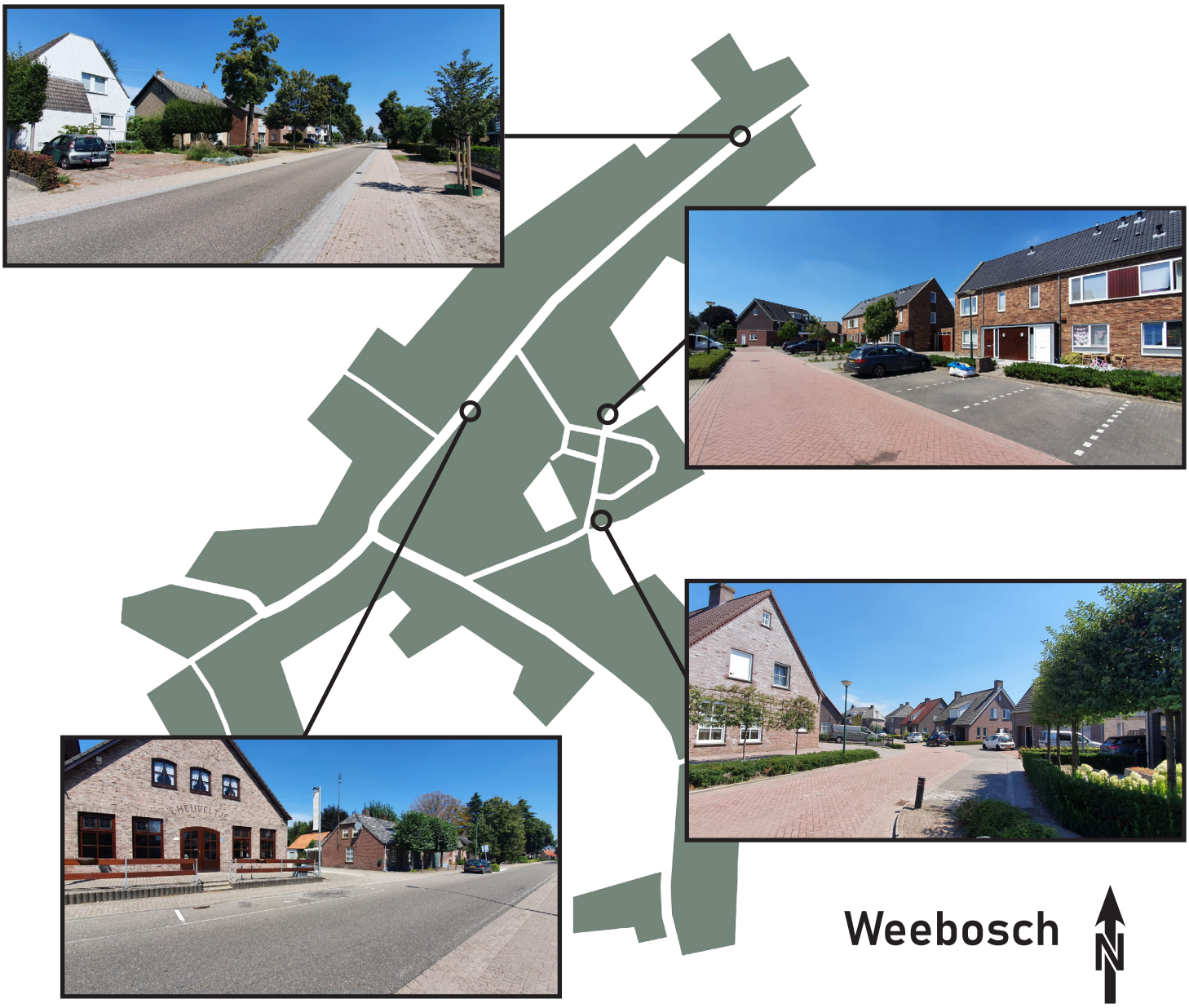


Figure 13: Map of Weebosch containing photos of the local streetscape

Street interviews

Only one inhabitant of Weebosch was willing to answer some questions in a short street interview during the observation on July 30. He was asked about his behaviour in terms of mobility and if he perhaps would make use innovative forms of mobility. The respondent indicated that he never uses the local bus, and mostly uses his car and bike.

Respondent 1: "Public transport is hardly used here, it has a very poor timetable. So there is kind of a vicious circle" and *"Usually, I use my car or bike"*

Thereafter, he was asked about the implementation of mobility sharing systems in Weebosch. According to him sharing systems will not work in Weebosch, because he thinks no one will make use of this.

Respondent 1: "Shared bicycles would not work here, nor would shared cars. These systems would be used too little"

Lastly, the respondent was introduced to the concept of *F'kes meerijden* and he was asked what he thinks of this idea, and if he would make use of it once it has been developed.

Respondent 1: "I don't think people want to hitchhike, if they need a lift they will arrange it themselves"

4.3.4 Conclusion

The observations gave insights on the spatial development and the transport and land-use of the three small Kempen villages. Several things corresponded, such as the low building densities in all three villages and the low amount of services and facilities that were available. In addition, it was remarkable that the villages all have a poor connection to the public transport. Although there is a local bus service that runs through the villages, the timetable shows that it rarely runs. Besides, the local bus has stopped running since the start of the pandemic in March 2020. As a result, these villages have been without public transportation for months.

The street interviews with the villagers showed that they use their cars a lot every day. Commuting or doing groceries are mostly done by car, and sometimes by bicycle. Many households therefore have their own car(s) and bicycles, which means that they would probably not use shared mobility if it were implemented in their villages. The innovative hitchhiking concept *F'kes meerijden* has a greater chance of success according to the respondents. They think that the facilitation of helping

each other is a good idea. The social cohesion of the three villages plays an important role in this.

4.4 Analysing the case interviews

In order to find an answer to the main research question, information had to be gathered about the current mobility means and flows within the Kempen region. By elaborating the different transport flows and their users, potential groups of people which will benefit most from the implementation of new alternative modes of transport can be discovered.

4.4.1 Modal split of the Kempen region

During the interviews, the respondents were asked about the current situation concerning the use of means of transport in their village or municipality. The conducted interviews showed that the following means of transport are used within the Kempen region: motorised traffic (e.g. a car), bicycle, public transport and to a small extent shared cars. These modalities will be discussed further in the following section.

Car use

According to the respondents, the car is a widely used transport option in the Kempen region. They also indicate that the average number of cars per household is very high in their municipalities or villages. This corresponds with the numbers on average car ownership that were derived from the Rural Data Center in the previous section.

"And I must say - our region, but I think that applies to pretty much the whole of Brabant - we are very car-minded" and *"Here in Brabant, car ownership is still very high"* (policy maker municipality of Bladel)

"We are a rural municipality where car ownership is very high" and *"Actually there is too much car ownership. Two, three cars per household is no longer an exception in certain neighbourhoods"* (policy maker municipality of Eersel)

"Many people have a car, and people with children sometimes even have two or three cars per household. That is a lot more here in a village than in the city or something I think. A city is more populated and more used to public transport" (representative of village council Wintelré)

Multiple respondents indicate that it is very common in the Kempen region that young people, as soon as they turn eighteen, get their driver's license and buy their own car.

"A lot of people live here in a more rural region, so as soon as the children are seventeen, they get driving lessons - get a driving license, and as soon as they turn eighteen, they all have their own car. Because then they are much more flexible and their moms and dads don't have to drive them anymore. So everyone has been used to having their own car, or having a car at their disposal, almost from the age of eighteen"
(representative of entrepreneurs association Reusel-De Mierden)

"When someone is 18, he or she arrives in a car - and that is very easy nowadays, for a thousand euros you have one, so to speak" (policy maker municipality of Bladel)

According to the interview with a policy maker from the municipality of Reusel-De Mierden, is Reusel-De Mierden even the municipality with the most driving licenses per inhabitant in the Netherlands.

"I recently read somewhere that we, together with another municipality, have the most driving licenses per inhabitant" (policy maker municipality of Reusel-De Mierden)

According to the policy maker from the municipality of Bladel, are the cars used for commuting not used in an efficient way. According to him, there are many empty spaces in the commuting cars that could be easily filled.

"Hundreds of cars drive between the business parks and the bus station - but nobody lets anyone into their car - sharing is not yet in our DNA" and *"If there is a traffic jam in the direction of Eindhoven, then three more people would fit in each car - but that doesn't happen" and "We need to make better use of what is already on the road and what is already there"*
(policy maker municipality of Bladel)

Bicycle use
The interviews also showed that the bicycle use is high within the various municipalities in the Kempen. Especially short distances within the villages and municipalities are covered by bike. The respondents gave the idea that the bicycle fulfils a similar role in the Kempen region as in the rest of the Netherlands.

"The bicycle network is also quite an extensive bicycle network" and *"There is a lot of cycling here, there are also many recreational cyclists"* (policy maker municipality of Eersel)

According to a member of the village council of Knegsel, many young people take the bike. This is easy for them, since the distances from Knegsel to for example Eersel and Veldhoven are not that big. Also a policy maker from the municipality of Reusel-De Mierden states that cycling within the boundaries of their municipality is very common, but for longer distances the car is used.

"You see that the youth just take the bike. They go to Veldhoven - to school or to dance lessons, that's all in Veldhoven. And all of that can easily been done by bike" and *"That is the advantage, it is all relatively short and close to Veldhoven. Eersel can also still be done by bicycle. For example, I work in Veldhoven and I normally also go to work by bike"*
(representative of village council Knegsel)

"Within the municipality we do a lot by bike, but beyond that we are really a car municipality"
(policy maker municipality of Reusel-De Mierden)

A representative of the entrepreneurs association of Reusel-De Mierden, states that the amount of commuting trips done by bicycle has increased slowly in the past years. According to her, more employers are nowadays stimulating bike use among their employees. Which was originated by a program aimed at stimulating bicycle use.

"Well, most entrepreneurs are aware that it [cycling] is very good for the environment - and it is good for the employees too. Look, if they cycle for half an hour in the morning and in the evening, they will be more fit, and of course the company benefits from that, so that [cycling] is encouraged" and *"and of course there is the development of electronic bicycles, which has also increased bicycle use"* (representative of entrepreneurs association Reusel-De Mierden)

Use of public transport

Public transport in the Kempen region consists of two different modes of transit. Regular bus lines and some local bus (*buurtbus*) lines. The regular bus runs along the provincial road through the larger villages of the Kempen in the direction of Veldhoven and Eindhoven (bus lines 19 and 319) or in the direction of Tilburg (bus line 143). While the local bus lines (for example local bus lines 291, 292 and 294) are more focused on the connection between the smaller villages and the bigger villages of the Kempen. This ensures that the public transport is experienced differently in the larger villages than in the smaller ones. The respondents indicated that the regular bus line is mainly used by scholars, students and elderly.

"The bus is mainly used by the elderly and students - this of course has to do with their mobility options" (policy maker municipality of Bladel)

"Scholars are usually taking the bus – it is a really busy bus connection" (policy maker municipality of Eersel)

"As far as I know, young people use public transport a lot. Because they have a student card for public transport" (policy maker province of North-Brabant)

On the other hand, the local bus is according to multiple respondents hardly used by the inhabitants of the Kempen region. Besides, the local buses are running not very frequent causing in an ineffective mode of public transport.

"And those local buses are hardly used to come to Bladel to catch the regular bus - then they just take the bike, for example" and *"It often happens that there are empty vans [local buses] driving around"* (policy maker municipality of Bladel)

"I think there is some kind of local bus, but it only runs every two hours. That is a bus that makes a trip via Veldhoven, but the frequency of that bus is so low that I really wonder which people make use of it. It actually makes no sense for commuters" (representative of village council Knegsel)

"One [a local bus] runs to the other three small villages of Wintelré, Vessem and Knegsel. A local bus runs there. It runs, I think once an hour during the day" and *"The public transport facilities are not good in the smaller villages"* (policy maker municipality of Eersel)

"That local bus runs every hour and stops running at six in the evening. So if you are in Eindhoven and you are not ready until six, then you can no longer go home by bus. And you can't be there [in Eindhoven] before nine in the morning, you can't. So the local bus is fine, but it is a bad connection for the majority of people who want to use public transport for their work. But it is also a bad connection for the students who have to go to the train - to Breda or Tilburg, Den Bosch or Utrecht. They often have to be at school or university at nine o'clock - and that does not work. Then you have to go to the train station [Eindhoven Centraal] by bike or be taken away by car" (representative of village council Wintelré)

But not only the local bus has its problems. Also the regular buses are facing problems according to multiple respondents. For example, fewer buses run on weekends and in the evenings, which ensures that the cities like Veldhoven, Eindhoven and Tilburg are at those times bad accessible by public transport for the inhabitants of the Kempen.

"But the bus to Tilburg, for example, does not run on weekends, and also not in the evening - I don't know exactly, but in any case - it does not go in the evening" and *"He [the bus] will go to Eindhoven, but that will take a long time. You have a fast service and a slower service. One really takes a lot longer - the other one goes a bit faster, but it is still quite a distance. Also because you still have to go through the city in Eindhoven before you reach the station"*
(representative of entrepreneurs association Reusel-De Mierden)

"During the weekend you cannot go to Tilburg [by public transport], then you have to travel via Eindhoven" and *"We do hear that certainly students often suffer - especially towards Tilburg, because there is no bus in the evenings and at weekends"* (policy maker municipality of Reusel-De Mierden)

Use of alternative forms of mobility
In addition to the more traditional means of transport, alternative forms of mobility can also be found in the Kempen region. These alternatives exist to a small extent, such as shared cars that can be used by employees of the municipalities of Eersel and Bladel.

"For example, we as a municipality recently purchased a number of cars that we can use with the staff of the municipality, which is also a form of shared mobility - the same applies to bicycles"
(policy maker municipality of Bladel)

"Within the municipality we do have - what's that called - our own cars that the staff can use"
(policy maker municipality of Eersel)

At this moment, these cars can only be used by employees, but according to a policy maker of the municipality of Eersel, there are plans to make shared cars available for general use.

"Yes, we do have plans to put a few shared cars here in the municipality" and *"We want to start in Eersel. The idea is to park two shared cars at the town hall, but hey, those are still plans"*
(policy maker municipality of Eersel)

In Casteren, a village from the municipality of Bladel, an innovative mobility initiative is originated. It concerns a local bus service that is organised by volunteers, which is called *Casters Vervoer* (literally translated: Transport Casteren). This local bus runs around 9 times a day between the villages of Bladel, Hapert, Hoogeloon and Casteren. This small bus has the advantage that it can be boarded anywhere along the route, in addition, the costs for a single journey is only 1 euro and this initiative is therefore a cheap option to travel. Finally, this concept has also the service of bringing people home personally who for example, have heavy shopping bags with them (representative of the village council of Casteren, personal communication, 06-07-2020).

4.4.2 Factors explaining this modal split

The modal split that is roughly elaborated in the previous section shows that the inhabitants of the Kempen region are car-minded. The car is used for most trips both inside and outside the municipality. The explanations for this travel behaviour will be given on the basis of statements of the interview respondents which are based on the categories by Buehler (2011).

Social-economic and demographic factors

This category did not play a role during the interviews. This because the social-economic and demographic facts of the inhabitants of the Kempen region were already gathered by analysing the CBS-data. This data showed that the villages in the region are lightly populated and that there is a high average number of cars per household.

Spatial development

During the observations much information was gathered about the spatial development of the smaller villages in the Kempen region. Questions were asked during the interviews to check the observation findings and to collect an even better insight on the spatial development of the region. The low building density in the smaller villages is often mentioned when it comes to spatial development. This in combination with little inhabitants can cause that there are little services and facilities in the villages.

> *"Yes, that [the demand of services and facilities in Knegsel] is actually very limited, because - in the past there was a supermarket, but it closed years ago. A few years ago there was still a bakery, but it is also closed. There was still one real brown café, but it has also recently closed"*
>
> (representative of village council Knegsel)

This lack of services can ensure that villagers have to travel further to reach the services and facilities that they need such as an supermarket.

[Answer on where villagers of Knegsel do their groceries] "Yes, you actually see two movements. One is towards Veldhoven - Veldhoven has Albert Heijn and so on. We always go to Veldhoven ourselves, which is four kilometers by car. But other people are more drawn to Eersel, but that's a matter of personal preference" and *"In Vessem you also have a Plus market or something, so some people also go there. Vessem is a bit bigger than Knegsel, but of course also a small village, so that's just a small supermarket"* (representative of village council Knegsel)

"The majority goes to Veldhoven or Eindhoven [to go shopping] (...) but some people also go to Eersel and Hapert, there are more specific shops" (representative of village council Wintelré)

The observations also showed that there are many parking spaces in the villages of the Kempen, where it's also free to park your car. This was agreed by the respondents during the interviews.

"There is free parking everywhere [In Reusel-De Mierden] and we have no capacity problems" (policy maker municipality of Reusel-De Mierden)

"No, that is not too bad [parking pressure at business parks in Reusel-De Mierden] - the company's design also takes this into account. So that's not really an issue that often arises" (representative of entrepreneur association Reusel-De Mierden)

A policy maker at the municipality of Bladel states that a part of the reason of the difference between the modal split between Amsterdam and Bladel is the difference in costs, for instance the parking costs.

"And in the Randstad you also have a completely different cost level. If I have to park my car in Amsterdam, it is much different in terms of costs than the fact that you can park for free here in Bladel, so there is a completely different social difference" and *"If it remains financially very attractive to drive a car, then we will continue to do so - and if it is financially very expensive for alternatives, then we will not use them"* (policy maker municipality of Bladel)

Interpreting these statements leads to a possible link between the parking pressure and parking costs and the usage of the car. Because there is almost no parking pressure in the Kempen and there are very few places where you have to pay to park your car, it's not urgent for people to stop using their cars.

Transport and land-use

Just like the observations did, the interviews also show that the villages in the Kempen are easily accessible by car and by bicycle. In addition, new roads are already being constructed to improve the accessibility of the Kempen and the Eindhoven metropolitan area by car or bicycle.

"Yes for the car it is actually all fine [road infrastructures], the bicycle too - there is always room for improvement, but the basis is good" (policy maker municipality of Reusel-De Mierden)

"We [Knegsel] are actually located on the edge of the Kempen, almost touching the borders of Veldhoven - and that means that if you look at the map - Knegsel has quite a few access roads. So they [the cars] come from different sides from the Kempen"
(representative of village council Knegsel)

The public transport network is less well organised and because of the lack of a good network of public transport, it is also less used. According to the respondents, a good working public transport network which also serves the smaller villages is only possible if there are enough potential bus riders. But if the public transport network is poor, it will be used by only a few people, which ensures that no investments are made to make it a well-functioning network. This vicious circle is also mentioned by one of the respondents.

"You first have to prove potential [for a new bus line], but you know how it works, only when there is a bus, and people see that, then people are going to ride that bus. But if you have to show in advance how many travellers per bus are possible - yes, that's a chicken-and-egg situation. That is really difficult matter" (policy maker municipality of Bladel)

"You have to have sufficient demand for it - a network of buses is therefore not profitable"
(representative of village council of Knegsel)

"That [no higher frequency of buses] also has to do with - yes, they are not going to drive empty buses" (policy maker municipality of Reusel-De Mierden)

"And it is also about better bus connections from the rural areas to the cities. You can speed up, increase the frequency - run more buses every hour. That makes it all more attractive for the people to use it more" (policy maker province of North-Brabant)

The good accessibility by car and bike, and the poor connection to a proper public transport

network for almost all villages in the Kempen explains why the car and bike are the most popular means of transport in this region.

Culture and attitude

In the previous section of this chapter it was discussed that it's common in the Kempen region that people from the age of eighteen have access to a car, and sometimes even their own car. This attitude stems from the independence that the car carries in this area. This because public transport does not always meet the wishes of a large part of the Kempian population, and cycling is not always preferred, due to for example long distances or bad weather.

4.4.3 The consequence of car dependency

The previous analyses of the mobility in the Kempen region show that a large share of the trips are made by car. This was explained on the basis of a good infrastructure for the car, free parking, services and facilities that are not close by for some parts of the region, and a poor public transport network. The goal of the municipalities of the Kempen to keep the region accessible and making the Kempen even more accessible through the implementation of innovative mobility solutions and/or alternatives for the car can be reached when current car users will switch to the proposed ideas of the SMARA program. But according to the respondents of the interviews, that switch is probably hard to achieve. The interviews show that behavioural change is very hard to reach.

"That mentality, that car culture - you notice that it is very difficult to adjust" and *"We notice that once someone has chosen for the car, it is very difficult to get it out of their system. We do our best with many projects (…) can we facilitate the traveller trip in other ways? - but once in the car - that is a luxury that you get used to so quickly, that people often choose not to switch. And there are some exceptions - of course you have people who are very sporty and choose the bike (…) But actually getting rid of the car for another transport mode is really difficult"*

(policy maker municipality of Bladel)

"I think it will be very difficult to achieve that. Changing people's behaviour is one of the hardest things to do" and *"Hopefully they will eventually switch and change their behaviour, which is what you want to achieve. But yes, that is difficult. People really like to hold on to their car"*

(policy maker province of North-Brabant)

One of the reasons why it's so hard to change people's behaviour to use a car, is the fact that most of the car users in the Kempen region don't have the urgency to do so. This is because there is no parking pressure within the villages and there are no costs to park your car, as discussed earlier.

In addition to that, the congestion on the roads does not cause delays to such an extent that driving is discouraged.

"I do think that it is clear to the traveller in advance what time he will arrive at his destination. And if that is uncertain, people are more likely to opt for certainty, and then public transport - at least if it is better organised, could be an option. But it is not uncertain at all on what time you will arrive, it [the congestion] can make a difference of a few minutes but I am always on time for my work - whether it is busy or not busy, that traffic does not delay me enough to worry about that" (policy maker municipality of Bladel)

"But it is not such a high priority [reducing cars in Reusel-De Mierden]. Because we also have sufficient capacity on the roads for all those cars, so it will only be necessary if there are problems there [with the capacity]" (policy maker municipality of Reusel-De Mierden)

The inhabitants of some smaller villages are also aware that living in a more rural area has the side effect that the public transport network is less well organised than, for example, in a more urban area. This realisation can contribute to less need from the population to make use of alternative transport options instead of their car.

"Yes, the situation is now such that people are accepting it [a poor public transport network in their village] more and more. We are the people that choose to live here"
(representative of village council Knegsel)

4.4.4 Determining a target group for alternative forms of mobility

From the previously discussed statements of the respondents can be deducted that the Kempen region is very car-minded. The inhabitants of the villages of the Kempen are therefore very dependent on their car. It also became clear that changing that mindset is very difficult to achieve. The expected chance that car users would leave their car to travel with different means of transport, such as the proposed alternatives by the SMARA program, is therefore very small. Certainly not since there is a lack of urgency to change means of transport. The group of people who do not have to adapt as much in terms of mobility are those who do not have a car. These people have already been made aware of alternatives to the car and may therefore be more willing to make use of the innovative concepts of the SMARA program.

"First, let's try it on a small scale for people who do not have a car or – that will be the target group because they are already dependent on alternatives - to see if those alternatives actually work" (policy maker municipality of Bladel)

A large proportion of the inhabitants of the Kempen without a car are young people, which for example are going to high school or the university in Eindhoven or Tilburg. It was already noted in a previous chapter that a large share of the users of the public transport network in the Kempen are scholars and students. According to the statements of the respondents, the proposed alternatives will mainly serve to facilitate the transport from and to public transport nodes, such as a bus stop or bus station. This means that according to this information, young people who do not have a car can have a big advantage of the implementation of the proposed innovative mobility concepts of SMARA. These alternatives should ensure that the first and last mile of a trip is provided in a convenient and sustainable way.

"If we want to arrange for an adequate connection from those areas [rural areas] to the nearest pick-up point for regular public transport, that will be a good idea. I do not believe that a direct connection can be created from those areas to the urban area - towards Tilburg or towards Eindhoven" and *"I really see SMARA as an instrument for arranging pre and post transport for rural areas"* and *"If you get off the bus, and you have to do the last bit with a shared bike, I think that's quite acceptable"* (policy maker municipality of Bladel)

"Suppose we can stretch the bus line from Reusel to Tilburg - and it will only stop on the provincial road, then you could do something with the pre and post transport from the bus stop to the villages [Hooge en Lage Mierde], for example with a shared bicycle or something similar. But otherwise I think there is unfortunately not much to be gained there"
(policy maker municipality of Reusel-De Mierden)

These statements imply that the main purpose of those mobility alternatives such as shared mobility is to make a better connection between the existing public transport network and the smaller villages of the Kempen. On this way, the poor accessible villages will be better accessible and there are possibly more people who will see public transport as a good alternative for the car. But also the concept of *F'kes meerijden* can be useful to facilitate the first and last mile of the trips of people. In addition has this hitchhiking concept, according to the respondents of the interviews, a good chance of success in the more rural areas. There is a strong sense of community in the small villages, which is useful for *F'kes meerijden*, since helping your fellow villagers is the main idea of this innovative concept.

"I think it's [F'kes meerijden] ideal for people because they all know each other over there [in Knegsel]" and "Here in the village [Knegsel], you would say they are all acquaintances so why should you not be allowed to drive a bit along?" and *"It's the same people who take the bus every day, and the same people who drive past that pillar every day, so it's very easy for a driver to let someone in and drop him off a little further on. I used to do that, then I took students with me, sometimes even up to the houses to drop them off at their front door"*
(representative of village council of Knegsel)

"Hooge and Lage Mierde are very small villages where everyone really knows each other. I think there is a great willingness to help each other" (policy maker municipality of Reusel-De Mierden)

"What I actually kind of hope for - is that - certainly in those small villages, everyone knows each other (…) – and people have to go somewhere at the same time every day - that you actually get to know the people a bit who drive there, so that you often meet the same ones and make agreements among themselves after driving a number of times. That doesn't seem like a problem to me" (policy maker municipality of Bladel)

In addition to the current mobility 'poverty' of people without cars, such as young people, another reason why they might be the potential target group is the mindset of these people. According to multiple respondents, young people are rather willing to experiment and try new things.

"I think the new generation certainly - that more people are open to that [to use alternative forms of mobility]" and *"Well, it's more like if it's on offer [alternative forms of mobility] and it's also constantly pointed out that that's a good way to travel - then this option is going to land. That is the same as - better not to smoke, of course there are people who are so addicted to smoking and who continue to do so, but actually among the youth it is really known that it is not healthy. And that takes a generation – that does not mean that no one doesn't - but that is how I see it, if you continue to put in the effort and make the youth known from primary school – that it [alternative forms of mobility] is a good way to move around, then I see an opportunity there"*
(representative of entrepreneurs association Reusel-De Mierden)

"I think they would do that [use shared mobility] more easily than we as older people would. I see that 'Go Scooter' is a widely used system, and that could also be the case for a shared car. Young people can adapt to this a bit easier" (representative of village council Wintelré)

"Young people are accepting new forms of transport more quickly, or are more flexible in using them. They are a bit more used to the new digital environment, or using apps or that sort of things - than the older generation" and *"Young people become less dependent on material matters. Young people no longer always need their own car, so there is a completely different perception. Which means that the time has come to look at how you can start to implement this change in the field of accessibility and mobility"*

(representative of Huis van de Brabantse Kempen)

4.4.5 Conclusion

The analysis of the case interviews with respondents with different backgrounds learned that the Kempen region is a very car-minded region. The modal split of the region is mainly formed by the car use of its inhabitants. The reason behind this car dependency is mainly due to a low building density in the region. This ensures that the services and facilities are often far apart from each other, and that people have to move long distances to reach those services and facilities. The inhabitants also often have to travel some time for their work, which also leads to a high car use. In addition, the regular public transport network only serves the bigger villages of the Kempen, making the use of public transport unattractive to many people. The interviews also showed that there is no urgency or need for car users to change to other modalities. This means that there is probably little support from the current car users for the use of alternative forms of transport, such as shared mobility or *F'kes meerijden*. According to the respondents is behavioural change very difficult to achieve, it's therefore that the current car users will not be seen as a potential target group for the proposed SMARA program interventions. Instead, the potential target group according to the case interviews are the people without a car. This group can mainly be split into two target groups: young people and elderly. Because of the earlier shown numbers about younger people who are more likely to use shared mobility systems and the statements of respondents about the flexibility and high willingness from young people to use mobility alternatives, the younger generation will be the main target group where the following chapter will be focused on. In addition, the emphasis will be on the people without a car in the smaller villages. This because the proposed mobility innovations are focused on the first and last mile, or the pre and post transportation of people toward and from a public transport node.

4.5 Analysing the target group interviews

The analysis of the case interviews showed that young people are in the first instance the potential target group for alternative forms of mobility. To find out if this is actually the case, six interviews with young people from six different villages within the Kempen region were held. They were asked about the current mobility situation of their village and which transport options they might miss or

what eventually could be improved. In addition, it was investigated whether the respondents would use the intended mobility alternatives from the SMARA program once they are implemented. The results of these questions are described and analysed in the following sections.

4.5.1 Mobility needs of the potential target group

According to the respondents, the bicycle is a commonly used means of transport within the Kempen region. For many young people the bike is the most ideal way to move independently in and between villages. Therefore, almost every high school student comes to school by bike. Some students travel many kilometres every day to get to school.

[Answer on 'how did you go to your high school?'] "By bike, because that was five and a half kilometres, so that was fine" (inhabitant of Hulsel and Lage Mierde)

"It was about eleven kilometres [to reach high school], so that was quite a bit. If you were in a hurry, you could manage it in 35 minutes, but then you arrived at school 'like an otter' [very sweaty]. But on average it took you 45 minutes to 50 minutes - in the morning and in the evening. It took me daily two hours" (inhabitant of Luyksgestel)

"But when I had to go to high school, I had to cycle to Eersel every day. And that was around 35 minutes back and forth" (inhabitant of Vessem)

"Some [friends and classmates] had to cycle for about 45 minutes. (...) For example, my friends, they lived in Luyksgestel, and that was quite a distance, that is close to the Belgian border - and they were almost forced to purchase a scooter or electric bicycle. Because otherwise it was almost impossible for them" (inhabitant of Eersel)

But when the respondents graduated from their high schools a new challenge arose. For further education they have to travel to Eindhoven, Tilburg, Den Bosch or other cities in the Netherlands. The earlier discussed absence of an extensive public transport network results that people without a car, who for example want to travel by public transport for their studies or to reach the facilities, firstly have to reach a bus stop by bike. Sometimes the nearest bus stop is a few kilometres away, making it not a pleasant trip.

"At one point we [me and friends] wanted to go to Eindhoven to shop or to go to the cinema in the weekend, but then you still have to cycle a bit before you reach the first bus stop" and *"I always saw that as a nuisance [no bus stop nearby]. When I went out, and I wanted to go back home...*

... of course my parents did not want me to have to cycle that stretch home alone when I was younger. So I often had to sleep at a friend's house or I couldn't go at all. Just because you live in such a remote village. I thought that was annoying. Certainly because at that age I wanted to do more and more" (inhabitant of Vessem)

The journey to a bus stop differs in length and time for every village. Some villages of the Kempen region are connected to the regular bus line, while others are a lot further away. The interviews show that when the bus stop is close by, the overall trip is very well appreciated by the respondents. Although traveling by public transport generally takes longer than by car, it also has its advantages according to the respondents, such as the costs (public transport is free for students), the physical health (cycling to the nearest bus stop) and using travel time to work.

"I always liked cycling for fifteen or ten minutes [to reach the nearest bus stop], because - it's the start of your day, and if you've been on your bike for ten, fifteen minutes, you also become a bit flexible" (inhabitant of Hulsel and Lage Mierde)

"If I have a long day, it doesn't matter to me whether I spend that half hour longer in the train or not, that day is long anyway. Then I can possibly still work for school on the train or bus. The advantage is that I have the possibility to sometimes use the public transport and not only the car" (inhabitant of Bladel)

The combination of bicycle and public transport is according to the respondents a good way to travel, with the condition that the bike ride doesn't take too much time. The respondents representing the young people of the Kempen region are willing to use multiple means of transport for their trips to the urban areas of for example Eindhoven and Tilburg. Since the smaller villages of the Kempen are not connected to each other by a regular public transport, these connections still have to be travelled by bike or car. The interviews show that these inner connections are still very poorly organised and that the younger people of the Kempen would like to see this to change.

"On our high school in Eersel, there were also people from Bergeijk or Luyksgestel. We also have friends in Bergeijk or Luyksgestel, but there is no bus connection to Duizel from there. To Luyksgestel you either have to cycle for an hour or you have to go by car. Those are the only options" (inhabitant of Duizel)

[Answer on if she would like a direct bus operating between Luyksgestel and Eersel] "Yes. That would be really useful. Because I don't think there is even a bus connection from Bergeijk to...

... Eersel - which I think is very strange actually, because they are two somewhat larger villages, but in my opinion they are not really well connected by public transport or something" (inhabitant of Luyksgestel)

"If you want to cycle from Eersel to Bergeijk - that is actually only one long road, which also contains a part through the forest and I always think that's a bit - yes, it's not really convenient to cycle there in the evening. So in that case, a bus from Eersel to Bergeijk would be nice in the evening hours" (inhabitant of Eersel)

4.5.2 Motives and resistances for alternative forms of mobility

During the interviews, the respondents were asked whether they think innovative mobility concepts such as shared mobility and *F'kes meerijden* would fit into the more rural areas of the Kempen region. Besides, they were asked about their personal motives and resistances against these forms of transport. In the following section the findings of these questions will be presented into two tables, one with motives and resistances for shared mobility, the second one for *F'kes meerijden*. The content of these tables will be clarified on the basis of statements from the interviews.

Motive	Resistance
Move around faster (1)	No added value (3)
Better connection between villages (2)	Difficult to use (4)
Better connection with public transport	Is it reliable? (5)

Table 25: Motives and resistances for shared mobility according to the target group interviews

Motives

(1) Multiple respondents think that shared mobility in the form of a scooter or a car, can be useful for inhabitants of the Kempen region to quickly reach certain destinations.

"I haven't used it myself yet [shared mobility], but I see myself doing that. If I have to go to school quickly or to the city" (inhabitant of Bladel)

"A shared scooter, that might work. I think for a moment about when I was in high school - if I had overslept, I had to cycle very fast to reach my school. So maybe it is - for high school kids aged about fifteen or sixteen years old - that they could use it like that" and *"You are faster [with a shared scooter], and in unexpected moments it could be useful. You are faster on a relatively longer distance than you would otherwise have been with a bicycle"* (inhabitant of Hulsel and Lage Mierde)

(2) In addition to the fact that the use of shared scooters and shared cars can shorten the travel times. It can also ensure that people without cars can more easily reach villages without a public transport connection, which are too far to cycle to.

"If you have to travel such a distance to another village - where they don't have a bus stop - then a shared car or scooter could be useful. For example, if you have to go from Duizel to Vessem, you cannot go by public transport. And cycling is a really long way. In such cases a shared car or shared scooter could be useful" (inhabitant of Duizel)

Resistances

(3) The respondents of the interviews all questioned the usefulness of the implementation of shared mobility, and in particular a bike sharing system. According to them there is no added value for sharing means of transport which they already own themselves. In particular, many inhabitants of the Kempen region already have their own bicycle, making it unnecessary for them to use a concept like shared bikes. But also to a smaller extent, many people already have access to their own car or the car of friends and family.

"I think everyone has already a bike in Bladel, so it will not succeed I think. There is too little demand for it" (inhabitant of Bladel)

"Everyone already has a bicycle and everyone is already used to cycle from Hulsel to get to another place - as long as you are under the age of sixteen" (inhabitant of Hulsel and Lage Mierde)

"I don't think it makes much sense for bicycles because everyone already owns one" (inhabitant of Duizel)

"Also because the people who need a car probably have already a car. And older people probably all have an electric bicycle, so if you have an electric scooter or e-scooter, for example, they probably say I already have that electric bicycle. So it is not necessary in that sense, I think" (inhabitant of Luyksgestel)

"I don't know if shared bikes would be useful. Because I actually think that everyone in Vessem already has a bicycle. That is not necessarily the problem" (inhabitant of Vessem)

"But of course many people already go by bike themselves. Everyone has a bicycle at their home" (inhabitant of Eersel)

(4) Also, one of the respondents mentioned that new systems like shared mobility could scare people because it requires new techniques and technologies which other means of transport don't. Especially the older generations can suffer from that according to the respondent.

"Maybe once it is properly explained to me [how to use shared mobility] – for example like you can do it with your public transport card or something. But I think it also requires a QR code and a telephone and an app, and many difficult things" and *"But I think people will think 'What kind of technology is this? I don't need that overhere'"* (inhabitant of Luyksgestel)

(5) Lastly, one respondent questioned the reliability of a sharing system in the more rural parts of the Kempen. To make such a concept a success, it's according to the respondent very important that there are enough vehicles available so that potential users of the system always have the opportunity to use one. When people depend on the sharing system to be able to return home after for example doing the groceries, they must have access to a vehicle without having to wait a long time for it.

"I think the problem is, most people still have to go back. If you have to return that same day, for example in the evening after work or after school, there should always be enough cars to drive back. For example from Eersel to Vessem. And I don't know if it is fast enough or if you have to wait a very long time, for example" (inhabitant of Vessem)

Motive	Resistance
Better connection between villages	Damage to personal image (8)
Better connection with public transport (6)	Safety (9)
Helping fellow villagers (7)	

Table 26: Motives and resistances for *F'kes meerijden* according to the target group interviews

Motives

(6) According to the respondents could *F'kes meerijden* be very useful for the first mile of their travels, for example as a substitute for their bicycle. They could use these rides to quickly get to a near bus stop or even a train station where they will continue their journey.

"I would think of that [F'kes meerijden] okay, this may happen. Because Luyksgestel is of course close to the border, there are also many cars from Belgium that have to go to Eindhoven. So there are a lot of people who come through Luyksgestel and then go that way [towards Eindhoven], and if they are alone and can take someone with them that will be very useful of course" (inhabitant of Luyksgestel)

[Answer on 'Would you possibly use F'kes meerijden?'] "Certainly. That's the easiest if I - the journey I often make is either from Eindhoven to Vessem, or from Vessem to Eindhoven, to get to the train station. And then I no longer have the problem of going back the same day, so then you no longer have that dependency. And I think if it works, then I would definitely use it. Very useful" (inhabitant of Vessem)

(7) Another motive to use a concept like *F'kes meerijden* is according to the respondents is the willingness to help fellow villagers. In previous chapters of this research the social cohesion of the Kempen region is extensively discussed, which is confirmed by a number of respondents.

"Yes, I think that [the large social cohesion in the Kempen] makes it a lot easier [to give someone a ride]. If you know or recognise that person, you can more easily take them with you" (inhabitant of Bladel)

"In the Kempen there is a lot of cooperation and working for each other. Often people know each other too, so I think that has perspective [the implementation of F'kes meerijden]" (inhabitant of Hulsel and Lage Mierde)

"If I know the person [who wants to hitchhike], I would of course say 'yes' much easier. Unless I'm in a hurry and I can't make it otherwise, but otherwise I would of course always help someone out" (inhabitant of Eersel)

Resistances

(8) A remarkable reason why a respondent doesn't want to hitchhike is that according to him you can get a bad name when you stand next to the road for a ride. This respondent thinks that hitchhiking is only accepted by his fellow villagers when you are really in need.

"In the small villages of the Kempen there is so much gossip that it is best not to do things like that [hitchhiking], because then you will get a bad name" (inhabitant of Hulsel and Lage Mierde)

Also another respondent agrees that according to him hitchhiking is only for people in need, and would therefore rather call a friend or taxi when he needs a ride.

"I think hitchhiking is - I don't know. You only do that when you are in need, right? At least that's how I see it. I'd rather call someone or just arrange a taxi or something" (inhabitant of Bladel)

(9) The last resistance is about the doubt whether hitchhiking and *F'kes meerijden* are safe enough to use. According to the interviews, the respondents have many doubts about getting into strangers' cars. They specifically mention that it could be unsafe for women and for younger children.

"Yes, a little bit of safety and confidence. I think that is often the thing with hitchhikers why you wouldn't do it" (inhabitant of Bladel)

"I don't see myself doing that on my own [hitchhiking]. As a woman I wouldn't do that on my own, for safety reasons. You don't know who you will end up with - but if maybe I'm with someone else, I would do it" and *"I think maybe that's different for men [to hitchhike] - I don't know. (...) - all those horror stories that you hear of girls who get into a car and are kidnapped. So maybe men and boys would have less trouble with that. I do not know"* (inhabitant of Duizel)

"I think - well, I wouldn't think that was such a problem myself [unsafety of hitchhiking]. But I think if such a concept were there when I was a bit younger, when I was in third grade or something, and – I would like to get to Eindhoven or something. I don't know if my parents would have liked that" (inhabitant of Vessem)

"I don't think I would do it [hitchhiking], because I would never get into a stranger's car or something that quickly. And to take someone with me myself - look, if it is such a backpacker of which you can really see that he is just traveling and that he has a lot of luggage with him, then I would be a bit sorry if I left him standing there. Yes, that may be a bit blunt and stereotypical, but I would not easily take everyone with me" (inhabitant of Eersel)

It had been established earlier this chapter that there is a great social cohesion in the Kempen region, which can ensure that people know each other causing a safe feeling for people to use *F'kes meerijden*. However, according to the respondents, this does not automatically apply to all the villages in the region. According to them, this has to do with the location of the villages in relation to the busy provincial road.

"But I think that if you hitchhike in Duizel along the provincial road, you will also meet many people who are on their way from Reusel to Eindhoven, for example. So I think over there the chance that you will get into the car with someone you know is actually very small" (inhabitant of Duizel)

4.5.3 Conclusion

The target group interviews learned multiple things. All the respondents agree with the earlier conducted interviews that there is a big car dependency in the Kempen region and that there's a poor public transport connection to most of the villages. This ensures that the youth of the Kempen are really used to cycle long distances to for example their school or to the facilities. According to the interviews this is not really seen as a problem for most people in the Kempen. However, once the youth have to go to other cities for their studies, traveling without a car becomes inconvenient for them. Due to the long distances to cycle to the nearest bus stop and the long travel time by bus to reach Eindhoven, it becomes not a pleasant trip. Especially when Eindhoven is not their final destination, and they have to continue their journey from there. In addition to this inconvenience, also the lack of a proper interconnection by public transport between the villages was mentioned. Although the youth are fine by cycling, some routes are too long to cover by bicycle. With friends living all around the Kempen, the respondents mentioned this inconvenience multiple times.

The proposed mobility alternatives from the SMARA program were generally well received. Only the idea of a shared bike system was not positively appreciated by any of the respondents. This is mainly because shared bikes have no added value for the inhabitants of the Kempen according to them. They think that those bikes will be rarely used due to the fact that almost everyone has already a bike. Instead, the concepts of shared scooters and cars were considered as promising. This because, according to the respondents, scooters and cars can add new transportation options for many people. In addition, these vehicles are easier to use and a more convenient way to travel on the long distances within the Kempen region. The hitchhiking concept of *F'kes meerijden* was also seen as a good addition to the current range of means of transport. Building on the social cohesion within the villages, this concept can ensure that smaller villages will be connected better to each other and to the public transport network. But to make this concept work, much attention must be paid to the safety of the users. Many of the respondents are not sure whether *F'kes meerijden* can be a safe way to travel. According to the interviews the safety of the people can be better guaranteed by using an app where potential drivers first have to sign up, in order to make use of this service.

It is remarkable that during the target group interviews not a single respondent mentioned something about the sustainability of these proposed alternatives. Therefore it cannot be determined whether sustainability plays a role in choosing their mode of transport.

5. Conclusion, discussion and recommendation

In the final chapter of this research, the main research question will be concluded on the basis of the answers of the sub-questions. Afterwards, this research will be discussed according to its implications and limitations. Finally, some recommendations will be given for the Kempen region and for follow-up research.

5.1 Conclusion

5.1.1 Conclusion of the sub-questions

In this paragraph, the five sub-questions of this research will be answered based on the earlier provided information, analyses and conclusions.

Sustainable and innovative forms of mobility

The first sub-question of this research is: **'What can be considered as sustainable and innovative forms of mobility?'**. This question was answered in the literature review of chapter 2. In this chapter an distinction was made between sustainable an unsustainable transport modes, at which private motorised transport, such as cars and motorcycles are seen as unsustainable transport modes, while walking, cycling, shared mobility systems and public transport are seen as sustainable ways of transport. The innovative aspect of transport modes is about the potential to use new technologies, which is called smart mobility. A trend in smart mobility is 'Mobility as a Service' (MaaS), which has the simple idea of offering transport modes to customers as a service instead of making it an investment for them. For example, the MaaS concept can be applied to cars, bicycles, scooters and public transport. MaaS could also be applicated in the form of mobility hubs, which are places where multiple transport options come together in order to facilitate an easy transfer of transport modes for travellers. Also the proposed mobility options from the SMARA program, *Mini Hub*, *F'kes meerijden* and *Dorpsauto* can be considered as sustainable and innovative forms of mobility.

Lessons learnt from similar cases

The second sub-question of this research is: **'Which lessons can be learned from similar cases in other rural areas?'** and was investigated on the basis of interviews with representatives of *Hoppin* (*Mobipunt*), the hub program for Groningen and Drenthe (*Reis via hub*) and the hitchhiking association *Stichting NederlandLift*. These interviews showed that the usage of mobility hubs is rather

new for most people. Especially in more rural areas is a concept like shared mobility still quite unknown for the general public and therefore not easy to implement. According to the interviewees it's therefore very important to properly attune the hubs to the location and the intended audience for the alternative forms of mobility. Every hub must therefore be 'tailor-made', from the various transport options offered, to the added facilities at each different hub. It can therefore help to develop these hubs step by step, by constantly thinking about what could be of added value for the area its located in. Hubs don't have to be delivered in one go containing various types of transport options and facilities, but can be introduced gradually by simply start calling bus stops and train stations 'hubs' and by providing an attractive and universal design for these places. Besides, since mobility hubs are still new concepts, it's allowed to experiment to discover what can work well where, and if something doesn't work out well, it's not a failure, it can be seen as information to learn.

In addition, the interview with the founder of *Stichting NederlandLift* learned that hitchhiking is a cheap, sustainable and a very pleasant way to travel because of the social contact. Especially on places with a poor public transport network can hitchhiking be a good alternative for the car. However, hitchhiking can be seen as a forgotten option in the Netherlands. Local governments can according to the interview easily give hitchhiking more attention by simply making it more visible in the living environment. This can for example been done by placing road signs along main roads to indicate hitchhiking spots where people can stand safely. Because this can be implemented quite easily, hitchhiking can given the low costs for municipalities been seen as a good way of transport. To have a greater chance of success, it can be useful according to the interview to avoid the word 'hitchhiking'. This due to the negative image of hitchhiking which is often associated with poverty. In addition, making hitchhiking more convenient and easy by the use of technology can also lead to more users.

The modal split of the Kempen region

The third sub-question that needs to be answered in order to answer the main research question is: **'How can the modal split of the Kempen region be described and declared?'**. This question is in particular answered on the basis of the four factors of Buehler. These factors were introduced in chapter 2.1.3 and are according to the theory influencing the transport mode choice. The demographic facts showed that the villages and municipalities of the Kempen region are sparsely populated. Besides, the average number of cars per household in the Kempen region (between 1,3 and 1,5 car) is much higher than the national average (0,9). These numbers were verified by the observations of three Kempen villages, which showed that the building density within the villages is very low and that the car use is high. In addition, it was observed that there are only little facilities and

services available in the smaller villages, which result in many car movements of people to go the facilities in other parts of the region. This was also confirmed during the interviews with, among others, local policy makers and representatives of the local village councils. According to them is the car use very high in the Kempen, this is mainly due to the large distances between the homes and the desired destinations (work, shopping, leisure, etc.). In addition, the car use is high because of the lack of proper alternatives. In particular the regular public transport network is experienced by the Kempenaren as poor since many villages are not connected to this network. Next to the high use of the car, also the bicycle is commonly used to move around in the Kempen. This mode of transport is however mainly used for only short distances within municipalities. Longer distances are less likely to be covered by bicycle, which means that those longer rides are often made by car. Finally, in recent years also some mobility alternatives have emerged in the Kempen, such as shared cars for municipality employees of Eersel and Bladel. In addition, the initiative of *Casters Vervoer* has also established. This system is operated by local volunteers and ensures a small-scale alternative for people who are less mobile, in some small villages of the municipality of Bladel.

Potential target group for alternative forms of mobility

The fourth sub-question of the research is: **'What is the target group for innovative forms of mobility, and what are their motives and resistances to use them?'**. The first part of this question, the determination of a potential target group is answered on the basis of the Kempen case interviews. These showed that the inhabitants of the Kempen region are highly car-dependent, which is according to the respondents very difficult to change. This, because there is a lack of urgency among the car drivers to stop using their car. Driving a car is fast and a good way to quickly cover the large distances within the region. Besides, there are no parking costs in the villages and there is always plenty room to park. Also the traffic jams that are caused by commuters are not perceived in such a way that people rather use other modes of transport to reach their destinations. A sense of urgency is according to the theoretical framework of chapter 2.2 of great importance in order to be able to change behaviour. Due to its complexity, the target group for alternative forms of mobility will be people without cars. These people are at this moment bounded to their bicycle and the public transport, and thus have a sense of urgency to use alternative forms of mobility. This group of car-less people can mainly be split into two groups: young people and elderly. Because of the earlier shown numbers about young people who are more likely to use shared mobility systems and the statements of respondents about the flexibility and high willingness from young people to use mobility alternatives, the younger generation will be the main target group for alternative forms of mobility.

Subsequently, six people from the potential target group were interviewed in order to find out what

their motives and resistances are to use the proposed mobility alternatives from the SMARA program. It became clear during the interviews that the target group is positively opposed to these alternatives. Only the idea of a shared bike system was not positively appreciated by any of the respondents. This is mainly because shared bikes have no added value for the inhabitants of the Kempen according to them. They think that those bikes will be rarely used due to the fact that almost everyone already has a bike. Instead, the concepts of shared scooters and cars were considered as promising. This because according to the respondents, scooters and cars can add new transportation options for many people. In addition, these vehicles are easier to use and a more convenient way to travel on the long distances within the Kempen region. The hitchhiking concept of *F'kes meerijden* was also seen as a good addition to the current range of means of transport. Building on the social cohesion within the villages, this concept can ensure that smaller villages will be connected better to each other and to the public transport. But to make this concept work, much attention must be paid to the safety of the users. Many of the respondents are not sure whether *F'kes meerijden* can be a safe way to travel. According to the interviews the safety of the people can be better guaranteed by using an app where potential drivers first have to sign up in order to make use of this service.

Applying the proposed mobility alternatives

The fifth and final sub-question of this research is: **'How can the proposed mobility alternatives be applied to the Kempen region?'** and can be seen as a prelude to the conclusion of the main research question. In order to answer the fifth sub-question, information from all phases of this research is combined.

First of all, the mobility needs of the target group must be considered. According to the target group interviews, do the people without a car like to see more options to travel within the region. In particular, there is need for a better connection of the smaller villages to the regular public transport network. In this way, the first and last mile could be facilitated in a better way. Besides, this better connection can increase the use of the regular public transport in the region. According to the respondents from the target group interviews, they appreciate the use of public transport and they would like to continue using it. The target group interviews showed that the concept of *Mini Hub*, which contains forms of shared mobility, could contribute to a better connection between the smaller and larger villages. However, it is important to only add transport options at those hubs that are actually of added value for the travellers. For example a bicycle sharing system would not add value to the region. This, because almost all people already have a bicycle themselves, therefore too little use would probably be made of these bicycles. Shared scooters and shared cars could be of added value for the people without a car. These means of transport provide additional

options for car-free people next to their own bicycles and the public transport. Also the hitchhiking concept of *F'kes meerijden* was received positively and could, according to the target group, also be useful to enhance the accessibility of the smaller villages. This concept could make good use of the high car usage in the Kempen. Besides, this concept fits in well with the identity of the region, as the concept relies heavily on social cohesion and cooperation.

But in addition to the positivity about the proposed alternatives of the SMARA program, also some resistances to use these alternatives were found. For the shared mobility systems the resistances are mainly about the 'user friendliness' of these systems. Also the reliability of these systems, so whether the shared transport means are always available when desired, was questioned. These resistances fall under the typology of scepticism, as described in chapter 2.1.4. This form of resistance is directed against the content of a proposal or plan, and can be recognised by disbelief, verbal counter-arguments, the dismissal of arguments, and the attitude of 'I believe it when I see it'. Methods to decrease this resistances can be 'gaining experience' and 'offer guarantees regarding the use of the alternative' as seen in table 9 from chapter 2.1.4. 'Gaining experience' will decrease the amount of sceptical arguments by letting people experience the mobility alternatives themselves. An addition to this method can be giving guarantees of the new proposed alternatives. For example by saying: 'No available shared scooter nearby? You get a 50% discount on your next trip'. The most heard resistance against the use of *F'kes meerijden* is the uncertainty of the safety of the concept. This resistance can also be shared under the typology of scepticism. The easiest way to get rid of this uncertainty is to let people experience the concept themselves. Another thing that can increase the feeling of safety according to the interviews is a screening of participants and drivers by a mandatory subscription. But this can ensure that there will be too few potential cars on the roads to let the concept succeed.

By initially reducing and removing the resistances among the younger generation, it can be ensured that these people are getting used to alternative forms of mobility. When they perceive their travels positively, it is likely that they will make extensive use of these means of transport and that they are becoming therefore less dependent on car use. A good operating network of *F´kes meerijden* and *Mini Hub* can at best reduce the need for a second or even a third car. In addition, the positive experiences of the younger generation with the mobility alternatives can ensure that there is less scepticism among other inhabitants of the Kempen region, such as the more car dependent people. Under the guise of ´a good example tends to be followed´, could this also lead to a higher amount of users outside of the initially designated target group.

Another important aspect for the implementation of the proposed mobility alternatives is the

physical appearance, like the locations for the hubs and *F'kes meerijden* pillars. According to the respondents of the interviews, the best places for the Mini Hubs are those which are located at bus stops from the regular bus lines along the provincial road. This, because the main target group indicated that the shared mobility systems could be useful to facilitate the first and last mile of their travels. In order to get at these bus stops in the first place, smaller hubs which contain for example shared scooters can be located in each small village. In this way, inhabitants can be connected to the regular public transport network, which is needed according to the target group. The *F'kes meerijden* pillars could be best located in each village along the main roads. These are the places where the many car users of the region will passing by, which will eventually create a dense network by using the available car seats more efficiently. Next to the locations of the hubs and pillars, also the design of these concepts are of importance. The similar case interviews learned that the design of every single location must be 'tailored-made', to ensure that the local needs are met. To realise this, it's useful to proceed step by step. In this way every part of the process can be carefully implemented, reducing risk and give time to the Kempenaar to get used to the concepts. In addition, it can help to avoid words with negative connotations, such as 'hitchhiking'.

5.1.2 Conclusion of the main research question

After concluding the answers of the sub-questions in the previous section, the main research question can be answered. The main research question of this research is:

'How can different target groups be reached to stimulate them to use innovative forms of mobility in a rural area, in order to organise its mobility in a more efficient and sustainable way?'

Although the sub-questions were more focussed on the Kempen region in particular, the main research question will focus on rural areas in general.

The most important aspect in order to reach and stimulate people to use alternative forms of mobility is the need of urgency to do so. This research has indicated that a lack of urgency can ensure that people are not willing to change their behaviour. Especially in car-minded areas, such as rural regions, is changing the behaviour of the inhabitants very difficult without a sense of necessity. The car-dependency of a region can be explained on the basis of Buehler's four factors: socio-economic and demographic factors, spatial development, transport and land-use and culture and attitude. Based on these factors, it can be determined to what extent people are dependent on car use. Subsequently, it can be determined which people will be most likely to benefit from alternative forms of mobility. It's important that the intended plans are in line with the wishes of the potential target group. To increase the success rate of the project and to limit the risk, every step of the

process must be taken carefully to create 'tailor-made' solutions for every target group and location. In addition, in order to achieve behavioural change from the potential target group, it's important to get to know their motives and resistances to use the alternative forms of mobility. These motives and resistances will be different at various target groups, and could for example include theme's like convenience, health, safety, costs and time. Afterwards, these motives for using these alternatives can be reinforced, while the resistances must be reduced. There are different methods to do so, ranging from psychological to physical measures.

In the end, reaching and stimulating target groups to use innovative forms of mobility will be a process whose approach strongly depends on the geographic location and the identity of its inhabitants. This research, for example, showed the specific properties of the Kempen, which makes this an unique region needing its own specific approach in order to reach and stimulate target groups to use innovative forms of mobility.

5.2 Discussion

5.2.1 Implications

This research is mainly valuable for the research case of the Kempen region, as described in the problem statement of this research. This problem statement stated that the SMARA program must ensure that every inhabitant of the Kempen region has physically and financially access to a transport mode, and to reduce environmentally harmful mobility. In the last section of chapter 5.1.1, where the fifth sub-question was answered, insights are given on how the transport options of the inhabitants of the Kempen villages can be extended. By implementing the proposed mobility alternatives of the SMARA program, the accessibility for people without cars can be increased. The reduction of environmentally harmful mobility turned out to be more difficult to realise. This because of the high car-dependency of this region. But by improving and guaranteeing the mobility of people without cars, it can be ensured that fewer (second) cars will be needed. Besides, targeting a young target group ensures that these people will be in the future less dependent on the car, and that they will be more used to using mobility alternatives like shared mobility systems. But due to the uniqueness of this region, generalisation of the research outcomes will not be possible. However, this research and its methods can serve as an example for other rural areas in need of mobility alternatives.

5.2.2 Limitations

This research has also its limitations. Because of the narrative nature of the research, not every aspect from the theoretical framework was discussed evenly in every interview. This, because the respondents were given a lot of freedom to talk about the things they considered most important

in the field of mobility. Besides, almost all conclusions of this research were drawn on the basis of qualitative data. Although the respondents broadly agreed and told many corresponding things, it could be useful to speak to even more people to reinforce the arguments. This could also apply to the observations, which were only done in three villages due to the lack of time. Besides that the research would have been stronger if more interviews had been held, is another limitation of this research the way in which these interviews were conducted. Due to the Covid-19 pandemic, it was not possible to conduct the interviews face to face. Especially for the narrative research approach it could be useful to also see the respondents non-verbal communication. This could have strengthen the interview transcriptions because the emotions and feelings of a respondent during certain statements could then be noticed. This was however not possible since the conversations were held by telephone.

5.3 Recommendations

In the last section of this thesis, some recommendations will be made. Firstly, there will be some practical recommendations for the Kempen region, after which this thesis will end by giving recommendations for follow-up research.

5.3.1 Recommendation for the Kempen region

The most important recommendations for the Kempen region are extensively described in chapter 5.1.1 where is explained how the proposed conditions of alternative forms of mobility can be applied to this region. Applying these conditions can ensure a better accessibility for the smaller villages in the Kempen region. Besides, it will improve the mobility possibilities for the inhabitants, which can be very useful and convenient for people without a car. To ensure that the right decisions will be made during the implementation process for these mobility alternatives, it can be helpful to conduct a large-scale survey among the potential target group. This can lead to a better understanding of the wishes and needs of these people. In addition, with the help of this data, it can be properly mapped out which transport options are preferred and which are therefore likely to be used the most.

5.3.2 Recommendation for follow-up research

Since this research and its results are mainly focused on the Kempen region, it will only contribute to a small extend to the existing literature in the field of smart mobility in rural areas and sustainable transport choice. To be able to do so, it could be useful to do similar researches in other rural areas. This can make sure that the results can be compared to each other, which will give a better insight in the possibilities and application of innovative forms of mobility. For example, it would be interesting to look at areas that are less car dependent and are connected to a properly operating

public transport system. It would be interesting to explore whether in such an area there will be more potential users for innovative forms of mobility. And lastly, the developments in the field of mobility and sustainability are moving very quickly. What is now seen as new and innovative, can perhaps be labelled in the near future as old and outmoded. Permanent research will therefore have to be conducted about sustainable and innovative mobility options in the coming decades.

6. References

Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., & Airaksinen, M. (2017). What are the differences between sustainable and smart cities? *Cities, 60*, 234-245.

Albino, V., Berardi, U., & Dangelico, R.M. (2015). Smart Cities: Definitions, Dimensions, Performance and Initiatives. *Journal of Urban Technology, 22*(1), 3-21.

Antea Group. (n.d.). Mobility as a Service (MaaS). *Gebruik in plaats van bezit.* Retrieved September 9, from: https://www.anteagroup.nl/nl/diensten/smart-cities-en-communities/smart-mobility/mobility-service-maas

Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy 15*, 73-80. Oxford University.

Brainport Eindhoven. (2020). *De Kempen maakt het in Brainport Eindhoven.* Retrieved September 23, from: https://brainporteindhoven.com/nl/nieuws/de-kempen-maakt-het-in-brainport-eindhoven

Brovarone, E.V. & Cotella, G. (2020). Improving Rural Accessibility: a Multilayer Approach. *Sustainability, 12*(2876), DOI:10.3390/su12072876.

Buehler, R. (2011). Determinants of transport mode choice: a comparison of Germany and the USA. *Journal of transport geography, 19*(4), 644-657.

CBS. (2019a). *Personenmobiliteit naar vervoerswijze.* Retrieved September 15, from: https://www.cbs.nl/nl-nl/maatschappij/verkeer-en-vervoer/transport-en-mobiliteit/mobiliteit/personenmobiliteit/categorie-personenmobiliteit/personenmobiliteit-naar-vervoerswijze

CBS. (2019b). *Bevolking; kerncijfers.* Retrieved October 23, from: https://www.cbs.nl/nl-nl/cijfers/detail/37296ned

CBS. (2019c). *Population Pyramid.* Retrieved October 23, from: https://www.cbs.nl/en-gb/visualisations/population-pyramid

CBS. (2020). *Autopark groeit sterker dan bevolking.* Retrieved October 1, from: https://www.cbs.nl/nl-nl/nieuws/2020/10/autopark-groeit-sterker-dan-bevolking

Cervero, R., & Kockelman, K. (1997). Travel demand and the 3Ds: Density, diversity, and design. *Transport and Environment, 2*(3), 199-219.

Club of Rome. (n.d.). *The limits to growth.* Retrieved September 15, from: https://www.clubofrome.org/report/the-limits-to-growth/

Creswell, J.W. (2013). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches.* SAGE Publications.

CROW kennisplatform. (2019). *Autodelen wordt steeds normaler.* Retrieved November 18, from: https://www.crow.nl/over-crow/nieuws/2019/september/autodelen-wordt-steeds

CROW kennisplatform. (2020). *Toolkit autodelen.* Retrieved November 18, from: https://toolkitautodelen.crow.nl/home/veelgesteldevragen

Daenen, R. (2018). *De Kempen één gemeente: Vanuit eigen identiteit samenwerken.* Retrieved November 27, from: https://www.ed.nl/mening/de-kempen-een-gemeente-vanuit-eigen-identiteit-samenwerken~a60eadc2/

EC. (2011). *White Paper: Roadmap to a Single European Transport Area - towards a competitive and resource efficient transport system.*

European Parliament. (2019). *CO2-emissies door auto's: feiten en cijfers.* Retrieved September 9, from: https://www.europarl.europa.eu/news/nl/headlines/society/20190313STO31218/co2-emissies-van-auto-s-feiten-en-cijfers-infografiek

Eurostat. (2020). Greenhouse gas emissions statistics – emission inventories. *Statistics explained.*

Ewing, R., & Cervero, R. (2010). Travel and the built environment: A meta-analysis. J*ournal of the American Planning Association, 76*(3), 265-294.

Farthing, S. (2015). *Research design in urban planning: a student's guide.* SAGE publications.

Firnkorn, J., & Müller, M. (2011). What will be the environmental effects of new free-floating car-sharing systems? The case of car2go in Ulm. *Ecological Economics, 70*(8), 1519-1528.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research, 2*(163-194), 105.

Handy, S., Van Wee, B. & Kroesen, M. (2014). Promoting Cycling for Transport: Research Needs and Challenges. *Transport Reviews 34*, 4-24. Routledge.

Harbers, A. & Snellen, D. (2016). Smart transportation. *Topos Magazine*, 99-111.

Hatch, J.A. (2002). *Doing Qualitative Research in Education Settings.* State University of New York Press.

Het Huis van de Brabantse Kempen. (2020). *Mobiliteit in de Kempen. Project: Pilot F'kes meerijden.* Retrieved November 24, from: https://brabantsekempen.eu/portfolio-items/pilot-fkes-meerijden/

Het Kop. (n.d.). *Slimme Maakregio de Kempen.* Retrieved September 11, from: https://www.hetkop.nl/slimme-maakregio-de-kempen/

Hollway, W. & Jefferson, T. (2000). *Doing Qualitative Research Differently: Free Association, Narrative and the Interview Method.* SAGE Publishers.

Hoppin. (2020). *Stap over aan een Hoppinpunt.* Retrieved November 24, from: https://hoppin.be/

Jenks, M., & Dempsey, N. (2005). *Future forms and design for sustainable cities.* Routledge.

Klöckner, C. A., & Blöbaum, A. (2010). A comprehensive action determination model: Toward a broader understanding of ecological behaviour using the example of travel mode choice. *Journal of Environmental Psychology, 30*(4), 574-586.

Knippenberg, M. (2017). *Zes minuten wachten op geluk: 100 bijzondere ontmoetingen met vreemden.* Bigbusinesspublishers.

Knoflacher, H. (2003). *Sustainability of transport: The roles of modal split and pricing.* Technische Universität Wien: Vienna.

Lyons, G. (2016). *Getting smart about urban mobility – Aligning the paradigms of smart and sustainable.* DOI:http://dx.doi.org/10.1016/j.tra.2016.12.001

Martin, C. J., Evans, J., & Karvonen, A. (2018). *Smart and sustainable? Five tensions in the visions and practices of the smart-sustainable city in Europe and North America.* DOI:https://doi.org/10.1016/j.techfore.2018.01.005

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). *The limits to growth.* New York, 102, 27.

Ministerie van Infrastructuur en Milieu. (2012). *Structuurvisie Infrastructuur en Ruimte. Nederland concurrerend, bereikbaar, leefbaar en veilig.*

Mobipunt. (n.d.). *Wat is een mobipunt?* Retrieved November 24, from: https://www.mobipunt.be/

Papa, E., & Lauwers, D. (2015). *Smart Mobility: Opportunity or Threat to Innovative Places and Cities?* 543-550.

Reis via hub. (n.d.). *Over hub.* Retrieved October 29, from: https://www.reisviahub.nl/over-hub/

RIVM. (2019). *Infographic Impact van de vergrijzing.* Retrieved October 15, from: https://www.rivm.nl/infographic-impact-van-vergrijzing

Rural Health Information Hub. (n.d.). *Barriers to Transportation in Rural Areas.* Retrieved September 16, from: https://www.ruralhealthinfo.org/toolkits/transportation/1/barriers

Shergold, I., Parkhust, G. & Musselwhite, C. (2011). Rural car dependence: an emerging barrier to community activity for older people. *Journal of Transportation Planning and Technology, 35*(1), 69-85.

SMARTA. (n.d.). *The SMARTA project in a nutshell.* Retrieved September 16, from: https://ruralsharedmobility.eu/about/

Smartwayz. (2020). *COVID-19 en Mobiliteit in Noord-Brabant.* Retrieved November 24, from: https://app.powerbi.com/view?r=eyJrIjoiZTkyMjA0YTgtZjU5NC00ZGE2LThmODUtODRmZTE2ZjdlYWExIiwidCI6ImQyYWZmNWY5LThjMjEtNDdmMi04OGYzLTA4YWM0ZmRhNTZmNSIsImMiOjh9

Smart WorkPlace. (2020). *Corona-vervoersladder en strategische keuzes bij werknemersreizen.* Retrieved at October 1, from: https://www.smartwp.nl/nieuws/20200415-corona-vervoersladder-en-strategische-keuzes-bij-werknemersreizen

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of environmental psychology, 29*(3), 309-317.

Stichting NederlandLift. (n.d.). *Stichting NederlandLift.* Retrieved November 16, from: http://www.nederlandlift.nl/

TNO. (n.d.). *CO2-reductie in Nederland: maatregelen en innovaties.* Retrieved October 1, from: https://www.tno.nl/nl/aandachtsgebieden/co2-reductie-in-nederland/

Van Dam, T. (2019). *Accelerate sustainable mobility. Aiming for decrease of car ownership in an outer urban area* (Masterscriptie). Retrieved from: https://theses.ubn.ru.nl/handle/123456789/8756

Verschuren, P. & Doorewaard, H. (2016). *Het ontwerpen van een onderzoek* (5e druk). Boom Uitgevers: Amsterdam.

Vlaamse overheid. (2020). *Basisbereikbaarheid, Hoppin.* Retrieved November 24, from: https://www.vlaanderen.be/basisbereikbaarheid/hoppin

WBCSD. (2001). *Mobility 2001: world mobility at the end of the twentieth century and its sustainability.* Massachusetts Institute of Technology: Cambridge.

Zo Brainport Smart Mobility. (2019). *Gedragsveranderingsstrategie. Zuidoost-Brabant: Samenwerken aan bereikbaarheid en leefbaarheid.*

Zo Slim Bereikbaar. (n.d.). *Innovatieve vervoersconcepten. Pilot SMARA De Kempen F'kes meerijden.* Retrieved September 16, from: https://zoslimbereikbaar.nl/innovatieve-vervoersconcepten