Parking controls in Groningen: Modal shift or problem shift?

Assessing the potential of controlled parking as a catalyst for modal shift in Groningen

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Summary

Over the 20th century, the car has become a more and more common mode of transport, increasing mobility significantly. However, car usage on a large scale brings problems, especially in an urban environment. In order to solve these problems, more efficient modes of transport need to be used, and to achieve this a modal shift needs to happen.
A car journey has a destination, and for the car to be a viable mode of transport, the destination requires a parking space. controlling this can therefore potentially help with discouraging car use. However, this also raises a problem. When measures like parking controls are introduced, it is possible that the people who previously parked there will parik in a nearby area where parking is still free, moving the problems cars cause to a different place. This phenomenon is known as parking spillover. Therefore this study looks at the interaction between parking controls and modal shift, with the added factor of parking spillover, in Groningen. Representatives of different stakeholders were interviewed on their experiences with modal shift, parking controls and parking spillover. From this, the conclusions are drawn that in Groningen, parking controls do decrease parking demand and cause parking spillover, where it does not cause spillover it leads to modal shift, and in order to prevent spillover, parking controls need to be introduced on scale that is large enough for people to no longer be willing to park outside of the zone.

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1 Introduction

This segment discusses the underlying reasons for the research, the relevance, and the aim of the research. It also shows the research questions that are attempted to be answered.

Background

While cars allow for great mobility, they also create negative side effects, such as traffic congestion and emissions. In an attempt to reduce these externalities of automobility and move to more sustainable modes of transport, policy makers try to to move people away from the car through demand-reduction strategies (Urry, 2004). One of such measures is reducing parking availability. This desire to reduce car use also exists in Groningen. Groningen is a medium-sized city of around 200.000 inhabitants in the north of the Netherlands. Currently mobility is an important topic in the city, created by the reconstruction of the southern ring road, which will cause the city to temporarily be more difficult to reach by car. Additionally, the compact nature of the city makes it difficult to provide parking in and around the city. As a result, the city is looking for ways to try and encourage a modal shift, in order to minimise the negative effects of the temporarily limited accessibility. One of the measures that potentially can be used to achieve this is introducing parking controls.
The aim of this study is is to look at the potential effectiveness of these measures, given the elements that positively and negatively influence this effectiveness. This knowledge can potentially help planners and policy makers in their parking policy, by making sure the policy is effective and by minimising negative side effects. Additionally, there is very little scientific literature on the main element that can potentially hamper the effectiveness of parking controls, parking spillover. This study can also help in shedding more light on this topic.

Research problem

Having a large amount of cars in a city means that they cause congested roads, raise safety concerns, cause a strong reliance on finite resources, and are not sustainable in both the ecological and urban environment (Böhm et al., 2006). However, in order for the car to be a suitable mode of transport, there needs to be parking available at the place of origin and the destination. It requires no explanation that adding controls to parking, such as increasing cost or reducing availability, leads to a decrease of demand of parking in the area where these controls are placed, but if this decrease leads to a complete modal shift is questionable. Ideally, drivers shift mode and use public transport or other modes of transport instead for their journey, but it is also possible that they park in another nearby area where there are no parking controls. As a result, attempts to solve the externalities of automobility may instead simply move these problems elsewhere. As such, the following research question is formulated:

How can parking controls in Groningen encourage modal shift while minimising parking spillover?

In order to answer this question, four sub-questions will be asked.

-What is the current parking policy in Groningen?
-What are the results of parking controls in Groningen?
-Why will people shift mode and why not?
-What is the relation between a high amount of on-street parking and nearby parking controls?

Structure

In this study, first the relevant concepts related to modal shift, parking controls and parking spillover will be explained and discussed. Consecutively the relationships between the concepts discussed in the theoretical framework will be visualised in a conceptual model. The methodology explains the methods used for data collection, and for analysing it. In the results this data is shown in relation to three main subjects discussed in the interviews, namely modal shift, parking spillover, and reasons for parking controls. After this a conclusion is made.The appendix includes the transcripts of the conducted interviews, in Dutch.

2 Theoretical framework

The theoretical framework discusses the literature relevant to the subject. Based on this literature, a conceptual model is constructed that visualises the relations between the relevant subjects. From these results, a hypothesis will be drawn of the expected results of the study.

Relevant literature

Externalities of automobility

While automobility has great advantages, it also bears externalities. A study conducted by Maibach et al. (2009) looks at the externalities of transport in general. The costs of automobility mentioned include the cost of scarce infrastructure, accident costs, air pollution, noise, and climate change. The cost of scarce infrastructure refers to the congestion that arises if there is not enough infrastructure for the amount of people that want to use it, and as a result causes lost time. This can mean congestion, but also other situations where there are more cars than the infrastructure can handle. Shoup (1997) also mentions the cost of infrastructure, but in the context of lost space instead of scarcity. The study looks at the parking cars require, and puts a price on the space surrendered to parking, as space and especially urban space has a high price. This raises the additional externality of space lost to cars, and specifically to parking, that can be used in different ways. Banister (2008) also mentions these three aspects, and especially congestion and lost space, as an argument for sustainable mobility.

Sustainable mobility

“The sustainable mobility paradigm” (Banister, 2008) discusses four approaches to encourage sustainable mobility: substitution, modal shift, distance reduction and efficiency increase.
With substitution, the aim is to decrease the amount of traffic by reducing the need to travel by, for example, making use of the internet so people don’t have to commute.
Modal shift aims to encourage the use of more efficient modes of transport. Means of achieving this modal shift, according to Banister (2008), are slowing down urban traffic, increasing road prices and using parking controls, and making it easier to use public transport.
Distance reduction means using urban design to reduce the amount of distance people need to travel for their needs. This change in urban design can also be used to encourage more sustainable modes of transport.
Efficiency increase demands using new technologies in order to make the means of transport more efficient, and therefore more sustainable. In order to achieve this, standards can be introduced to reduce noise and emissions from the source.

Parking controls

In order to combat the externalities of automobility, one of the methods that can be used is introducing controlled parking. Many studies have been conducted on the effectiveness of such policies. Pandhe & March (2011) describe how decreasing the amount of parking spaces in the CBD of Melbourne has caused a large shift in mode choice of employees. They state that *"Restricting parking provision is potentially the most powerful mechanism affecting travel mode choice."* (Pandhe & March, 2011). However, the study dismisses increasing the price of parking as an effective mechanism to encourage modal shift, as most employees are shown to be prepared to pay this price. Christiansen et al. (2017) also confirm that limiting access is the strongest tool for decreasing car use for commuting. However they state that increasing the cost of parking is another effective measure when there is a high availability of parking. On the subject of increasing the price of parking, Willson & Shoup (1990) find strong relations between introducing parking controls and the amount of cars used for commuting. These studies show that generally, controls on parking are a strong method of decreasing car use. However, it is also possible that measures can fail when they are too weak, such as the case of Melbourne (Pandhe & March, 2011)

Parking spillover

Despite the studies suggesting that parking controls encourage a reduction in car use, the concept of Parking spillover suggests otherwise. Willson (2013) briefly mentions this under-researched phenomenon as an argument in favour of minimum parking requirements. The concept describes the situation where a lack of parking availability leads to people parking in undesirable locations as they look for an alternative, such as neighbourhood streets or long term parking in shopping areas.

There are however different studies on modal shift that mention the effects of parking spillover.

A survey conducted in Paris concluded that if commuters would no longer be able to park for free at their work, around 40% of people indicated that they would park their car somewhere else, and the rest would seek alternatives like public transport, walking or cycling, or carpooling. (Young et al., 1991)

A survey in Edinburgh examined if people who use free on-street parking would change behaviour if the controlled parking zone were to be extended. Results showed that 75% of people who used on-street parking would continue to do so if the zone was extended by 0.6 kilometres, and 25% of people would continue to do so if the zone was extended by as much as 2.5 kilometres. The remaining people of this group would seek alternative means of transportation. (Rye et al., 2006).

These two articles show that while parking controls can be effective at achieving a modal shift, they also cause an increase of parking spillover, the size of which depends on how extensive the parking controls are. The more limited parking controls are, the more they will result in parking spillover.

Parking policy in Groningen

The parking policy of Groningen in the past decade can be summarised by the policy defined in “Parkeren in de stad; duurzaam bereikbaar!”[1] (Gemeente Groningen, 2009). This contains three different policies, based on proximity to the city centre. In the city centre, parking is only allowed in parking garages, with a high capacity and large fee. This is to allow for people visiting the city to park their car, and keeps the city attractive for shoppers. In the neighbourhoods surrounding the city centre, there is on street parking but against a fee, intended to be used by residents only. The fee is to reduce the effects of parking spillover. The exact extent of this policy can be seen in figure 1. Additionally, parking spaces further away from the city centre are arranged for longer stays, with good connections to public transport. These are the so-called P+R parking lots, which are located around the perimeter of the city in strategic locations. “Ruimte voor de straat: Parkeren in een levende stad”[2] (Gemeente Groningen, 2018) introduces multiple changes to the old policy in order to increase the quality of life in the city regarding parking. These changes include reducing the dominance of the car in the streets and a more area specific approach. In order to achieve the first goal, the municipality aims to remove on-street parking in certain streets and move parking to a nearby area, and if required to P+R parking lots located on the outside of the city. In order to achieve the second goal, the municipality wants to make use of specific parking controls that can be tweaked. These parking controls include changing the price, changing the amount of parking permits, and changing the times during which parking is allowed. This tweaking is also allowed in new developments, where there will be the possibility to use a so-called “0-norm”, which means that no parking requirements need to be met in the development. Additionally, the municipality wants to cooperate with businesses in order to allow residents to make use of the vacant parking lots at night, and encourage their employees to make use of different modes of transport as a measure to decrease parking problems.

[1] Parking in the city; Sustainably accessible!
[2] Room for the street: Parking in a living city

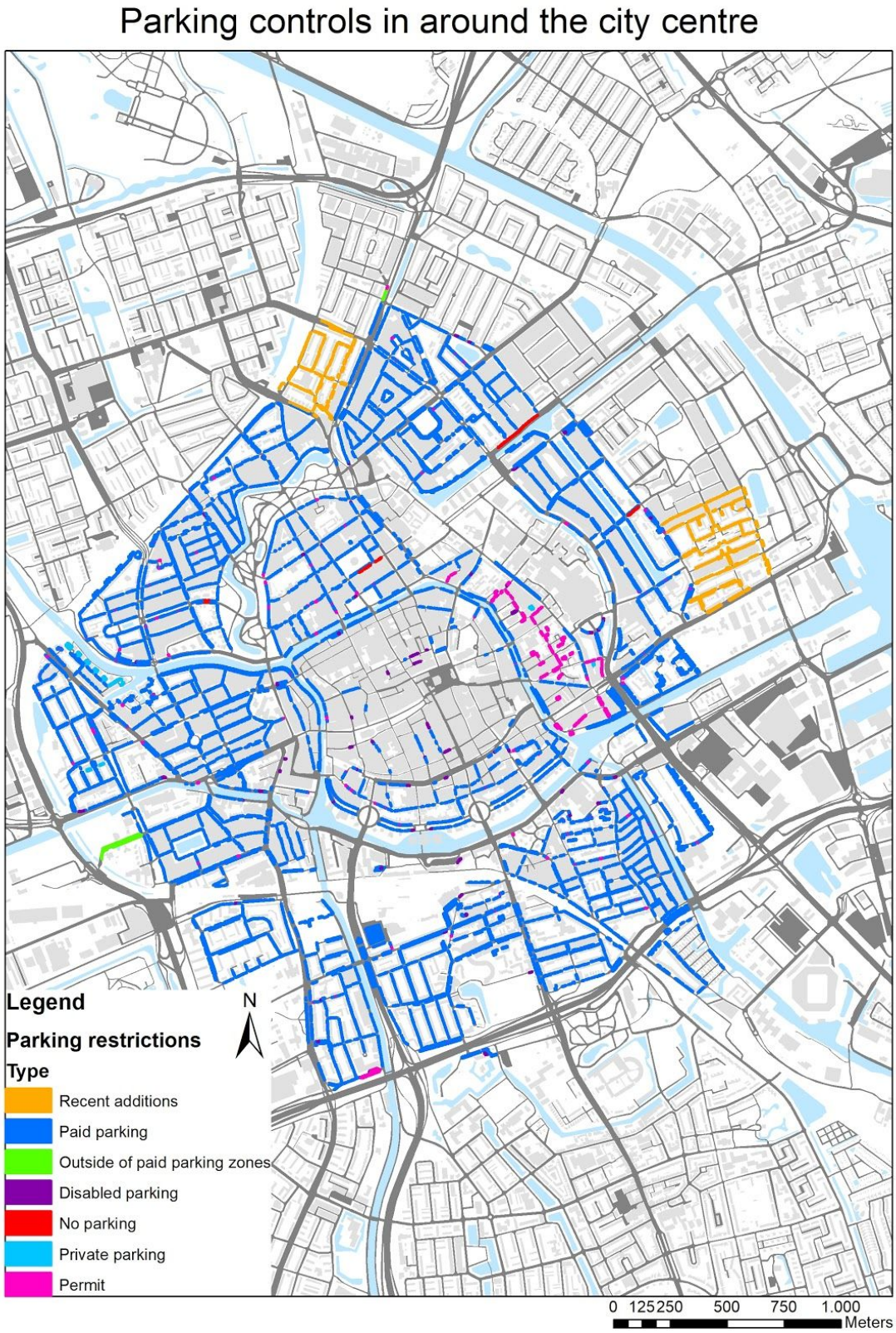

Figure 1- Parking controls on on-street parking in and around the city centre of Groningen (Source: Gemeente Groningen, 2018a)

Conceptual model

With the concepts discussed in the theoretical framework, a model can be made to show the reasons why parking controls are introduced, how they can encourage modal shift and which problems they can cause. This model is shown in figure 2.

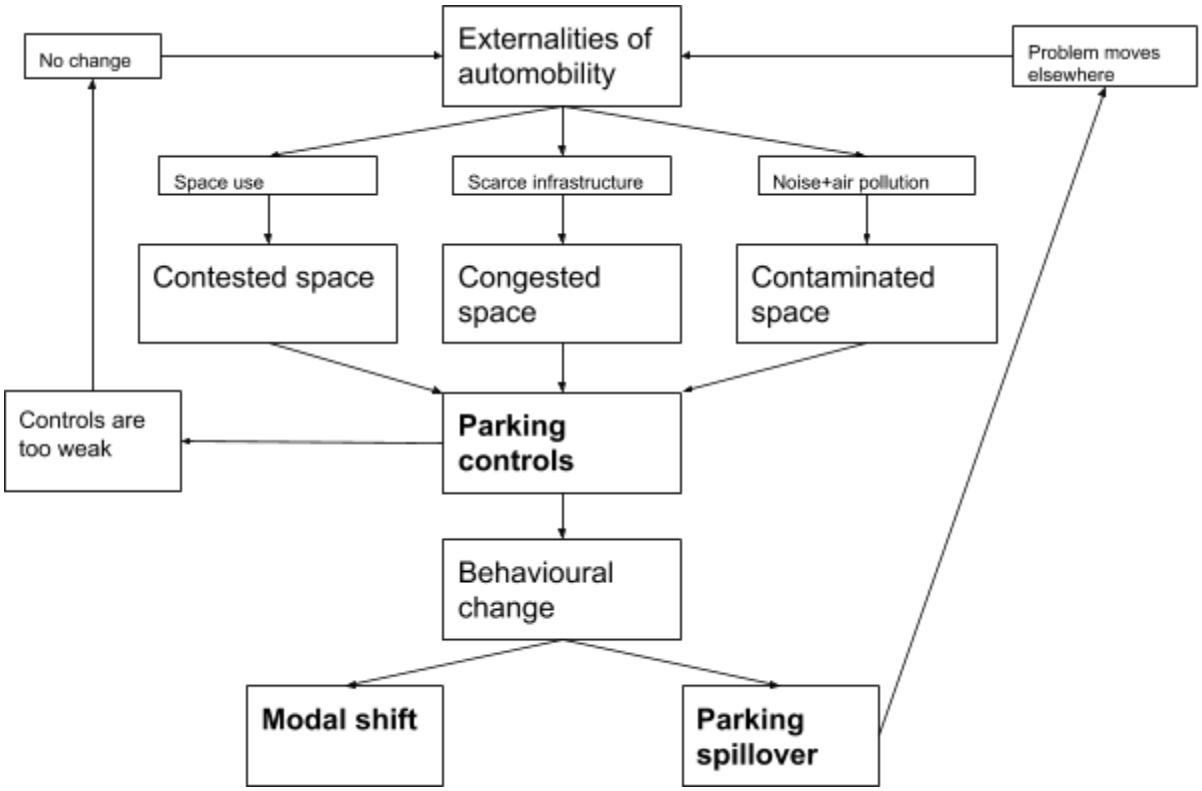

Figure 2- Conceptual model (Source: Author)

The reason why governments move to parking controls is to combat the externalities of automobility. This can directly relate to parking, indicated as “contested space”. Urban space is limited and has a value, and using more space for parking is not only costly but the space can also be used in more positive ways. However, one of the main arguments for parking controls is the need to reduce the amount of cars in the city, as they cause both congestion and pollution. Limiting the amount of parking spaces leads to fewer people using the car, provided these controls are strong enough to change behaviour. If this is the case, two results are possible: Either the driver changes their mode of transport to travel to their destination, which is the intended effect as reducing the amount of people using the car was the goal, or the driver changes where they park their car, moving the problems that a high amount of cars cause to a different area as the overall amount of cars is only partially reduced in this instance.

Hypothesis

From the analysed literature, several expectations on parking controls, parking spillover and modal shift and the interactions between them can be drawn.

First of all, it is expected that parking controls in Groningen will be effective in dissuading people from parking in those areas and cause a proportion of drivers to park in neighbouring areas, where it will cause problems for the people living there. As such, it is expected that there is a relation between introduced parking controls and nearby parking spillover. The potential for this spillover from commuting can be seen in figures 3 and 4. In terms of modal shift. It is expected that people will only shift mode when there are sufficient alternatives to the car, as well as barriers to the car. In the case of parking however, this effect is expected to be dampened by parking spillover, as the barriers are softer. As a result, it is expected that the best way of encouraging modal shift through parking is by using extensive parking controls, which sufficiently discourage driving to the destination as well as helping reduce spillover.

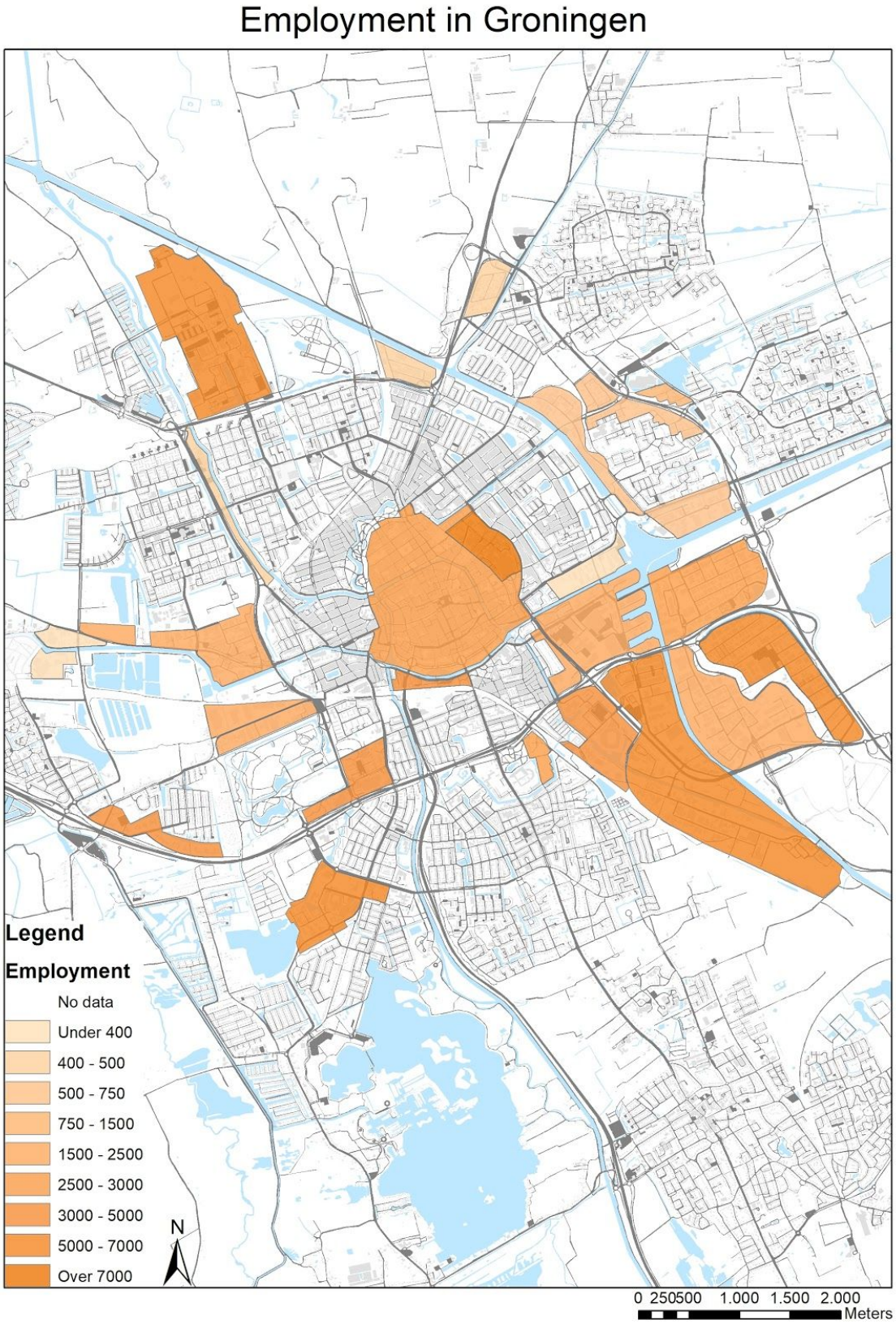

Figure 3- Employment in Groningen in 2017 (Source: Author, Gemeente Groningen, 2018b)

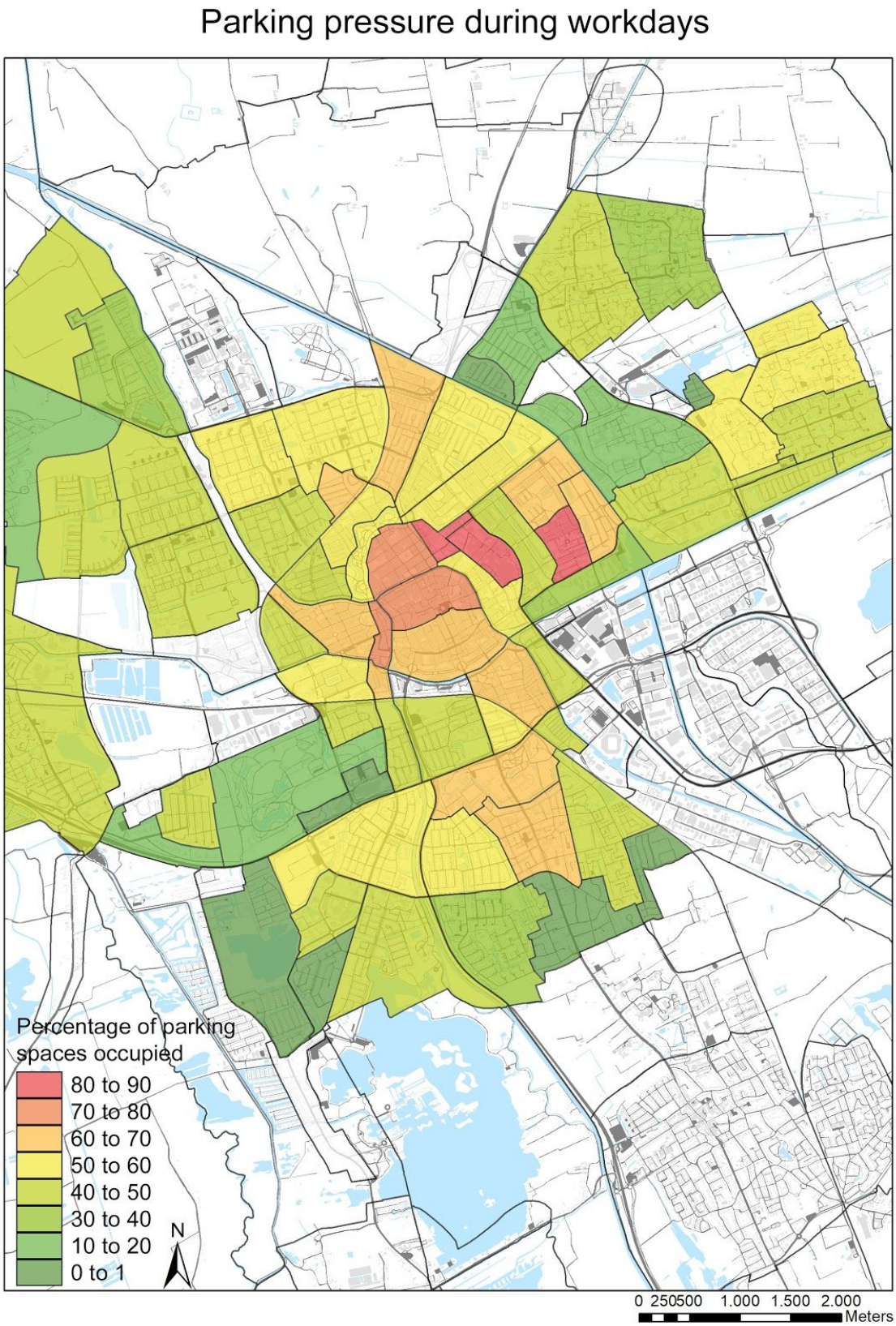

Figure 4- Parking pressure during workdays in 2015 (Source: Author, Gemeente Groningen, 2018)

3 Methodology

This segment discusses and explains the methods used to answer the research questions, and describes the data collection process.

Data collection

In order to answer the research questions, the diverse nature of the city, and the different factors that influence the decision making in modal shift and parking need to be taken into account. Within the city of Groningen, it is difficult to find areas to compare to each other as no two areas are alike, and therefore it is difficult to draw the right conclusions from secondary data without considerably simplifying the situation. This is also unnecessary, considering that the required in-depth knowledge and expertise already exists. As a result of this, a qualitative method was chosen with experts who can properly account for these different factors and intricacies. These interviews were semi-structured for the same reason. semi-structured interviews don't follow a fixed set of questions, and allow the respondent to have more influence on the direction of the interview (Dunn, 2005). The respondents have a diverse profile, which means that not all respondents can answer all of the research questions with the same authority, and as such the knowledge does not overlap. Instead each respondent was asked different questions based on the field they represent. In order to keep the interviews largely semi-structured, the interviews were allowed to veer off from the predetermined questions. These questions can be found in the appendix.

For this study, five semi-structured interviews were conducted. Two with representatives for businesses in Groningen, two with policy makers for the municipality of Groningen, and the representative of a neighbourhood association.
Respondents:
-N. Borgman, representative of two business associations in Groningen, Zuidoost and West. The interview focused on the role of smaller employers in modal shift, and their parking policies.
-D. Duifhuis, member of city development department for the municipality of Groningen. The interview is focused on parking policy and results. The aim is to gain insight into the reasons behind parking controls, their consequences and the interaction with parking spillover
-J. de Graaf, board member of residents' organisation Oosterpark. The interview is focused on the influence of parking controls on a neighbourhood. Oosterpark is a neighbourhood that has had parking controls introduced in phases, meaning that the influence of the different aspects parking controls, such as effectiveness and spillover, can be seen in this neighbourhood. The aim is to gain insight into inhabitants' perspectives regarding parking controls and the causes of parking spillover. The recording of this interview was erased, and to solve this issue the a summary of the interview by the respondent was recorded immediately after. In this study, only the summary is used in the results. The findings that are not mentioned in the summary are discarded.

-C. S. Kumm, project leader accessibility and sustainability for UMCG[3]. The interview is focused on the UMCG, which is the largest employer in Groningen, and how it influences modes choice of employees and their parking policies. The large size means that there are different challenges.
-M. Oedekerk, policy advisor public transport, department of spatial policy and programming for the municipality of Groningen. The interview is focused on the municipality's efforts on modal shift, specifically in the case of public transport.

These respondents were contacted both through the relevant institutions, and through suggestions as other relevant stakeholders by other respondents. They were then asked if they were willing to participate in an interview on parking in Groningen. The location of was chosen by the participants, and through this all interviews were conducted in an environment familiar to the respondents, and most in an environment familiar to the respondent.

Ethical considerations
In scientific research it is important to protect the rights of the individuals, communities and environments involved (Clifford et al., 2010). In this study, the choice was made to include the names of the respondents as it concerns experts, and their names are required to validate their authority on the subjects discussed. Respondents were informed that the information discussed was confidential, that the interview was being recorded, and that they could choose to stop the recording at any time. The interview recordings and their transcripts were only accessible to the researcher.

Data analysis

The interviews are coded in three different categories, as can be seen in table 1. These categories do not aim to answer specific research questions, but instead are the three main topics that were discussed in the interviews and describe the interaction between parking and modal shift. The "modal shift" code is about understanding the reasons why people shift mode and what measures are being used to encourage it. The "parking spillover" code identifies the reasons for spillover, the problems caused by it, and how it can be solved. Lastly the "reasons for parking controls" code describes the different identified causes for parking controls, be it policy or more practical reasons.

[3] University medical centre Groningen

Code scheme

Modal Shift	**Parking Spillover**	**Parking controls**
Methods of achieving modal shift	Reasons for parking spillover	Congestion
Effectiveness of measures	Problems caused by parking spillover	Parking pressure
Exceptions	Solutions	Other reasons
		Arguments against parking controls

Table 1- Code scheme

4 Results

The results of the interviews are discussed in this segment, supported by translated excerpts from the interviews. The results are organised under the three main subjects and code themes of modal shift, parking spillover and parking controls. At the end of each segment a table shows how and if each respondent responded to different topics.

Modal Shift

In the interviews, three main subjects emerged: the methods of achieving modal shift that are used by the municipality and employers in Groningen, the effectiveness of these measures, and the exceptions to the notion that modal shift is desirable.

Methods of achieving modal shift

The means of achieving a modal shift according to Banister (2008) are slowing down urban traffic, increasing road prices and using parking controls, and making it easier to use public transport. This can be done by governments as well as private businesses, who wish to have fewer employees commute by car for different reasons. The reasons for this in Groningen are discussed in the *Parking controls* section of the results. The most common ways used by employers of encouraging modal shift are offering both financial and fiscal advantages to employees. Financial advantages include measures such as offering compensations for using public transport, fiscal advantages include allowing employees to pay for bicycles through their gross salary, meaning they have to pay lower taxes.

"We have a fiscal bicycle regulation, which co-workers can purchase a bicycle with fiscal advantages. We have discount actions with bicycle suppliers, we have two bicycle repair shops, we have good services and we always have actions in between, for example with the spring service at the bicycle repair shop. We always try to do that very economically. Additionally, you can try a speed-pedelec for one week or an e-bike for two weeks at no cost, in case you don't have one but consider buying one, through Groningen Bereikbaar[4]. For public transport we have P+R subscriptions where we give an own contribution, so co-workers can have a subscription with a 62% reduction. We also have public transport compensations that we are going to expand." -C.S. Kumm

In order for these measures to work, public transport needs to be able to compete with the car. This can be done by a combination of improving the quality of public transport, with elements such as speed, reliability, and price, while increasing the cost and practicality of using the car. This combination of measures, improving alternatives to the car and making the car less attractive of an option is in agreement of Banister's (2008) suggestion.

"It mainly depends on the quality of the choice for a given mode. That is decided among other things by price, travel time, ease, comfort. And if you increase the parking fee, the car becomes less attractive. If you increase the frequency of buses, public transport becomes more attractive." -M. Oedekerk

In conclusion, the measures that are used in Groningen in order to encourage modal shift aim to make alternative modes to the car competitive in terms of cost and practicality. This is done by both making the car less competitive and the alternatives more competitive. Despite this, parking controls are not actively used as a measure to decrease the competitiveness of the car.

Effectiveness of measures

Many of the measures mentioned are already in place, and respondents are identifying a modal shift that is currently happening in Groningen. Of the respondents who were asked, all mentioned that they were seeing an increase in the use of alternative modes. However, respondents also identify that there still is a group of people that is harder to reach, and generally unwilling to stop using the car.

"I think a part changes mode because the car is still expensive, and perhaps you will still be in traffic, even if you can park for free. If you also see that you can purchase a bicycle with fiscal advantages, you do that. But for another group those stimulating measures will have no effect. They will only change mode if they have no other choice." -C.S. Kumm

[4] Groningen accessible, an organisation tasked with promoting measures improving accessibility during construction works

Exceptions

For respondents, modal shift is not a goal in itself. Therefore, there are a number of exceptions where people will, and should be able to continue using the car. Contrary to the measures taken to encourage modal shift, parking spaces do play an important role in this enabling of the car. One of the reasons for these exceptions is that all relevant respondents want people to retain their freedom of choice, meaning that the car should always be an option, as can be seen in table 2, even if this choice is nudged in a certain direction by for example high fees. The result is that parking spaces still need to be available when the car needs to remain an option.

"Not everyone would like to travel with public transport or bicycle. Therefore we chose for the policy of "if you really don't want to, or have no other choice, you can park on the street for a high fee, slightly less in a parking garage, and otherwise in a P+R area."" -M. Oedekerk

Additionally, in some cases, there is no alternative to the car. In these cases, people will only be able to use the car, and so they will need to be accomodated. This is partially caused by the spatial character of the city and its surroundings. It is a dense city with a strong border, meaning that there is a sudden transition in opportunities for public transport.

"It's not realistic to give every farm in the outer areas a bus connection. At the same time you want the liveability there to be in order. So in that case the car is much more appropriate than public transport. This is a very compact city, and you often see the border, so to say. Here it starts, here it ends." -M. Oedekerk

In other cases, there is no modal shift because there are not enough incentives by employers and the government. In these cases alternative modes of transport are not encouraged by employers, usually for the reason that there are sufficient parking provisions, and that the municipality still primarily uses minimum parking spaces in new developments. This means that there will still be people using the car, especially in areas such as Euvelgunne[5] where spillover is not a problem because no one experiences nuisance from it.

"You keep seeing more change [in employers' role in the mode of employees], but it's still the case in Groningen that employees just get a compensation for their commute, and the businesses in Groningen, if they start a business somewhere they have to make sure that there are enough parking spaces. So with that you still encourage that people often drive their cars to the city" -N. Borgman

Employers also see that part of employees are less willing to change their mode of transport, because in their eyes the bicycle or public transport still can not compete with the car.

[5] Large business park in the southeast of the city

"[People still like to park] because it's much more practical. Partially because they need to pick up the kids, because they have to deliver something, because they have appointments here and there, simply because it's raining, all kinds of different reasons. And everyone feels like they should be able to park here, that it really is important and they have a special function that makes it necessary, and sometimes it's status." -C.S. Kumm

Modal shift responses

	N.Borgman	C.S. Kumm	M. Oedekerk
Employers encourage modal shift	yes	yes	
Ring road as catalyst for modal shift	yes	yes	
Option for car should be available	yes	yes	yes
Public transport is of good quality	yes		yes
P+R is important for quality	yes		yes
Groningen Bereikbaar plays role	yes	yes	
Car is often preferred by individuals	yes	yes	
Using financial incentives	yes	yes	yes
Making the car less attractive		yes	yes
Making alternatives more attractive	yes	yes	yes
Parking controls help in modal shift	yes	yes	yes
Health benefits		yes	
Emissions		yes	
Modal shift is already happening	yes	yes	yes
Modal shift is a goal in itself	no		no

Table 2- Modal shift responses

Parking spillover

Respondents were asked about their experiences with parking spillover, both in professional and personal experience. This is divided into three categories: the underlying aspects that cause parking spillover, the problems caused by parking spillover and solutions to parking spillover.

Reasons for parking spillover

As described by Willson (2008), parking spillover is the phenomenon where a lack of parking availability leads to people parking in undesirable locations. The respondents mention two clear causes, one of which is the limited parking capacity of employers, which is something all relevant respondents mention as can be seen in table 3. This is in accordance with Willson (2008), as here too the parking spillover is caused by a lack in parking spaces. A situation that is described commonly by the respondents is that people park in a free area, and consecutively use a folding bicycle in order to reach their destination.

"[Companies having not enough parking spaces] is a problem, then they start parking in the neighbourhood, or they park in public facilities. In those areas you have a lot of long term parking. An example is Hoendiep, the Atoomweg[6], there is a lot of long term parking, because you're just outside of the regulated zone of the municipality. They park their car, get their bicycle and go to their work, and they return in the evening." -N. Borgman

Another cause is the extension of the paid parking area. Respondents identified that whenever the paid parking zone is expanded, the area where parking spills to moves to the new border area. This is also fits with Willson's (2008) definition, where in this case the parking is limited by introducing a fee. Contrary to Pandhe & March's (2011) findings in Melbourne, commuters in Groningen are largely unwilling to accept parking fees.

"Every time you see that as soon as in a part of the neighborhood parking fees are introduced, you see that the people who work in the city or in the UMCG, that they start parking their cars in the area where parking fees are not yet introduced." -J. de Graaf

The reason why this causes parking spillover, according to respondents, is that a proportion of people trying to enter the city are both unwilling to change their mode of transport and pay for parking.

"A trend has emerged over recent years, that people are getting bolder, and that's not just with parking, but in general. People start demanding more rights. You also see that with commuters, I'll take that as an example, but it's also neighbors from adjacent neighbourhoods. They think they have the right to park there, despite us having beautiful P+R areas, with good bus connections to the city, and bicycle connections to the city." -D. Duifhuis

[6] Business park to the west of the city centre

Problems caused by parking spillover

The main problem caused by parking spillover is that the people who the parking spaces are intended for, do not have access to them. Respondents specifically mentioned residents and shoppers.

"If you take Woonforum[7], Vesta, they have a parking lot under the western ring road. They suffer a lot from parking spillover. They park their cars, walk into the inner city, because that's where they work, and in the evening they walk back." N. Borgman

"[What people see as the problem is] that they have to drive longer in order to find a parking space after they come home from work, that it's not in front of the door, that they don't have direct vision on their car." -J. de Graaf

Solutions to parking spillover

The only solution to parking spillover respondents had confidence in was an increase of the controlled parking zone to the point where people are no longer willing to continue parking in undesirable places, and either pay for parking or change their mode of transport. Respondents also question whether the government should do this reactively, as is the case with the current policy.

"In the end is the expansion of the areas where there's parking fees, it produces some kind of waterbed effect, and that will continue until you reach the [eastern] ring road. And as municipality you have to ask yourself if it wouldn't be better to do all that at once." -J. de Graaf

"Parking fees are in that sense the only means we have as a municipality that has proven to work every time, with which we can reduce parking pressure." -D. Duifhuis

All respondents identified the problem that introducing controls on parking caused people to simply park in a nearby free area, from both professional and personal perspective.
Folding bicycles are commonly mentioned as a part of the problem, where commuters park in a free parking area, take a folding bicycle out of their car and continue their commute by bicycle. This suggests that the distance commuters are willing to travel in order to park for free may be substantially larger than the 2,5 kilometers suggested by Rye et al. (2006), which may make the problem harder to solve.

[7] Retail area to the west of the city centre

Parking spillover responses

	N. Borgman	D. Duifhuis	J. de Graaf	C.S.Kumm
Employees park in public parking spaces	yes	yes	yes	yes
People try to avoid parking fees	yes	yes	yes	yes
People use folding bikes for final part of commute	yes	yes		
Causes problems for retailers	yes			
Causes problems for residents		yes	yes	
Caused by popular destinations	yes	yes		
Caused by residents parking in different neighbourhoods		yes		
Solved by more extensive measures		yes	yes	

Table 3- Parking spillover responses

Parking controls

Parking controls, whether they are intentional or unintentional, are used commonly in Groningen, but the reasons for them differ. This segment is divided in congestion as a reason for parking controls, parking pressure, which is the situation where the amount of cars on the street is perceived to be too high, the arguments against introducing parking control, and the remaining outcomes relating to parking controls, including more practical reasons for parking controls.

Congestion

One of the reasons why parking controls are used, and more broadly why the desire for modal shift exists, is that the amount of cars that potentially go to the city is too large to handle. Cars use up too much space, and therefore more space efficient modes are more desirable. This is also described by Banister (2008).

"We just can't handle the daily commute that we have to receive. 200.000 people live in the former municipality of Groningen, I believe every day 200.000 more come for their work, and we can't fit all those people within the diepenring[8] and the ring. So you just have to make sure that you move to space efficient modes of transport: walking, cycling, public transport." -M. Oedekerk

[8] Inner city

This effect is amplified by the compact nature of the city of Groningen, which means that there is limited space available for parking. If this parking were to be unrestricted, it would lead to congestion.

"We have a compact city in Groningen. Fortunately it's still quite historical, and you just have very limited space, so you notice that you can't allow everything. So partially [restricting parking] is a very political choice, but partially it's also unavoidable, because if we hadn't applied a parking policy in the inner city and the surrounding neighbourhoods, then people can't park their car and things gets congested." M. Oedekerk

Parking pressure

Parking pressure describes the situation where the amount of cars on the street is such that it becomes difficult for people to find a place to park their car. Most respondents mention this as a reason for parking controls, as can be seen in table 4. Parking pressure causes frustration with residents, which results in them asking for action by the municipality. This problem however is not exclusive to areas where parking is free.

"[The complaints we get are] "Yes, it's busy, I can't park my car, do something." To be brief. Also in areas where there already are parking fees, but in places where it's free you now see that adjacent [to areas with parking fees] areas go more in that direction." D. Duifhuis

"You need to take the amount of cars and the amount of available parking spaces into consideration. Generally the the rule is that if there are 100 parking spaces, and there are fewer than 85 cars for those spaces, people experience that as something positive. Once you're above 85, things get tighter and people start seeing less and less of an advantage." J. de Graaf

Other reasons

For the private sector, there generally are not enough parking spaces for the employees wishing to commute by car. The reason for this is the price of parking spaces, which especially real estate owners are unwilling to pay. This is the same effect that is described by Willson (2013) who argues that a reason to use minimum parking requirements is that employers and developers are generally unwilling to provide these spaces. However, this the case of Groningen, it causes employers to encourage a modal shift.

"A parking space costs a lot of money, so what you see is that businesses, if they buy a piece of land, then they're obligated to build an amount of parking spaces, then they meet those minimal parking requirements. What you see with rental companies, so real estate owners, they especially keep to the minimum amount of parking spaces. So if you rent it, you have a limited amount of space, so you have to look for other solutions." -N. Borgman

Arguments against parking controls

Parking can be a sensitive subject, as parking fees add more costs to residents where there were no costs before. This is worsened by the fact that people feel like the problems that parking controls aim to solve are not caused by them. By its nature, parking spillover is caused by people from an area with not enough or too expensive parking moving to an area without such limitations. This causes problems for the actors in this area, and the common way to solve this is to force these actors to pay for their parking places.

"Parking is a matter of feelings, and especially for the people who are parking, because you are touching their wallets, and generally they don't really like that." -D. Duifhuis

"There's people who principally are against introduction [of parking fees] because they think the government never does anything right, there's people who are in favour of parking fees, but think it's unfair that they have to pay for problems that are not caused by them but by people who live in the centre but park their cars here, and you have a smaller group that says: "It doesn't matter to me, I have the money, I'll pay."" -J. de Graaf

Parking controls responses

	N. Borgman	D. Duifhuis	J. de Graaf	M. Oedekerk	C.S. Kumm
No possibility of expanding capacity	yes				yes
Leave space for intended group		yes	yes	yes	yes
Avoid congestion of roads				yes	yes
Complaints of parking pressure		yes			
Liveability of neighbourhoods		yes			
Too many cars want to park		yes		yes	
Financial costs of parking spaces	yes				no

Table 4- Parking controls responses

Answering the research questions

From the results, the research questions can be answered. The first stems from the literature review, the other three from the interview results. The answers to these questions can be seen in table 5. Especially the answers to the questions related to parking and spillover are very clear and one sided, meaning that it can be stated with confidence that parking controls are effective in limiting parking in the targeted area, and are part of the cause for an increased amount of parking in neighbouring areas.

Question	**Answer**
What is the current parking policy in Groningen?	Currently the parking policy is aimed at reducing the presence of parked cars in the streets
What are the results of parking controls in Groningen?	Parking controls cause fewer cars to be parked in the targeted area
Why will people shift mode and why not?	When using the car becomes less attractive and alternatives become more attractive
Do parking controls in Groningen cause spillover?	Parking controls result in more parking in adjacent areas

Table 5- Answered research questions

5 Conclusions

This study attempted to find an answer to the question *How can parking controls in Groningen encourage modal shift while minimising spillover parking?* This segment formulates a final conclusion from the found results and discusses this conclusion.

Findings

In Groningen, parking controls are currently used to solve issues related to the streets being filled with cars, known as parking pressure. Reasons for an increase of parking pressure include parking spillover and low capacity. The issues that are attempted to be solved are scarce public space, a decreased attractiveness of the streets, and that people who are intended to park in a given area cannot do so. However, despite an increase in parking controls in the city which aim to solve the problems of parking pressure, these controls are not used as a means to encourage modal shift. Parking controls do however cause modal shift in Groningen, as they discourage car use. This effect is only partial however, as the effectiveness of parking controls as a means of encouraging modal shift is hampered by parking spillover.
Following from this, in order for parking controls to become an effective measure for encouraging modal shift, the effect of parking spillover needs to be reduced. The best way of doing this is by extending the controlled parking area far enough that people are not willing to park in neighbourhoods, and thus will use different modes of transport. For modal shift to happen another requirement is that there are sufficient alternatives. In Groningen, the alternatives are of good quality, and cycling, public transport, a combination of the two, or using the car in combination with these through the P+R system will be a competitive alternative to the car.

From this, it can be concluded that most of the hypothesis is correct. The key to using parking controls as a way to encourage modal shift in Groningen is solving the problem of parking spillover, which can be done by extending the control zone and placing new zones around common destinations. This is an effective method for the case of groningen, as other requirements for modal shift have already been met.

Discussion

The outcome of the study is very one sided, with respondents mostly agreeing when asked similar questions. This may mean that possible counter arguments have been missed. Additionally, the analysed data solely consists of interviews based on perception, with no secondary data to paint a more complete picture. This is due to the lack of time and expertise to properly account for the different complex factors that play a role in the subject

Recommendations

The subject that has come out as a somewhat important factor in this study, but has not been further investigated is the difficulty of implementing parking controls. This study has concluded that in order for parking controls to be an effective measure in encouraging modal shift, parking controls have to be used extensively, but how this can be implemented is another question. One of the findings is that parking controls are not popular, and therefore it is recommended to look into effective methods of passing these measures in the future. Another finding of the study is the usage of folding bikes as part of the commute. Their prevalence and influence on parking spillover are still unknown, and might prove to be useful knowledge.

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Appendix

Interview questions

C.Kumm and N. Borgman

What role do employers have in employees' mode of transport?

Why are or are alternative modes not encouraged?

In which ways are alternative modes of transport encouraged?

How are parking provisions determined?
What are determining factors in this?

How do employees respond in cases where there are not enough parking spaces?

What are the changes in the amount of parking spaces businesses supply to employees?

M. Oedekerk

What are the goals of public transport policy in Groningen?

What are the results?

What are reasons why people would switch to public transport?

What are the difficulties in encouraging people to use public transport?
    What methods work well?

What are recent patterns in the usage of public transport?

What role does parking have in transport policy?

J. de Graaf

What are the advantages of introducing parking control?
    Are the problems that parking controls aim to solve caused by other parking measures?
    What are the reasons people would want parking controls to be introduced?

Do parking fees solve the issues they are intended to solve?

How are parking controls introduced?

D. Duifhuis

What is the current parking policy in the city?

What are your thoughts on providing fewer parking spaces?

What are the results of parking policy?

Where does spillover parking play a role?

What are the goals of parking measures?

What is the effect of parking measures on mode of transport?