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THE SOCIAL PRACTICE OF COMMUTING CYCLING

ANALYZING COMMUTING CYCLING BY USING SOCIAL PRACTICE THEORY IN THE AREA 'S-HERTOGENBOSCH – ROSMALEN

Radboud Universiteit Nijmegen

Provincie Noord-Brabant

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Preface

Before I present you my master thesis, I want to thank some people who had a major help in my process to complete the master thesis. First, I want to thank my supervisor Arnoud Lagendijk for all the useful discussions and feedback. The process of data collection and analyzing went different from what I expected because of the corona crisis. I got good advice in this time to continue my process and therefore I am grateful.

I also want to thank the province of North-Brabant and especially Ewoud Vink for giving me the opportunity of a research internship. It was a challenge for both of us to adjust the internship due to the corona crisis. Luckily, I was able to go to the office of the province a couple of times in the beginning of the internship. After that, the internship changed into online meetings and we managed to continue to cooperate in such a way that my research contributes to the work of the province to promote cycling for commuting purposes. This resulted in a presentation and a Dutch summary of my work and I hope that it will be from great use for the province.

Besides this, I want to thank my fellow students in the feedback groups, both the economic geography group and the group that wrote their thesis about cycling. I got useful feedback and I learned a lot to by reading their work too.

I hope you enjoy reading my master thesis and if there are any discussion points, feel free to contact me.

Summary

The advantages of commuting cycling for both the individual as for society are clear. Nevertheless, it is hard to change the modal shift to active mobility. It is a complicated question of how to make employees start and keep cycling to their work. Many hardware and software measures are introduced in the Netherlands which try to promote cycling. One of the newest is the fast cycle route. These are cycling paths where the comfort for cyclists is higher than at regular cycling paths. Cyclists have priority above other traffic users, and there are fewer obstacles at the fast cycle routes. The question is if this has the game-changing effect of shifting the dominant role from the car to the bicycle. This research focusses on the whole spectrum of cycling promotion in a case where a fast cycle route is there. By using social practice theory, this research tries to find new insights about commuting cycling. This leads to recommendations for the focus of cycling promotion in areas with a fast cycle route. This research focusses on the corridor Rosmalen – 's-Hertogenbosch where the province and municipalities established a fast cycle route in 2016.

The use of social practice theory makes it possible to look from a different perspective to commuting cycling. Social practice theory has the following assumptions. The first is the object of study which differs from other behavioural theories such as rational-choice theory. Where the individual is central in rational-choice theory, social practice theory takes the practice or behaviour as the object of study. It looks at the elements that are required for a practice to embed in the everyday life of the individual. The individual performs a specific behaviour such as commuting cycling when this embeds in his/her life. There are three different kinds of elements. The elements are materials, meanings and competences. Materials are objects such as the bicycle and infrastructure. Meanings are how employees think about cycling and competences are the capabilities employees believe they need to perform commuting cycling. A social practice also interacts with other practices. Practices compete with each other for individuals. Commuting cycling competes with car driving and public transport. Besides this, the social practice of commuting cycling needs to collaborate with other practices such as shopping and leisure activities in the life of an individual. This research tries to analyse commuting cycling by finding the important elements and the links with these other practices. It will look to the promotion of cycling too and analyses whether the promotion of cycling focusses on the essential elements of commuting cycling.

This research uses the following data sources to answer the research question. First, this research describes the context of the case of Rosmalen – 's-Hertogenbosch. Desk research, observation and expert interviews are the data sources which lead to the description of the context. These expert interviews are with different stakeholders involved in the promotion of cycling in the region. The stakeholders include the province of North-Brabant, the municipality of 's-Hertogenbosch and the organisations' Ons Brabant Fietst', 'Brabant Mobiliteitsnetwerk' and 'Fietsersbond'. The expert interviews are also leading to the next step in this research. This step is to describe the range of initiatives that facilitate cycling in the area and how these initiatives promote cycling with hardware and software measures. After this, interviews with employees living in Rosmalen and working in 's-Hertogenbosch give the right information to find the essential elements of the social practice of commuting cycling. The conclusion section discusses the use of social practice theory to analyse commuting cycling. Besides this, it advises on the promotion of cycling based on the comparison between the initiatives and the experiences of employees with commuting cycling.

The most crucial hardware solution discussed in this research is the F59. This is a fast cycle route between 's-Hertogenbosch and Oss. The part between Rosmalen and 's-Hertogenbosch is from high-quality, with a few possible improvements.

The experts acknowledge these improvements and the reason for these shortcomings is because the F59 is one of the first fast cycle routes, and the standards changed after a few years. The municipality facilitates the cycling infrastructure. Their goal is to prioritise the cyclists as much as possible. Bicycle parking in public spaces is a responsibility of the municipality and employers are responsible for the bicycle parking at the workplace. Brabant Mobiliteitsnetwerk is working together with employers to find solutions for mobility problems. They work broader than just cycling, but it is an integral part of their work. They promote cycling by helping employers set up facilities such as an e-bike pool, shared cars and campaign equipment. Ons Brabant Fietst facilitates a campaign, namely Sjees Gangmakers, to promote commuting cycling. The Fietsersbond influences the local politics to include cycling in infrastructural plans as much as possible. The experts acknowledge that both hardware and software solutions are implemented, but there is an improvement possible in terms of software solutions. There are software solutions, but the scale of this is still not that big that it has the game-changing effect. The collaboration between commuting cycling and other practices is not the focus point of cycling promotion initiatives. The experts state that it is hard to include this in the initiatives.

The next step is to describe the social practice of commuting cycling based on the experiences of employees. There are three major themes which are infrastructure, cycling and work and cycling and the individual. The first about infrastructure shows that the distance between Rosmalen and 's-Hertogenbosch does not restrain cycling. In general, employees appreciate the cycling infrastructure in the area. Every respondent knows the F59 and which cycling route this is. They appreciate the comfort of the fast cycle route. Nevertheless, only 20% of the respondents that cycle to work takes the fast cycle route. Others do not use it because it is a detour, and they do not want to take a detour to use the fast cycle route. The respondents think it is unfortunate that they do not experience the high comfort of the fast cycle route at their route to work.

Essential elements of commuting cycling are safe bicycle parking, financial support from the employer and the beneficial meanings of cycling such as healthy, exercise and environmentally friendly. If these elements are present, cycling embeds in the life of the individual, and they take the bicycle most of the days, but not every day. There are certain circumstances which make regular cyclists choose for the car at a specific day when these circumstances are there. The two major circumstances found in this research are work appointments and bad weather conditions. The first one is about cycling and work and the second one about cycling and the individual. Employees can have work appointments at the workplace and somewhere else. They take the car because they want to show up properly if they have work appointments at the workplace. The presence of showers and changing facilities does not change this. They take the car too when they have appointments elsewhere because it is too far away. In most of the cases, shared cars do not change this at this moment. Regular cyclists choose again for the car when there are bad weather conditions. They look at a rain radar or look outside and decide to take the car when there is heavy raining. Flexible working hours did not change this before the corona crisis. Nowadays, it is a better option to work from home or show up later because of the new standards after the crisis.

These events show that, although they take the bicycle usually, in this case, social practice theory is of less use because the required elements are not the key factor for the mode choice when these circumstances occur. Instead, employees seem to make a rational choice for the car on these days. In this case, it is more useful to use a rational choice approach than a social practice approach to finding solutions for employees taking the car these days. The conclusion chapter gives an extended debate on this topic and which consequences this has.

This research also gives recommendations for cycling promotion in the area. The first one is about the fast cycle route. This research shows that there is a danger that the cycling experience of employees decrease because they think it is unfortunate that they do not use the fast cycle route.

It shows that it is useful to look at the effect of fast cycle routes at a lower scale than the large region where a fast cycle route is. A suggestion is to investigate whether it is possible to include more cycling paths within an urban cycling network to the fast cycle route than just one. The Bruistensingel and the Graafsebaan are suitable options in the case of Rosmalen – 's-Hertogenbosch because they connect large residential areas in Rosmalen with the business parks in 's-Hertogenbosch. Further research could look to the quality of these other routes to lift the quality of these routes to the level of the fast cycle route.

Besides this, this research shows that there are events that make the cyclists choose for the car. Cycling promotion should find solutions for these circumstances. In the case of work appointments, it is crucial to utilise the option of shared cars better. Then employees could take the bicycle to work and make use of these shared cars. In the case of bad weather conditions, employers should utilise the flexible working hours and the options of online meetings. It should be the standard that meetings change to online meetings in case of bad weather conditions. This will decrease car use and make cycling a better option. The use of social practice theory in this research shows how comprehensive something like commuting cycling is. This research gives new insights for both the scientific debate about behaviour in transportation as well as for all the policymakers working on cycling promotion.

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1. Introduction

1.1 Research problem

Nowadays, the stimulation of active mobility gets much attention (Cohen, 2010; Schwanen, et al., 2011). Many policymakers try to promote walking and cycling to contribute to the solutions to problems like congestion and greenhouse emissions. One major contributor to these problems is the commuting trips of employees. In the past century, the car has played a dominant role in commuting trips (KiM, 2019). Many attempts have been made to promote cycling as a mode to go to work (Heinen, et al., 2013). These policy instruments are both hardware and software measures. Hardware instruments are physical infrastructure and parking facilities and software instruments are, for example, promotion, marketing and subsidies for cycling. Policymakers introduce a new hardware solution in the Netherlands. These are the fast cycle routes, which are regional routes where the cyclist encounters as least as possible obstacles to get to their destinations. It means that these routes avoid intersections with other modes, that there are no physical obstacles or sharp corners and that cyclists get priority at crossings (Van Esch, et al., 2013). The goal of these routes is to make it more comfortable to cycle and to make the bicycle as a mode a faster choice than the car. These routes are upgraded bicycle paths within urban cycling networks. These routes are not the only attempt to promote cycling. A network of stakeholders uses a range of instruments to promote cycling. Also, unintended factors change when a fast cycle route is present. The question is how commuting cycling change in a particular corridor when a fast cycle route and other cycling promotion initiatives are realised and if this affects the everyday life of the employees who the potential users of these fast cycle route are.

Despite all the efforts to promote cycling, a significant game-changer has not occurred, and the car still has the dominant position in commuting trips (CBS, 2019). In the scientific debate, the discussion is on how this could happen. One statement of the problem is the focus on the individual behavioural approach of lots of policy instruments. This approach assumes that an individual makes a rational mode choice every day and that this could change quickly if the rational benefits of cycling overweight the car (Spotswood, et al., 2015). Geographers like Elisabeth Shove say that this is not the case because people do not make a rational choice every day. Instead, a mode embeds in the life of an individual. This individual will show this behaviour without choosing this mode every day. Therefore, it is much harder for people to change their everyday behaviour (Shove, et al., 2012). Therefore, the social practice's approach provides a new way of analysing behaviour. This approach sees commuting trips as a social practice where the cycling practice is a different one from the car practice (Shove, et al., 2012). This social practice consists of all kinds of elements of the social practice itself, but this practice connects to other practices too. When a fast cycle route among other instruments is introduced, the elements of commuting cycling may change. This research analyses commuting cycling by using the tool that social practice theory provides. This might give new insights into the tools policymakers can use to promote commuting cycling.

The chosen case is the corridor between 's-Hertogenbosch and Rosmalen. The fast cycle route F59 locates in this corridor. This research describes all stakeholders and initiatives to promote cycling among this route. After that, this research analyses how these initiatives try to promote cycling. This will show how these initiatives facilitate cycling in the area. Then is the question of how this facilitation embeds commuting cycling into the everyday life of employees. Therefore, this research looks to the experiences of employees with commuting cycling and which required elements there are to execute the social practice of commuting cycling. This research leads to a proper exploration of the social practice of commuting which leads into two outcomes. Firstly, this research enriches the debate about the idea of practices forming individual behaviour in the case of commuting cycling.

It shows what practice theory can offer to understand commuting cycling better. Secondly, this research explores cycling promotion and how this is in line with the required elements according to the employees. This will lead to practical recommendations on the focus of cycling promotion.

1.2 Societal relevance

Many attempts try to shift from the car to bicycle in commuting trips. Still, in The Netherlands, which is a leading bicycle-country, only 26% of all trips are going by bike in 2017 (CBS, 2017). From all the kilometres which are travelled to work, only 6,8 per cent is by bicycle (CBS, 2019). Much research focusses on the benefits of cycling for utilitarian purposes such as work trips (De Geus, et al., 2019). The health benefits for the individual are lower odds of being overweight, higher fitness and decreased risk of diseases like diabetes and colon cancer (Wen & Rissel, 2008; Larouche, et al., 2016; Celis-Morales, et al., 2017). For the employer it is also beneficial when their workers start to cycle to work because research has shown that cycling to work is associated with less sickness absence (Hendriksen, et al., 2010; Mytton, et al., 2016). In addition to these benefits who have a direct impact at the population level (Meuller, et al., 2015), the shift to cycling will also have environmental and economic benefits. A shift from car use to cycling will help to resolve transport-related issues such as congestion, air and noise pollution, climate change, land consumption resulting in a more sustainable and healthier environment (Woodcock, et al., 2007).

The advances of cycling are also evident for the policymakers in the province of Brabant. The program 'Fiets in de Versnelling' ('Bicycle in Acceleration') tries to facilitate cycling in the province. At this point, 25,7% of all trips in Brabant are by bike (BUAS, 2020). This is in line with the Dutch average, but other provinces like North-Holland (31,6%), Overijssel (33,3%) and Gelderland (29,8%) score better regarding bicycle trips. A total of 10 fast cycle routes are present in the province. The possibilities of fast cycle routes in Brabant are quite many because of a lot of medium-sized cities are of a relatively short distance from each other which increases the potential of the use of a fast cycle route (Province of Noord-Brabant, 2009). The two first fast cycle routes, namely the F69 from Eindhoven to Valkenswaard and the F59 from 's-Hertogenbosch to Oss show that these routes generate new cyclists. Of all new users 34% used the car for commuting trips before in the case of the F69. In the case of the F59, it was 16% (Province of Noord-Brabant, 2020).

The difference between the two is fascinating. It makes the F59 an exciting subject of study because it shows that this route is less attractive for current car drivers than the other route. This study will provide inside in elements which affect the part of the F59 from 's-Hertogenbosch to Rosmalen. The study will give inside in what is changing in a setting of a fast cycle route and how is the discourse about the F59. Besides this, it will eventually give insight into how the employees perspective on this new situation is. This gives a better insight into who is using this fast cycle route and why, which could lead to a better understanding of the working of fast cycle routes. This research provides not only recommendations on improvements of the F59 but also recommendations on the broader policy strategy of implementing fast cycle routes in other places. The fast cycle route is not the only cycling promotion in the area. This research looks beyond the fast cycle route and analyses both hardware and software solutions to promote cycling. This research recommends how to improve the promotion of cycling by analysis the whole context using social practice theory.

1.3 Scientific relevance

The scientific relevance of this research is two-folded. First of all, this research contributes to the existing literature on social practices. Scientists as Elisabeth Shove have already written a lot about the life of single practices (Shove, et al., 2012). Also, bundles of practices have been analysed and the different ways in which practices connect (Hui, et al., 2016).

It is in this connectivity where this research will contribute. It describes the practice of commuting cycling by looking at how the promotion of cycling and the experiences of employees connect. One element is a fast cycle route, but this research will look at all initiatives to promote and thereby possibly change the practice of commuting cycling. The two parts in this research together will give the right image of the whole network, which is working around a social practice. Outcomes of this research can lead to better understandings about how a social practice theory can advance knowledge about the subject of commuting cycling.

The other scientific relevance lies in the current knowledge about commuting cycling as a social practice. The last years a couple of analysis of commuting cycling has been done in Britain (Spotswood, et al., 2015; Cass & Faulconbridge, 2016). This gives already some of the essential elements and links to other practices. This research will provide such an image in another context. Dutch cycling culture is different from the British one (Shove, et al., 2012). In the Netherlands, cycling is more common. Many initiatives try to promote cycling in the Netherlands (CBS, 2019). One of them is a fast cycle route, and this may change the social practice (Shove, et al., 2015). This research will thereby give a new analysis of commuting cycling as a social practice in a new context. This new context is a situation where lots of instruments are implemented to promote cycling in a specific corridor. This will lead to new insights into the social practice of commuting cycling and can give knowledge to institutions who are doing studies about the promotion of cycling. Social practice theory is the tool which is used to achieve this. This theory has some assumptions which create a new view on commuting cycling (Shove, et al., 2012). This research discusses the use of social practice theory to analyse commuting cycling. There might be circumstances where social practice theory might not be the best tool to use. This research discusses this debate between the different theories by focussing on one behaviour, namely commuting cycling.

1.4 Research objective

This research has two main research objectives. The first one is to analyse commuting cycling by using a social practice approach. This leads to the required elements of commuting cycling and the links to other practices in the specific case. The following steps lead to this objective. The first step is to describe the chosen case because practices can differ between different places. The second step is to find out what facilitates commuting cycling in the area. The next step is to find the required elements and the links with competing and collaborating practices of commuting cycling. This leads to a comprehensive description of all factors that play a role in commuting cycling. This leads the elements which play an essential role in commuting cycling in the specific case. The second main objective is to analyse whether the promotion of cycling is focussing on the crucial elements of commuting cycling. This research compares cycling promotion initiatives with the experiences of employees in the area. This leads to recommendations on how cycling promotion can be improved to have a more significant impact to increase commuting cycling in the area.

This research has several limitations due to the planning of this research. This research will dive into one specific case where a fast cycle route has been realised. It will not make a comparison with a case where there is no fast cycle route. In this way, an analysis of the effect of just the fast cycle route is harder to make and is not the focus of this research. Besides this, the theory shows the competition between commuting cycling and car driving, for example. This research gives not an analysis of the social practice of car driving in the chosen case. It is interesting to do this because this might show why car driving embeds in some lives of employees, and this could give indirect missing links for the social practice of commuting cycling. This analysis within the corridor of ‘s-Hertogenbosch-Rosmalen is not part of this research.

Nevertheless, the research question can give an exciting view of the social practice approach and the promotion of cycling in the province of North-Brabant.

1.5 Research questions

The main question of this research is as followed:

"What is the social practice of commuting cycling in the case of Rosmalen – 's-Hertogenbosch and to what extent does the promotion of cycling in the area, including the fast cycle route, facilitate these required elements of commuting cycling?"

This research focusses on several sub-question, which lead to the answer to the main question. The thesis answers the following sub-questions:

- What is the context of the area Rosmalen – 's-Hertogenbosch regarding commuting cycling?
- Which stakeholders are involved in promoting cycling and which initiatives are there to promote cycling in the corridor Rosmalen – 's-Hertogenbosch?
- What are the materials, meanings and competences of commuting cycling according to employees in the corridor Rosmalen – 's-Hertogenbosch?
- What influence does competing and collaborating practices have on the social practice of commuting cycling?
- Which circumstances are there which make social practice theory not the best tool to analyse commuting cycling?
- To what extent is the focus of the cycling promotion initiatives in line with the elements of the social practice?

2. Literature review

2.1 Cycling promotion

The last decades, several pieces of evidence were given to the fact that the transport system contributes a lot to the greenhouse emissions and therefore can play a massive role in the decarbonisation of the world (Cohen, 2010; Schwanen, et al., 2011). Much attention goes to the modal shift to active mobility where cycling gets the most attention. All kinds of policy measurements try to motivate people to cycle more instead of using the car. In the field of commuting trips, examples are e-bikes, facilities at the workplace or bicycle infrastructure (Heinen, et al., 2013). Policies in the past saw individual behaviour as a central point informed by rational choice economics, social psychology, and 'nudge' theory (Cass & Faulconbridge, 2016). In the past, both hardware and software policy instruments were implemented to promote cycling. Hardware instruments are mostly infrastructure investments. However, research has shown that investing in bicycle infrastructure alone not lead to a significant increase in bicycle use for commuting trips (Hickman & Banister, 2007). Because of this, software solutions were presented such as personal travel planning, marketing and travel awareness campaigns (Spotswood, et al., 2015). To measure the effect of these soft policy instruments is difficult (Graham-Rowe, et al., 2011). Nevertheless, the studies that did try to measure the effect found little or no effect regarding the change from the car to active mobility (Arnott, et al., 2014; Melia, 2013; Seethaler & Rose, 2009).

2.2 Critique on individualistic approach

These foundings started a broader debate whether the focus on the individualist behavioural change approach is appropriate (Spotswood, et al., 2015). This approach is widely popular because of neo-liberal thinking, which is behind the theories within this approach (Disney, et al.,2013; Marsden, et al., 2014). It assumes that individuals make a rational choice about their behaviour. In case of commuting this is then the mode choice. According to this theory, individuals make a rational choice whether they take the car or the bicycle every single day. This choice is based on an evaluation of different modes in terms of duration, length and comfort. It means that they choose the same mode every day under the same circumstances. It can change if the circumstances change. For example, a car driver switches to cycling when a road construction makes the car ride longer than the bicycle. This approach leads to the policy where the focus is on making the advantages of cycling outreach the advantages of car-driving. Employees will automatically take the bike when they reach this point. This favours the policy of focussing on cycling infrastructure because it decreases the duration of the route.

First of all, the criticism on this individualistic approach is on the effectiveness as described above. A second critique is on the assumption that individuals, rather than societal structures, are primarily responsible for the use of specific modes (Spotswood, et al., 2015). Therefore, it is essential to recognise how institutions shape action, which makes some choices much more likely than others (Shove et al., 2012). Reality shows that the mode choice is not always a rational choice because many people choose a mode which is not the shortest or fastest mode (Shove et al., 2012). The question is which other aspects play a role in this mode choice rather than the length and duration of the route.

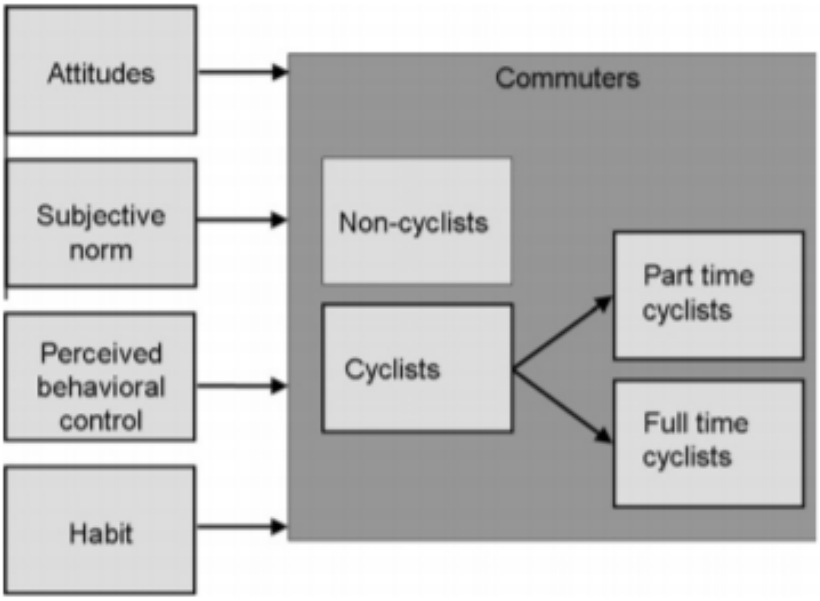

Figure 1: Factors of planned behaviour theory which has influence on commuters (Source: Heinen, et al., 2011)

Another theory about human behaviour which acknowledges this problem is the theory of reasoned action which says that people are more tend to do a particular behaviour above other behaviour because of there personal intentions (Fishbein & Azjken, 1975). This theory assumes that attitudes, the subjective norm, and the perception that one can perform a behaviour affect the actual execution of a specific behaviour (Ajzen, 1991). Figure 1 shows which factors of the planned behaviour theory influence commuters (Heinen, et al., 2011). Attitudes are the degrees to which performance of the behaviour is positively or negatively valued. The subjective norm is the perceived social expectation to follow a particular behaviour. The perceived behavioural control is the individual's perception of the possibility of engaging or not engaging in certain behaviour. In the research of Heinen, et al. (2011) also habit was included because they already concluded that commuters do not always decide after a rational evaluation of alternatives. Instead, past behaviour in other travel situations affects the bicycle commute mode choice as well (Heinen, et al., 2011). The research concludes that a positive attitude towards cycling has a positive effect on the change to cycle to work more often (Heinen, et al., 2011). Therefore, it is more difficult to change the behaviour of people because it is not only a rational choice which individuals make everyday. Using the behavioural planned theory does not explain why specific policies are not working yet. Therefore a new approach has made its introduction into the scientific debate.

This alternative approach, introduced in the field of transport, is that of the social practice theory (Shove, et al., 2012). What is different in this approach is, in essence, the different object of analysis (Spotswood, et al., 2015). In psychology-based individualist models, the individual's intentions and subjective interests are central (Spotswood, et al., 2015). In social practice theory, it is not this individual intention, and also it is not the existence of any form of societal totality (Giddens, 1984). It is about the practices and how its performers carry these (Shove, et al., 2012). It shows in the field of transportation that commuters make their mode choice not consciously every day. A particular behaviour is a practice performed again if this practice embeds in everyday life of an individual. The practice can sometimes compete with other social practices for the recruitment of practitioners. Also, when an individual performs one social practice, it is harder to change to another social practice (Shove, et al., 2012). This research uses the social practice approach to analysis commuting cycling. This research uses social practice theory because of two reasons.

First of all, social practice theory gives useful tools to analyse behaviour such as commuting cycling by looking at the different elements. This might give surprising outcomes regarding commuting cycling. Secondly, social practice theory gives a new view of the policy that tries to change commuting behaviour. A lot is going on regarding cycling policy, and this research uses social practice theory to give recommendations on cycling policy.

2.3 Elements of a social practice

There are different aspects of social practice, and when a person enacts the practice, these aspects or elements integrate (Shove, et al., 2012). The question is then which aspects are present in social practices. According to the book of Shove et al. (2012), social practices elaborate on three different elements (figure 2). These elements play a crucial role in the success or failure of social practices. The social practice embeds in a practitioner's life when the necessary elements are available for the individual. Therefore, this research will attempt to find out which elements are needed for employees to start or embed the practice of commuting cycling.

The following section explains the three different kinds of elements a bit further. There will be a general description and a link to commuting cycling with elements based on the existing literature. Note that in every different setting or case, a practice can have different elements (Shove, et al., 2012). Therefore, the elements found in the literature are a starting point for this research. Some elements might not be essential in this specific case, and other elements might be necessary in this case while they are not in the existing literature. This research uses the existing literature as a guideline to build up the social practice of commuting cycling combined with a semi-open method to look for possible additional elements.

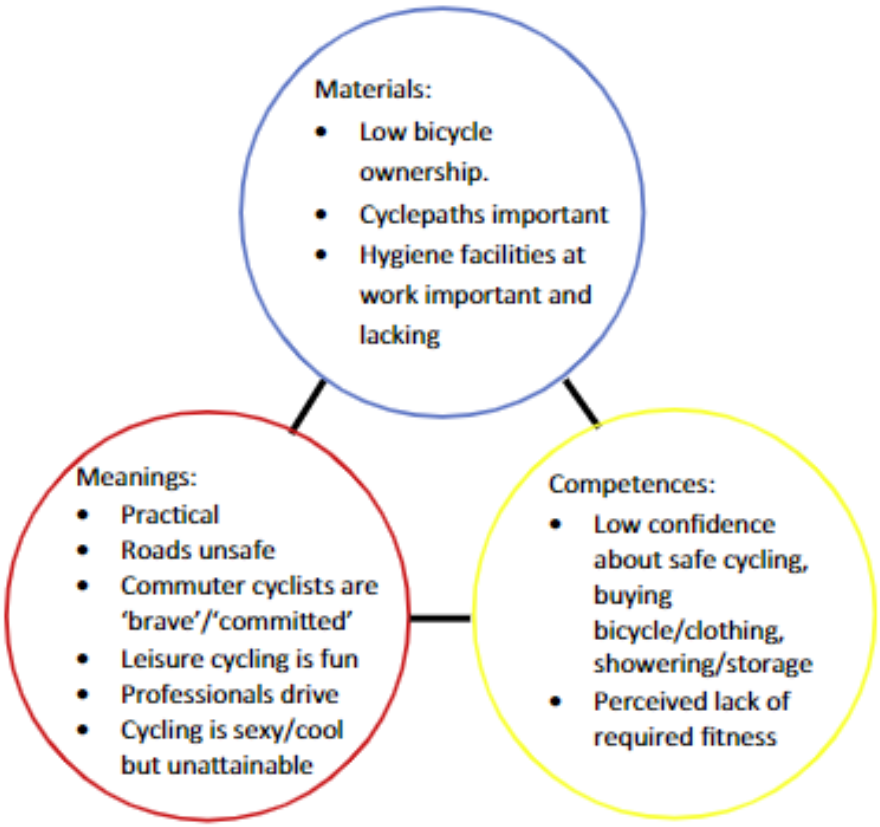

Figure 2: Elements of the social practice of commuting cycling in Britain. (Source: Spotswood, et al., 2015)

2.3.1 Materials

In the earlier work of writers like Giddens (1984) and Bordieu (1984), the focus is entirely on the social, leaving 'things' left behind. It was Schatzki who started to explore the various ways in which practices are intrinsically connected to and interwoven with objects (Schatzki, 2002). In 2009, Røpke claimed that there was a broad agreement that materials are elements of practices too. Materials are physical objects, infrastructures, tools, hardware and the body itself, and these are the first kinds of elements of practices (Shove, et al., 2007). The practitioners must have access to the required materials. If this is not the case, it is more challenging or sometimes even impossible for the practitioner to embed the practice in their life. In this research, the focus will be on the social practice of commuting cycling. There are already many elements recognised by the previous research about commuting cycling (Spotswood, et al., 2015). The list of these elements might not be entirely in line with the elements involved in the chosen case. It gives a starting point of elements.

The first important material which commuting cycling requires is the bicycle itself (Spotswood, et al., 2015). Also, the e-bike has become a material which plays a significant role in recent years. With the e-bike, it is easier to travel long distances and therefore makes it an element which can lead to more practitioners of commuting cycling. Another material which comes from the literature is facilities at the workplace. Lots of studies show that employees value safe bicycle parking (Hunt & Abraham, 2007; Martens, 2007). The strongest preference is for bike lockers, followed by bike enclosures and bike racks (Abraham, et al., 2002). A second facility at the workplace are showers, lockers and changing facilities. Studies show that cyclists experience these facilities as necessary, but the presence of these facilities does not lead automatically to more cyclists (Abraham, et al., 2002; Heinen, et al., 2013).

The existing cycling infrastructure is another material. Previous research shows that separate bicycle paths are attracting more cyclists than, for example, curb lanes by roads where cyclists interfere with motorised travel (Taylor & Mahmassani, 1996). The separate bicycle lanes or solitary cycling paths are more desirable than both bicycle lanes on shared roads and roads without bicycle facilities (Stinson & Bhat, 2005; Hunt & Abraham, 2007). Besides the bicycle path itself, the route to work and its potential stops such as traffic lights or crossings play a role. Cities that have large numbers of stops have fewer people who cycle to work (Rietveld & Daniel, 2004). The research of Stinson and Bhat (2003) shows that routes with many traffic lights attract fewer cyclists than other routes. Fast cycle routes are cycling paths that suffice these requirements. These fast cycle routes are shorter in terms of the distance, separate bicycle lanes from other traffic modes and have as few stops as possible. This research tries to find what the experiences of employees are with the fast cycle route and other infrastructure. The goal is to find the material elements of the social practice in the specific case.

2.3.2 Meanings

The second kinds of elements follow from what Reckwitz describes as mental activities, emotion and motivational knowledge (Reckwitz, 2002). In the work of Shove, et al. (2012) this is brought into one broad element, which is called meanings. Meanings represent the social and symbolic significance of participation in any moment (Shove, et al., 2012). It is useful to see meaning as one of the elements of the practice itself. For the element of meaning, the association practitioners have with the practice is very important. It can be experiences of what feels as right or wrong behaviour for the individual. It is therefore important to investigate how this is in the chosen case because meanings are also very situated, which means that they can differ in different places.

Meanings also play a vital role in building up the social practice of commuting cycling. The first group of meanings identified in the research of Spotswood et al. (2015) were associated with the practical benefits of cycling. Cycling neatly matched the requirements for a fast, efficient and cost-effective mode of transport for some employees (Spotswood et al., 2015). These practical benefits fit in the focus of individualistic approaches which see these benefits as the most critical aspects to promote cycling.

By using the social practice approach, a lot more meanings come forward, which might be important in the life of this social practice. The first one is the social norm which exists around commuting cycling. The social norm can have both a positive and negative effect on the embeddedness of commuting cycling. On the positive side coworkers can affect each other within companies because research provides evidence for the fact that if an individual's coworkers cycle to work, then it is more likely that the individual will cycle as well (Dill & Voros, 2007). Therefore, it is crucial how many practitioners are performing the practice in the social environment around an individual (Shove, et al., 2012). The more other people cycle in one's social environment, the more the individual tent to start this practice. Besides this, individuals with more deeply held environmental beliefs make more use of both public transport and non-motorised forms of transport such as cycling (Hunecke, et al., 2001). A cycling culture occurs if these meanings are present in the group of employees in a company. On the other side, there are also norms which are cynical about commuting cycling. In general, people's attitudes towards car-use are generally more favourable than people's attitudes towards cycling (Dill and Voros, 2007). Besides this, the meaning of cycling is for some people as being fun and only for leisure purposes and therefore not appropriate for career professionals (Spotswood, et al., 2015). This can also be linked with the material element of changing facilities and showers in the workplace. If these are not available, then meaning can be that it is not appropriate to start with an unfresh feeling after the exercise.

The next element in the category of meanings is safety. It is not about objective safety with this, but about subjective safety. This means that it is not about actual figures about road incidents which are objective safety but about the feeling of safety which people has with specific practices. In the case of commuting cycling, it shows that having bicycle facilities, such as separate bicycle paths or bicycle parking, increases the subjective safety of cycling (Klobucar & Fricker, 2007). Car parking facilities is one example. Travellers rate roads without parking as safer than roads with adjacent parking because it leads to dangerous situations for cyclists when car drivers need to cross bicycle facilities in order to park (Stinson and Bhat, 2005). The question in this research is what provides the safety for cyclists in the case of 's-Hertogenbosch – Rosmalen and is this route perceived as safe enough to cycle for commuting purposes by the employees living in Rosmalen.

One other element is that of the weather. The most negative weather aspect, is the precipitation, in other words, the chance of rain. This is for many people a reason not to cycle (Nankervis, 1999; Brandenburg, et al., 2004). The temperature also has an effect on the meaning of cycling, where a higher temperature (until a certain point) results in a more positive attitude towards cycling than a lower temperature (Parkin, et al., 2008). The question is which role this plays in the social practice of cycling. It is not possible to affect the weather itself, but maybe there are initiatives which deal with the negatives effects of bad weather on cycling. It is the question which effect these circumstances has on the experience of the practititioner. This question addresses to all meanings which are in this chapter. What are the meanings according to the employees? What solutions are there to overcome negative meanings about cycling? Eventually, how are these solutions facilitated by the initiatives that promote cycling?

2.3.3 Competences

The last element of social practices is competences. Competences are about the know-how, background knowledge and understanding. It can be two different things, firstly in the sense of being able to evaluate performance. This is important to embed the practice after a practitioner executes a practice for the first time. The second thing is having the skills required to perform a practice (Warde, 2005). It refers to the embodied knowledge of the individual on how to perform the practice (Shove, et al., 2012). These are also called 'skills' and are needed to succeed in the practice. This second kind of competences is also essential because they are needed for a practitioner to start a practice. This research will not only be on individuals who already embedded cycling in their life but also how did not. For them, it is the question of whether they think they have the required skills to start cycling.

For commuting cycling, a couple of competences are in the existing literature. These connect with the other elements, but in this case, it is about the perception of the practitioner if he or she can use these materials and meanings to do commuting cycling. The first most logical one is the ability to cycle. In the Netherlands, were a cycling culture exist, most of the people can ride a bike. What comes along with this is that people need to think that they have good fitness and health to complete the commuting trip by bicycle (Spotswood, et al., 2015). This fitness is then required to perform the practice. What this sufficient fitness is, can differ between different employees. It is about their view on what fitness is needed to perform their commuting trip by bike. In other studies, the reason for exercise or fitness is given as one of the reason whether they go cycling or not (Ryley, 2006; Gatersleben & Appleton, 2007).

Another competence is the ability to negotiating the roads (Spotswood, et al., 2015). This links to the meaning of subjective safety. It is about the view on their capability to cycle on the given roads on the route to work. Other ones are managing and storing cycling gear when at work and managing personal hygiene and knowing what to wear (Spotswood, et al., 2015). This can be linked to the material of facilities at the workplace. The material question is whether these facilities are there and the competence question is whether the employees know how to use these facilities. In this research, the question is whether these competences are facilitated and then even more critical is what competences are required according to the employees and do they think that they are capable of these competences. Figure 3 gives an overview of the discussed elements in this chapter and shows that all the three different elements need to be present for the social practice to succeed.

Theme	Materials	Meanings	Competences
Infrastructure	Safe bicycle paths / Safe crossings / Not much stops on the route / Fast direct route	Subjective safety to ride a bike on the road to work	Capable of taking the route to work by bike
Cycling and work	Bike parking / Changing facilities / Lockers / Showers	Cycling as the social norm within a company	Know how to use facilities
Cycling and the individual	Bicycle / E-Bike	Cycling for commuting and not only for leisure activities / Influence of the weather / Experience of flexibility	Ability to ride a bicycle to the workplace

Figure 3: Overview of the elements of commuting cycling based on the literature (Source: Own work)

2.3.4 Role of policymakers

The introduction of the fast cycle route from 's-Hertogenbosch to Rosmalen facilitates one material precondition of cycling. The theory shows that these preconditions alone are not enough to attract new individuals to social practices (Shove, et al., 2012). There are not just hardware and software policy instruments needed, first it has to be clear what the dialogue about cycling is and what the whole context of the promotion of cycling in a region is. There are different ways of thinking about this topic, and about how designers' and planners' working methods might include in theorisations of the infrastructure–practice relationship (Spurling & Blue, 2014). One way is to see policymakers as outside observers who try to change the system from outside (Shove, et al., 2015). Another way is to see it as part of the system where the different policy instruments lead to a complex of elements which change the links of and between practices (Shove, et al., 2015). The importance of this lies in the fact that policy can reconfigure the relation between practices, for example, by systematically prioritising the bicycle above the car. This can set in train processes of positive feedback in terms of bicycle use (Shove, et al., 2012). Therefore, the goal of cycling promotion is two-folded. Firstly, it has to attract new individuals to start a desirable practice. Secondly, it has to facilitate missing elements which are needed to embed the social practice. This research analyses the promotion of cycling by rhyming it with the elements according to the experiences of employees.

2.4 Links with other practices

Practices can compete and collaborate with other practices, and this influences the behaviour of individuals (Shove, et al., 2012). Two significant points need clarification to describe the social practice of commuting cycling for employees. First, as described above, is that cycling is a social practice different from other modes of transport. Therefore it needs to be considered that for example, car-limiting policies do not have a direct effect if the elements of cycling are not changed (Cass & Faulconbridge, 2016). The social practices of cycling and car driving are competing for the recruitment of the practitioner (Shove, et al., 2012). Elements that people have with car driving can be missing for the practice of commuting cycling. Therefore, it is essential to look at these competing practices and how this affects commuting cycling. Competing practices of cycling are car-driving, public transport, walking and other means of transportation. This research focusses mainly on car-driving because it is the most used mean of transportation in the chosen case together with cycling.

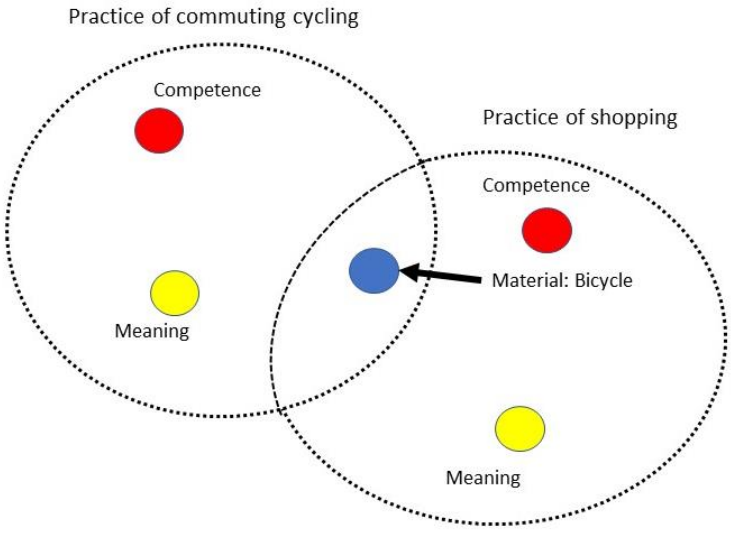

Figure 4: Illustration of how elements can link practices (Source: Shove, et al., 2012)

Besides competing, social practices are collaborating with other practices because it is interfering with other social practices in everyday life of individuals (Cass & Faulconbridge, 2016). Figure 4 shows an example of how practices can be linked together through their elements. In this example, commuting cycling and shopping are two different practices which have to be performed by the practitioner in a day. These practices have different competences, meanings and materials. The question is whether shopping can be performed using the material of the bicycle. If the shopping contains only groceries, this might be possible. This would not be possible when shopping for furniture, for example. These kind of links are essential for the practice of commuting cycling. Therefore, it is reasonable to find out what links there are with other practices in everyday life of employers and how this affects commuting cycling.

Commuting to work is for most of the people not the only mobility practice of a single day, especially nowadays where people are squeezing different practices into one day (Cass & Faulconbridge, 2016). Relationships between the past, present and future practices matter in defining temporality. The need to travel between sites of past, present and future practice determines both when travel occurs but also, in the context of the timing of different practices, how much time is available for each journey (Schatzki, 2009). The most common other practices that interfere with commuting are school/nursery runs, healthcare, recreational activities and shopping (Cass & Faulconbridge, 2016). Also, the practice has to combine with practices of other members of the household. This can also have effects on the mode which the individual chooses, for example, in the case where there is only one car available for the family. All these other social practices have to collaborate with commuting cycling to make commuting cycling a better practice in the competition with other modes. The focus of the interviews with employees will be on the elements of commuting cycling for the employees along the route ‘s-Hertogenbosch-Rosmalen and on this competition and collaboration between other social practices as described in this chapter.

2.5 Conceptual model

Figure 5 shows the conceptual model of this research, including the different parts of the literature review. The middle point of this research is the social practice of commuting cycling. This is in line with the social practice approach, where the object of analysis is the practice. The different elements (materials, meanings and competences) are shaping the social practice. These are required for the practice to occur. This can differ for everyone, but the goal of this research is to find the most critical elements of commuting cycling. If the elements are there, commuting cycling can embed in the everyday life of employees. Cycling policies are part of the practice by trying to attract new practitioners on the one hand and facilitating both hardware and software measurements on the other hand. This possibly produces the required elements of commuting cycling. Besides that, collaboration and competition with other practices influence commuting cycling. Practices as car driving, using public transport and walking can compete with cycling. In the life of employers, practices as school, healthcare, leisure activities and shopping might need to collaborate with commuting cycling. What this research aims to do is analyse commuting cycling by looking at all these different aspects of the social practice.

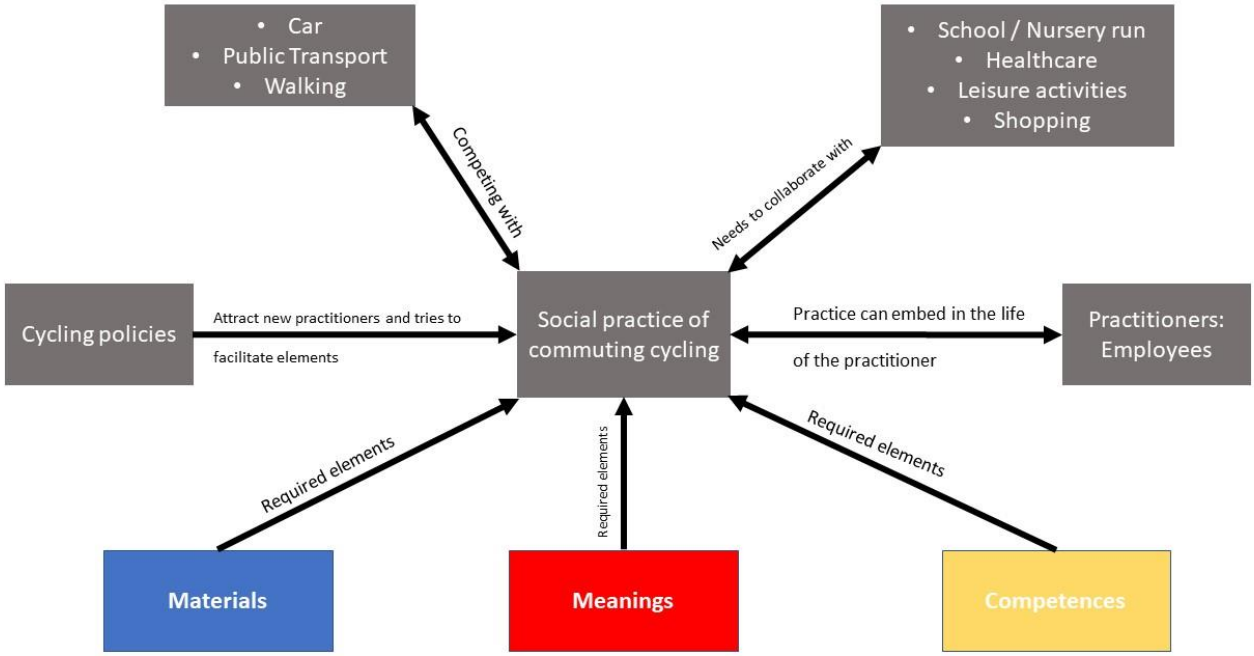

Figure 5: Conceptual model (Source: Own work)

3. Methodology

3.1 Case selection

This research has an abductive reasoning design to find the answers to the research questions. The research objective is to analyse commuting cycling as a social practice and to analyse the promotion of this practice in the area ‘s-Hertogenbosch – Rosmalen . Chapter 2 shows that there is already quite some knowledge about commuting cycling. Chapter 5 elaborates on this by looking at the promotion of cycling and how experts think about commuting cycling. This research contributes to this knowledge by using the social practice approach to analyse commuting cycling in a Dutch case. This research uses abductive reasoning because it uses previous research about commuting cycling as a starting point. From there, it tries to find new surprising insights or elements to the subject by abductive reasoning.

The first part is about the case, which is central to this research. This is done in cooperation with the Brabant Mobility Network (BMN). The BMN is trying to connect companies to support sustainable mobility. The route between ‘s-Hertogenbosch – Rosmalen is the case of this research. This route is part of the corridor between ‘s-Hertogenbosch and Oss. A fast cycle route locates here since 2016.

Only the part between ‘s-Hertogenbosch and Rosmalen of this route is part of this research because of two reasons. The first reason is that only in this part, the fast cycle route is from high quality and meets the standards of the province while the other parts still need improvements. The second part is the collaboration between companies and BMN in this region. This collaboration is already quite comprehensive, with a couple of networks of participating employers. The goal is to have these two aspects in the whole province and therefore, this case is suitable because it gives a better view of the new context of cycling promotion. The fast cycle route connects Rosmalen, a village of approximately 30.000 inhabitants to the city of ‘s-Hertogenbosch. There are a lot of companies, shops and other job opportunities in ‘s-Hertogenbosch. The length of the corridor is 2 to 10 kilometres, depending on where an employee lives and where he/she works. The distance in this region makes it suitable for this research because this distance is not that far, which makes it reachable by bike. This research rhymes these initiatives with the experiences of employees. Therefore, the corridor ‘s-Hertogenbosch-Rosmalen has potential in finding the answers to the different questions within this research. Chapter 4 describes the case of ‘s-Hertogenbosch – Rosmalen. It is a description based on both desk research and documents provided by the province of North-Brabant and municipality of ‘s-Hertogenbosch.

3.2 Data sources

3.2.1 Expert interviews about the promotion of cycling

Chapter 5 of this research is about describing the whole context of how cycling policy facilitates cycling in the corridor ‘s-Hertogenbosch – Rosmalen. Semi-structured interviews will do this with experts working on cycling promotion in the region. Respondents will be selected based on an analysis of existing policy documents like the vision of “Fiets in de Versnelling” and based on deliberation with BMN. Each expert-interview has its purpose for this part, but the primary purpose is to illustrate the facilitation of cycling in the area. Besides this, it is essential to find out how the different initiatives trying to promote cycling and what strengths and weaknesses there are with implementing these initiatives. Appendix 1 shows one example of an interview guide used in interviews with experts. The focus will be on the instruments that promote cycling and especially how these initiatives are trying to promote cycling. Besides this, the challenges will be central, which are restraining the promotion of cycling. It will be evident in this way what the focus is of the current cycling policy in the area. Figure 6 shows the stakeholders that participate in this research.

There is a description of each stakeholder in figure 6. Besides this, the figure shows which experts from the different stakeholders participate. The last column in figure 6 shows the interview reference number. This number refers to parts of the expert-interviews in the remains of this document.

Stakeholder	Description	Interview	Interview Reference number
Province of Brabant	The province makes policy for cycling. They have a role as coordinator for fast cycle routes and other initiatives which they implement in the whole province	Nathan Hooghof Marvin Bust Rick Baggermans	1 2 8
Municipality of Den Bosch	The municipality makes policy for cycling too. They are responsible for the details of the infrastructure, and they have the campaign to promote cycling for its inhabitants.	Annelies de Ridder	3
Fietsersbond	They represent the cyclists and try to include cycling investments into political decisions in municipalities, provinces and the central government.	Aad Smid	4
Brabant Mobiliteitsnetwerk	Initiative to help employers with their mobility challenge. They try to build communities of employers to cooperate to tackle mobility problems. Part of this can be the promotion of cycling. They use the campaign of Sjees for this, and they can advise about facilities or help with setting up programs like an e-bike pool.	Jos Hollestelle Bo Bos	5 6
Platform 'Ons Brabant Fietst'	An organisation that started a campaign for cycling in Brabant. They are responsible for the campaign Sjees which tries to promote commuting cycling amongst employees and the campaign Sjees Gangmakers which tries to include employers to the process of cycling promotion.	Etiënne Lataster	7

Figure 6: List of stakeholders, description of stakeholders, experts and interview reference number (Source: Own work)

3.2.2 Survey to find respondents

The second part of this research is about defining the social practice of commuting cycling based on the experiences of practitioners. The practitioners in this research are people that live in Rosmalen and work in 's-Hertogenbosch. A short survey served to find the respondents. Appendix 2 shows the survey. The researcher distributed the survey in two different ways. First, the Brabant Mobiliteitsnetwerk spread the survey to some of their cooperating employers. Also, the neighbourhood councils in Rosmalen spread the survey amongst citizens. There was no option to go door-to-door to distribute the survey because of the measures of the government regarding the corona crisis.

This survey has two purposes. First of all, to find the respondents and to ask for their contact information to schedule the interviews. The second purpose is to ask some questions about their personal information and their mobility choices. This information serves as the base for the choice of respondents for the interviews. The goal is to have a mixed group in terms of age, the kind of company they work for and the mode they normally use to go to work. Fifty-five employees participated in the survey, and 15 of them participated in the interviews as well. Figure 7 shows the age of respondents that participated in the survey and of the selection in the interviews. The groups between 40 to 49 years old and 50 to 59 years old are represented more than the other groups. Especially the younger generation below the age of 40 did barely participate in this research. This fact has some consequences for the representativity of the outcomes. It means that the outcomes are more represented by older employees than by younger employees in Rosmalen. The same accounts for the kind of work that the respondents do. Figure 8 shows that the group working in the public sector is more represented in the interviews (67%) than employees working in the private sector (27%) or employees that are self-employed (6%).

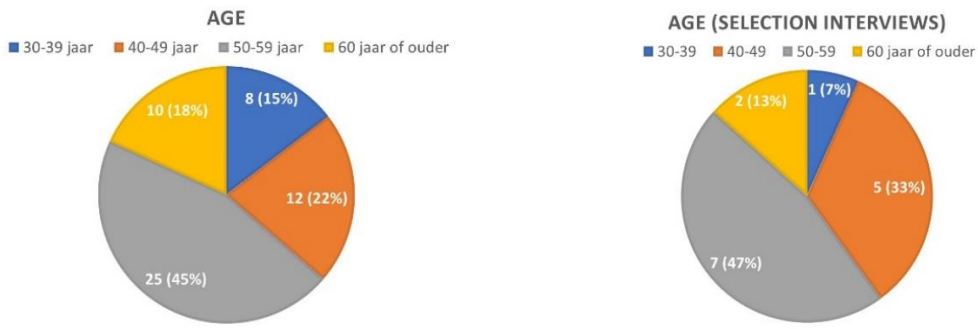

Figure 7: Right: Age of all respondents in the survey. Left: Age of selection in interviews (Source: Own work)

Figure 8: Right: Work of all respondents in the survey. Left: Work of selection in interviews (Source: Own work).

Besides this, the question in the survey was what mode was used the most by the respondents to work before the corona crisis and what other modes they used occasionally. Figure 9 shows the mode choice of respondents. 27% of the interviewees cycled every day to their work. 53% of them took a bike sometimes. From this 53%, 33% took the bicycle most of the days, and 20% took the car most of the days. Another 20% of the interviewees took the car every day. Other modes are less represented in the research group. One respondent in the survey took public transport and walked to work. Therefore, this research does not include these modes as a competing practice of commuting cycling in further analysis of this research. Both people who did and did not cycle to work participate in this research. This to explore reasons for use and non-use and the contextual factors influencing modal choice and possibilities for improving the promotion of cycling. The corona crisis makes this information a bit blurry because many people are in a different situation now because they have to work from home for example and they do not know how the situation will be after the corona crisis. Nevertheless, it is crucial to make a distinction between the cyclists, partly-cyclists and non-cyclists. If only the cyclists participate, a one-sided picture of the practice will show up, and then it would be hard to look at missing elements or links in the promotion of cycling.

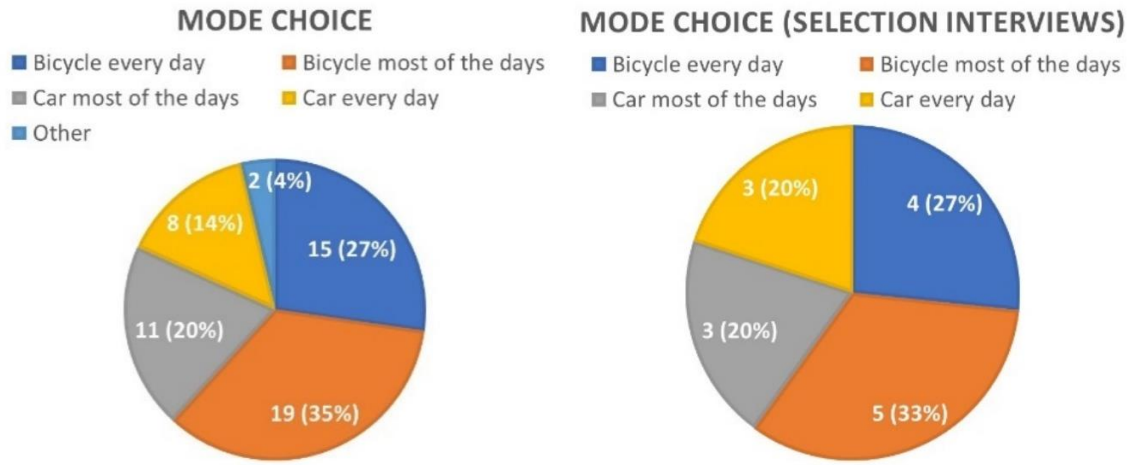

Figure 9: Right: Mode choice of all respondents in the survey. Left: Mode choice of selection in interviews (Source: Own work)

3.2.3 Interviews with employees

The semi-structured interviews lead to the required elements to build the social practice of commuting cycling according to the experiences of employees. The existing knowledge about commuting cycling serves as a starting point for the interview guide. There is enough room for new surprising elements because the interviews are semi-structured. The goal is to check how the employees experience certain aspects of commuting cycling that previous research has found and to find new elements in this specific case. Appendix 3 shows the interview guide of the interviews with employees. The following subparts are in the interview guide:

- Description of the commuting trip
- Experiences with infrastructure and the fast cycle route
- Cycling and work
- Cycling and the individual
- Corona crisis

The first part, the description of the commuting trip, is to have a clear view of what the route to work is for the respondent. The question is why he chooses this route and if he takes an alternative route sometimes.

Besides this, it is about the mode he normally takes to work, why he does that and if he can take the bike. The second part is about the infrastructure on the one hand and the experiences of the respondents with the fast cycle route on the other hand. The question is whether the respondent takes the fast cycle route or not and why this is. Besides this, it is about possible improvements for the cycling infrastructure in the area. The third part, cycling and work, is about the facilitation of cycling at the workplace. This can be both hardware facilities such as sufficient parking and showers. However, it can also be software facilities such as a bicycle plan and how the respondents talk about cycling with their colleague's. The fourth part, cycling and the individual, is about all personal aspects that the respondents think are essential regarding their mode choice. The main subjects are their attitude towards cycling, other practices that they combine with their work trip and what role the weather plays in their mode choice. The goal is to find out overlapping elements regarding the individual situation between employees. The last part is about the experiences of the employees with the corona crisis and how this influences their work situation and mode choice.

3.3 Analysis

The objective of this research is to analyse the social practice of commuting cycling and to give recommendation on the promotion of cycling. The first step is to describe the promotion of cycling as it is now in the area. Chapter 5 describes the promotion of cycling based on expert-interviews. There is a summary of every expert interview and parts in chapter 5 refer to these summaries. The analysis of this part makes a distinction between hardware and software initiatives in the area. Hardware initiatives include infrastructure, the fast cycle route and bicycle parking. Software initiatives include campaigns and the collaboration of BMN with employers. Besides this, chapter 5 will look at how competing, and collaborating practices influence the promotion of commuting cycling. The last part of chapter 5 describes the influence of the corona crisis on the promotion of cycling. The crisis does not only affect commuting cycling, but it also changes the possibilities for the promotion of cycling, which has consequences on the feasibility of specific initiatives.

The second step is then to find the elements of the social practice of commuting cycling according to the experiences of the employees. Semi-structured interviews with 15 employees who live in Rosmalen and work in 's-Hertogenbosch are the base for this. The analysis uses abductive reasoning. This means the following. The researcher transcribes the interviews, and the first step of coding is open coding all the relevant parts of the interviews. The second step was making code groups and classify all the open codes into these code groups. Figure 10 shows the code groups and how many different codes are in this code group. Appendix 4 shows all the codes in the different code groups and how often the respondents mention a particular code. The next step is to compare this with the existing literature about commuting cycling and the elements as described in chapter 2.3. This leads to some confirmation of existing knowledge, but also new elements which are relevant in this specific case. Chapter 6 describes the important findings of this analysis. Besides this, it gives a clear view of all the elements of commuting cycling found in this research.

Code group	Codes
01 Cycling infrastructure	28
02 Combination commuting tip with other practices	20
03 Personal attitudes towards cycling	20
04 Fast cycle route	12
05 Weather	12
06 Showers and changing rooms	12
07 Bicycle parking	10
08 Flexible working hours	10
09 Shared cars	7
10 Car traffic	7

11 Bicycle plan	6
12 Work appointments elsewhere	6
13 Car parking	6
14 Duration of route	5
15 Electric Bike/Step	4
16 Corona crisis	4
17 Work during the commuting trip	4
18 Natural environment	4
19 B-Riders	2

Figure 10: Code groups to analyse commuting cycling (Source: Own work)

The conclusion of this research tries to answer the research question in two steps. The first one is debating about the new insights of commuting cycling and discussing the use of this theory to analyse the behaviour of commuting cycling. To answer this question, the researcher compares the findings of chapter 6 with the literature of social practices in chapter 2. The second step is about comparing the crucial elements in chapter 6 with the current promotion of cycling, as described in chapter 5. This leads to or advice to better adjust the promotion of cycling to the experiences of commuters. An observation in 's-Hertogenbosch and Rosmalen supports the following chapters of this research. The goal of this observation is to photograph the different routes in the area. There are several pictures from this observation included in the text. Appendix 5 shows a comprehensive selection of photos from the observation.

4. Case study

An introductory statement in practice theory is that a social practice can differ between places. Therefore, it is essential to know more about the specific case in this research, because this has consequences for the social practice. There are two subjects in this chapter. The first one is about the relation between the city of 's-Hertogenbosch and Rosmalen. This part focusses on the different residential areas in Rosmalen and the business parks in 's-Hertogenbosch. The second part focusses on the characteristics of the fast cycle route within the infrastructural network of the region. It discusses previous research about the experiences with the fast cycle route. The goal is to describe the context of the area where the social practice of commuting cycling takes place.

4.1 Rosmalen – 's-Hertogenbosch

The city of Rosmalen and 's-Hertogenbosch are depending on each other in terms of their spatial relation. Figure 11 shows the municipality of 's-Hertogenbosch on the map of the province of North-Brabant. Rosmalen is part of the municipality of 's-Hertogenbosch since 1996. The municipality of 's-Hertogenbosch counts around 154.000 inhabitants in 2019 (CBS, 2019). Approximately 30.000 of them live in Rosmalen (CBS, 2019). The route between both central stations is 5 kilometres. The route between other sites can be between 2 kilometres and 10 kilometres. Figure 12 shows different neighbourhoods in the municipality of 's-Hertogenbosch. The three neighbourhoods in green are part of Rosmalen. These are from north to south De Groote Wielen, Rosmalen-Noord and Rosmalen-Zuid. De Groote Wielen is a new residential area which is not completed yet. 3.050 of the planned 4.400 houses are already there. A lot of sports activities locates in this neighbourhood besides these new houses. Rosmalen-Noord includes the city centre of Rosmalen, the residential area Overlaet and a small village outside of Rosmalen called Kruisstraat. The railway from 's-Hertogenbosch to Oss splits Rosmalen-Noord from Rosmalen-Zuid. Rosmalen-Zuid includes three large residential areas called Maliskamp, Sparrenburg and Molenhoek. The average income in the whole municipality is €28.400, and this number is higher in all three neighbourhoods in Rosmalen (Gemeente 's-Hertogenbosch, 2018). It is between €30.100 on average in Rosmalen-Noord and €35.400 in Rosmalen-Zuid (Gemeente 's-Hertogenbosch, 2018).

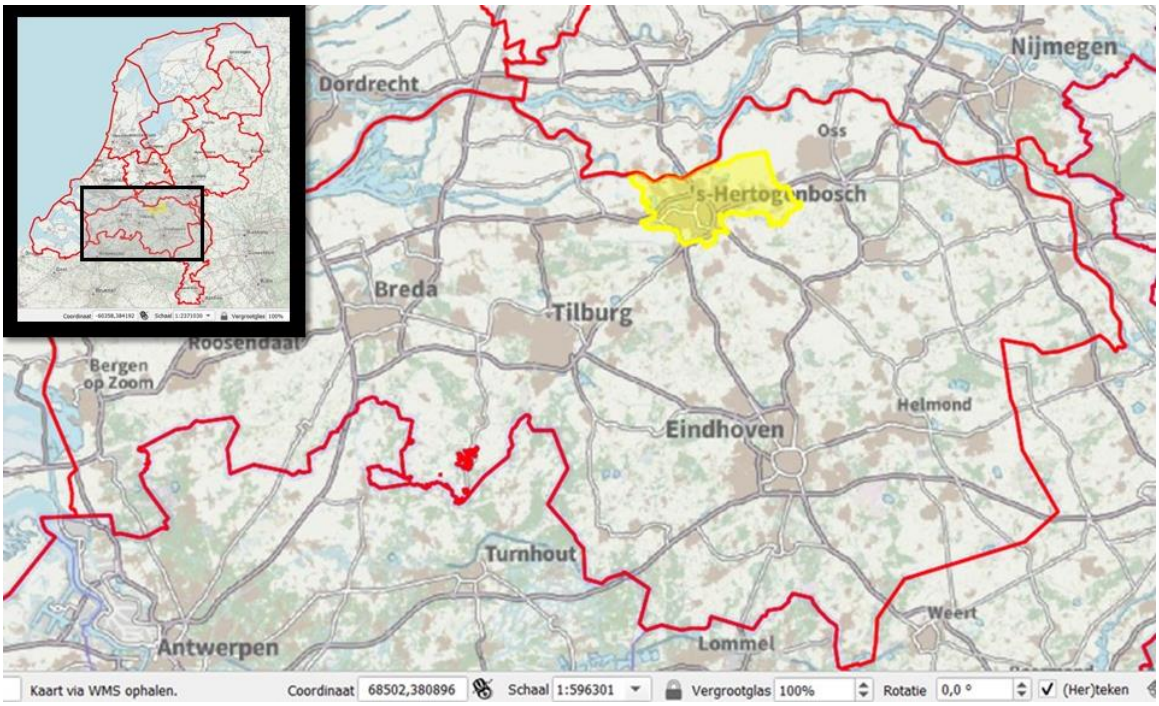

Figure 11: Location of the municipality of 's-Hertogenbosch in North-Brabant (Source base layer: (PDOK, 2020)*)*

The municipality conducts a neighbourhood monitor every year (Gemeente ‘s-Hertogenbosch, 2018). This monitor shows some useful outcomes regarding this research. 29% of the inhabitants of the whole municipality expect to own an e-bike within five years (Gemeente ‘s-Hertogenbosch, 2018). This percentage is higher in all three neighbourhoods in Rosmalen. Rosmalen-Zuid leads this list where 46% of the residents expect to own an e-bike soon. The distance of the commuting trip can be an explanation for the higher numbers in Rosmalen. This research includes this topic. Traffic safety is another aspect which is essential for this research. The neighbourhood monitor also includes traffic safety. The monitor shows which percentage of the residents are satisfied with the traffic safety in their neighbourhood. The average of this share is 49% in the whole municipality (Gemeente ‘s-Hertogenbosch, 2018). This number is higher in the neighbourhoods Rosmalen-Noord and Rosmalen-Zuid. The percentage of residents who thinks that traffic safety is sufficient is 56% in Rosmalen-Noord and 55% in Rosmalen-Zuid (Gemeente ‘s-Hertogenbosch, 2018). This percentage is much lower in the neighbourhood De Groote Wielen. It is only 41%. Work traffic for building these new houses in the neighbourhood can be an explanation for this lower number.

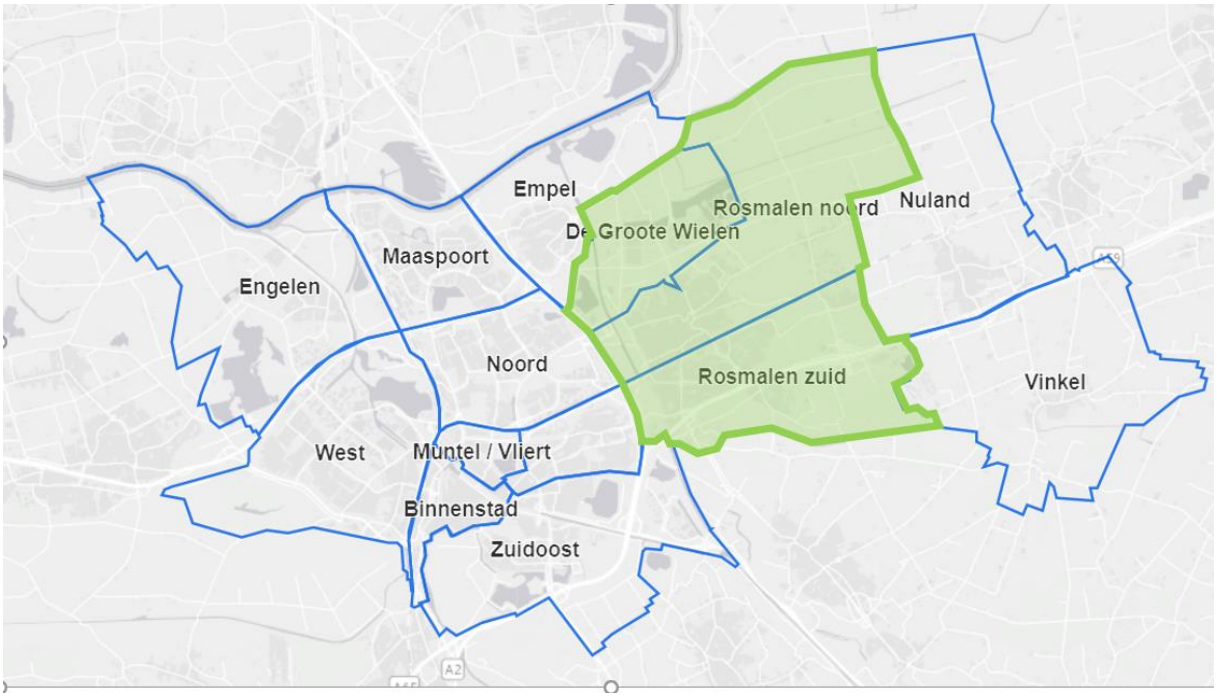

Figure 12: Map of neighbourhoods in the municipality of ‘s-Hertogenbosch (Source base layer: (Gemeente 's-Hertogenbosch, 2020).

There are not many jobs in the city of Rosmalen. There is a small centre with a few shops, but there is no large business park. Rosmalen is, in that sense, a commuter’s city. The link between ‘s-Hertogenbosch and Rosmalen has similarities with the American urban-suburban relation. ‘s-Hertogenbosch is, in this case, the big city with much employment. Rosmalen is more the suburban living area with lots of commuters going to the city of ‘s-Hertogenbosch. The city map of ‘s-Hertogenbosch shows a European city with an old historical centre. There is not one centre with high rise business parks, but the business parks locate across the city. Figure 13 shows the prime economic locations in the city of ‘s-Hertogenbosch. The blue areas are business parks with lots of jobs. The city centre (“Binnenstad”) is in the south of the city. Lots of shops and hotel and catering industry locate here. Other large business parks are “Rietvelden” in the west, “Maaspoort” in the north and “De Herven” in the east. There is an area with lots of schools and the main hospital in the southwest of the city. The “Pettelaarspark” locates in the south-east. The office of the province of North-Brabant is at the “Pettelaarspark”.

The fast cycle route from Rosmalen to ‘s-Hertogenbosch is the green line in figure 13. It passes the business park of “De Herven” and then goes to the city centre. It is also on the way to “Rietvelden”. It is less directed to the business parks “Maaspoort” and “Pettelaarspark.

Figure 13: Map of prime economic locations in ‘s-Hertogenbosch (Source base layer: (PDOK, 2020)*)*

4.2 F59

The F59 is a fast cycle route established in 2016. It is part of a more extensive network of existing and planned fast cycle routes. Figure 14 shows the planned network. The municipalities, with help from the province, realise this network. The province is stimulating the process, and the municipalities execute the plans. The F59 is one of the first two established fast cycle routes in the province besides the fast cycle route between Valkenswaard and Eindhoven. The F59 connects the central train station of ‘s-Hertogenbosch with the central train station of Oss. It crosses all train stations including ‘s-Hertogenbosch-Oost, Rosmalen and Oss-West along the way. The route goes through a green environment and the villages of Nuland and Geffen between Rosmalen and Oss. The F59 is not the only cycle path between Rosmalen and 's-Hertogenbosch. Fast cycle routes are part of a regional and urban cycling network, including different cycle paths. In this case, other cycling paths connecting Rosmalen with 's-Hertogenbosch are the Bruistensingel and the Aziëlaan north of the fast cycle route and the Graafsebaan in the south (figure 15). There are more routes but only these routes include in this research because the employees interviewed in this research are using these routes. These other cycling paths do not fully meet the standards of fast cycle routes. They are still from high-quality, but there are some more obstacles such as traffic lights and these cycling paths are narrower than the fast cycle route. The municipality is responsible for this urban cycling network, and they try to make these cycling paths as comfortable as possible within the whole urban mobility network.

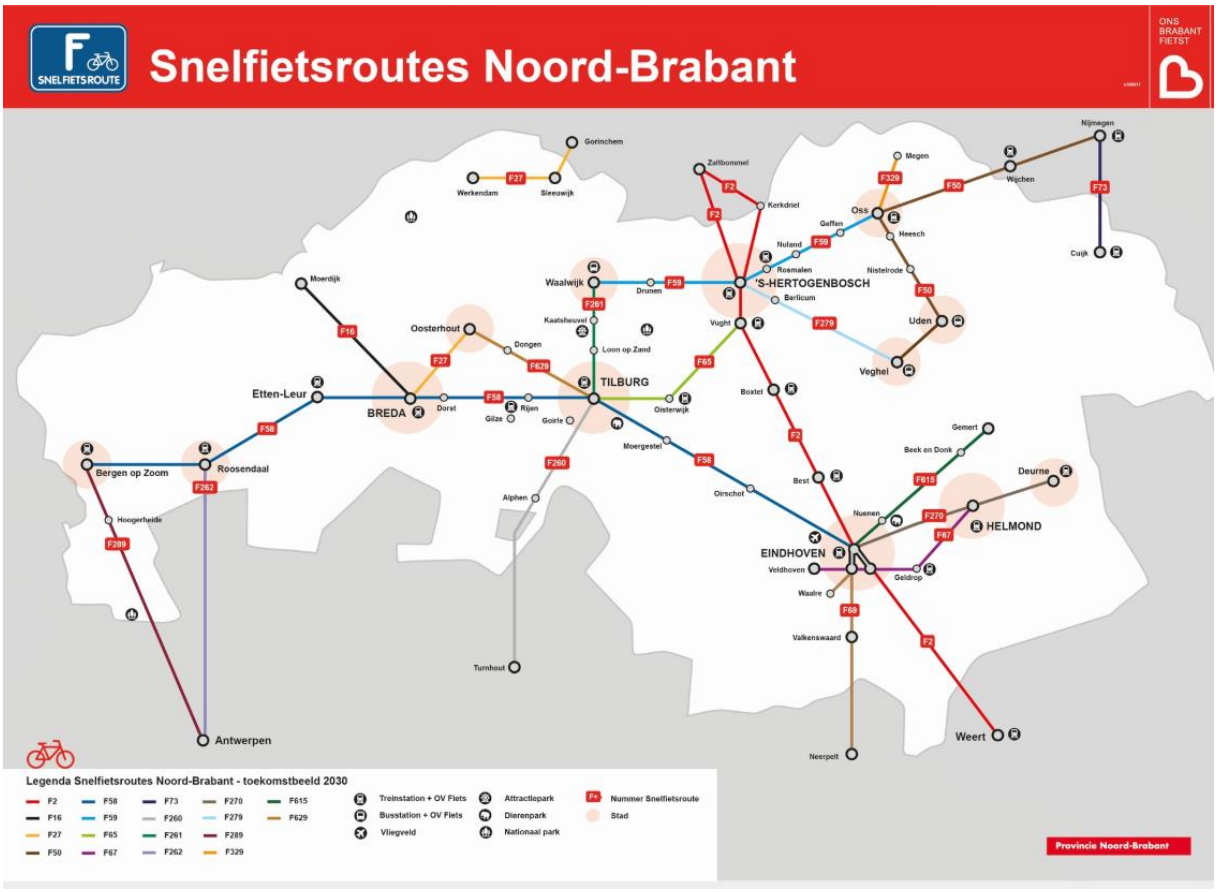

Figure 14: Planned network of fast cycle routes in the province of North-Brabant (Source: (Provincie Noord-Brabant, 2018)*).*

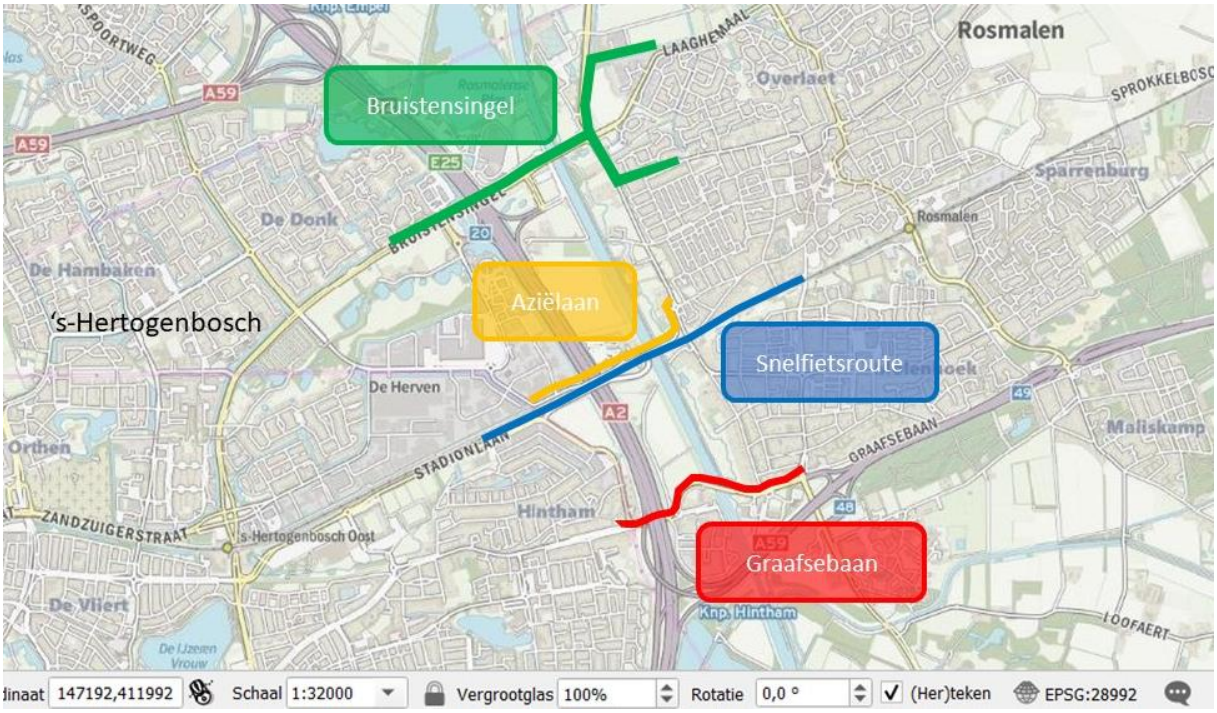

Figure 15: Cycling paths that connect Rosmalen with 's-Hertogenbosch (Source: (Provincie Noord-Brabant, 2018)*).*

The province conducted a baseline measurement and a measurement in order to monitor the quality of the fast cycle routes. They used multiple strategies to conduct this research. Firstly, they used data from the road authorities. Secondly, a unique bicycle measured some variables, such as waiting time. At last, they surveyed users to find out what the users' experiences are with the route before and after the realisation of the fast cycle route. A significant improvement was made regarding the street surface of the route. The percentage of asphalt was 60,4% at the baseline measurement. This number increased to 94% at the effect measurement. Figure 16 shows the F59 and which kinds of cycle paths it exists of (Provincie Noord-Brabant, 2017). The yellow parts are solitary cycle paths which separate cyclists from other traffic. The green parts are cycling streets where other traffic, especially car traffic, is allowed at the cycling path, but the cars need to slow down and are so-called visitors of the street. Figure 17 shows both a cycling street and a solitary cycling path. The blue parts are regular cycling paths on the side of the roads of car traffic. This research focusses mainly on the part between Rosmalen and 's-Hertogenbosch. The longest part of the fast cycle route on this stage is a solitary cycling path separated from other roads. There is a small part which is a regular cycling path and two parts which are cycling streets. These small parts are in the city of 's-Hertogenbosch.

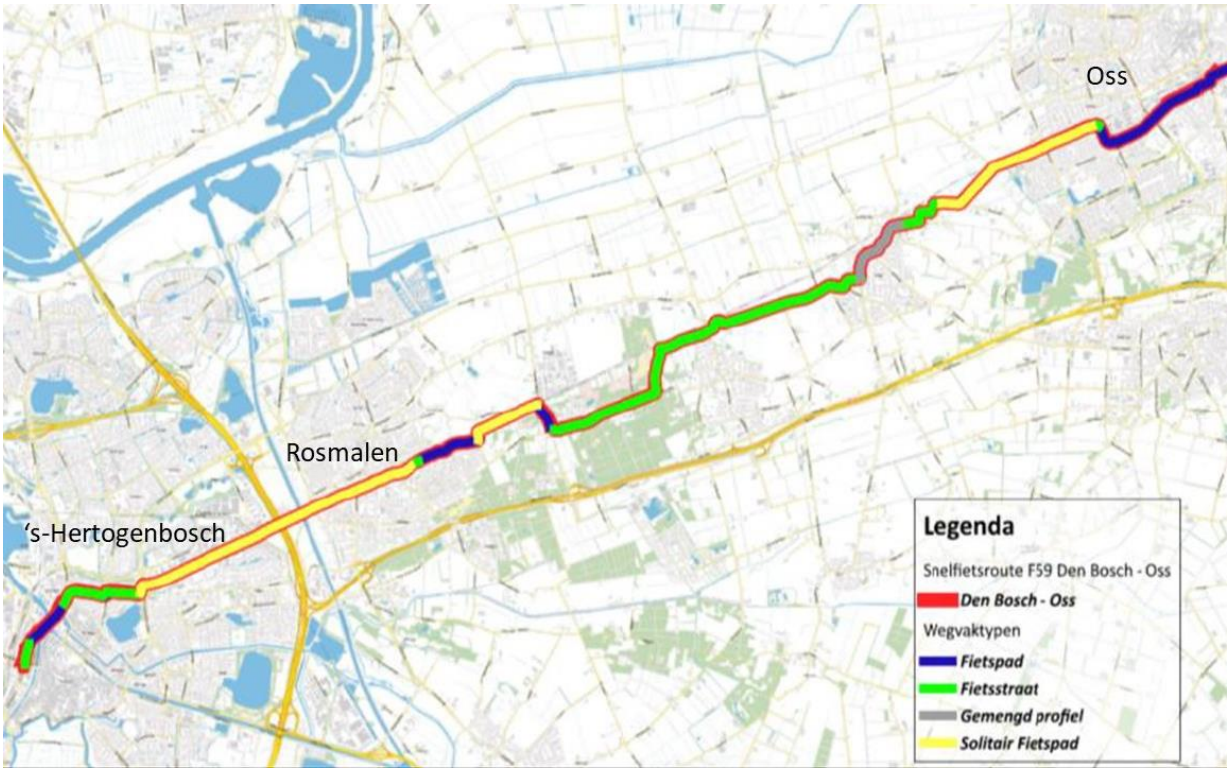

Figure 16: Different kinds of cycling paths on the F59 (Source: (Provincie Noord-Brabant, 2017)*)*

Figure 17: Left: Cycling street. Right: Solitary cycling path (Source: Own work)

The survey conducted during the baseline and effect measurement also shows some interesting findings. The average grade giving by the respondents increased just a little from 6,8 to 7 out of 10 (Provincie Noord-Brabant, 2017). Other fast cycle routes score higher on these measurements. The average increase in these other routes is 0,9 while it is only 0,2 in this case. The 6,8 from the beginning was higher than the grade other routes got at the baseline measurement. This might explain the little increase in grade after the realisation of the fast cycle route. Some increased elements according to the respondents of the effect measurement are the flat surface, the draining of the cycle path, the public lighting and the natural environment of the route. Some other elements got a worse grade at the effect measurement than at the baseline measurement, including traffic safety and the crossings without traffic lights. The most mentioned strong points of the fast cycle route are asphalt, fast and a pleasant environment (Provincie Noord-Brabant, 2017). Weak points are the part in the centre of Geffen, the crossings without priority and cars on the cycle path at cycling streets.

These are exciting points which give a better view of the quality of the whole fast cycle route. This research focusses only on the part between Rosmalen and ‘s-Hertogenbosch. This chapter shows that there is great potential for commuting cycling. The first reason for this is the short distance between the places. The second reason is the considerable potential of commuters between the living area’s in Rosmalen and the prime economic locations in ‘s-Hertogenbosch. The last reason is because of the existence of the F59, which might attract more commuters. More on that later. It is interesting to see whether the outcomes of the interviews of this research are in line with the survey conducted by the province. This research will expand the knowledge about the experiences of users of the F59. Furthermore, it describes the experiences of commuters with other cycling infrastructure. This will give a better view of the relation between Rosmalen and ‘s-Hertogenbosch in terms of commuting cycling, which will lead to recommendations about the development of the F59 and other fast cycle routes.

5. Promotion of cycling

This chapter elaborates the different initiatives which involve in the promotion of cycling in the area. The first part is about the different stakeholders. These include the province of Noord-Brabant, the municipality of 's-Hertogenbosch, Ons Brabant Fietst, Brabant Mobiliteitsnetwerk and the Fietsersbond. The main questions are how these stakeholders organise the promotion of cycling and which initiatives are introduced by these stakeholders to promote cycling. Then the focus will be on how all these practices around this fast cycle route try to promote cycling by the employers living in Rosmalen. Chapter 5.2 is divided into the following parts:

- Hardware solutions
- Software solutions
- Competing practices
- Collaborating practices

This chapter gives insights into what is happening in the area to promote cycling. The outcomes should rhyme with the experiences of the employers in chapter 6. Some small statements will be made about the current changing factors of the promotion of cycling due to the corona crisis.

5.1 Organizations

5.1.1 Province of North-Brabant

The promotion of cycling within the province of North-Brabant organises the promotion of cycling around a vision document named 'Cycling in the next gear" ('Fiets in de Versnelling'). The province focusses on three pillars in this vision document around cycling (Province of Noord-Brabant, 2009). The first one is the infrastructure, including the fast cycle route in the region. The second pillar focusses more on the behaviour side of cycling. This includes utilitarian cycling as well as recreational cycling. The last pillar is about the bicycle as a stimulus for innovation. This last pillar is less important than the other two for this research. Therefore, the next part focusses on the first two pillars.

The province has a role as a stimulator in the case of infrastructure to provide high-quality cycling paths. The municipalities have the task of the realisation of these cycling paths [1,7]. Frequently, the province collaborates with municipalities to help them with this development. Besides this, the biggest project of the province is the network of fast cycle routes. The role of the province is, on the one hand, to bring different municipalities together to realise a fast cycle route and on the other hand, investing both time and money to guarantee the quality of the fast cycle routes [2,5]. The province thinks that the fast cycle route has an essential role in the promotion of cycling. It attracts cyclists, it is a good and safe alternative on the medium-length distances, and it gives adequate attention to cycling in general. This was only done locally at first, but now both provinces and the national government invest in these fast cycle routes [1,6]. The target group for these fast cycle routes are mainly commuters, but the route can attract a more ubiquitous group, including students and recreational cyclists [2,6]. The campaign Sjees Gangmaker includes the promotion of the use of the fast cycle routes. This will enlarge when more fast cycle routes are realised in the future.

Another initiative from the province to change the behaviour in such a way that people cycled more was the project B-Riders. The project started in 2014 and ended in December 2018. At first, it focussed on stimulating e-bike use. By joining, participants could earn back a share of the money they spend on buying the e-bike. They had to download an app, and for every kilometre, they cycled to work, they saved some money which they could get at the end of the project. The participants could earn a maximum of 1000 euros, and the average participants earned was between 300 and 400 euros. The first years of the initiative were a success.

After that, they expanded it to not only e-bikes but also regular bicycles. The data from the app was of great value for the province to analyse the mobility patterns in the province. They got great feedback from the participants, who were triggered in this way to start cycling and also keep cycling. After 2018, the purpose was that private parties would take over the project. This happened on a smaller scale within municipalities but not at the scale were B-riders was operating.

5.1.2 Municipality of ’s-Hertogenbosch

The municipality has its policy on mobility and thereby cycling too. The municipality is responsible for the execution of smaller infrastructural projects such as cycling paths, crossings and streets. They have a comprehensive mobility plan which includes behaviour, cooperation and technology besides infrastructure (Gemeente ‘s-Hertogenbosch, 2020).

The municipality has a role in the realisation of the fast cycle route. In the process of a fast cycle route, different municipalities are involved, and the smaller municipalities often have more difficulties with the organisation and the investment in such a project. The municipality of ‘s-Hertogenbosch tries to be a frontrunner in that sense that they are a big municipality and helps the smaller municipalities in the fulfilment of this kind of projects [3,6]. Besides this larger infrastructural project, the municipality is responsible for the maintenance of the local infrastructure and the design of crossings and streets. Their policy is that cyclist can cycle along every street with least interference as possible with other traffic modes. They also have an urban cycling network with critical cycling paths between Rosmalen and 's-Hertogenbosch. These cycling paths are one level below the fasts cycling route, and these cycling paths must also be from high-quality. It is impossible to let every employee take the fast cycle route. After all, it is not the shortest route from every neighbourhood in Rosmalen to 's-Hertogenbosch. Therefore, it is good to have a look at the experiences of employees with other cycling infrastructure than just the fast cycle route.

The municipality is also working on software solutions for mobility problems. For commuters, they cooperate with the campaign of Sjees and Sjees Gangmakers. Besides this, they have their campaign on the level of neighbourhoods to influence the behaviour of people in traffic. This includes a mobility analysis within the neighbourhoods. This analysis finds out which challenges there are regarding the traffic-safety and the accessibility of the inhabitants. Strategies or solutions can then be signs to lower the speed, or it can be a campaign to promote sustainable ways of transportation within the neighbourhood. There are some attempts to combine the campaign of the municipality with the campaign of Sjees. This would create a more general message than these separate campaigns, but this is not realised at this point.

5.1.3 Brabant Mobiliteitsnetwerk

The BMN (Brabant Mobiliteitsnetwerk) cooperates with employers in Brabant to increase the accessibility and solve mobility problems. BMN forms communities to work on these challenges. BMN tries to cooperate with both individual companies as well as forming alliances of companies to work together. Companies can join this community, and then the BMN is helping them and trying to bring them together with other companies nearby. How eager companies are to join these companies depends, amongst other things, on the context of the area. In an urban area with schools and housing around, there are often more mobility problems than in an industrial area outside the city centre. In the first case, companies are more willing to work on mobility issues because they experience more problems than companies outside the city centre [5,4].

BMN starts with a mobility investigation when a company is willing to cooperate with them. In this investigation, all aspects of mobility are included to find out where possible challenges are. This is not only on the aspect of promoting cycling, but it is also about the logistics of the supply, parking facilities and other aspects. Regarding the promotion of cycling, they have multiple options to offer. BMN researches to find out where the employees of company life, for example. They use this to show which group lives within cycling distance. They also look at the facilities at the workplace, for example, the parking facilities for bicycles, showers or a shared car for work trips. BMN does not realise these facilities, this is the responsibility for the employer, but the BMN knows third parties that can help with the realisation of these facilities [6,3]. More significant facilities, such as safe bicycle parking, can also be realised in cooperation with other companies. Therefore, these communities exist in which the BMN tries to create a shared goal and sharing the costs can also be beneficial for the participants. Another example is an e-bike pool where employees can try an e-bike for a couple of days. For a small company, this might be too expensive, but it is doable when a couple of companies organise this together [6,8]. They also offer the campaign Sjees Gangmakers to the employers who cooperate with them, which also tries to promote commuting cycling.

5.1.4 Platform 'Ons Brabant Fietst'

Ons Brabant Fietst is an organisation which has a program to encourage cycling in the province of Noord-Brabant. It is not only for commuting cycling but also for everyday cycling to places like shops or leisure activities and recreational cycling. Their target group is thereby the commuter, the everyday cyclists and students/youth. They cooperate with BMN but also other organisations like municipalities or private companies which help them to spread their campaign amongst citizens of the province. The campaign they are making has the purpose of showing citizens that the bicycle can play a more critical role in their life and that it is just a little step to start cycling. They make a magazine named Sjees Magazine, which serves this purpose. Besides this, they make a campaign which focusses more on the commuters. This campaign is divided into two parts, namely Sjees and Sjees Gangmakers. Both try to reach commuters, but the difference is that Sjees focusses on the employees and helps these employees overcoming the challenges to start cycling to their work. Sjees Gangmakers helps employers to promote cycling amongst their organisation. It is essential to recognise that their campaign is in the first stage of structural behaviour change. The facilitation of cycling and is more for other cooperating parties such as the BMN and the municipality [7,10]. The focus of Sjees and Sjees Gangmakers is in the first step, which is showing the possibility of cycling. This is in line with the practice theory where the practice of car driving is the dominant practice in the life of lots of employers and to change this the first step is let people think about different options, in this case, cycling.

5.1.5 Fietsersbond

The Fietsersbond tries to increase the attention for cycling. They do some promotion for cycling amongst citizens, but they are mostly trying to get attention in political processes. This happens at different scales, both the national government in The Hague as well as the local politics. Their goal is to better the context of cycling, not only in terms of infrastructure but also in behaviour. They are in contact with different political organisations such as municipalities and provinces to have a look at how things can be improved for cycling. The key in this is to join a process at the beginning before the detailed plans are produced (4,5). It is not that different modes are competing, but with large projects, it is crucial to have a good look at what effect specific projects have on cycling and where there are opportunities to adjust the plans better to fit the needs of cyclists (4,2). The Fietsersbond tries to find these opportunities and includes them in political processes. Figure 18 shows the stakeholders and initiatives which form the promotion of cycling in the area.

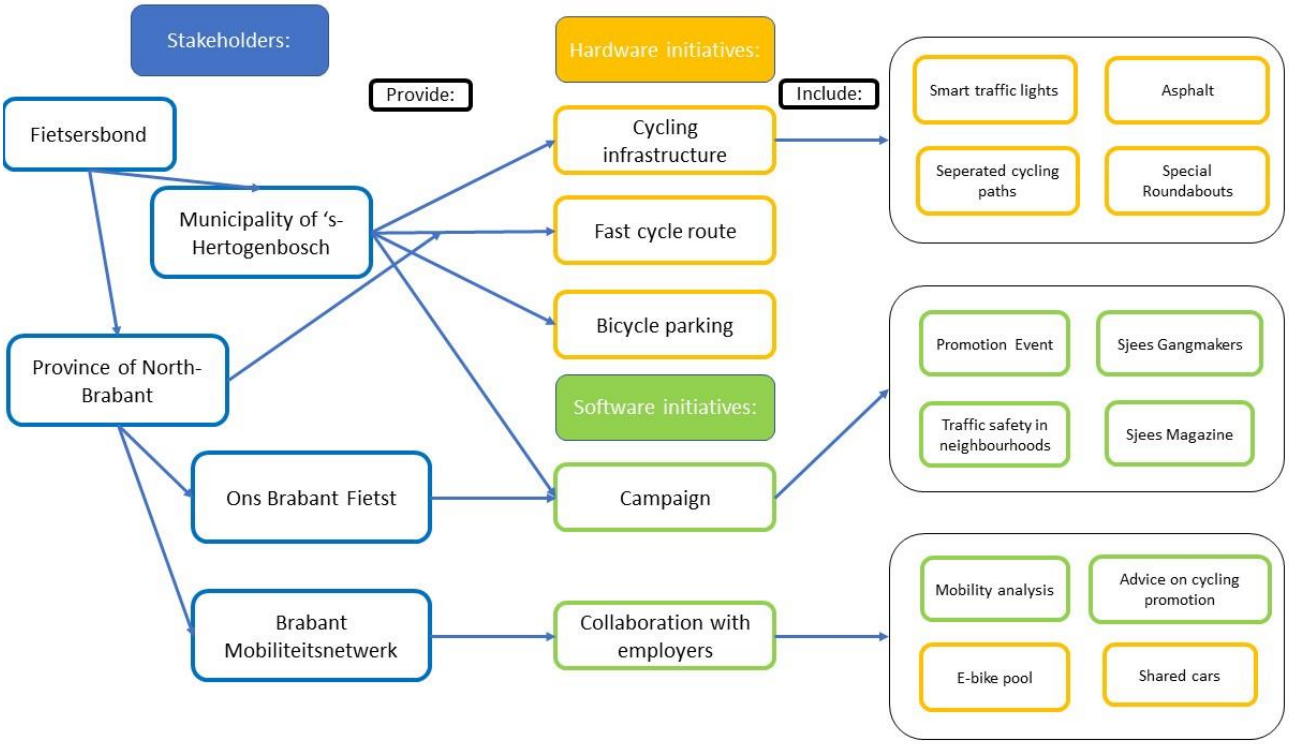

Figure 18: Overview of the stakeholders and initiatives in chapter 5.1 (Source: Own work).

5.2 Promotion of cycling

The previous chapter discusses the different stakeholders and initiatives which have the common goal to promote commuting cycling. There is a clear distinction between hardware and software solutions to promote cycling. It is essential to see the differences between this two and how these two kinds of initiatives execute in the area. Therefore, the first part of the next section is about hardware and software initiatives. After that, we follow the practice theory and have a look at how the policy of cycling is influenced by competing and collaborating practices of commuting cycling. Firstly, the competing practices are discussed, including car driving and public transport. Secondly, collaborating practices are mentioned, such as shopping and leisure activities.

5.2.1 Hardware initiatives

The hardware measures for cycling, according to the experts, are mostly about the infrastructure. This is about the quality of the fast cycle route, the traffic designs in the area and parking facilities. The fast cycle route between Rosmalen and 's-Hertogenbosch was one of the first fast cycle routes established in Brabant. The province monitors the use and experience of the fast cycle route by doing both quantitative and qualitative research. The most mentioned experiences with the fast cycle route are the high comfort and the priority at junctions [2,7]. The fast cycle route is maybe not of the highest standard because it is a couple of years old, but the users of it still appreciate the quality of the fast cycle route. There are a couple of improvements possible at this part of the fast cycle route. The first one is that the route is not 4 metres wide in all places. Four metres is the current standard for fast cycle routes, and at some points, the F59 is only 3 metres or even less. The second one is that there are still some obstacles on this route such as bicycle streets where cars can park their car or the cycling bridge near the train station of 's-Hertogenbosch-Oost which does not meet the requirements of a fast cycle route because it is too narrow and too steep [2,11]. Figure 19 shows the cycling bridge near the train station.

Figure 19: Cycling bridge near the station 's-Hertogenbosch-Oost (Source: Own work)

There is more to say about infrastructure than just the fast cycle route. Especially in the case of 's-Hertogenbosch – Rosmalen because there are more routes possible from Rosmalen to the city and also within 's-Hertogenbosch, it is important what the quality of the infrastructure is. The other routes from Rosmalen to 's-Hertogenbosch is from a lower quality than the fast cycle route. There are more crossings and obstacles at routes like the Bruistensingel. The municipality is responsible for this, and they try a lot to prioritise cyclists at these different traffic situations [3,7]. Two examples of this are the traffic lights were cyclists get prioritised in a way that these smart traffic lights let cyclists pass by earlier than cars in peak hours, and they have roundabouts were cyclists can go both ways. Cyclists get prioritised at these roundabouts. There is some discussion about the safety of these roundabouts. Nevertheless, it shows that the municipality increases the flow of cyclists [3,7].

In many cases, these strategies work, but sometimes this still leads to some unsafe situations where car drivers and cyclists meet at crossings or roundabouts. Traffic lights are often safe, but still, cyclists have to wait, which lower the comfort of cycling. The Fietsersbond argues that it is better to separate cycle paths from crossings, where cyclists interact with other modes [4,7]. This means cycling bridges or tunnels, which increases the flow for cycling. They admit that this requires enormous investment sometimes, but there are opportunities if the government includes this in big infrastructural projects around highways or other roads.

The last point, which is a hardware initiative is the parking facilities for cyclists. The first step starts already at the homes of employers where it is often more quickly to take the car than the bicycle [4,8]. The car often stands in front of the homes of employers while sometimes the bicycle is in a souterrain which is further away than the car. This is more a challenge for urban planners to look at these facilities in building projects. The same story applies at the other end of the route.

There are often extensive parking facilities near offices or shops and just a small bicycle parking facility for employers. The BMN looks at these facilities when they cooperate with a company to better the situation for cyclists in comparison to car drivers [5,10]. Both the province and municipality see this as a challenge to have a critical look at parking facilities at business parks and in the inner city [2,12; 3,9].

5.2.2 Software initiatives

The preconditions of cycling are essential, and the previous section shows that a lot is going on to facilitate these preconditions in the province of Noord-Brabant. It is of high quality in terms of safety and recognition [1,10]. What practice theory shows, is that these preconditions are not enough to change the modal split. The province acknowledges that there are already some software initiatives going on which are trying to prioritise cycling above other modes, but this can be on a much larger scale [1,10]. All the experts are addressing that they are not aiming to a complete modal shift to cycling because many people are just not able to cycle because of health conditions or distance to their destination. Nevertheless, there is a target group of people who can cycle but are not cycling because of habits, and it is there goal to reach this target group [7,5]. The project of B-Riders was a proper initiative regarding the behavioural change, but unfortunately, this project ended and did not return in the same size. The municipality is trying to change the behaviour using a campaign on the neighbourhood level.

Figure 20: Different stages of behavioural change towards cycling (Source: Brabant Mobiliteitsnetwerk, 2020).

Regarding the mode change to cycling, BMN distinguishes different stages in the behavioural change to cycling (figure 20). The first one is that an individual is open to new behaviour. An employer can play a role in this to tell the employees about the opportunities of cycling and also other members within the social environment of an individual should have positive experiences with cycling and talk about it with [8,10]. The campaign of Sjees and Sjees Gangmakers is focussing on this first step by giving campaign equipment to employers, for example, and they make a magazine. Within this magazine, they try to show that cycling is an option with the right equipment and preparation a lot more people can start cycling [7,6].

They made four imageable characters which presents the most important target groups such as a young couple with or without children and by using these characters they want the readers to recognise themselves in these characters and then get an idea of the possibility of cycling within their life [7,6]. Then the next phase is that people know about this but are not sure if they want cycling. Then the BMN tries to help with an e-bike pool, for example [8,10]. In every phase, BMN is helping the employer to stimulate their employees in the right way and also helping them to find the right organisations to realise specific initiatives such as shared cars or changing rooms. They believe that it is much more useful to organise this promotion of cycling through employers than on an individual level because these employers can have much more effect on the everyday situation of the employees. In the end, when employees made the change, it is essential to let them continue this behaviour. An option to do this is complementing these employees [8,10]. This whole process is a traveller's journey where each phase needs different aspects of cycling promotion, and in this way, a structural behaviour change towards cycling is possible.

5.2.3 Competing practices

There are different practices involved in commuting; one example in this is the mode which commuters use. It became clear that a lot is going on to promote cycling for commuting, but what about the other options, modes, which commuters use. The question is whether there is a strong competition between cycling and these other modes and which influence this has on the effectiveness of cycling policy. Most experts agree that the aim is to not compete between cycling and other modes but that the bicycle can be an addition to these modes [2,8; 3,8; 7,8]. Firstly, the aim is to let employees understand that a bicycle is an option, maybe not for all days but just for a couple of days per week [7,8]. This goal shows that the bicycle does not have to be a full replacement for other modes. Instead, cycling should be a serious option with the aim that the new habit of the individual is that they take the bike when it is suitable weather or when they do not have an appointment for work that day for example. That they take the car or public transport on the other days is considered as not a problem. The second way in which the experts think to overcome this competition is to include cycling in infrastructural plans of other modes [2,8]. Examples of this are cycling facilities at bus stops which makes it possible to include cycling at least in a part of the route or including a bicycle bridge in a sizeable infrastructural plan. Besides this, the municipality has a traffic network in such a way that cyclists have their separate routes with less interference with other modes to better the flow of cycling [3,8].

Although this is the aim, there are some structures in existence which does not help to overcome this competition. There is much cooperation between the different policy groups of different modes, but still, they are different groups where each group wants to optimise its mode [1,9]. The idea of expanding roads to lower traffic jams is not that popular anymore because this only happens when there is no other option. Nevertheless, it is the question whether the cooperation between cycling and other modes is at the level where it should be. This is also a political question but what the experts see is that it is a slow revolution which could go faster [1,9]. The Fietsersbond agrees with these points by saying that it is good that cycling is more and more included in large infrastructural plans. However, the rate in terms of investments of car infrastructure and cycling infrastructure is still very uneven [4,9]. While the big MIRT-projects costs billions of euros sometimes, the investments in cycling infrastructure stop at 50 to 60 million at max [4,9]. This shows that although the aim is there to overcome the competition and see the opportunities to connect the modes, in reality, it is a bit more complicated and the competition is still visible.

5.2.4 Collaborating practices

Previous research shows that individuals combine their commuting trip with other trips, as shown in chapter 2. The expert interviews show that this is a problematic point in cycling policy. This is really about behaviour, and there are steps to take in this matter [1,15; 4,12]. It is hard because it differs a lot between individuals, everyone is in different life stages, and this leads to different destinations in a day. Therefore, a solution is often very complex. Therefore, the statement is that if an individual has side activities during a commuting trip, it might not be possible to cycle, but this is not the case every day. Maybe, there are other days when an individual does not have to go to these other destinations and then it is possible to cycle [2,9]. The question is whether this works like that. There has to be a situation where people are actively thinking about their mode options. That is often not the case according to the practice theory. To show people that these different trips are possible by bicycle, the campaign of Sjees tries to give examples and tips on how to make this possible by bicycle [7,13]. Even there it is hard because every individual is in a different situation and it is hard to make a general campaign on this, but this is one example on how they want to include these other practices in the promotion of cycling. Still, it is hard to include this correctly, and it is a challenge to come up with ideas about how this can be included more in the future.

5.3 Corona crisis

So far, this chapter explains the practices involved in the promotion of cycling in the area. It is based on all the knowledge and possibilities before the changed context due to the corona crisis. A couple of notions have to be addressed because both opportunities and challenges came up due to the crisis. Mobility patterns did change the last months, and the best example is the high increase in working at home. At one point, people start working at the office again. The question is whether people choose less or more times for the bicycle after the crisis and some positive things increase the chance that people take the bike. The first one is that people did not want to stay in their house all the time and therefore started cycling just for leisure purposes [1,16]. Maybe they experienced this as positive and want to implement this cycling trip in their daily routine, even after the crisis. From a policy perspective, the fast cycle route can play an essential role in this as well. Unintentionally, the fast cycle route makes cycling a safe mode choice because of the extra space for cyclists and its capability to host a high number of cyclists at the same time [2,10]. Therefore, making the bicycle a promising alternative for less corona proof modes such as public transport.

On the other hand, people start driving the car more instead of cycling because of its subjective safety regarding the coronavirus. It is a challenge to show people now that they can take the bicycle, but the other challenge is that many promotion activities such as events at companies or in neighbourhoods cannot take place at this moment [7,15]. Besides this, the question is whether employers are as enthusiastic about the promotion of cycling as they were before the crisis because they might have other things on their mind in terms of financial issues or other challenges [4,14]. A lot is still uncertain about the future in this sense. The challenge is to promote the bicycle in such a way that after the crisis, the mobility patterns have changed in the right direction.

6. Social practice of commuting cycling

The previous chapter shows that there is a lot to facilitate commuting cycling in the region. The next chapter looks into the practice of commuting cycling based on the experiences of commuters who live in Rosmalen and work in 's-Hertogenbosch. This part of the research serves to answer the sub-question: 'What are the materials, meanings and competences of commuting cycling according to employees in the corridor Rosmalen – 's-Hertogenbosch?'. Besides this, the chapter will give some insights that will come back in the conclusion chapter, which discusses the use of social practice theory in analysing commuting cycling. The interviews held with the commuters form the base of this chapter. The chapter has three subparts. The different parts are:

- Infrastructure
- Cycling and work
- Cycling and the individual

The first part is about the route of the commuters to work and the infrastructure of this route. This part includes the experiences of the commuters with the fast cycle route as well as with other infrastructural elements such as other cycle paths and traffic lights. The influence of work-related matters on cycling is the second part of this chapter. This includes the facilities at the workplace and the issue of work-related appointments elsewhere. The personal matters of the commuters are the focus in the third part. This is about the motivations regarding commuting cycling. The third part also discusses the subjects of weather conditions and the corona crisis and their effect on commuting cycling. This last part also includes the relation to other social practices in the private life of commuters. With this, groceries and leisure activities are essential practices which affect the social practice of commuting cycling. There is a table of different elements after every subpart in this chapter (figure 27, 28 and 29). The references of the elements that many respondents mention are in the tables beneath each subchapter. References of elements that are mentioned by just a few respondents are in the text. These elements build up the social practice of commuting cycling, according to the respondents in Rosmalen.

6.1 Infrastructure

6.1.1 Time and distance

The first question in the interview was about the duration of the route to work. Both with the car as with the bicycle. The duration with the car is between 10 and 20 minutes, and the duration with the bicycle is between 20 and 30 minutes. Only a few respondents experience the bicycle as more time-consuming than the car [9,4; 13,12]. Most of the respondents do know that the car is a bit quicker, but they do not mind that the bicycle is a bit more time-consuming. The difference of 10 minutes on average between the car and bicycle is not sufficient enough that the respondents prefer the car because of time reasons. The respondents who take the car to work are avoiding the highroad A2 because of the chance of traffic jams. Instead, they take a similar route as with the bicycle. This route is often also busy for the car. Traffic lights hold up the car drivers, and there are some busy roundabouts which slow the car down. This has a negative meaning for car driving and is for some respondents a stimulus to take the bicycle [12,17; 14,10; 19,21]. The distance for every respondent is between 5 and 10 kilometres. They find themselves to have the competence to cycle this distance. The distance and time have no significant meaning for both cycling and car driving. What this shows is that time and duration are by far, not the most critical elements of the social practice in the case of two cities within 10 kilometres. Commuters experience no clear negative or positive meanings about a mode if the duration and distance of the route are within this range. This range is a duration of a 30 minutes maximum of cycling and a distance of 10 kilometres maximum.

Around half of the respondents uses an alternative route sometimes. They take these routes for different reasons, but it happens only on the way back home. They all use the same route to work in the morning. Variation in the route is the most mentioned reason for taking an alternative route. Some of them take a detour through a more natural environment, others just within the city to have some variety in their daily routine. Some take an alternative route when they combine their commuting trip with other trips such as groceries in the city centre. More about this will follow in chapter 6.3.

6.1.2 Fast cycle route

Figure 21 shows the fast cycle route between Rosmalen and 's-Hertogenbosch (blue) and other possible routes to cross the channel and the highway. The number of respondents who take that route is behind the name of that route. The map shows that four respondents use the Bruistensingel to cross the highway and channel. The other routes are used by two respondents each. This shows that most of the respondents who cycle to work are not taking the fast cycle route. They prefer the Bruistensingel, for example, and then only cross the fast cycle route or follow it for a little part. Respondents take the shortest route to work with the bicycle. The fast cycle route is often not the shortest. Respondents are not taking a detour to ride this fast cycle route. Instead, they use the shortest route in their experience. The respondents state that it is unfortunate that they do not enjoy the high comfort of a fast cycle route at their route. Figure 22 shows the neighbourhoods where the respondents who cycle live and the workplaces of these respondents. The dots in this figure are only indications of the neighbourhoods where respondents live and work. They might not be entirely correct. This map shows that the route which they take to cross the channel and highway depends on where they live in Rosmalen. Employees living in De Groote Wielen are more likely to take the Bruistensingel instead of the fast cycle route. The same applies for employees in the south with the Graafsebaan.

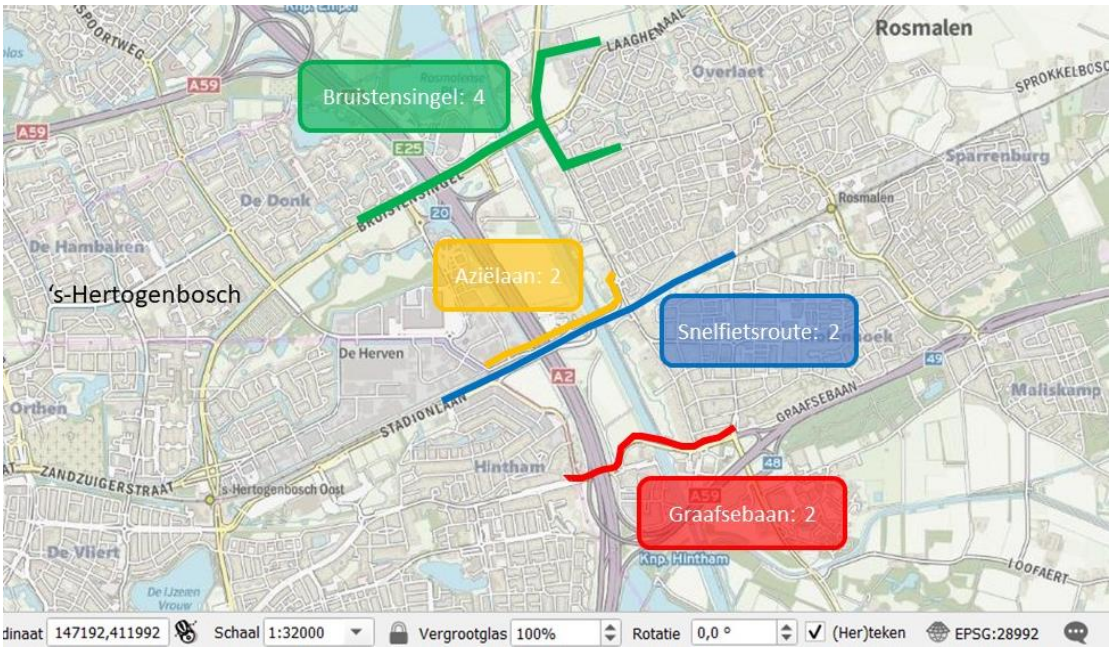

Figure 21: Map of routes taken by respondents who cycle to work (Source base layer: (PDOK, 2020) *Data: Own work)*

It shows that the fast cycle route is not the only important cycling path for the target group living in Rosmalen. This has some consequences for the promotion of cycling regarding the fast cycle route. The conclusion of this research includes a discussion about this topic. The F59 established a couple years ago. The route is well-known amongst the respondents.

Every respondent knows that there is a fast cycle route between Rosmalen and ‘s-Hertogenbosch. The respondents also know which cycle paths are a part of the fast cycle route. They also appreciate the name which is referring to the highroad A59. The A59 connects the same cities as the F59, and this link makes it understandable for the respondents. This increases the awareness of the existence of this fast cycle route.

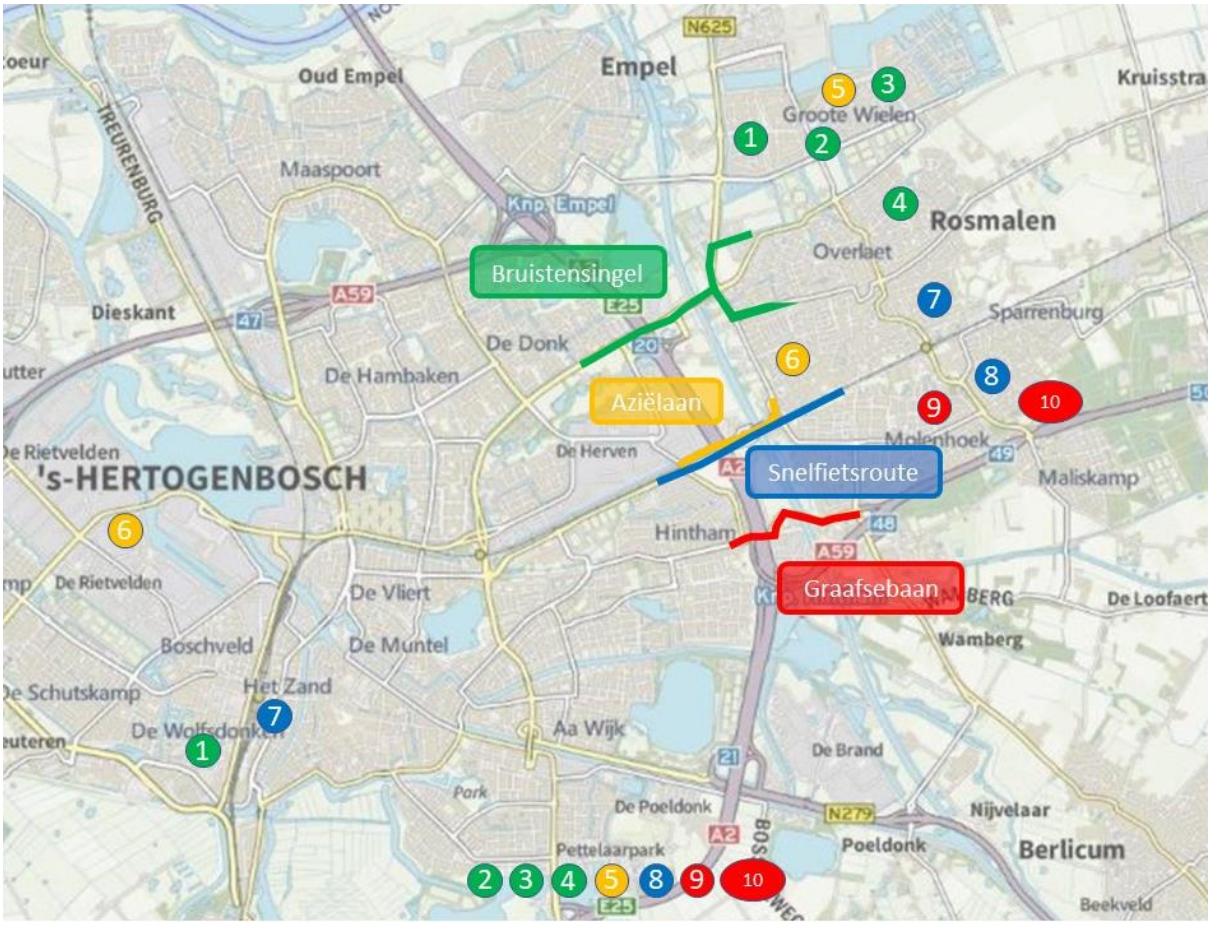

Figure 22: Map of the neighbourhood and the business parks where the respondents life and work: (PDOK, 2020) *Data: Own work)*

Most of the respondents are not using the fast cycle route to commute. They do use it at other times. For example, they go shopping in the city centre of ‘s-Hertogenbosch or when they are cycling as a leisure activity. The experiences with the fast cycle route differ between different parts of the fast cycle route. This research focusses mainly on the part between Rosmalen and ‘s-Hertogenbosch. The respondents rate this part as very comfortable. They appreciate the broad cycling paths and the fact that there are fewer obstacles, such as crossings. The fact that it is a straight line with no sharp turns or other detours is also a plus regarding the respondents. Figure 23 shows the part of the fast cycle route that the respondents appreciate a lot. There are a few minor negative experiences with the fast cycle route. The first one is some crossings in Rosmalen. Cyclists do not get prioritized at these crossings (figure 24). The respondents are negative about these crossings (14,20; 16,20; 21,34). The part of the fast cycle route in the city centre of ‘s-Hertogenbosch is also a negative point (11,2; 12,16). This is because this part is often busy. Cyclists have to be careful in this part because they have much interference with other traffic modes. Some respondents also shared their experiences with the part of the fast cycle route from Rosmalen to Oss. They were negative about the part in Geffen because it was unclear and not as comfortable as the part from Rosmalen to ‘s-Hertogenbosch (16,20; 20,32).

In general, the experiences with the fast cycle route are good, but there are a few parts that can be improved. These findings are in line with previous research about the experiences of cyclists with the F59 (Provincie Noord-Brabant, 2017).

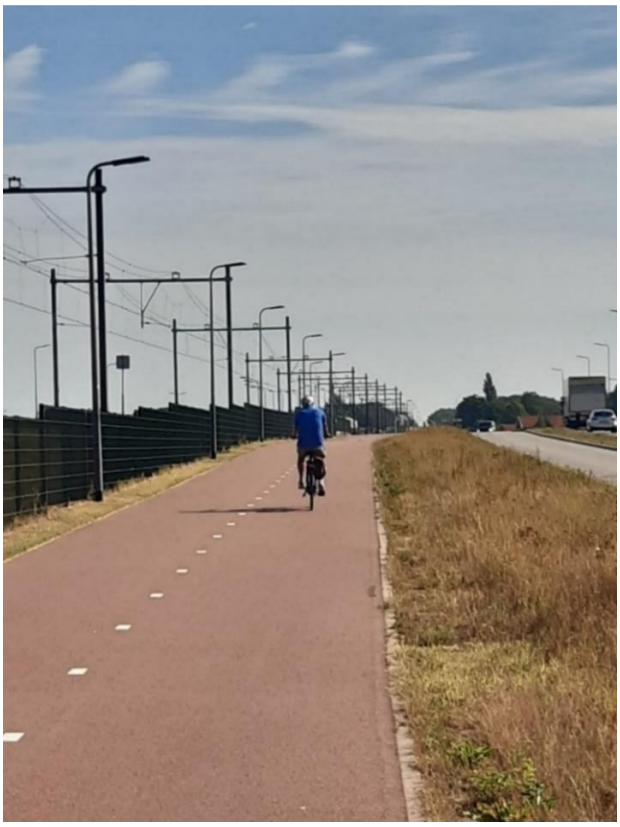

Figure 23: Comfort bicycle path at the fast cycle route (Source: Own work)

Figure 24: Difficult crossing in Rosmalen at the fast cycle route (Source: Own work)

6.1.3 Other cycling infrastructure

The cycling infrastructure, besides the fast cycle route, is sufficient for cyclists regarding the respondents. Cycle paths that separate from roads for other modes are highly appreciated. These separate cycle paths are present everywhere except for some paths in the city centre of 's-Hertogenbosch. Asphalt is the most used street covering at the cycle paths. Respondents prefer asphalt above other coverings such as bricks or tiles. Dangerous crossings are the most experienced negative point of the cycling infrastructure in the area. The cyclist does not get prioritized at many of these crossings or traffic lights. This decreases the comfort of the route. The respondents are aware of the existing of smart traffic lights, but they valuate this very different. A couple of respondents appreciate the smart traffic lights. They have the competence to cycle in such a way that they do not have to stop at these traffic lights very often. Others are less enthusiastic about smart traffic lights. The smart traffic lights are not well-adjusted according to these respondents. They think that there are improvements possible in order to better the flow of cycling. The municipality of 's-Hertogenbosch makes use of unusual roundabouts where cyclists can ride both ways (figure 25). The respondents do not appreciate these roundabouts both while driving a car and cycling. They think these are not safe, and one respondent mentioned that he had a couple of incidents where a car driver did not notice him on his bicycle. This leads to traffic accidents, according to this respondent. There are some minor improvements possible besides this. These are some steep climbs in order to cross the high road and channel. Especially the older respondents mark this as dangerous and challenging to cycle without an electric bike [11,14; 12,13; 23:13]. Some other respondents mention the dangerous situation in the winter when it gets slippery sometimes (figure 26) [12,13; 14,11; 19,30]. In general, the respondents rate the cycling infrastructure as sufficient. The fast cycle route is even better in terms of comfort, but it did not change the route of the respondents.

Figure 25: Roundabout where cyclists can go both ways (Source: Own work)

Figure 26: Warning of slippery grids and bridge during bad weather conditions (Source: Own work)

Theme	Materials	Reference	Meanings	Reference	Competences	Reference
Time and distance			Cycling only a bit slower than car driving	(9,5; 10,2; 11,1; 12,1; 15,1; 16,11; 17,2; 18,1; 19,2; 20,1; 21,1; 22,1; 23,1)	Capable to cycle this distance	(9,5; 10,2; 11,1; 12,1; 15,1; 16,11; 17,2; 18,1; 19,2; 20,1; 21,1; 22,1; 23,1)
			Time not considered a negative point	(9,5; 10,2; 11,1; 12,1; 15,1; 16,11; 17,2; 18,1; 19,2; 20,1; 21,1; 22,1; 23,1)		
			Detour for variation	(11,18; 19,12; 20,41; 23:16)		
Fast cycle route	Fast cycle route has to be on shortest route	(10,5; 13,15; 14,20; 16,20; 17,20)	Broad cycling path	(11,13; 12,16; 14,20;	Awareness of the existance of the route	(9,19; 10,5; 12,14; 13,15; 14,19; 15,21;

				15,24; 19,24; 20,32; 23,13)		16,19; 17,20; 19,22; 20,29; 21,31; 22,3)
			No obstacles	(11,13; 12,16; 14,20; 15,24; 19,24; 20,32; 23,13)		
			Straight line	(9,20; 10,17; 15,24; 19,24; 23,13)		
Further cycling infrastructure	Solitary cyclepath	(10,16; 12,13; 16,1; 17,10; 18,2; 19,1; 20,33; 21,20; 23,15)	Cycling infrastructure sufficient	(11,11; 18,12; 20,38; 22,6; 23,15)	Not capable to cycle steep climbs	(11,14; 12,13; 23:13)
	Asphalt	(10,15; 14,1)	Negative: Crossings	(18,2; 19,25; 21,35; 22,19; 23,16)		
			Negative: Traffic lights	(14,1; 17,11; 18,2; 19,14; 20,40)		
			Negative: Special roundabouts	(19,16; 22.19)		

Figure 27: Overview of elements found in the theme infrastructure (Source: Own work)

6.2 Cycling and work

6.2.1 Work appointments

Different factors around the work of the respondents play a role in shaping the social practice of commuting cycling. One of the most mentioned factors in the interviews is work appointments. Work appointments are meetings, visiting clients or field trips, for example. There are two different kinds of work appointments that are important for this research. Work appointments at the workplace are the first one, and work appointments elsewhere are the second one. Respondents choose the car when they have a necessary appointment at the workplace because they want to show up formal and proper. They think that this is not possible by bike because of sweating or getting wet during rain. Facilities such as showers and changing rooms do not affect this meaning. They take the car if they have appointments elsewhere too. These appointments are often further away and are therefore not possible by bike most of the time. The respondents who usually take the car to work experience the car as ease because they can take the car from the workplace to these other appointments without any further need for planning. The respondents who normally take the bicycle experience that they plan more in advance. If they know that they have an appointment elsewhere, they take the car from home instead of the bike. This is an exciting outcome because this suggests that the mode choice of cyclists seems to be more rational-based than the mode choice of car-users when these respondents have work appointments that day. More on that will follow in chapter 7.

Shared cars at the workplace is a possible solution which makes it possible to cycle to work and take a shared car from the workplace to appointments elsewhere. Most of the respondents know that this solution is present at their workplace, but not all of them. The experiences with these shared cars are mixed. Some respondents have very positive experiences with shared cars (19,9; 20,17; 22,9). They use it a lot, and the practicalities around these shared cars are good.

They say that the option of shared cars is a real stimulus for using the bicycle to work. Other respondents are less positive about shared cars. They say that it is much work to make a reservation or they find themselves not capable of using these shared cars. They are afraid of driving another car. A suggestion is to try these shared cars together with an instructor who explains the details of the car. Some respondents say that even then they would prefer their car. The reason for this is that they do not plan days. Therefore, it is not possible in their eyes to use a shared car. In general, shared cars have the virility to overcome the obstacle of work appointments elsewhere. They are not everywhere available at this point, and it would help if these shared cars get more attention and helping commuters to use them.

6.2.2 Facilities at the workplace

The bicycle parking spaces at the workplace are adequate in contrast with the parking facilities for cars according to the respondents. The respondents praise bicycle spaces for multiple reasons. Safety is the first reason. The respondents are all convinced that their bicycles are parked safely at the parking spaces. Besides this, the parking spaces are close to the entry of the workplace. Another positive point is that the spaces are roofed in most of the time. There is a bicycle pump in some places. There is even a repairman at the workplace of the province. The capacity of the bicycle spaces at the province is not enough, according to some employees. Nevertheless, this is considered a minor problem. The general view is that bicycle parking spaces are sufficient.

The respondents were also asked how the parking facilities for cars are in the workplace. Around half of the respondents experience the capacity of the parking facilities as unfavourable. There are not enough spaces near the entry of the workplace. Therefore, they have to park their car further away when it is a busy day. This is a real stimulus for cycling for some, but others have fewer negative feelings about this.

So far, this paragraph only talked about the parking facilities at the workplace. The possibility to park the car in front of the home of employees also plays a role. The respondents who are driving a car are pleased with the fact that they can park their car close by. The respondents who are partly or most of the time cycling state that the car close by is tempting when they consider which mode they would take that day. In conclusion, the interviews show that the bicycle parking facilities at the workplaces in the area are adequate. The car parking facilities both at home and at the workplace can have a restraining effect for cycling if these facilities are from high-quality.

Showers and changing rooms are quite often available for the respondents, but the respondents are not using these facilities in general. The distance is the most given reason why the respondents are not using the facilities. The respondents that cycle usually experiences no troubles in terms of sweating or dirt, which might tempt them to use the facilities. Respondents who take the car say that sweating is a reason not to cycle. However, the presence of showers and changing facilities do not overcome this meaning for these respondents—the same applies when respondents have important meetings at the workplace. The respondents do not take the bicycle and use these facilities in this case. Instead, they take the car in this case. Nevertheless, the facilities are present, and the respondents are aware of these facilities. Some of them acknowledge the fact that colleagues who live further away are using the facilities. The average distance is between 5 and 10 kilometres in the case of Rosmalen – ‘s-Hertogenbosch. This research shows that for this group, showers and changing facilities are less critical.

Lockers are also often present in the workplace. Some respondents find it hard to cycle to work because they need to bring work stuff such as a laptop, documents, lunch or other items (11,4; 16,8). They do not use the locker for this stuff.

The respondents who bring a laptop do not put the laptop in the locker because they have to use the laptop in the evening, or they often have to go to a client the next day. This makes it impossible to leave the laptop at a locker at work. Therefore, showers and changing rooms are not the essential focus point for cycling promotion to affect the group of cyclists and car drivers in Rosmalen.

6.2.3 Financial support cycling and flexible working hours

Financial support to purchase a bicycle and flexible working hours are the last work-related factors. The first one promotes cycling effectively, and the latter depends on the character of the employee. A lot of the respondents who cycle daily make use of a bicycle plan ('Fietsplan'). This is a system where the employer pays a share of the costs of a decent bicycle. The effectiveness of this system is not only the high number of users, but it also changes the mindset of the users. Respondents who are using the system feel proud of their bicycle. They feel the obligation to use the bicycle because the employer partly pays it. The purchase of this bicycle makes them conscious about the option of cycling. There is a real difference between the users of this bicycle plan and other respondents in terms of considering commuting cycling. This plan might be the trigger to start cycling. After that, according to social practice theory, the practice of commuting cycling became embedded in everyday life of the employee. This is eventually the goal of cycling promotion policy. Therefore, employers can have a significant impact by introducing a bicycle plan.

Flexible working hours is an option for about two-thirds of the respondents. Classes, meetings or other appointments are the most given reasons why flexible working hours are not an option (11,22; 12,25; 14,25). Most respondents do not have these meetings every day and thus are partly able to use flexible working hours. Only half of the respondents make use of this option even though it is a possibility. This depends more on the character of the individual. Some respondents are more strictly in their daily routine (9,15; 13,4; 14,25; 19,10). They go to work at the same time every day. Others find themselves more flexible (10,25; 15,38; 23,8). These people have no problem starting at home and go a bit later to work. The same situation applies when there are bad weather conditions at the moment that the employees want to go to work. More on that will follow in chapter 6.3. Almost none of the respondent argues that flexible working hours is a stimulus for cycling.

Theme	Materials	Reference	Meanings	Reference	Competences	Reference
Work appointments	Shared car	(10,8; 14,17; 17,34; 19,8; 20,16; 22,7)			Show up properly at meetings not possible	(9,8; 12,23; 18,22; 23,7)
					Appointments elsewhere too far	(9,1; 10,8; 13,7; 14,16; 16,9; 17,32; 19,3; 20,6; 21,39)
					Not comfortable with driving shared car	(10,9; 17,34; 21,41; 22,9)
Facilities at the workplace	Bike parking close to work	(10,13; 11,7; 12,8; 14,8; 19,17; 21,23; 22,13)	Bike parking safe	(10,13; 11,7; 12,8; 13,22; 14,8; 15,13; 17,13; 18,9; 19,17; 20,24; 21,23; 22,13; 23,10)		

	Bike parking roofed in	(10,13; 14,8; 17,13; 19,17; 21,23; 22,13)	No need for showers and changing facilities at this distance	(10,14; 11,9; 11,12; 15,20; 18,16; 19,17; 21,27; 22,16; 23,11)		
	Bike parking at province needs little bit more capacity	(12,22; 14,8; 18,9; 22,12; 23,10)	No need of lockers	(10,14; 16,27; 17,18; 21,27)		
	Limited car parking	(10,11; 14,15; 15,16; 16,18; 20,24; 21,23; 23,10)				
Bicycle plan	Bicycle plan	(10,23; 13,19; 14,13; 15,32; 17,31; 18,6; 19,17; 20,35; 21,28; 22,17; 23,21)	Bicycle plan stimulates commuting cycling	(10,23; 18,6; 19,17; 22,17; 23, 21)		

Figure 28: Overview of most-mentioned elements found in the theme cycling and work (Source: Own work)

6.3 Cycling and the individual

6.3.1 Motivations for cycling

The motivations for cycling that the respondents gave during the interviews are similar to motivations in previous research. Daily exercise is the most mentioned one. Most respondents enjoy the daily exercise and prefer this above going to the gym, for example. Not only physical exercise is a health-related motivation for cycling. Mindfulness is important too. Respondents like that they can clear their mind on the way home. They forget about their work-related issues and have a feeling of freshness when they arrive at home. Besides this, the combination of physical and mental health is also mentioned as a motivation a lot. This motivation is general health. Rapidity is another mentioned motivation for cycling. Respondents feel that cycling is faster than other modes. The absolute time it takes to cycle is often longer than the time it takes with the car. Nevertheless, respondents feel that cycling is quicker because of the constant limitation of car traffic through traffic jams, traffic lights and crossings. They experience fewer limitations to cycling. Therefore, rapidity is a motivation for cycling for the respondents. Public transportation is both in absolute and relative terms slower. Environmental principals and the reduction of car-use are other motivation for why cycling is necessary for the respondents. These motivations above are in line with previous research about the motivations of cycling. The cyclists and car-users give the same motivations. These motivations are all meanings in practice theory. This suggests that meanings are not the only important kind of element because both cyclists and car-users agree on these personal meanings of cycling. It is the combination with the other elements that embed a social practice in personal life.

6.3.2 Bad weather conditions

Respondents who cycle normally, choice for the car when there are bad weather conditions. Social practice theory argues that individuals do not make a rational choice every day, as discussed in chapter two. Bad weather conditions, mostly rain, changes the context of the mode choice. Every respondent takes the car when the conditions are deplorable with heavy rain and thunderstorms. Two-third of the respondents take the car with light rain too. The process looks very much like a rational choice. Most of the respondents watch a weather report or use an app with a rain radar.

Others look outside whether it is raining or not. They decide to take the car when the forecast predicts rain for the next few hours. Regular cyclists take the bicycle when it is dry for the next few hours. They do not mind that they get wet on their way home in the afternoon. Arriving wet and sweaty is the motivation why respondents do not want to cycle when it is raining. Most of the respondents do not want to use rain gear. Instead, they take the car when it is raining.

Chapter 6.2.3 discusses the option of flexible working hours. Most of the respondents do not use flexible working hours in bad weather conditions. They do not wait until the rain is over. This is an option, but they do not use it because they do not want to wait. They prefer to go right away. They choose the car in this case. Therefore, bad weather conditions are changing the routine of cyclists. The mode choice is, in this case, a rational choice based on the weather conditions as perceived by the cyclists. This is less the case for car-users who take the car no matter what weather conditions there are. This outcome shows that bad weather conditions restrain cycling, and it is the question of how much can be done about this. Promoting working at home is a better solution than trying to promote cycling because the car seems to be the only choice for all respondents in bad weather conditions.

6.3.3 Collaboration with other practices

Around two-thirds of the respondents combine their commuting trip with getting groceries. There is a difference between shopping a few small items and shopping for more oversized items or weekly groceries. The respondents who cycle usually find themselves capable of taking a detour to a shop when they only need to buy some small items. This can be a bag of milk, a small birthday present or some ingredients for dinner, for example. They experience that they are flexible with the bike to get these things. These respondents find themselves not capable of getting larger groceries. Some take the car to work when they need to do this. Others are not combining these larger groceries with their trip to work. They do this another time, or they make use of a delivery-service. Respondents who take the car normally use the car for both smaller and bigger shopping when they combine it with their trip to work. It is interesting to notice that car-users have the same experience of flexibility when they go shopping for just a few small items. Cyclists think that they are flexible because they cycle, and car-users think the same because they use the car. Flexible in the sense that they can take a little detour to pass by the shops they want to go to. This suggests that the mode choice is not rationally based when the respondent combines the trip to work with groceries. Respondents cycle when the social practice of cycling is embedded in their life and others take the car when car driving is the dominant social practice. However, another exciting finding for the debate about social practice theory which chapter 7 is about.

Bringing children to school or daycare and getting them in the afternoon is a practice that makes respondents prefer the car above cycling. These schools and daycares are often further away. Because of this, respondents need to take a detour from their usual route to work. This idea makes the bicycle less attractive. Another argument is that it is hard to cycle with little children for a more considerable distance. The respondents find themselves not capable of doing this. Nevertheless, most respondents experience that having little children to bring somewhere restrains cycling. There are a few other mentioned practices, including visiting family and friends, sports activities and cultural activities. The respondents do not combine these practices very often with their trip to work. The combination is possible by bicycle for some [14,13; 20,21]. Others choose the car when they know that they have such a combination that day [12,15; 23,5]. Despite these findings, it is hard to influence this combination of practices. Besides this, the effect it might have will be limited because the combination with these practices does not happen very often for the respondents. Groceries is a practice that seems to shape the practice of commuting cycling, but other practices do not.

6.3.4 Natural environment

The respondents are predominantly negative about the natural environment on the route to work. The route is not green enough, according to the respondents. Besides this, the living environment in neighbourhoods focusses on the car (10,21; 17,27). This decreases the quality of the surroundings for cyclists. Respondents experience their route as quite dull with not much to see. Some respondents take a detour to cross some natural elements such as a park or pound. The natural environment does not affect the mode choice of the respondents. The quality of the route is discussed in previous sections. The infrastructure is sufficient, and cyclists tend to take the shortest route to work. The natural environment does not change a lot about these findings. Commuters do not bother the quality of the surroundings of their route. This is in contrast with the experience of cycling as a leisure activity.

6.3.5 Corona crisis changes the context of mode choices a bit

The most significant change in the context of mode choices is the more cynical view of public transport by the respondents. Wearing face masks and less capacity are the reasons why respondents are less likely to use the public transport system. This changes not so much in the specific case of this research because public transport is less critical than cycling and car-driving. Some respondents used public transport for work-related appointments elsewhere. Here, the car is the substitute which is most likely to be used instead of the public transport system. The other significant context change is the increase in working from home. Respondents expect that working from home will stay more permanently after the corona crisis. Although working from home will not entirely replace working from the workplace, according to the respondents. Respondents value the workplace for face-to-face meetings and a better work environment. The corona crisis does not have an effect on the mode choice between car driving and cycling for the respondents. Some cyclists miss their cycling trip in their daily routine thanks to the corona crisis. These respondents are aware of the option to cycle a short route from home to home before working, but none of them is doing this. The respondents do not have a different opinion on the experience of cycling through the corona crisis. It is not sure how the corona crisis will develop at this point. Nevertheless, these findings show that there is still potential for promoting commuting cycling in the future.

Theme	Materials	Reference	Meanings	Reference	Competences	Reference
Image of cycling			Positive: Physical exercise	(9,13; 12,26; 14,15; 15,18; 19,21; 21,14; 22,7; 23,5)		
			Positive: Mental health	(12,26; 15,18; 17,23; 19,21; 22,7)		
			Positive: General health	(11,4; 14,15; 15,18; 17,23; 19,21; 22,7)		
			Experience of rapidity	(11,4; 12,17; 14,16; 16,7; 21,13; 23,15)		
			Environmental friendly	(14,16; 18,6; 22,7; 12,15)		
Weather conditions	Rain radar app	(10,24; 12,24; 15,37; 17,7; 18,19; 19,4; 20,8; 21,15; 22,29; 23,6)	Negative: Getting wet	(9,13; 12,23; 19,5; 23,7)		
			Negative: Getting Sweaty	(10,14; 12,23; 16,8; 17,6; 18,6; 19,5)		

			Negative: Using rain gear	(11,20; 19,5; 23,6)		
Combination with other practices	Negative: Daycare further away	(9,11; 15,8; 21,7; 23,5)	Cycling is flexible	(14,12; 19,26)	Able to shop small items with bicycle	(11,17; 12,6; 14,13; 17,25; 18,10; 19,26; 22,22)
			Negative: Car flexible too	(15,8)	Not capable to do larger groceries with bicycle	(12,6; 14,13; 17,26; 21,11; 22,22)
Natural environment			Negative: Route is boring	(9,6; 10,21; 13;17; 15,10; 16,26; 21,21; 22,21; 23,15)		
			Detour for natural environment	(14,11; 15,10; 18,13; 19,12; 23:16)		
Corona crisis			Working from home more embedded	(12,25; 14,23; 15,38; 17,9; 18,21; 19,10; 20,11; 23,19)		
			Negative feeling about public transport	(10,21; 11,23; 15,23; 14,23; 18,21; 19,10; 21,43)		

Figure 29: Overview of elements found in the theme cycling and the individual (Source: Own work)

7. Conclusion and recommendations

The research objective, as mentioned in chapter 1, is two-folded. The first objective is to analyse commuting cycling by using social practice theory leading to a proper image of all the required elements and interacting practices of commuting cycling in the specific case. Looking at commuting cycling by using social practice theory is a new way of analysing commuting cycling in a Dutch context. It brings new insights regarding this topic. At the same time, this research shows that social practice theory is one way to look at commuting cycling, and there might be circumstances where it might be useful to use rational-choice theory rather than social practice theory. This research discusses what practice theory can say about commuting cycling and whether there are circumstances that ask for a more rational-based analysis of this behaviour. The second objective is analysing the promotion of cycling in the case of Rosmalen – 's-Hertogenbosch by rhyming this with the required elements of commuting cycling according to the employees. The first step to do this is looking at all cycling promotion initiatives in the first place in chapter 5. Chapter 6 describes the social practice of commuting cycling based on the experiences of employees living in Rosmalen, and this chapter gives recommendations on how to improve the promotion of cycling. The two research objectives lead to the following central question:

"What is the social practice of commuting cycling in the case of Rosmalen – 's-Hertogenbosch and to what extent does the promotion of cycling in the area, including the fast cycle route, facilitate these required elements of commuting cycling?"

The debate about the first research objective is the focus of chapter 7.1. After that, chapter 7.2 focusses on the second research objective. This part includes different subjects. Namely, the fast cycle route, shared cars and flexible working hours, collaboration with other practices and other infrastructure. Each part begins by stating the most important findings of this research. This leads eventually to recommendations for the promotion of cycling regarding each subject.

7.1 Commuting cycling as a social practice

Using social practice theory to analyse commuting cycling and all its elements show how diverse and comprehensive something like commuting is. Previous research shows that it is hard to change such behaviour. This research affirms this. Expecting behavioural change by just focussing on hardware solutions is not realistic. This research used social practice theory to take a more detailed look at the social practice of commuting cycling. Social practice theory assumes that a choice like a mode choice is not rationally based. It takes social practice as an object of study instead. Chapter 6 covers essential elements for commuting cycling in this case. Social practice theory argues that an individual will perform commuting cycling when it embeds in his/her life. The outcomes of chapter 6 give a few findings which support the idea of the embeddedness of the practice of commuting cycling while other findings nuance this idea. This leads to circumstances where a more rational-based analysis is needed.

The respondents who take the car usually seem to have less of a rational process to choose the car. Their motivations to take the car are convenience, appointments elsewhere, weather lasting, or a combination of these. According to them, this does not change a lot, and they do not think about this every time they have to choose a transportation mean. Furthermore, both cyclists and car drivers like the flexibility of their mode when they have to shop some little things, for example. This supports the idea of practices in a way that the individual motivations are not leading to the mode. It is precisely the other way around in this case. The practice leads to individual motivations only because the practice is embedded in their life. The respondents then reason upon these motivations afterwards. The practitioners of the behaviour do this behaviour because it is embedded in their life.

Social practice is useful under these circumstances because it can show the required elements of commuting cycling. A significant mode shift towards the bicycle is possible when the required elements are present under these circumstances.

Chapter 6 also shows some findings against this idea despite the arguments mentioned above. Therefore, the respondents who usually cycle play an important role. The survey shows that only 27% of the respondents cycle to work every day. The other cyclists switch between the bicycle and the car. Reasons for this are the appointments elsewhere, bad weather conditions and a combination with other practices in their private life. The mode choice of these commuters becomes rational when one of these events or individual situations happen. The respondent looks at his/her agenda to see whether they have an appointment elsewhere that day or need to combine their work trip with other practices. The respondent takes the car if that is the case—the same accounts for bad weather conditions. The respondents look outside or use a rain radar in the morning. They do this to reason upon whether it is possible to cycle that day. It may differ between individual's what the turning point is to switch to the car. Nevertheless, they all seem to make a rational choice in the circumstances of bad weather conditions and these other events.

This raises the question if a practice-based analysis is the best tool to influence travel behaviour under these circumstances. Cyclists seem to have a couple of events or circumstances that make them have to think about their mode choice. Cyclists seem to have this more than car drivers. The practitioners can change their behaviour away from this practice, but only during these specific circumstances. Further research can build on this by acknowledging the fact that there are circumstances that make a specific behavioural choice rational and the goal of cycling promotion is than to find solutions that these individuals make a different choice than they do know. Chapter 7.2 gives recommendations for the promotion of cycling to address these problems.

Chapter 5 shows the context of cycling promotion in the case of 's-Hertogenbosch – Rosmalen. The debate above influences this context too. The focus of cycling promotion is about persuading employees to choose the bicycle. This process goes in 5 different stages according to the working methods of BMN and the campaign of Sjees. Their goal is to let the employees make a rational choice every day. They argue that employees choose the bicycle by showing and facilitating advances in cycling. The debate before shows that employees remain to make rational choices after they became regular cyclists. This research shows what the circumstances or individual situations are that makes the mode choice rational again at a particular day. Stakeholders in cycling promotions can develop by acknowledging two things. Firstly, cycling can embed in the everyday life of an employee when the required elements are there. The steps that try to achieve this are already there. A lot is going on, like chapter 5 shows and the focus is more and more on letting employees start the behaviour of cycling. This research shows by using social practice theory that this is a good first step. This promotion of cycling by let people start cycling leads to more practitioners in the practice of commuting cycling. This will lead to a larger share of commuting cycling compared to other modes in the area. Secondly, specific events or individual situations makes it that social practice theory is less useful because cyclists seem to make a rational choice under certain circumstances. It is at this point that an analysis using rational-choice theory is more of use than social practice theory. This is because these circumstances often make cyclists choose rationally for the car that day. After all, the car has more advantages at this point. Cycling promotion needs to find solutions by making more advantages for the bicycle under these circumstances. Solutions can be flexible working hours for bad weather conditions or shared cars for appointments elsewhere. Chapter 7.2 describes these recommendations more in detail.

7.2 Recommendations to cycling promotion

This research does not only enrich the debate about commuting cycling as a social practice. Chapter 5 shows that a lot is going on regarding the promotion of cycling in the area. This research tries to find improvements by comparing the context in chapter 5 with the experiences of the employees in chapter 6. Firstly, the general view this research gives is that the promotion of cycling is heading in the right direction. Not only the preconditions for cycling are there, but the stakeholders also try to focus on behaviour a lot more than before. The introduction of the fast cycle route combined with the other initiatives to promote cycling make a strenuous effort to stimulate cycling in the area. The stakeholders acknowledge the problem of individualistic approaches on mode choices. They try to embed cycling in everyday life of employees by both facilitating preconditions and trying to attract employees by using the different initiatives such as campaigns and all that derives from the collaboration with employers. This chapter focusses on some recommendation to better adjust the focus of cycling promotion to the experiences of employees in the case of Rosmalen – 's-Hertogenbosch. The fast cycle route as a precondition and the circumstances or individual situations, as discussed in chapter 7.1, are the main subjects of this discussion.

7.2.1 Fast cycle route

The fast cycle route plays an essential role within the promotion of cycling, but this research shows that there are employers who think it is unfortunate that they do not use this route for their trip to work. The province of North-Brabant and the municipalities within the province make an excellent effort to realise the network of fast cycle routes. The F59 is one of the first fast cycle routes. The stakeholders acknowledge that the F59 does not fully meet the current standards of the fast cycle route. This is not something illogical because of the early stage that the F59 was realised. The stakeholders found valuable shortcomings of the fast cycle route, which are lessons for other fast cycle routes. Overall, the respondents appreciate the comfort of the fast cycle route, but the employees experience the same shortcomings. The most mentioned are the unclear situation in Geffen, some dangerous crossings and slipperiness during bad weather conditions. These outcomes are in line with previous surveys of the quality of the fast cycle route, as mentioned in chapter 4. The stakeholders have plans to improve these issues. This improves the comfort of the F59. The fast cycle route will thereby probably meet the standards of fast cycle routes in a couple of years. Besides this, not many respondents use the fast cycle route for commuting purposes. This is not because of these shortcomings, because these shortcomings are just minor things which does not lower the comfort of the route that much that employees do not want to use it. The reason for not using the fast cycle route is that it is a detour to use the fast cycle route from neighbourhoods like Rosmalen – South and De Groote Wielen to 's-Hertogenbosch.

Chapter 6 also shows that the employees who live in Rosmalen do not use the fast cycle route for commuting trips often. The employees are aware of the fast cycle route. All respondents know that the F59 is a fast cycle route and where it is located. Nevertheless, only two respondents use the fast cycle route for commuting trips. Others mention that the comfort of this part of the route is proper, but this does not make them change their route. The fact that it is a detour for many employees is the reason for this. A fast cycle route often connects two big cities. In this case, the F59 connects 's-Hertogenbosch to Oss. The route is quite a straight line from both centres of the cities from the scale of these two large cities. A closer look on the scale of Rosmalen – 's-Hertogenbosch in chapter 4 shows that the fast cycle route does not connect many residential areas in Rosmalen with business parks in 's-Hertogenbosch directly. The employees do not take a detour from their living area to the business park where they work to make use of the fast cycle route. This suggests that only people who live in the centre of Rosmalen and work in the centre of 's-Hertogenbosch make use of the fast cycle route.

There are two reasons why this finding does not mean that the fast cycle route is located in the wrong place. Firstly, the people from Rosmalen are not the only target group of the F59. This research excludes employees from villages like Geffen and Nuland or even from Oss. The fast cycle route might have a more significant impact for these people because a detour to the fast cycle route is a much shorter part of their route relatively. Secondly, the fast cycle route is not the only cycling path connecting Rosmalen with 's-Hertogenbosch, and it is not the aim of policymakers to let every employee use the fast cycle route. There is an extensive urban cycling network between Rosmalen and 's-Hertogenbosch which focusses on the different cycling paths. These other cycling paths like the Bruistensingel and the Graafsebaan are from less quality than the fast cycle route, but the quality is still high enough that respondents want to use these other cycling paths.

Nevertheless, the stakeholders in chapter 5 focus on a target group which have the best chances to start cycling. These are the people living in Rosmalen in the case of the F59. This research shows that employees do not take a detour to use the fast cycle route. They use other routes which are from less quality. They think it is unfortunate that they cannot enjoy the quality of the fast cycle route. This raises the question of what should be done to reach the largest part of the target group in Rosmalen. A suggestion is to look at how to connect the other necessary cycling paths (Bruistensingel and Graafsebaan) with the fast cycle route. This research shows that these cycling paths are from equal importance for commuting cycling as the fast cycle route. Figure 30 shows the essential parts of these routes which connect them with the fast cycle route. An option is to include these routes in the project of a fast cycle route. The respondents like the idea of the fast cycle route, and it is right in terms of recognition.

The aim is to show them that these other routes are also part of the fast cycle route. The researcher has the following suggestions to achieve this. First, the cycling paths should meet the same requirements as the fast cycle route in terms of infrastructure. There are improvements possible at these routes, and it is useful to look into these improvements of the quality of the street covering and the obstacles at these routes. The question is how employees experience these routes as a fast cycle route too. Further research should investigate how these routes can be improved. This would increase the awareness of these routes as important routes within the urban cycling network. The goal is to increase the comfort of commuting cycling. This research shows that it is important to keep the whole cycling network in mind because a fast cycle route alone might have a limited effect because it would increase the comfort of one group, but it would limit the experience of comfort of the group that do not make use of the fast cycle route.

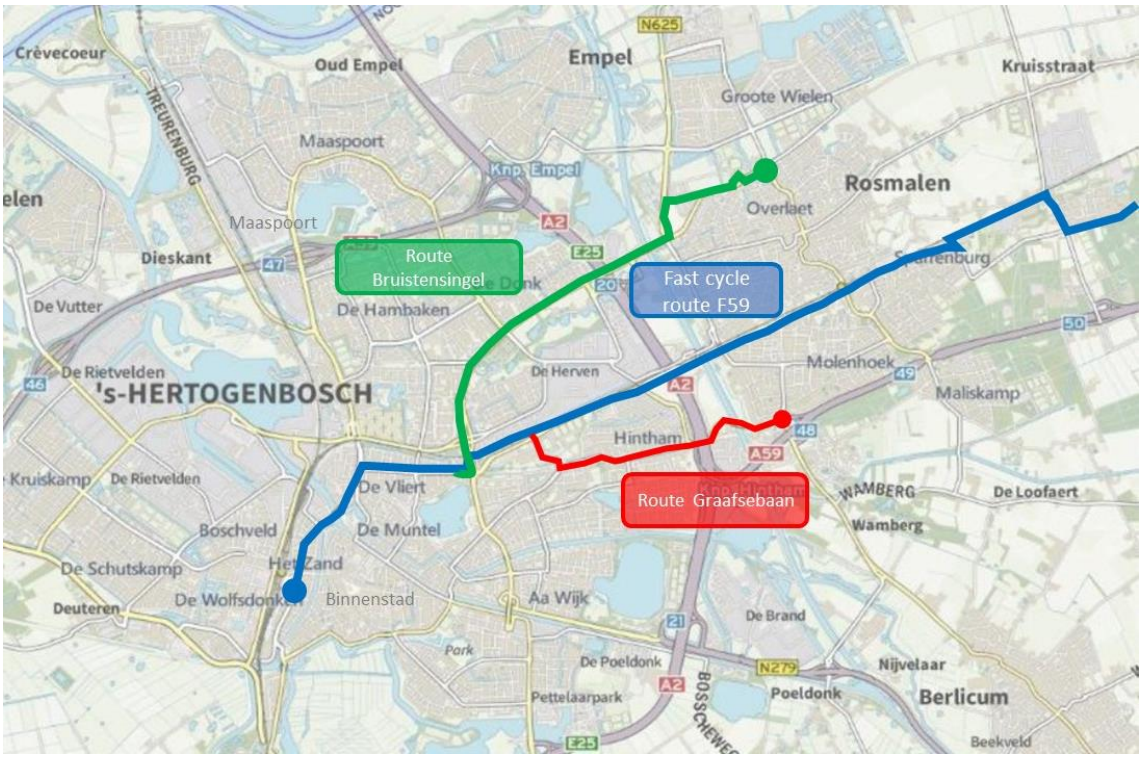

Figure 30: Bruistensingel (green) and Graafsebaan (red) as a possible addition to the F59 (Source base layer: (PDOK, 2020)*).*

7.2.2 Shared cars and flexible working hours

Chapter 7.1 concludes that cyclists tend to make a rational choice for the car in certain circumstances or individual situations. Chapter 6 shows that the two most essential circumstances are bad weather conditions and appointments elsewhere. These two make many cyclists choose for the car at that day. The question is whether there are solutions to overcome these circumstances in favour of cycling. Shared cars and flexible working hours are two solutions, but the impact of these solutions can be improved. In theory, shared cars make it possible for employees to cycle to work and take a car from work to appointments elsewhere. Despite the presence of these shared cars for lots of employees, only a few do use shared cars. Some refuse to use it because they have not tried it yet, and they are a bit afraid of the idea of driving another car. Others say that it is not convenient for them and that they prefer their car from home. Cycling promotion policy should therefore focus on the use of shared cars and how to improve the experience of this. It is the researcher's suggestion to facilitate test drives with these shared cars with an instructor. This test drive helps to overcome the problem of employees being a bit scared of using shared cars. Other options could be awarding employees who make use of shared cars. An option is to append this in the cycling plan in the form of financial support for their bicycle. More out of the box suggestions are a shared car driver competition, for example. In this way, the people who are not eager to use the shared car might try it and embed this part of the practice after they used the shared car for a while.

Another solution is not to focus on cycling and shared cars but rather manage to reduce the appointments elsewhere by doing these meetings online. It does not matter where the employee is in that case. It could be at the workplace of the employee, but it can also be at home. It works if the employee makes use of flexible working hours. These flexible working hours can also solve another circumstance which makes cyclists choose for the car, namely bad weather conditions. The employee can start work from home and go to the workplace when the rain is over, for example. Alternatively, he/she works from home the entire day. Chapter 6 shows that many employers allow their employees to use flexible working hours.

Nevertheless, the general experience of employees is that it was challenging to make use of flexible working hours before the corona crisis. They were bound to a fixed schedule and did not want to adjust this. The corona crisis changed the context in a way that working from home is the standard at this point. The challenge is to keep this context when employees can go to their work again. Stakeholders, and especially employers, should stimulate flexible working hours as much as possible. The campaign of Sjees Gangmakers and the work of BMN can help with that. The researcher suggests that employers should promote online meetings with clients elsewhere to overcome the problem of employees taking their car when they have an appointment elsewhere. Besides this, they can promote the switch to an online meeting instead of a meeting at their workplace if there are bad weather conditions. Employers should make this easy by communicating to their employees that this is possible. The regime of working from home and flexible working hours could change then. Chapter 7.1 shows that employees make a rational choice in these circumstances. The employees could choose less for the car if these solutions are present. The corona crisis shifted this in the right direction, and the challenge for policymakers is to use this.

7.2.3 Collaboration with other practices

The collaboration between the practice of commuting cycling and other practices is difficult to summarise in one conclusion with a recommendation. The reason for this is that this collaboration is quite comprehensive. It differs a lot between individuals. It depends on the life situation which collaboration of practices an individual has. Employees with little children whom they have to bring to school tend to take the car in this case. Bringing children to school is a social practice on their own. It also brings new elements. Others have the same for doing groceries, visiting the city centre or combining the trip with leisure activities. All these practices are circumstances which could make the employee take the car, as discussed in chapter 7.1. It is tough to address all these issues into cycling promotion effectively because the elements of commuting cycling in combination with the elements of other practices are very diversified and differ per individual. Chapter 5 shows the view of the expert on this subject. The goal was to find out how these collaborating practices are involved in cycling policy. The experts say that it is hard to include all of this in cycling policy. One option is to include these other practices in campaigns but not as one general story but as smaller items in a magazine for example. It is even harder to include this into hardware measurements. The expert interviews show that it is not included in, for example, the fast cycling project or other infrastructural initiatives.

Instead, the software measures focus on making the mode choice rational. It is the goal that people see the bicycle as an option and that they choose the bike whenever this is possible. This research shows that this is the most effective way regarding collaborating practices. Some employees have to bring their children to school every day, for example. In this case, it might be harder to embed cycling as a practice in their life. Other respondents do groceries once or twice a week. They can cycle the remaining days that they do not do groceries. This employee would cycle more than half of the days when cycling embeds in his/her life. Therefore, the researcher's opinion is that the context of cycling promotion is heading in the right direction by trying to show cycling as a possibility without the goal of forcing employees to cycle under every circumstance.

7.2.4 Other infrastructure and the natural environment

There are some improvements possible regarding the general cycling infrastructure and the natural environment. Respondents appreciate a lot what the municipality is doing regarding infrastructure. Nevertheless, there are some improvements possible. There are some crossings where cyclists do not get priority both on the fast cycle route and on other routes. These crossings are significant setbacks of their cycling experience.

The general outcome of this topic is that the goal is to get separated cycling paths as much as possible. The problem with this is that building a tunnel or bridge, for example, are often significant investments. To prioritise cyclists at more crossings is easier. The question is to what extent is this possible regarding the other traffic flows. Further research should investigate this.

The municipality of ‘s-Hertogenbosch has introduced roundabouts where cyclists can go both ways. They acknowledge already themselves that the safety of these roundabouts is questionable. This research shows that the experience of cyclists with these roundabouts is also harmful. They think it is dangerous to cycle there. It might be useful to reconsider these roundabouts and possibly redesign them to normal roundabouts.

Another outcome is that the natural environment is not an essential element in the social practice of commuting cycling. Nevertheless, the general view of the employees is that the natural environment is not from high quality in the area. While it does not affect the social practice of commuting, it could influence other practices regarding cycling, such as cycling as a leisure activity. The employees think that cycling paths are often boring without much green. Further research should investigate this because this research shows that there are improvements possible regarding the green environment of the corridor Rosmalen – ‘s-Hertogenbosch.

8. Reflection

This last chapter reflects on this research both on the content and the methodological part. It consists of three parts. Each part starts with a reflection on how this research addresses the topic. Eventually, this will lead to recommendations for further research. The first part is about the competing practice of car driving. The second part is about the details of structural behaviour change. These two subjects are essential for the main topic, but the focus was less on these subjects because of the boundaries of this project. The last topic is about the method to distribute the survey and what consequences this has.

8.1 Competing practice of car driving

This research conducts an analysis of commuting cycling by using social practice theory. Social practice theory recognises competing practices besides the elements of individual practices. Car driving is the most critical competing practice for commuting cycling in this case. The survey and the interviews show that all respondents living in Rosmalen either take the car or take the bicycle. Public transport or other modes play a less critical role. This research focusses on the elements of commuting cycling and the link between car driving and commuting cycling. This resulted in some excellent outcomes about the elements of commuting cycling.

Nevertheless, the elements of car driving were partly involved. However, more respondents who drive the car daily are necessary to conduct proper research on this social practice. Only three of the interviews were with employees who take the car every day. Besides this, another three respondents take the car most of the days. They take the bicycle the other days. The first group is the most critical target group to analyse the social practice of car driving because these people have fully embedded the practice of car driving. It is the goal to let them think about the bicycle as a real possibility in order to start the new practice of commuting cycling.

Further research in the area could conduct this analysis to understand the practice of car driving better. This research focusses only on the promotion of cycling but restraining the option of the car is also an option. Further research can dive deeper into this aspect of commuting to find new points of focus which could eventually help the process of attracting people to embed the social practice of cycling.

8.2 Structural behaviour change

The recommendations in the previous chapter give already some pieces of advice to implement in the promotion of cycling. Eventually, the first step is to change the behaviour of people to cycling. The second step is to overcome certain circumstances which switch employees from cycling to car driving. The first step is about structural behaviour change. The question is, how can cycling promotion change the behaviour of the target group to cycling. This research did not focus that much regarding the details of structural behaviour change. There is some excellent work on structural behaviour change from writers like Cialdini (Cialdini & Sagarin, 2005). This research gives points of focus for cycling promotion based on the existing context and the experiences of employees. The next step is to translate this into policy. The specific strategies lie in this structural behaviour change, and it is a challenge for policymakers to do this translation. Examples of this are the ways to change the regime of flexible working hours in such a way that the norm would be to use these flexible working hours to avoid car-use. Another example is the question of how to make employees use shared cars more. This research states these problems, and it is the task to investigate further how cycling promotion can overcome these problems.

8.3 Distribution of survey

Chapter 3 describes the compilation of respondents that take part in the survey and the interviews of this research. It shows that 78% of the respondents work in the public sector as a civil servant. The method of distributing the survey explains this high number. The survey was distributed by sending it two companies who cooperate with BMN. Besides this, the counsels of the neighbourhoods of the city of Rosmalen distributed the survey. The survey did not reach many people through these strategies. Eventually, the survey was put on the intranet of the province of North-Brabant, which was more effective, and many employees of the province participated. It explains the high number of people working in the public sector. Self-employed respondents did not participate except for one respondent. The strategy to distribute the survey is the reason for this because it could only reach this group through the effort of the counsels in Rosmalen. Nevertheless, there were not many other options to spread the survey because of the corona crisis. It was not possible to go door-to-door in Rosmalen because of the measures of the government, which could have been useful to reach a more diverse group of respondents. A selection for the interviews was based on the outcomes of the survey, and the goal was to spread better the number of people working in the private sector, public sector and self-employment. It succeeded a little bit but still two-third of the respondents in this part work in the public sector. Therefore, the outcomes should be interpreted, given the fact that it might not represent the whole society within the city of Rosmalen. Further research might include other strategies such as going door-to-door to reach a better reflection of all employees in Rosmalen.

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