



The parcel locker as a sustainable last-mile alternative: An explorative comparison between two neighbourhoods in the city of Groningen

Randy ten Brink



rijksuniversiteit
 groningen

Colophon

Title: The parcel locker as a sustainable last-mile alternative: An explorative comparison between two neighbourhoods in the city of Groningen

Author: Randy ten Brink

Student Number: S3833798

Contact: rm.tenbrink@hotmail.com

University: Rijksuniversiteit Groningen

Faculty: Spatial Sciences

Degree: BSc Spatial Planning and Design

Supervisor: dr. W.S. Rauws

Date: June 11th , 2021

Cover photos: Noorderplantsoenbuurt (Ben-s.nl Groningen, 2021)

Reitdiep (Van De Biezen, 2021)

Abstract: The last-mile in city logistics is very inefficient, expensive and polluting. New technologies, such as the parcel locker, are necessary to mitigate this problem. There is no research on how parcel lockers should be implemented in Dutch cities. The Dutch are known to travel a lot by foot and bike, suggesting that there is potential for the parcel locker to reduce the environmental impact of city logistics, on the condition that the parcel lockers are placed in such a way, that consumers will access them by using zero-emission modes of transport. Previous research shows that travel behaviour in general can already differ on the neighbourhood level. Therefore, this research compares two neighbourhoods in Groningen, these being the Noorderplantsoenbuurt (Traditional neighbourhood) and Reitdiep (Suburban neighbourhood). A questionnaire that links travel behaviour and the perception of the neighbourhood design to the usage of the parcel locker, was distributed to residents of both neighbourhoods. A Key finding is that the parcel locker seems to be a more promising solution in dense traditional neighbourhoods, as a small percentage of the suburban residents would still use their non-electrical car to travel to the parcel locker. This percentage of residents that prefer the use of their non-electrical car is of sufficient size to nullify the positive impact of the parcel locker on CO2 emissions.

Keywords: City Logistics, Last-Mile, Parcel Locker, Travel Behaviour, Neighbourhood Design

Table of Contents

1. Background	4
1.1 The last-mile problem	4
1.2 The ever-growing amount of parcels.....	4
1.3 The benefits of parcel lockers.....	5
1.4 The shift of responsibility for the last-mile.....	5
2. Scientific and societal relevance	5
3. Research aim and questions	6
4. Reading guide	6
5. Theoretical framework	7
5.1 The position of the parcel locker in the transition to sustainable city logistics	7
5.2 The factors that influence how a consumer makes use of a parcel locker	8
5.3 The influence of neighbourhood design on travel behaviour	9
6. Conceptual model	11
7. Methodology	12
7.1 Theoretical stage: Literature review	12
7.2 Empirical stage: Questionnaire and comparative analysis	13
7.3 The research area	14
7.4 Questionnaire design	16
7.5 The data collection	16
7.6 Data analysis.....	17
7.7 Research ethics.....	19
8. Results	20
8.1 Introductory questions related to online shopping.....	20
8.2 Results: Travel behaviour	21
8.3 Results: Neighbourhood design.....	27
9. Conclusion	30
9.1 Recommendations for further research	31
10. Reference list	32
11. Appendices	37

1. Background

1.1 The last-mile problem

Urban freight transport is a very important aspect of everyday city life. For a city to function normally day in day out, many goods and packages need to be delivered to stores and homes every 24 hours. Previous research already indicated that the last-mile of these trips are the most inefficient, expensive and polluting part of the chain (Dablanc & Rodrigue, 2017; Jiang et al., 2019). According to Ranieri et al. (2018), the last-mile is responsible for 28% of total delivery costs. Dablanc (2007) mentions that twenty to thirty percent of vehicle kilometres in urban areas are represented by urban freight transport. The last-mile plays a substantial part in these driven kilometres. For these reasons, the last-mile has become an obstacle to the development of a sustainable transport system (Jiang et al., 2019).

1.2 The ever-growing amount of parcels

This research will look into the last-mile of parcels in business to consumer transport, as e-commerce has been growing rapidly in past years (Statista, 2021). Moreover, the current COVID-19 pandemic causes an even bigger growth in E-commerce than previously expected (Varona et al., 2020). This increase in E-commerce results in an increased amount of parcels that need to be delivered to people's front door. Consequently, this leads to more parcel delivery vans on the streets, which may cause additional congestion and air pollution in cities. To reduce this negative impact of parcel delivery vans, alternative last-mile delivery methods, like the parcel locker (PL) could provide a solution (Figure 1). In contrary to current service points, PLs have no need for an intermediary. This can save people valuable time, as they can swiftly collect and drop-off their parcels, instead of waiting in line at service points (Vakulenko et al., 2018).



Figure 1: A parcel locker from PostNL (AD, 2018)

1.3 The benefits of parcel lockers

Multiple researches have already addressed benefits of PLs. Jiang et al. (2019) proved that PLs help reduce total delivery costs and carbon emissions. Iwan et al. (2016) also found PLs help to reduce unnecessary vehicle mileage. The investigated PLs in their study, were able to 'deliver' 10 times as much parcels in one day, with 80 kilometres less travelled than the original method using a delivery van. There is also more support for economic benefits of PLs in previous research. Van Duin et al. (2020), found that PLs in De Pijp (Amsterdam) could save PostNL €121,356 per year in delivery costs, in comparison to traditional delivery methods.

1.4 The shift of responsibility for the last-mile

When PLs are being used as an alternative for last-mile delivery, consumers will be responsible for the last-mile of their parcels instead of logistics companies. Iwan et al. (2016) identified this shift in responsibility as a weakness of PLs. It implies that behaviour of consumers will play a considerable role in ensuring the sustainability of PLs as a last-mile alternative. If PLs are not sufficiently accessible by zero-emission modes of transport for consumers, there is a risk that previous mentioned environmental benefits will perish. Therefore this research will focus on how the PL can be a sustainable last-mile alternative, by looking at travel behaviour of consumers.

2. Scientific and societal relevance

Several researches already address the role of consumers in ensuring the sustainability of PLs. However, most of these researches were conducted outside of the Netherlands, for example in countries such as Poland (Iwan et al., 2016; Lemke et al., 2016), Austria (Hofer et al., 2020) and Brazil (de Oliveira et al., 2017). No research on the role of consumers in ensuring the sustainability of PLs has been conducted in the Netherlands. This knowledge gap is problematic, as different consumer cultures could mean different findings (Vakulenko et al., 2018). So previous research may not be applicable to The Netherlands, especially because Dutch people have a very unique type of travel behaviour. According to Eurostat (2021), out of all countries in Europe, trips made by bicycle are most frequent in the Netherlands, up to twenty to forty percent of all trips are made by bicycle or foot. This suggests that the identified weakness of PLs stated by Iwan et al. (2016), may be of less influence in The Netherlands. However, even in the Dutch context there could still be differences in travel behaviour. The different neighbourhoods in cities have different spatial designs, which could in turn have an influence on travel behaviour of inhabitants (Aditjandra et al., 2013). They found significant differences between traditional and suburban neighbourhoods. Therefore, a traditional and suburban neighbourhood in the city of Groningen will be used as an example for other Dutch neighbourhoods. Such a study is also very timely, as the first PL in Groningen made its appearance in 2019 (PostNL, 2019). Groningen has an ambitious policy agenda for zero-emission city logistics in the inner-city. The aim is to make the whole city centre a zero-emission zone by 2025 (Gemeente Groningen, 2021). The introduction of more PLs could go hand in hand with this ambitious policy agenda.

3. Research aim and questions

The aim of this research is to investigate how PLs can be a sustainable last-mile alternative on the neighbourhood level by looking at travel behaviour of consumers that would use a PL in their neighbourhood, as they are the ones responsible for the last-mile when using a PL. This travel behaviour may in turn be influenced by the design of the neighbourhood they live in. A traditional and suburban neighbourhood in Groningen will be used as an example, in order to create useful knowledge for the implementation of PLs in Dutch neighbourhoods.

The main question of this research is: *“How can parcel lockers be a sustainable last-mile alternative and how is their sustainability influenced by residential travel behaviour in a traditional and suburban neighbourhood in Groningen?”*

This main question will be answered by making use of five sub questions.

Theoretical sub questions:

- 1) *“How can the concept of the parcel locker be positioned in the transition towards sustainable city logistics?”*
- 2) *“Which factors related to travel behaviour have an influence on how a consumer makes use of a parcel locker?”*
- 3) *“What is the influence of neighbourhood design on the travel behaviour of its inhabitants and how may this differ between traditional and suburban neighbourhoods?”*

Empirical sub questions:

- 4) *“What is the influence of the travel behaviour of the inhabitants of the two different neighbourhoods in Groningen on the parcel locker as a sustainable last-mile alternative?”*
- 5) *“What lessons can be derived for the sustainable implementation of parcel lockers (on the neighbourhood level)?”*

4. Reading guide

The first three chapters gave some information about PLs in general and the relevance and aim of this study. The remainder of this research consists out of 7 chapters. Chapter 5 is the theoretical framework and it introduces relevant concepts and theories about the sustainability of PLs and how this is influenced by travel behaviour of consumers and the neighbourhood they live in. This framework is summarized in a conceptual model in chapter 6. Subsequently, chapter 7 will discuss the methodology. It will show how the research was structured and how the data was collected and analysed. Chapter 8 will discuss relevant results from the online questionnaire that was distributed in the two neighbourhoods in Groningen. The conclusion in chapter 9 gives an answer to the main question of this research. It also includes lessons for planning practice and recommendations for further research. The reference list can be found in chapter 10, followed by the appendices in chapter 11.

5. Theoretical framework

5.1 The position of the parcel locker in the transition to sustainable city logistics

The transition towards sustainable city logistics (SCL) concerns many facets that should be improved upon. The most topical issues as defined by Kauf (2016) include infrastructure and space constraints associated with time and place of deliveries, inefficient processes, loading/unloading of goods, increased energy costs, as well as CO2 emissions. Kauf (2016) states that new intelligent technologies are required in order to enable the transition towards SCL. The PL is one of these new intelligent technologies that could enable the transition towards SCL (Cassiano et al. 2021; Kauf, 2016).

New technologies like the PL can only help the transition if various stakeholders involved in city logistics cooperate. The complexity of this stakeholder network is apparent in an actor-based model of the transport system (Figure 2) made by Behrends et al. (2008). Every actor in this model can help the transition towards SCL. The shipping company should provide a delivery option for PLs. But first, the PL should be located somewhere, either the government is involved if it is about public space, or private stakeholders are involved if it is about private space. But before the parcel arrives at the PL, it is important that it arrives at a consolidation centre to ensure that less freight vehicles are driving through the city, if the logistics company is even prepared to adapt to this system. If not, there may be a role for the government to give the logistics company an incentive to also take part in so-called joint-delivery systems.

Then there is the question if consumers are prepared to travel the last-mile of the journey with a zero-emission mode of transport, to ensure that PLs are a sustainable invention. This was also indicated during a conversation on the 29th of March 2021 with junior researcher Rudy Niemeijer of the Rijksuniversiteit Groningen, who researches PLs in the province of Drenthe. If someone uses their car for a dedicated trip towards the PL, the whole positive effect of the PL on emissions could be nullified. Therefore, it is important that PLs are placed in such a way, that zero-emission modes of transport become the preferred mode for consumers. Lachapelle et al. (2018) also mention that PL managers should ensure access to PLs via non-motorized travel.

This example shows the substantial amount of actors involved in SCL and which actors play a role when implementing PLs. The behaviour of these actors is determinative for the success of PLs. Due to the shift in responsibility for the last-mile, the behaviour of consumers is especially important for this success. Therefore, this research focuses on the consumer.

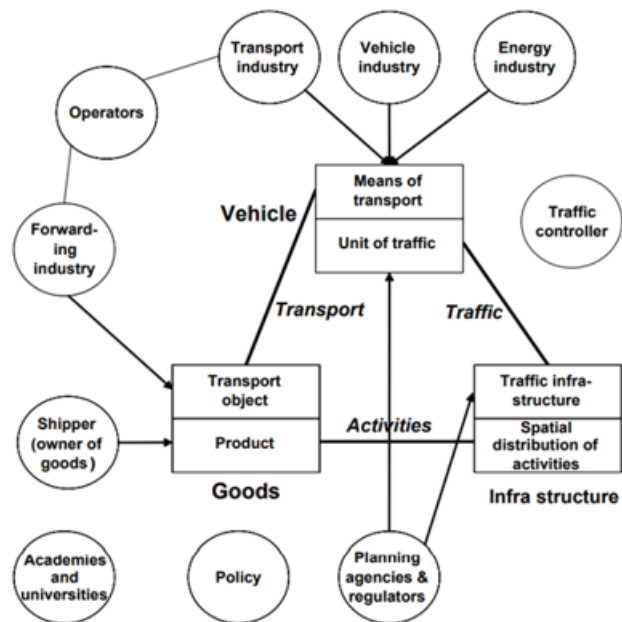


Figure 2: An actor-based model of a transport system (Behrends et al, 2008, p. 706)

5.2 The factors that influence how a consumer makes use of a parcel locker

With respect to travel behaviour of consumers, multiple factors that could have an influence on PL use, have been identified in previous research. The most important factors found are:

- Access mode options
- Distance
- Opportunities to integrate the collection of parcels in existing trips (i.e. trip chaining)

(Collins, 2015; Hofer et al., 2020; Iwan et al., 2016; Lachapelle et al., 2018; Lemke et al., 2016; de Oliveira et al., 2017; Weltevreden, 2008).

Access mode options are related to where the PL is located and by which modes of transport the PL can be reached by consumers. Previous research found some preferable and less preferable locations for PLs. Shops and supermarkets were regarded as preferable locations, whereas gas stations seemed considerably less preferable (Lachapelle et al., 2018; de Oliveira et al., 2017). Furthermore, public transport stops are said to have great potential as a PL location in research conducted in Poland (Iwan et al., 2016) and Australia (Lachapelle et al., 2018). In addition, studies showed that the car is the main mode of transport used when collecting and returning parcels. This percentage was 44,5% in the study of Hofer et al. (2020) in Austria and 59% in the study of de Oliveira et al. (2017) in Belo Horizonte (Brazil). These percentages are contradictory to the previous mentioned statement by junior researcher Rudy Niemeijer of the Rijksuniversiteit Groningen and Lachapelle et al. (2018) about the necessity of non-motorized access options. Next to this, Collins (2015) found that areas with higher population densities are more likely to have better walking and cycling infrastructure. This may cause consumers in higher density areas to habitually use these zero-emission modes of transport, in part because there are also more trip attractions in vicinity. However, the use of these zero-emission modes of transport in higher density areas may also be explained by the fact that those who value certain modes more, may locate themselves in areas that better support such modes.

Distance to the PL was also deemed as an important factor by previous research. Consumers are more likely to use a service point/PL when they are found close to the homes of consumers (Iwan et al., 2016; Lemke et al., 2016; Weltevreden, 2008). Weltevreden (2008) mentions a five minute driving distance by car as the critical accessibility value. However, it is important that non-motorized modes of transport are being used to reach the PL as previously mentioned. Hofer et al. (2020) found that in Austria, participants are willing to use environmental friendly transport modes for a maximum travel distance of 1.9 kilometres between a PL and e.g. their home.

Trip chaining was another important factor found in previous research. For PLs to be a sustainable invention, it is also important that people integrate the collection of a parcel in their existing trips. The choice to take the car combined with the choice of a dedicated/chained trip has implications for the environment and congestion (Collins, 2015). Dedicated trips by motorized modes of transport should be minimized, as those lead to the highest vehicle kilometres (Hofer et al., 2020). Nevertheless, Hofer et al. (2020) found that dedicated car trips were still frequently made to the PL in Austria. Approximately 15% of all trips in the research of Hofer et al. (2020) were dedicated car trips. This was also found in the study of Lemke et al. (2016) in Poland, 29% of the respondents that presumably use their car to collect a parcel from the PL, never combined picking up a parcel with other activities. So when consumers use their car to collect a parcel from the PL, it is crucial that they only do this when the collection of the parcel can be integrated in an existing trip.

Table 1 gives a summary of this paragraph, it shows the important aspects per factor.

Factors	Important aspects	Literature derived from
Access mode options	<ul style="list-style-type: none"> - Shops, supermarkets and transit stations are regarded as preferred locations by consumers, whereas gas stations are less preferable - A large share of PL users utilizes their car to retrieve parcels from the PL - Consumers in high-density are more likely to travel to the PL by foot or bike 	Iwan et al. (2016), Lachapelle et al. (2018), de Oliveira et al. (2017)
		Hofer et al. (2020), de Oliveira et al. (2017)
		Collins (2015)
Distance	<ul style="list-style-type: none"> - Consumers are more likely to use a PL close to their home - 1.9 km as a maximum travel distance for using environmental friendly modes (walking/cycling) to the PL 	Iwan et al. (2016), Lemke et al. (2016), Weltevreden (2008)
		Hofer et al. (2020)
Trip chaining	<ul style="list-style-type: none"> - In order for the parcel locker to be sustainable, dedicated trips by motorized modes of transport should be avoided - A substantial part of PL users make dedicated car trips to the PL 	Collins (2015), Hofer et al. (2020)
		Hofer et al. (2020), Lemke et al. (2016)

Table 1: Important aspects per factor related to travel behaviour to the parcel locker

5.3 The influence of neighbourhood design on travel behaviour

Aditjandra et al. (2013) found that travel behaviour can already differ at a level as small as the neighbourhood. Different neighbourhood designs may lead to different effects on travel behaviour. Neighbourhood design has an influence on subjective safety and it may also stimulate/discourage the use of certain modes of transport. Previous studies used a division between traditional and suburban neighbourhoods (Aditjandra et al., 2013; Handy et al., 2005). Traditional and suburban neighbourhoods are different on various aspects (Table 2)

Neighbourhood type:	Traditional	Suburban
Aspects:		
Density	High	Low
Location	Inside the city	Outside or at the border of the city
Road layout	Rectilinear connected grids	Curvilinear with dead ends
Walking and cycling infrastructure	Good	Decent to bad
House frontages	Close to street	More set back in space

Table 2: General differences between traditional and suburban neighbourhoods

An important finding of Aditjandra et al. (2013) was that consonant behaviour (Being able to use your mode of preference) was apparent in traditional neighbourhoods and dissonant behaviour (Not being able to use your mode of preference) was apparent in suburban neighbourhoods. Previous research also found a link between neighbourhood type and attitude to travel modes (Aditjandra et al., 2013, Handy et al., 2005). Residents of traditional neighbourhoods were more positive about walking and cycling and more negative about car use. Whereas, suburban neighbourhoods were deemed more safe. If high-density traditional neighbourhoods were to be more safe, it would be even easier to promote sustainable mobility in these neighbourhoods (Aditjandra et al., 2013). There are several factors that potentially influence subjective safety in the neighbourhood and at the PL, such as good street lighting, the neighbourhood being safe for the use of certain modes of transport, a low crime rate, open space, unambiguous refuge and video surveillance (Aditjandra et al., 2013; Bengtsson & Vikingson, 2015; Loewen et al., 1993). Lastly, even though a relationship was found between neighbourhood type and attitude to travel modes, there were no links found between neighbourhood type and attitude to travel itself. For example, neighbourhood type does not influence how often a resident trip chains. Even though Maat & Timmermans (2009) found that residential density leads to shorter distances, but also prompts residents to make extra trips. In short, previous research shows that neighbourhood design does influence access mode options. Residents of traditional neighbourhoods like walking and cycling more than suburban residents. It is not clear if this also increases their preparedness to travel further distances to the PL by these modes. Furthermore, it is not clear if neighbourhood type influences how often a resident trip chains.

6. Conceptual model

The conceptual model (figure 3) gives an overview of how previously mentioned factors relate to each other. Travel behaviour is moderated by neighbourhood design and together they determine if residents are able to use the PL as a sustainable last-mile alternative on the neighbourhood level. Every resident has their own travel behaviour. However, neighbourhood design influences how much of this travel behaviour will be expressed when accessing the PL in their neighbourhood. So travel behaviour is the independent variable and the PL as a sustainable last-mile alternative is the dependent variable. Neighbourhood design is the moderating variable. Empirical research will show if inhabitants of both neighbourhoods can ensure that the PL will be a sustainable last-mile alternative.

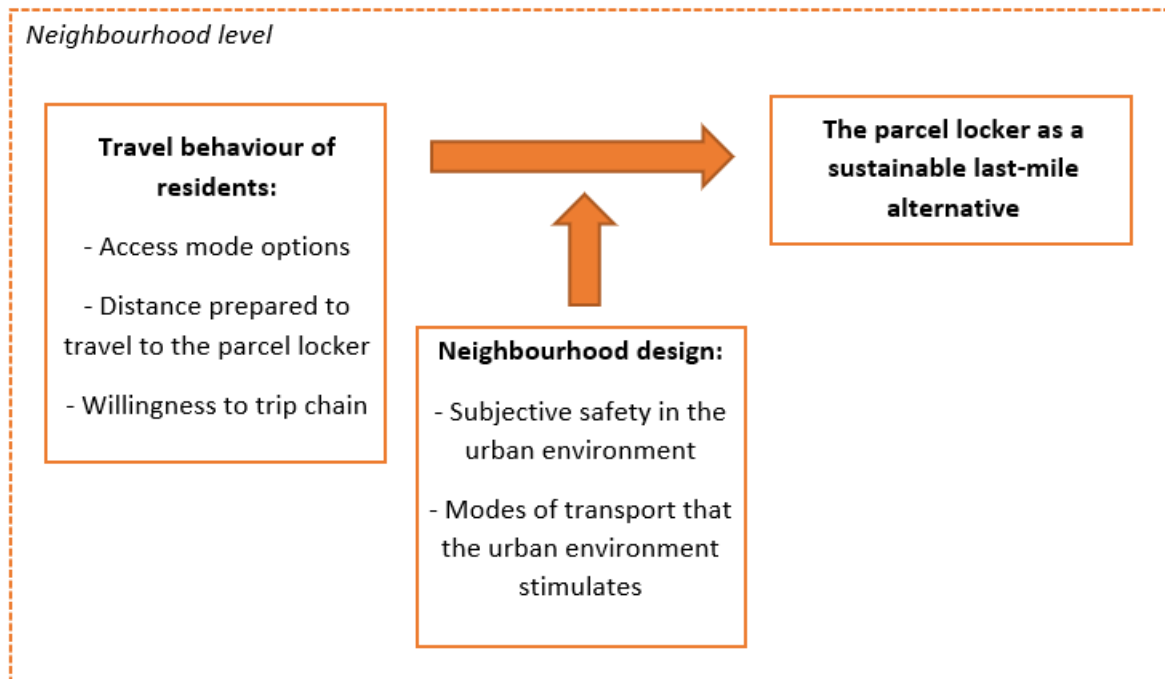


Figure 3: Conceptual model

7. Methodology

This study is a quantitative and explorative analysis on PLs as a sustainable last-mile alternative, comparing a traditional and suburban neighbourhood in Groningen, the Netherlands. The methodology will be explained by distinguishing a theoretical stage and an empirical stage.

7.1 Theoretical stage: Literature review

Table 3 shows an overview of how the articles in the literature review of the theoretical stage were found.

The theoretical sub questions:

1: "How can the concept of the parcel locker be positioned in the transition towards sustainable city logistics?"

2: "Which factors related to travel behaviour have an influence on how a consumer makes use of a parcel locker?"

3: "What is the influence of neighbourhood design on the travel behaviour of its inhabitants and how may this differ between traditional and suburban neighbourhoods?"

Search terms	"Sustainable city logistics" "Sustainable urban freight transport"	"Parcel locker" AND "Travel behaviour"	"Neighbourhood design" AND "Travel behaviour" "Safety" AND "Urban environment"/"Parcel locker"
Search engines	Google Scholar and Scopus	Google Scholar and Scopus	Google Scholar and Scopus
Selected articles	Behrends et al. (2008) Cassiano et al. (2021) Kauf (2016)	Collins (2015) Hofer et al. (2020) Iwan et al. (2016) Lachapelle et al. (2018) Lemke et al. (2016) de Oliveira et al. (2017) Weltevreden (2008)	Aditjandra et al. (2013) Bengtsson & Vikingson (2015) Loewen et al. (1993) Handy et al. (2005) Maat & Timmermans (2009)
Reason of selection	The most relevant articles as found by the search engines were scanned and these were deemed most useful for giving an overview of sustainable city logistics as a whole. Thus enabling the placement of the parcel locker in sustainable city logistics	The most relevant articles as found by the search engines were scanned. The articles that provided factors of influence were used and other relevant articles were snowballed from their reference lists.	These articles were most relevant according to the search engines. Furthermore, previously mentioned factors in the literature that answers the second sub question were also mentioned in most of these articles. Thus making the comparison between travel behaviour and neighbourhood design very clear. Other relevant articles were looked at by snowballing from the reference lists.

Table 3: Overview of the literature review

7.2 Empirical stage: Questionnaire and comparative analysis

Table 4 shows where the data used to answer the two empirical sub questions originates from and how this data was used to formulate answers to the empirical sub questions.

The empirical sub questions: **1: "What is the influence of the travel behaviour of the inhabitants of the two different neighbourhoods in Groningen on the parcel locker as a sustainable last-mile alternative?"** **2: "What lessons can be derived for the sustainable implementation of parcel lockers (on the neighbourhood level)?"**

Source of data	The responses to the questionnaire that was made in Qualtrics	The answer to the first empirical sub question, the theoretical framework and the conceptual model
Method	<p>The responses to the questionnaire were analyzed in SPSS and QGIS. This showed if there were differences per neighbourhood.</p> <p>In SPSS statistical tests showed if there were any significant differences between neighbourhoods by using the responses to the questionnaire.</p> <p>In QGIS an analysis was made to see if there was a relationship between the chosen parcel locker location by the respondents, the distance to the location and the type of the location chosen.</p>	<p>The result of the data analysis combined with the findings in previous academic literature will show what lessons can be derived for the implementation of parcel lockers on the neighbourhood level.</p> <p>It was looked at if differentiating between traditional and suburban neighbourhoods made sense when implementing parcel locker in the Dutch context and if the results were comparable to previous academic literature.</p>

Table 4: Overview of how the questionnaire was used for comparative analysis

7.3 The research area

To find an answer to the empirical sub questions, the research area had to be identified. The two neighbourhoods in Groningen that will be used as an example in this research were the Noorderplantsoenbuurt (Figure 4 and 6) and Reitdiep (Figure 5 and 7). As can be seen in the figures, Reitdiep has the characteristics of a suburban neighbourhood, whereas the Noorderplantsoenbuurt has the characteristics of a traditional neighbourhood, as mentioned in the theoretical framework. Several neighbourhood indicators have been plotted against each other in table 5 (Allecijfers.nl, 2021a; Allecijfers.nl, 2021b). Both neighbourhoods have similar amenities available in the neighbourhood that could function as a PL location in the future. A more in-depth characterization of both neighbourhoods can be found in appendix 1.



Figure 4: Noorderplantsoenbuurt



Figure 5: Reitdiep



Figure 6: Tuinbouwstraat in the Noorderplantsoenbuurt (Google maps, 2020)



Figure 7: Solwerd in Reitdiep (Google maps, 2020)

Neighbourhood:	Noorderplantsoenbuurt	Reitdiep
Indicators:		
Population	3850	3035
Population density	154 residents/hectare	31 residents/hectare
Construction period	1880 - 1930	2000 - present
Age distribution	0 – 15: 285 (7,4%) 15 – 25: 1200 (31,2%) 25-45: 1300 (33,8%) 45 – 65: 755 (19,6%) 65+: 305 (7,9%)	0 – 15: 860 (28,4%) 15 – 25: 255 (8,4%) 25-45: 935 (30,8%) 45 – 65: 780 (25,8%) 65+: 195 (6,4%)
Average annual income per resident	€ 24.700 ,-	€ 32.000 ,-

Table 5: Comparison of neighbourhood indicators

7.4 Questionnaire design

A questionnaire was used to identify the travel behaviour and perception of neighbourhood design of residents from the Noorderplantsoenbuurt and Reitdiep. According to Kelley et al. (2003), questionnaires are well suited to provide data for research that seeks to explain via testing of hypotheses. The big amount of residents that can be reached, enables generalization to the population. The online questionnaire was created in the programme Qualtrics and the language of the questionnaire was Dutch. While making the questionnaire, the ‘sequence effect’ as found by Sigelman (1982) and Bradburn & Mason (1964), was kept in mind. Wherever possible, the order of the questions was randomized. The questionnaire was also checked by three independent individuals. Small adaptations were made to increase readability and accessibility of the questionnaire.

The questionnaire started with some introductory questions about the respondents and their online shopping behaviour. This section was followed by questions about their travel behaviour and how they would use a PL on the neighbourhood level. Subsequently, there was a section of questions about how respondents perceived their neighbourhood (design). The complete questionnaire can be found in appendix 2. Appendix 3 shows the connection between the questions and the variables in the conceptual model.

7.5 The data collection

The questionnaire was distributed in both neighbourhoods to gather respondents. 130 addresses were selected in both neighbourhoods by making use of a random selection in QGIS. Appendix 4 shows the complete random sampling strategy. The selected addresses were approached to fill in the questionnaire. Initially, the doorbell of each address was rung. If residents opened the door, an introduction to the research was given. Afterwards, a flyer (appendix 5) with the QR-code to the online questionnaire and an introduction to the research was handed over. If people were not familiar with scanning QR-codes, a hard-copy was handed over, which could be retrieved later on. If residents did not open the door, the doorbell of their neighbours was rung and so on. This method of data collection was chosen, as spreading questionnaires in mailboxes is known to get low response rates (Agustini, 2018). She mentions that direct contact between the researcher and the respondent creates an obligatory feeling to fill in the questionnaire. A reward in the form of a gift card of €25 euros was rewarded to one of the respondents. This was also mentioned on the flyer and it was also mentioned during the talk with the respondents that opened the door.

7.6 Data analysis

The data collection resulted in 126 responses. Descriptive statistics were generated for each of the questions (Appendix 6). Question 1 shows 75 respondents are from Reitdiep and 51 respondents are from the Noorderplantsoenbuurt. Furthermore, questions 2 through 5 show that both samples are representative for the population, as reported by Allecijfers.nl (2021a & 2021b). This can be seen in figures 8, 9 and 10. It leads to the conclusion that the data is of good quality for the purposes of this research. The only big difference is that in both samples there are less one person households, especially in the Noorderplantsoenbuurt. This may be related to the fact that doorbells of apartments and studios in both neighbourhoods were not rung, as talking over the intercom is still not personal. Therefore, the flyers were put in their mailboxes. The other smaller differences are further discussed in appendix 7. Statistical tests were conducted for each of the remaining questions (6 through 25) to identify differences per neighbourhood (Appendix 6). The Chi-Square and Fisher's Exact Test were used for nominal data and the Mann-Whitney test was used for ordinal data. The most important findings will be discussed in the next chapter. All research steps are summarised in the research design, visualised in figure 11.

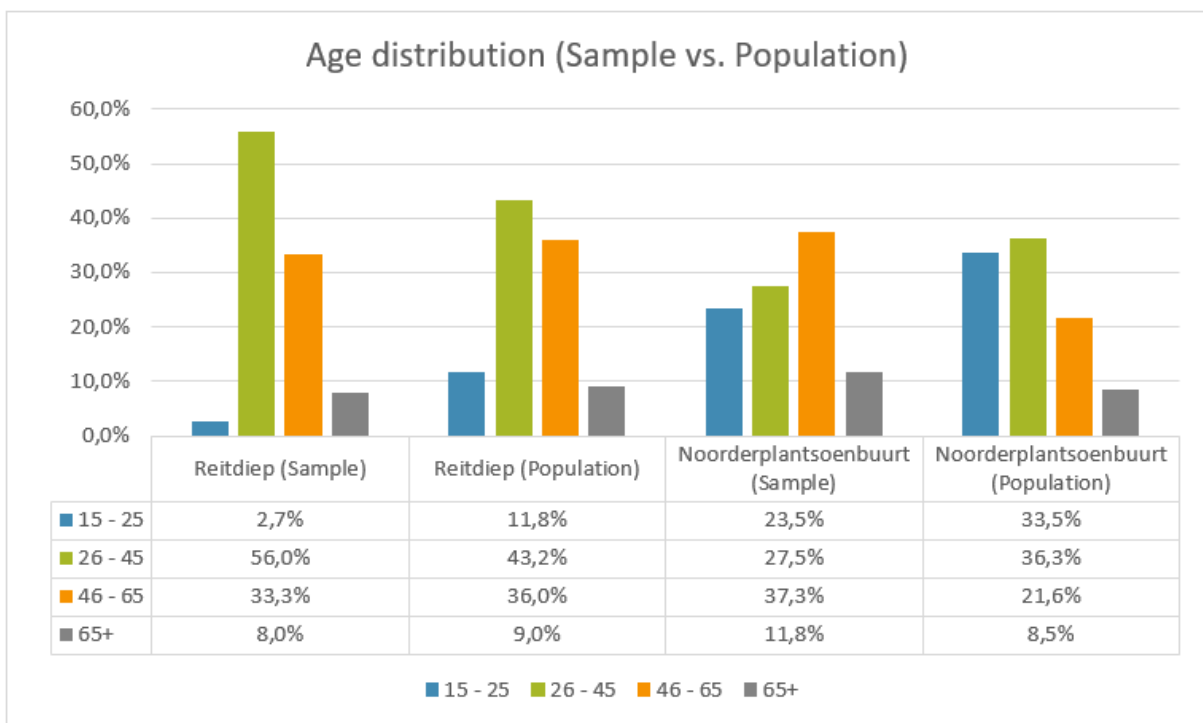


Figure 8: Age distribution (Sample vs. Population)

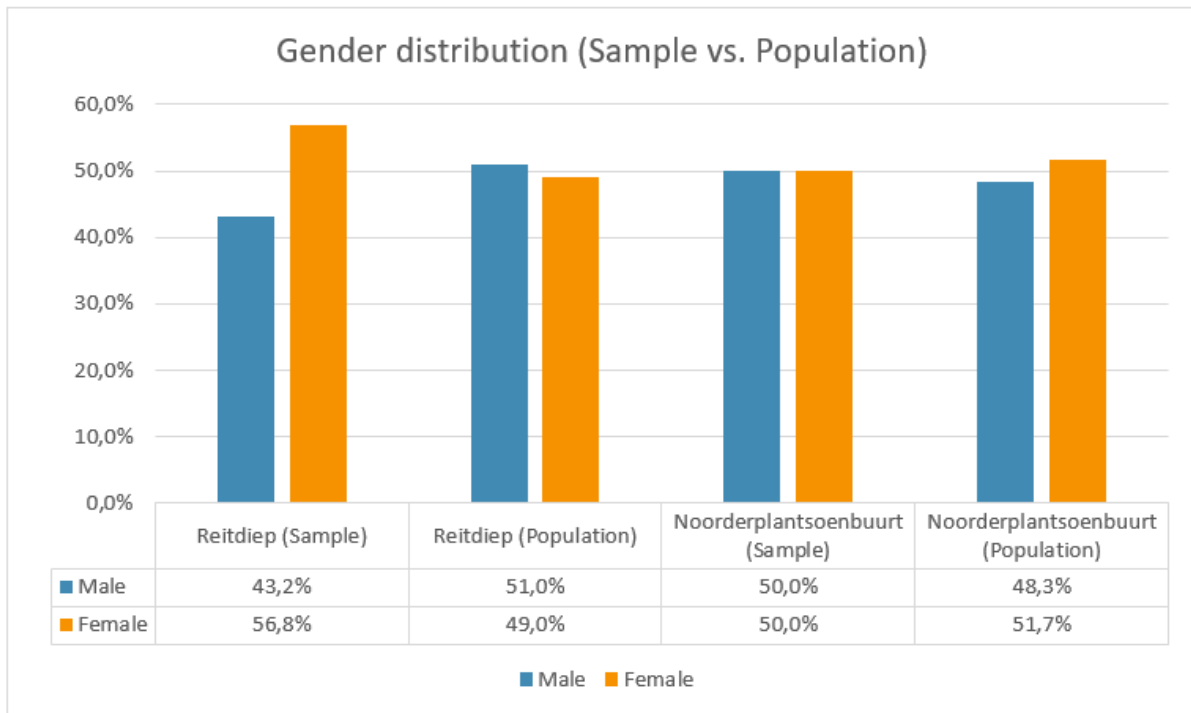


Figure 9: Gender distribution (Sample vs. Population)

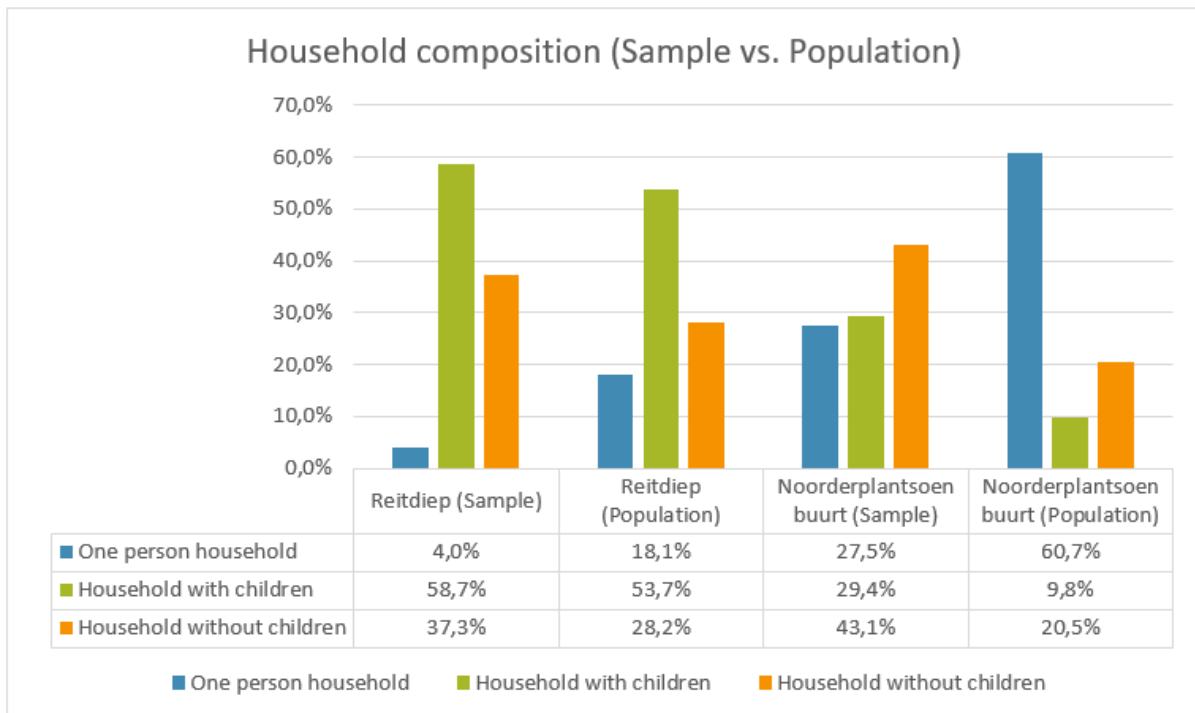


Figure 10: Household composition (Sample vs. Population)

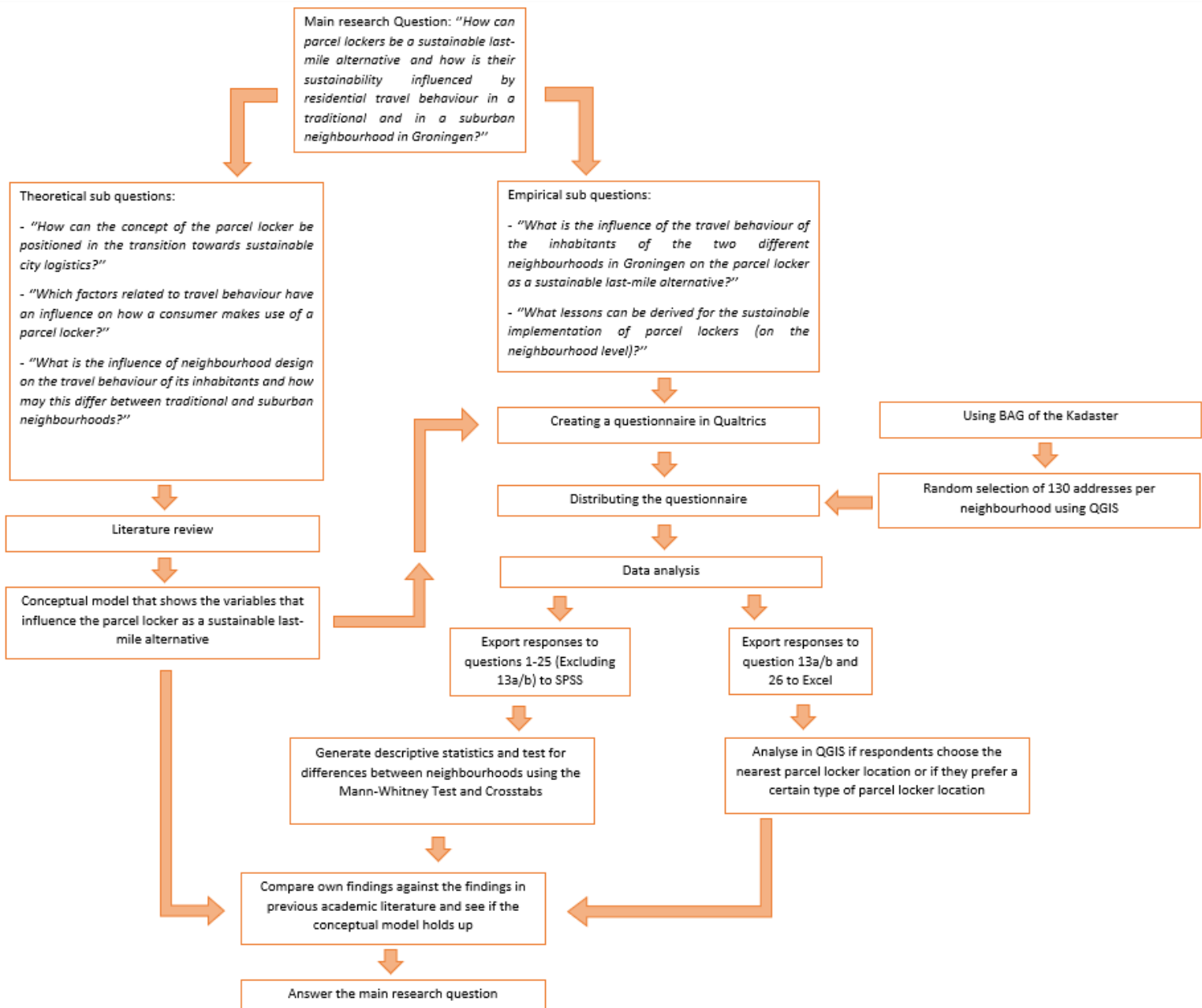


Figure 11: Research design

7.7 Research ethics

There were no power relations present that changed the answers given in the online questionnaire, as respondents were free to fill in the questionnaire on their own. However, the researcher influencing the response rate by ringing the bell and creating an obligatory feeling to fill in the questionnaire might be considered a power relation. Furthermore, the aim was to respect the privacy of respondents by limiting the amount of personal questions. If a personal question had to be asked, it was made sure there were options to skip the question or that they could for example indicate their age by making use of ranges. The respondents were also free to end the questionnaire at any given point without the necessity of providing a reason. The data they provide for this research was anonymous and it was solely used for research purposes. During the research, the data was stored safely in Qualtrics, which is a company that takes data privacy and protection very serious. After the research is finalized, all data will be deleted.

8. Results

8.1 Introductory questions related to online shopping

Most residents of both neighbourhoods order something online regularly (Figure 12). However, it was found that residents of Reitdiep seem to order online significantly more often than residents of the Noorderplantsoenbuurt. This may be related to the amount of nearby trip attractions in densely populated areas (Collins, 2015), residents of the Noorderplantsoenbuurt can reach a variety of shops in a relatively short amount of time. Although not mentioned in previous research, this might also be influenced by the higher annual income of residents of Reitdiep (Table 5).

Next to this, significantly more residents in the Noorderplantsoenbuurt (35,3%) prefer service points/PLs over at home delivery. This is considerably less in Reitdiep (18,7%). This does not take away the fact that at home delivery is still the most preferred way of parcel delivery in both neighbourhoods (Figure 13). Weltevreden (2008) found that only 19% of Dutch online shoppers used service points. So these numbers suggests that PLs especially have potential in the Noorderplantsoenbuurt. This is not to say that PLs could not function well in Reitdiep, but there is already twice as much support for PLs in the Noorderplantsoenbuurt.

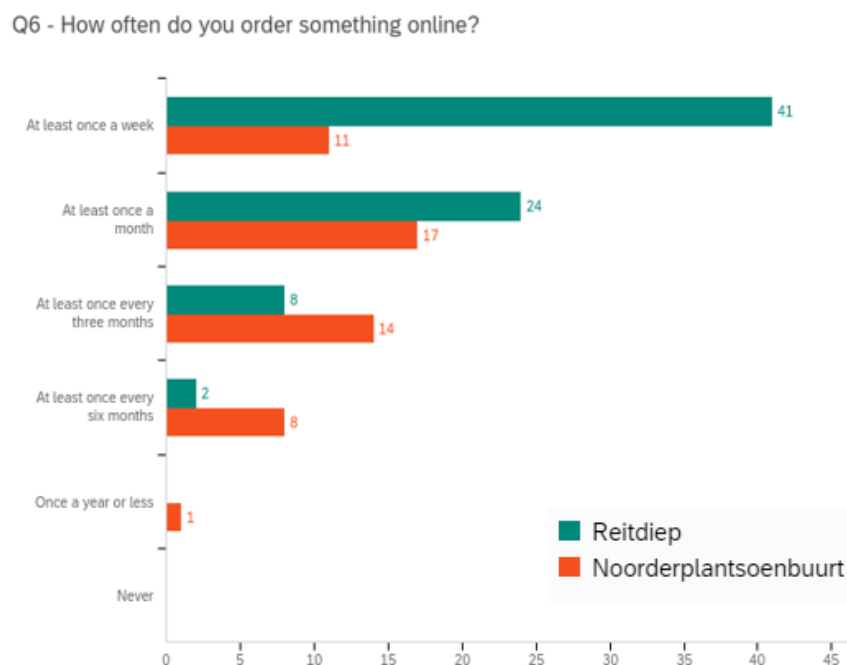


Figure 12: Frequency of online ordering

Q8 - Which way of parcel delivery has your preference?

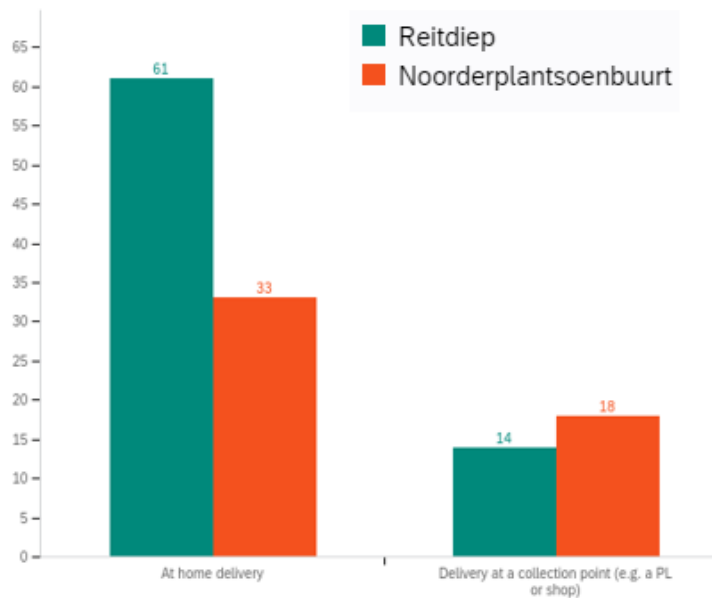


Figure 13: Parcel delivery preference

8.2 Results: Travel behaviour

One major difference can be found in the modes of transport that residents of both neighbourhoods have at their disposal. Almost all residents of Reitdiep have a non-electric car, whereas in the Noorderplantsoenbuurt only half of the residents have a non-electric car (Figure 14).

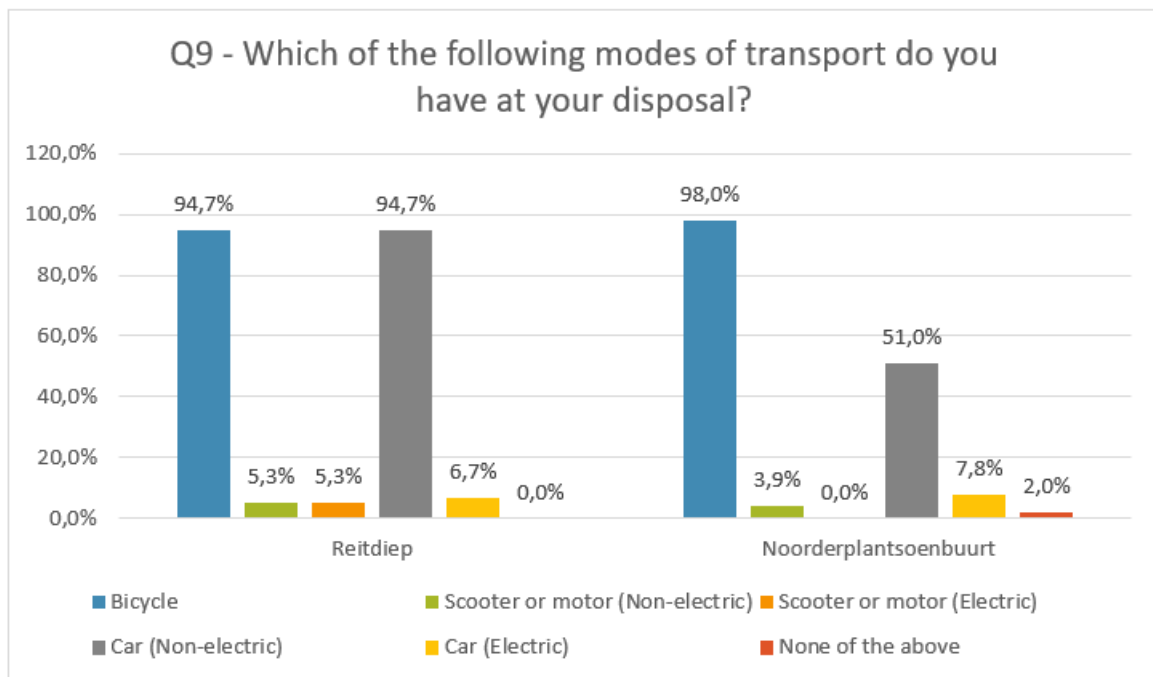


Figure 14: Modes of transports owned

Resident of both neighbourhood were able to select a PL location of their preference out of three options (Figure 16 and 17). When looking at which mode of transport residents would use when a PL would be placed on their location of preference, it becomes clear that there is a preference for walking and cycling on the neighbourhood level (Figure 15). 87,8% of the residents of Reitdiep would collect

their package by walking or cycling. In the Noorderplantsoenbuurt this percentage is significantly higher (100%). This is opposite to findings of Hofer et al. (2020) and de Oliveira et al. (2017), who found that the car was mostly used to reach the PL. This may be explained by the fact that for most residents in this research, their PL location of preference is within 1.9 kilometres. This was the limit mentioned by Hofer et al. (2020) for using environmental friendly modes. However, in their study, 11,6% of the dedicated trips to the PL are trips by car within 1.9 kilometres of the PL. Similarly, a large share (16%) of respondents in the study of de Oliveira et al. (2017) would already use their car to the PL when the travel time to the PL is at maximum 5 minutes. So it seems like culture has a substantial influence on the modes of transport used to reach the PL.

Q14 - Suppose the parcel locker will be placed at your location of preference. Which mode of transport would you mostly use to collect parcels from the parcel locker?

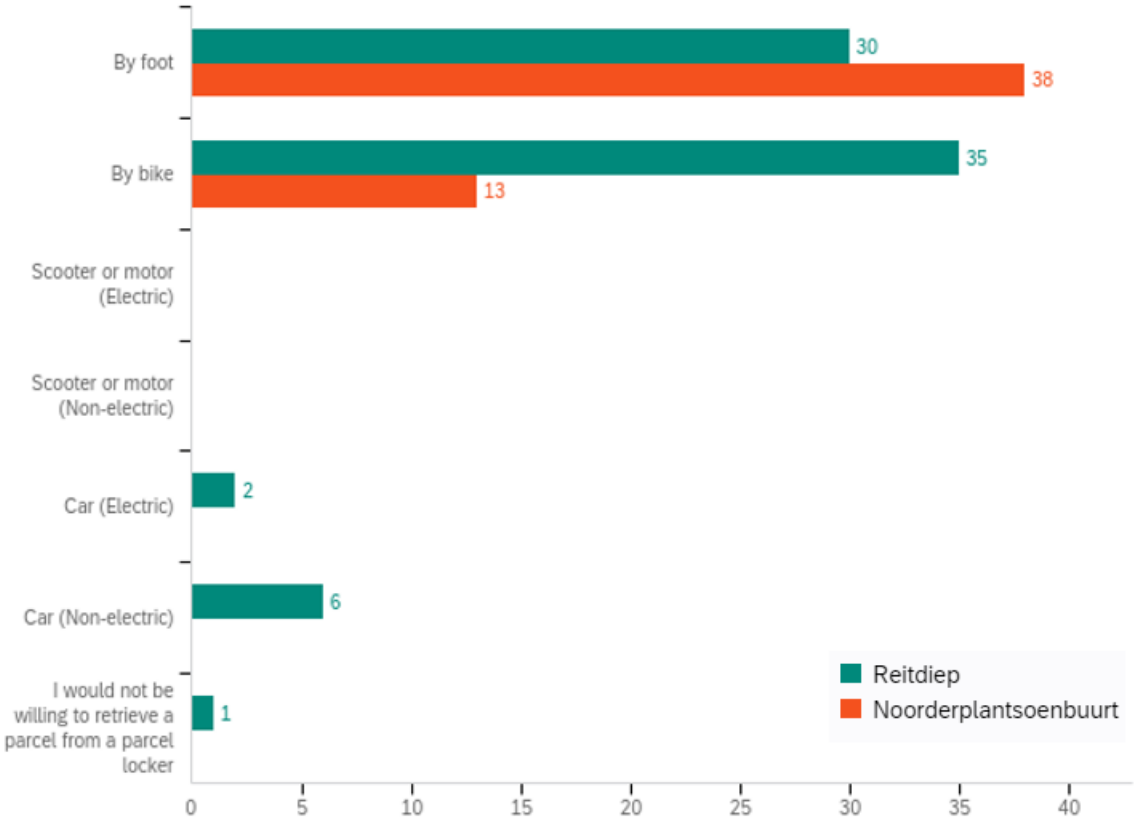


Figure 15: Mode of transport that would be used to access the parcel locker



Figure 16: Three possible parcel locker locations in Reitdiep

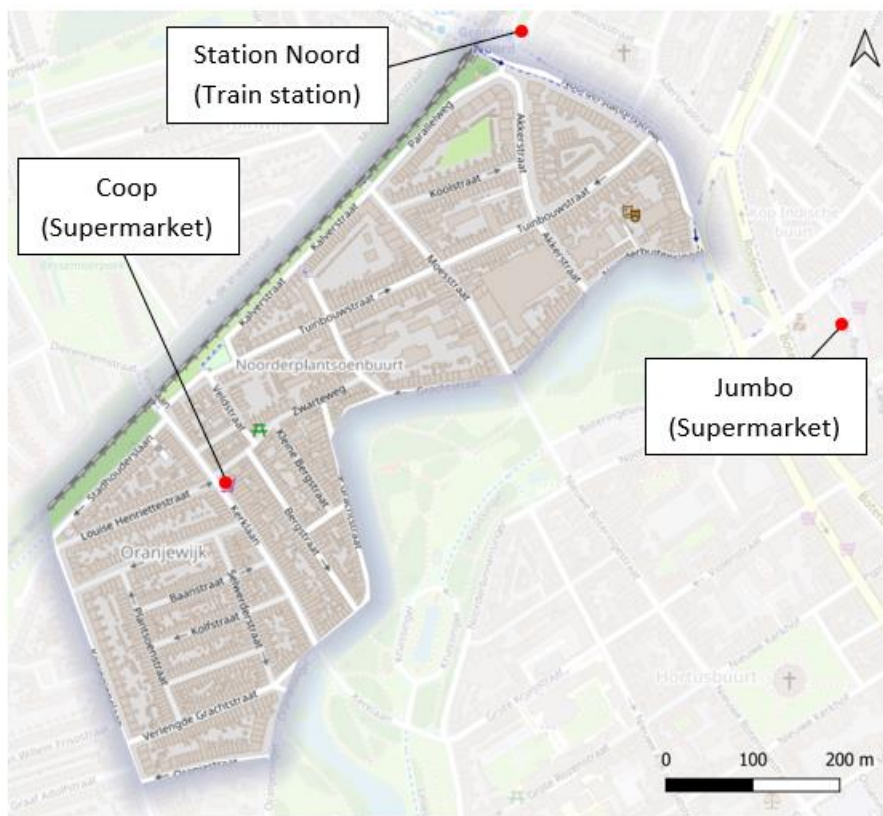


Figure 17: Three possible parcel locker locations in the Noorderplantsoenbuurt

So the neighbourhood level enables to travel to the PL by bike or by foot. Therefore, these results suggest PLs could be a sustainable invention on the neighbourhood level. Although it could be questioned what the impact would be of the 8,1% share of the residents of Reitdiep that would use their non-electric car to collect a parcel from the PL. As mentioned in the theoretical framework, junior researcher Rudy Niemeijer mentioned that the positive effect of PLs on emissions could be nullified if only one person uses their car to retrieve a parcel. 50% of the residents of Reitdiep that would use their non-electric car to retrieve parcels indicate at question 10 that they would not only pick up a parcel when they are able to trip chain (Figure 18). Even though the residents of Reitdiep as a whole, were significantly more prepared to trip chain when using the PL (Figure 19). Looking at the order frequency of these residents that travel by non-electrical car and are not fond of trip chaining (figure 20), this would translate into several dedicated trips to the PL by non-electrical car per week. This combination of dedicated trips to the PL with their non-electrical cars has serious implications for the environment (Collins, 2015; Hofer et al., 2020). Therefore, it could be questioned if PLs would be a sustainable invention in Reitdiep.

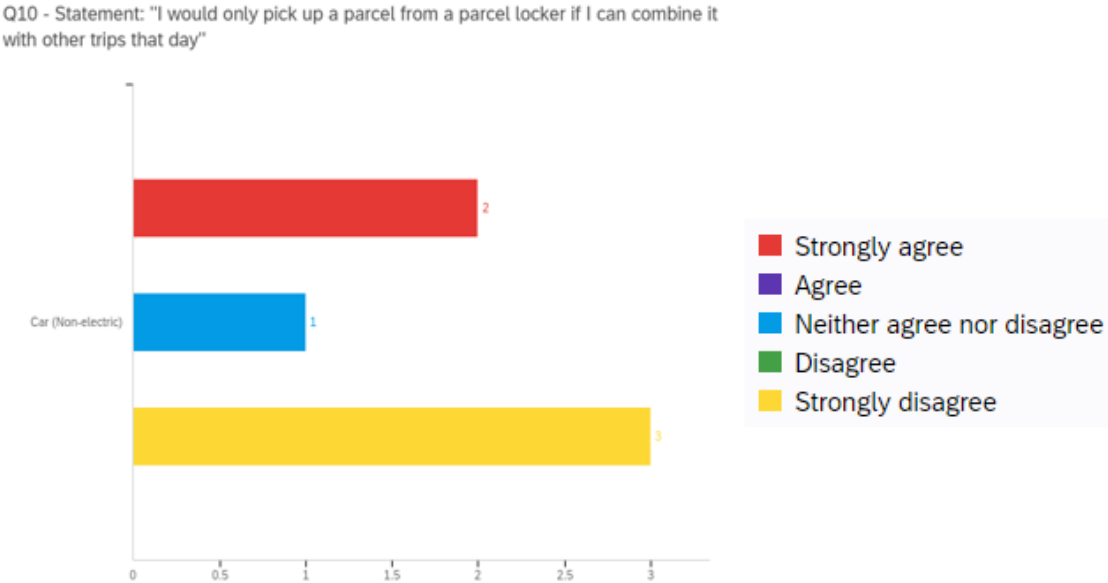


Figure 18: The trip chaining behaviour of Reitdiep residents with a preference for non-electrical car usage to the parcel locker

Q10 - Statement: "I would only pick up a parcel from a parcel locker if I can combine it with other trips that day"

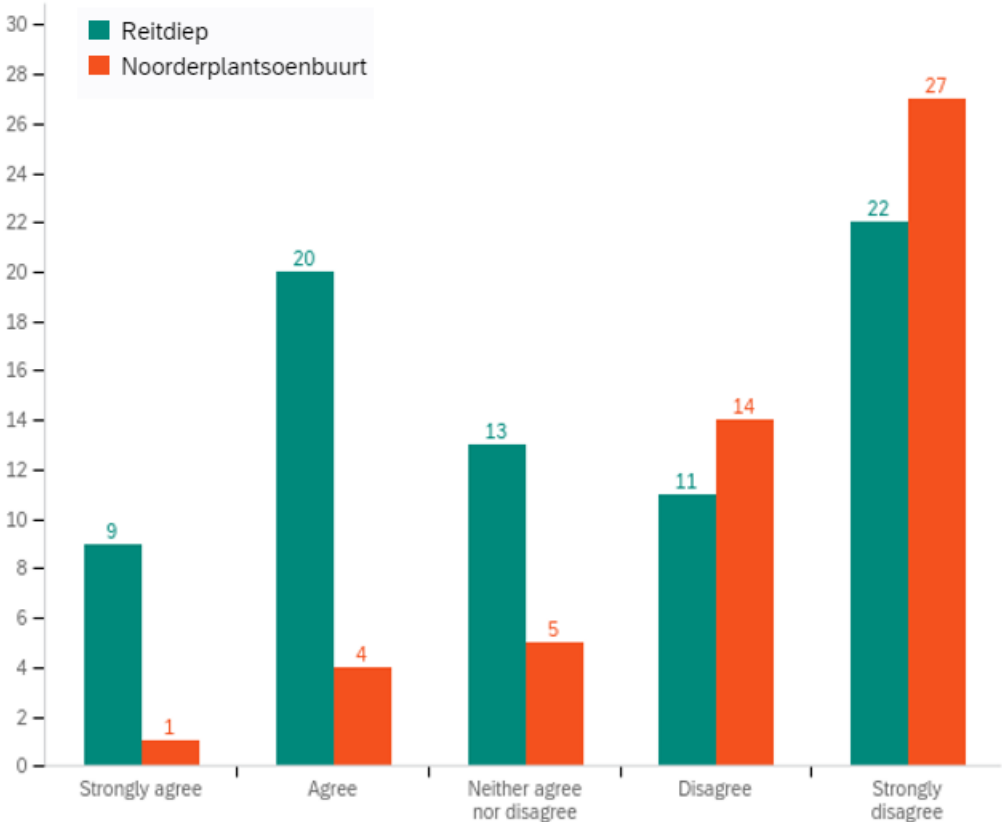


Figure 19: Trip chaining behaviour towards the parcel locker

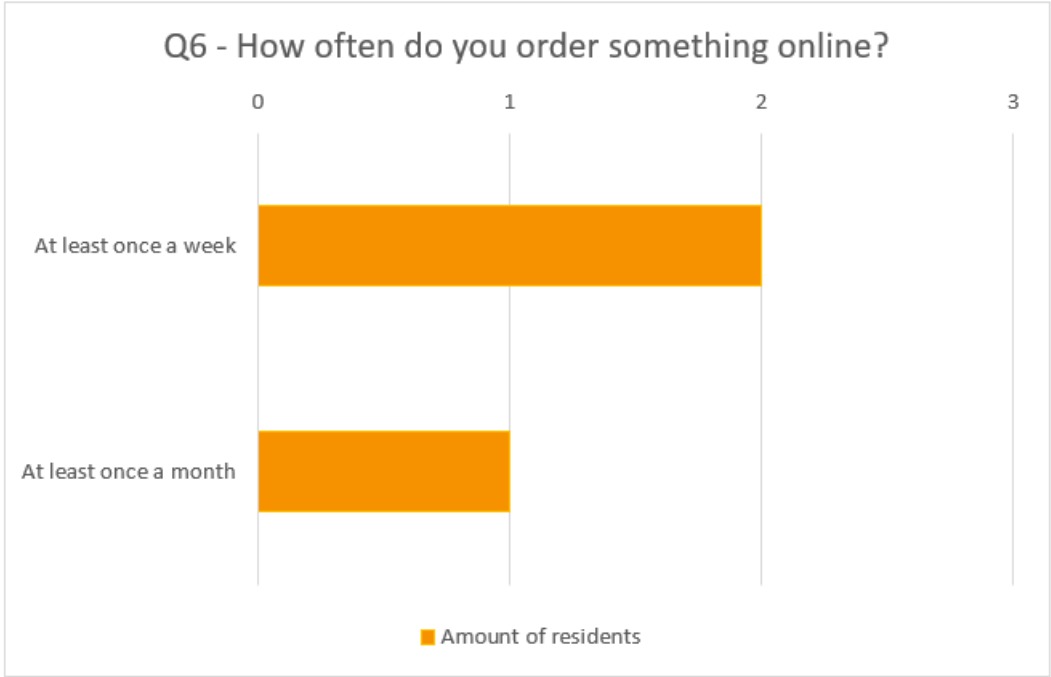


Figure 20: Order frequency of Reitdiep residents who would travel to the parcel locker by non-electrical car and who are not fond of trip chaining

The willingness to use non-motorized modes of transport to the PL in the Noorderplantsoenbuurt, suggests PLs could be a sustainable last-mile alternative in traditional inner city neighbourhoods. There are many more traditional neighbourhoods similar to the Noorderplantsoenbuurt in and around the city centre. So perhaps a cohesive PL network could be established here, as long as the nearest PL is not further away than 1.9 kilometres (Hofer et al., 2020).

In order to create such a network, it would be valuable to know which locations are preferred as a PL location by consumers. In both neighbourhoods approximately 75% of the residents chose the location closest to their home (Table 6), this confirms the theory about importance of vicinity (Iwan et al., 2016; Lemke et al., 2016; Weltrevreden, 2008). Tables 7 and 8 show that approximately 75% of the residents that did not chose the location closest to their home, did so because they preferred placement of a PL at a supermarket. Only six residents chose a location that was not closest to their home and also not a supermarket. Three residents in the Noorderplantsoenbuurt chose the local train station and three residents in Reitdiep chose a local bus stop/gas station. So this confirms previous findings that shops and supermarkets are regarded as preferable locations, whereas gas stations are less preferable (Lachapelle et al., 2018; de Oliveira et al., 2017). The great potential of public transport stops as PL location as indicated by Iwan et al. (2016) and Lachapelle et al. (2018) is not confirmed on the neighbourhood level. However, it might be the case that on a scale bigger than the neighbourhood, there is more support/need for PLs at public transport nodes, in order to ensure that a PL network is as sustainable as possible. Nonetheless, supermarkets/shops seem to be a promising option when implementing PLs.

	Reitdiep	Noorderplantsoenbuurt
Amount of residents that chose nearest potential parcel locker location from home	50 (74,6%)	36 (76,6%)
Amount of residents that chose a potential parcel locker location that was further away from home	17 (25,4%)	11 (24,3%)

Table 6: Chosen parcel locker locations by the residents

Noorderplantsoenbuurt	Amount of times chosen when nearest potential locker location	Amount of times chosen when not nearest potential parcel locker location
Station Noord (Transit station)	8	3
Jumbo (Supermarket)	0	8
Coop (Supermarket)	28	0

Table 7: Chosen parcel locker locations by the residents of the Noorderplantsoenbuurt

Reitdiep	Amount of times chosen when nearest potential locker location	Amount of times chosen when not nearest potential parcel locker location
P+R Reitdiep / Tankstation Tinq (Transit station / Gas Station)	43	3
Parkeerterrein Reitdiephaven (Supermarket)	5	14
P+R Zernike (Transit station)	2	0

Table 8: Chosen parcel locker locations by the residents of Reitdiep

8.3 Results: Neighbourhood design

Only 3 of the 11 questions related to neighbourhood design showed a significant difference between neighbourhoods (Appendix 6). Question 25 was one of these questions. Most residents of the Noorderplantsoenbuurt agreed that their neighbourhood does not invite use of the car. In Reitdiep this was only a third of the residents (Figure 21). This could already be seen in the difference in percentage of car ownership between both neighbourhoods (Figure 14), which are similar to findings of Aditjandra et al. (2013) about more car ownership in suburban neighbourhoods. However, there are also a lot of people in Reitdiep who are willingly to use non-motorized modes of transport to the PL (Figure 15). Figure 22 and 23 show that the neighbourhood design of both Reitdiep and the Noorderplantsoenbuurt invite the use of walking and cycling to the same degree. So residents of Reitdiep seem more able to walk or cycle in their neighbourhood compared to suburban neighbourhoods studied by Aditjandra et al. (2013).

Q25 - Statement: "The design of my neighbourhood invites to travel by car"

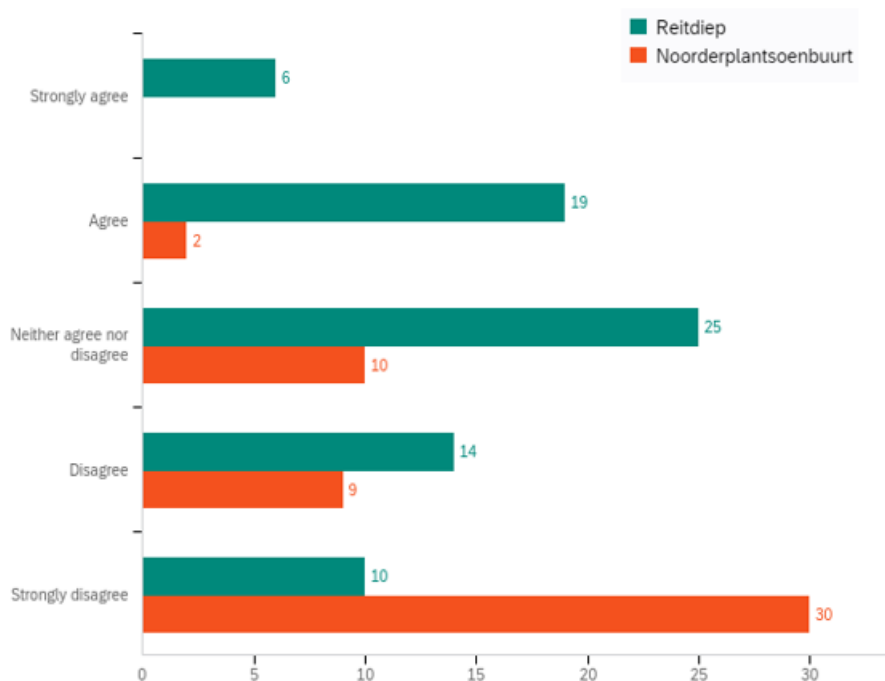


Figure 21: Influence of neighbourhood design on car use

Q23 - Statement: "The design of my neighbourhood invites to travel by foot"

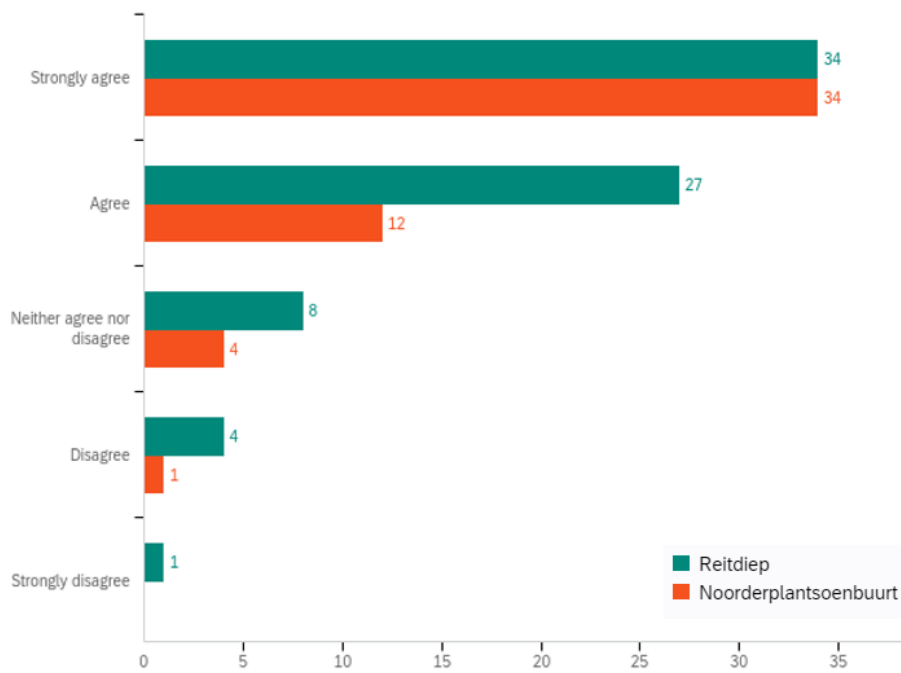


Figure 22: Influence of neighbourhood design on walking

Q24 - Statement: "The design of my neighbourhood invites to travel by bike"

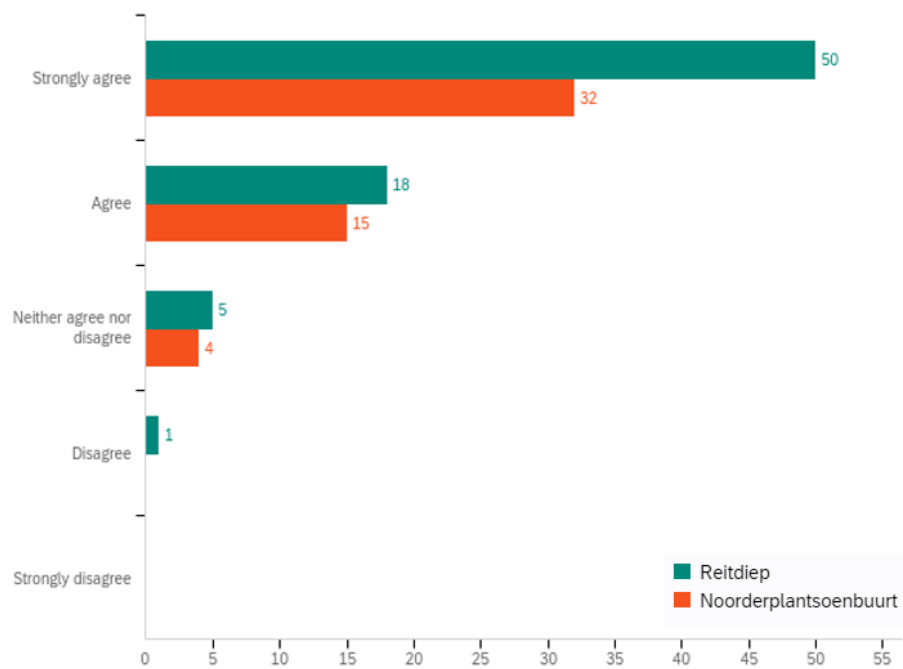


Figure 23: Influence of neighbourhood design on bike use

Furthermore, Aditjandra et al. (2013) found that suburban neighbourhoods were perceived as more safe by its residents. This research did find a significant difference about the perceived amount of crime in the neighbourhood (figure 24). However, the other statements about safety did not turn out significant. Therefore, it seems Reitdiep is as safe as the Noorderplantsoenbuurt. This leads to the conclusion that Reitdiep and the Noorderplantsoenbuurt are more similar than expected, judging by previous research. It seems like there are less differences between traditional and suburban neighbourhoods in the Netherlands, in comparison to the UK (Aditjandra et al., 2013) and the US (Handy et al., 2005).

Q20 - Statement: "There is little crime in the neighbourhood"

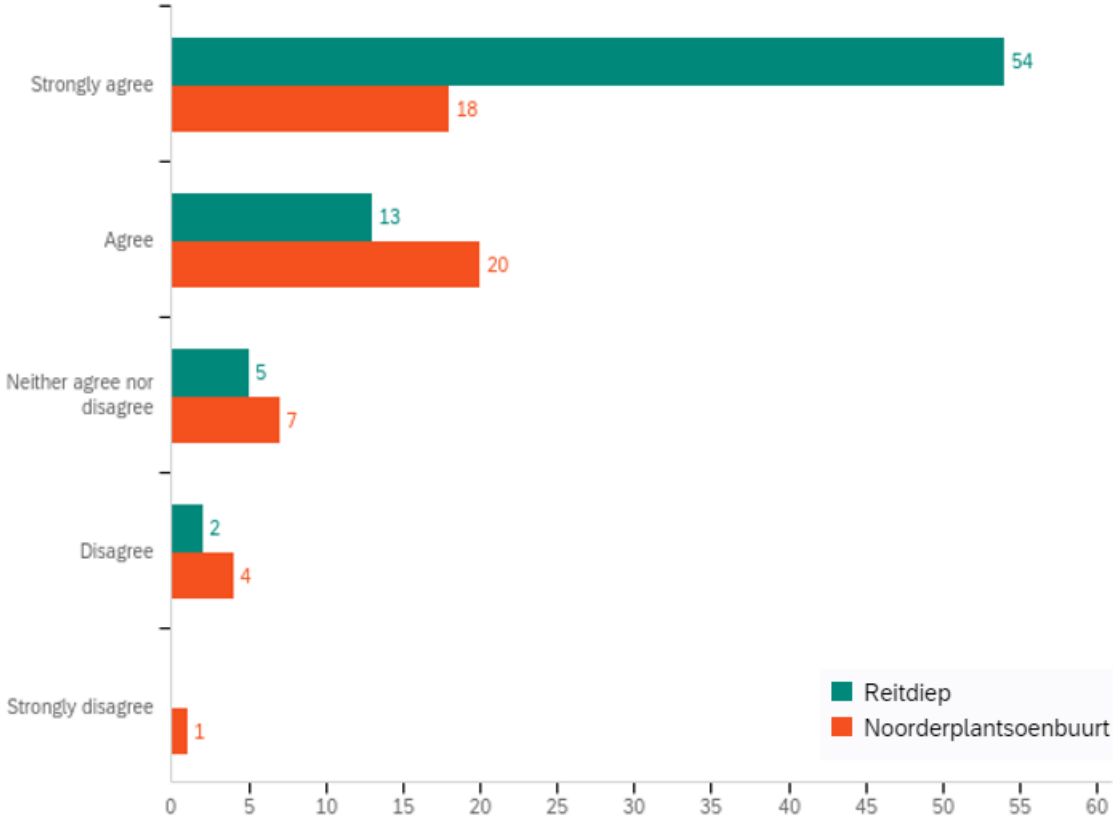


Figure 24: Amount of crime in the neighbourhood

The results also support findings of Maat and Timmermans (2009) about residential density leading to shorter distance, but also prompting residents to make extra trips. Figure 19 already showed that residents of the Noorderplantsoenbuurt would trip chain significantly less to the PL compared to Reitdiep. Collins (2015) suggested that these extra trips were not harmful to the environment, because the amount of trip attractions in their vicinity could lead to habitual use of non-motorized modes of transport. Figure 15 shows that this is confirmed in this research. If the PL is implemented on the neighbourhood level, residents of the Noorderplantsoenbuurt would habitually travel by bike or foot.

9. Conclusion

The aim of this research was to investigate how PLs can be a sustainable last-mile alternative on the neighbourhood level by looking at how consumers would use a PL in their neighbourhood, as they are the ones responsible for the last-mile when using a PL. A traditional and suburban neighbourhood in Groningen were used as an example. This study shows that PLs could be a sustainable last-mile alternative, if the travel behaviour of consumers of different neighbourhoods is taken into account. It seems PLs would be a sustainable invention in traditional neighbourhoods like the Noorderplantsoenbuurt. Not only, because of the higher percentage of residents that would prefer parcel delivery by PL, but also because 100% of the residents would use non-motorized modes of transport to retrieve a parcel on the neighbourhood level. However, it could be questioned if PLs would be a sustainable invention in suburban neighbourhoods like Reitdiep, as some consumers would still use their non-electric car to the PL, which could nullify the potential positive effect of PLs on the environment. Even though the neighbourhood Reitdiep and the Noorderplantsoenbuurt were more similar in terms of travel behaviour (to the PL) and how the neighbourhood design is perceived by its residents, than the traditional and suburban neighbourhoods in the UK (Aditjandra et al., 2013) and the US (Handy et al., 2005). Although the percentage of car owners was higher in Reitdiep, the residents of both neighbourhoods deemed their neighbourhoods equally appropriate for traveling by foot or bike. This might be related to the fact that residents of both neighbourhoods perceive their neighbourhood design similarly. Additionally, findings of Maat and Timmermans (2009) about residential density leading to extra trips were confirmed in this research. As was the suggestion of Collins (2015) about these extra trips being made habitually by non-motorized modes of transport.

This study also shows that, if PLs were to be implemented in Groningen/the Netherlands, placement of a PL at a local supermarket/shop seems to be the best location. Approximately 19% of the residents in both neighbourhoods are prepared to travel further to the PL if it is placed at a local supermarket/shop. This research contradicts findings of Iwan et al. (2016) and Lachapelle et al. (2018) about the great potential of transit locations as a PL location. However, it might be the case that on a scale bigger than the neighbourhood, there is more support/need for PLs at public transport nodes, in order to ensure that a PL network is as sustainable as possible.

In hindsight, the conceptual model was deemed suitable for this research and no adaptations are necessary. It still remains likely that neighbourhood design moderates travel behaviour of residents to some degree, even though this was not found between the two neighbourhoods in this study. The same can be said about the methodology, it was also a proper approach to answering the main and sub questions. The questionnaire, sampling and distribution strategy enabled to get a representative sample that showed how consumers in both neighbourhoods would use a PL in their neighbourhood and how their travel behaviour to the PL is influenced by the neighbourhood they live in. However, the used questionnaire only looked into which modes consumers would use to the PL. A direct question about their favourite transport mode would have been valuable, as that would give a better overview of the transport mode used and the one they prefer. If this was done, potentially more could have been said about the influence of neighbourhood design. Additionally, it could have revealed if the suburban residents that would use their car to the PL, would perhaps use a PL if it was even closer to their home, because they actually favour walking/cycling.

This study has shown that PLs could help the transition to SCL, especially in inner city areas with many traditional neighbourhoods, like the Noorderplantsoenbuurt, close to each other. A PL network has potential to reduce vehicle emissions and congestion in the already small streets of many traditional neighbourhoods. Therefore, it would be beneficial for the actors involved when implementing PLs, to look into options of creating such a PL network in these areas. As a start, online shops should provide

the option for delivery by PL. Subsequently, logistic companies should reach out to supermarkets/shops, to see if they are willing to have a PL in/near their business. Besides, this research could also be a call to the government to look into the possibilities of such a PL network. They can steer this development by using subsidies and/or restrictions.

9.1 Recommendations for further research

It has to be kept in mind that this study only used two neighbourhoods as an example for other neighbourhoods in The Netherlands. So further research is necessary in order to find out how big the support is, for sustainable use of PLs on a larger scale. Specifically, more research is necessary in suburban neighbourhoods similar to Reitdiep, to answer the question of why some consumers would still use their car to make a dedicated trip to the PL and if there is a possibility to change this behaviour in some way.

10. Reference list

- Aditjandra, P., Mulley, C. and Nelson, J. (2013). The influence of neighbourhood design on travel behaviour: Empirical evidence from North East England, *Transport Policy*, volume 26, p. 54-65.
- AD (2018). *PostNL zet automaat voor pakjes op acht plekken in Amersfoort*. [online] Available at: <https://www.ad.nl/amersfoort/postnl-zet-automaat-voor-pakjes-op-acht-plekken-in-amersfoort~a1a97d58/> (Accessed 27-05-2021)
- Allecijfers.nl (2021a). Informatie noorderplantsoenbuurt. [online] Available at: <https://allecijfers.nl/buurt/noorderplantsoenbuurt-groningen/> (Accessed 23-03-2021)
- Allecijfers.nl (2021b). Informatie buurt Reitdiep. [online] Available at: <https://allecijfers.nl/buurt/reitdiep-groningen/> (Accessed 23-03-2021)
- Agustini, M. (2018). Survey by knocking the door and response rate enhancement technique in international business research. *Problems and Perspectives in Management*, 16, p. 155-163.
- Behrends, S., Lindholm, M. and Woxenius, J. (2008). The Impact of Urban Freight Transport: A Definition of Sustainability from an Actor's Perspective. *Transportation Planning and Technology*, 31:6, p. 693-713.
- Bengtsson, C. and Vikingson, A. (2015). Exploring and Evaluating the Parcel Locker - A Swedish Consumer Perspective. *Department of Design Sciences*, Lund University, p. 0 – 110.
- Ben-s.nl Groningen (2021). *Wijken in Groningen – Waar wil jij wonen?*. [online] Available at: https://www.ben-s.nl/blog/wijken-in-groningen-__-waar-wil-jij-wonen (Accessed 21-05-2021)
- Biezen, B. van de (2021). *Groningen – Luchtfoto – Reitdiep*. [online] Available at: <https://www.hollandluchtfoto.nl/media/fc923086-f78c-412e-80ee-03ac7fb02dd5-groningen-luchtfoto-reitdiep> (Accessed 21-05-2021).
- Bradburn, N. & Mason, W. (1964). The Effect of Question Order on Responses. *Journal of Marketing Research*, 1, 57-61.
- Cassiano, D.R., Bertocini, B.V. and de Oliveira, L.K (2021). A Conceptual Model Based on the Activity System and Transportation System for Sustainable Urban Freight Transport. *Sustainability*, 13, 5642.
- Collins, A. (2015). Travel Behaviour in the Context of Parcel Pickups. *Institute of Transport and Logistics Studies*, p. 1–16.
- Dablanc, L. (2007). Goods transport in large European cities: Difficult to organize, difficult to modernize. *Transportation Research Part A: Policy and Practice*, volume 41(3), p. 280–285.
- Dablanc, L. & Rodrigue, J.P. (2017). The Geography of Urban Freight. *The Geography of Urban Transportation*. Routledge, London.
- Duin, J.H.R. van, Wiegman B.W., Arem, B. van and Amstel, Y. van (2020). From home delivery to parcel lockers: a case study in Amsterdam. *Transportation Research Procedia*, volume 46, p. 37-44.
- Eisenberg, N. and Fabes, R. A. (1998). Prosocial development. In W. Damon (Ed.), *Handbook of Child Psychology*, Fifth Edition (Vol 3: Social, Emotional, and Personality Development, N. Eisenberg [Ed.]).
- Eurostat (2021). *Walking and cycling as transport modes*. [online] Available at: https://ec.europa.eu/transport/road_safety/specialist/knowledge/pedestrians/pedestrians_and_cyclists_unprotected_road_users/walking_and_cycling_as_transport_modes_en#_1.2.2_Cycling_as (Accessed 18-03-2021)

- Fabes, R. A., & Eisenberg, N. (1998). Meta-analyses of age and sex differences in children's and adolescents' prosocial behavior. In W. Damon (Ed.), *Handbook of Child Psychology*, Fifth Edition (Vol 3: Social, Emotional, and Personality Development, N. Eisenberg [Ed.]).
- Gemeente Groningen (2021). *Definitieve visie stadslogistiek*. [online] Available at: <https://gemeente.groningen.nl/aanpak-binnenstad> (Accessed 10-03-2021)
- Google maps (2020). *Streetview*. [online] Available at: <https://www.google.nl/maps> (Accessed 11-06-2021)
- Handy, S., Cao, X. and Mokhtarian, P. (2005) Correlation or causality between the built environment and travel behavior? Evidence from Northern California, *Transportation Research Part D: Transport and Environment*, volume 10(6), p. 427-444.
- Hofer, K., Flucher, S., Fellendorf, M., Schadler, M., Hafner, N. (2020). Estimation of Changes in Customer's Mobility Behaviour by the Use of Parcel Lockers. *Transportation Research Procedia*, volume 47, p. 425-432.
- Iwan, S., Kijewska, K. and Lemke, L. (2016). Analysis of Parcel Lockers' Efficiency as the Last Mile Delivery Solution – The Results of the Research in Poland. *Transportation Research Procedia*, volume 12, p. 644-655.
- Jiang, L., Chang, H., Zhao, S., Dong, J. and Lu, W. (2019). A Travelling Salesman Problem With Carbon Emission Reduction in the Last Mile Delivery. *IEEE Access*, volume 7, p. 61620-61627.
- Kadaster (2021). *Basisregistratie Adressen en Gebouwen* (BAG). [online] Available at: <https://data.overheid.nl/dataset/basisregistratie-adressen-en-gebouwen--bag-> (Accessed 15-03-2021).
- Kauf, S. (2016). City logistics – A Strategic Element of Sustainable Urban Development, *Transportation Research Procedia*, volume 16, p. 158-164.
- Kelley, K., Clark, B., Brown, V. and Sitzia, J. (2003). Good practice in the conduct and reporting of survey research, *International Journal for Quality in Health Care*, volume 15, Issue 3, p. 261–266.
- Lachapelle, U., Burke, M., Brotherton, A. and Leung, A. (2018). Parcel locker systems in a car dominant city: Location, characterisation and potential impacts on city planning and consumer travel access. *Journal of Transport Geography*, volume 71, p. 1-14.
- Lemke, J., Iwan, S. and Korczak, J. (2016). Usability of the Parcel Lockers from the Customer Perspective – The Research in Polish Cities, *Transportation Research Procedia*, volume 16, p. 272-287.
- Loewen, L., Steel, G. and Suedfeld, P. (1993). Perceived safety from crime in the urban environment, *Journal of Environmental Psychology*, volume 13(4), p. 323-331.
- Maat, K. and Timmermans, H.J.P. (2009). A causal model relating urban form with daily travel distance through activity/travel decisions, *Transport Planning and Technology*, volume 32(2), p. 115–134.
- de Oliveira, L.K., Morganti, E., Dablanc, L. and de Oliveira, R.L.M. (2017). Analysis of the potential demand of automated delivery stations for e-commerce deliveries in Belo Horizonte, *Brazil. Res. Transp. Econ*, volume 65, p. 34–43.
- PostNL (2019). *Groningse primeur: eerste PostNL-pakketautomaat geplaatst in de provincie*. [online] Available at: <https://www.postnl.nl/over-postnl/pers-nieuws/nieuws/2019/groningse-primeur-eerste-pakketautomaat-in-provincie.html> (Accessed 22-02-2021)
- Ranieri, L., Digiesi, S., Silvestri, B. and Roccotelli, M. (2018). A Review of Last Mile Logistics Innovations in an Externalities Cost Reduction Vision. *Sustainability*, volume 10(3):782.
- Sigelman, L. (1981). Question-Order Effects on Presidential Popularity. *Public Opinion Quarterly*, 45, p. 199-207.

- Statista (2021). *Retail e-commerce sales worldwide from 2014 to 2023*. [online] Available at: <https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/#:~:text=In%202019%2C%20retail%20e%2Dcommerce,most%20popular%20online%20activities%20worldwide> (Accessed 22-02-2021)
- Vakulenko, Y., Hellström, D. and Hjort, K. (2018). What's in the parcel locker? Exploring customer value in e-commerce last mile delivery, *Journal of Business Research*, volume 88, p. 421-427
- Varona, G., José M., Villafáñez, F., Acebes, F., Redondo, A. and Poza, D. (2020). Reusing Newspaper Kiosks for Last-Mile Delivery in Urban Areas, *Sustainability* 12, volume 22, p. 9770.
- Weltvreden, J. (2008). B2c e-commerce logistics: the rise of collection-and-delivery points in The Netherlands, *International Journal of Retail and Distribution Management*, volume 36(8), p. 638.

List of figures and tables:

Figures:

- Figure 1: *A parcel locker from Post NL (AD, 2018)* P. 4
- Figure 2: *An actor-based model of a transport system (Behrends et al., 2008, p. 706)* P. 7
- Figure 3: *Conceptual model* P. 11
- Figure 4: *Noorderplantsoenbuurt* P. 14
- Figure 5: *Reitdiep* P. 14
- Figure 6: *Tuinbouwstraat in the Noorderplantsoenbuurt (Google maps, 2020)* P. 15
- Figure 7: *Solwerd in Reitdiep (Google maps, 2020)* P. 16
- Figure 8: *Age distribution (Sample vs. Population)* P. 17
- Figure 9: *Gender distribution (Sample vs. Population)* P. 18
- Figure 10: *Household composition (Sample vs. Population)* P. 18
- Figure 11: *Research design* P. 19
- Figure 12: *Frequency of online ordering* P. 20
- Figure 13: *Parcel delivery preference* P. 21
- Figure 14: *Modes of transport owned* P. 21
- Figure 15: *Modes of transport that would be used to access the parcel locker* P. 22
- Figure 16: *Three possible parcel locker locations in Reitdiep* P. 23
- Figure 17: *Three possible parcel locker locations in the Noorderplantsoenbuurt* P. 23
- Figure 18: *The trip chaining behaviour of Reitdiep residents with a preference for non-electrical car usage to the parcel locker* P. 24
- Figure 19: *Trip chaining behaviour towards the parcel locker* P. 25
- Figure 20: *Order frequency of Reitdiep residents who would travel to the parcel locker by non-electrical car and who are not fond of trip chaining* P. 25
- Figure 21: *Influence of neighbourhood design on car use* P. 27
- Figure 22: *Influence of neighbourhood design on walking* P. 28
- Figure 23: *Influence of neighbourhood design on bike use* P. 28
- Figure 24: *Amount of crime in the neighbourhood* P. 29

Tables:

- Table 1: <i>Important aspects per factor related to travel behaviour to the parcel locker</i>	P. 9
- Table 2: <i>General differences between traditional and suburban neighbourhoods</i>	P. 9
- Table 3: <i>Overview of the literature review</i>	P. 12
- Table 4: <i>Overview of how the questionnaire was used for comparative analysis</i>	P. 13
- Table 5: <i>Comparison of neighbourhood indicators</i>	P. 16
- Table 6: <i>Chosen parcel locker location by the residents</i>	P. 26
- Table 7: <i>Chosen parcel locker locations by the residents of the Noorderplantsoenbuurt</i>	P. 26
- Table 8: <i>Chosen parcel locker locations by the residents of Reitdiep</i>	P. 27

11. Appendices

- Appendix 1: Characterization of the selected traditional (Noorderplantsoenbuurt) and suburban (Reitdiep) Neighbourhoods **(p. 38)**
- Appendix 2: The questionnaire **(p. 42)**
- Appendix 3: An overview of which questions relate to which factors **(p. 50)**
- Appendix 4: Random sampling strategy **(p. 51)**
- Appendix 5: The flyer that was used during data collection **(p. 54)**
- Appendix 6: Questionnaire results **(p. 55)**
- Appendix 7: Comparing the sample to the population according to Allecijfers.nl (2021a & 2021b) **(p. 83)**
- Appendix 8: Excel sheets derived from the GIS analysis **(p. 87)**

Appendix 1: Characterization of the selected Traditional (Noorderplantsoenbuurt) and suburban (Reitdiep) Neighbourhoods

Noorderplantsoenbuurt (Traditional neighbourhood)

The Noorderplantsoenbuurt can be found close to the popular park Noorderplantsoen in Groningen (Figure b). It has plenty of green space surrounding the neighbourhood. The neighbourhood has 3850 residents and a surface area of 25 ha (Allecijfers.nl, 2021a). This leads to a population density of 154 residents per ha, which shows that the neighbourhood is densely populated. The average annual income per resident is €24.700,-.

The Noorderplantsoenbuurt has the characteristics of a traditional neighbourhood. The neighbourhood was largely built pre-war (1880 – 1930) and the road layout is more or less rectilinear with connected grids (Figure b). The roads are small, which explains why there are a lot of one way streets in the neighbourhood (Figure c). Throughout the neighbourhood you find many bicycles stalled in front of the houses, as you can see on figure c. This suggests that the bike is a popular mode of transport choice. Furthermore, there are also quite some cars parked along the streets, which can also be seen in figure c. The figure also shows that the frontages of the buildings are close to the street, like one would expect in a traditional neighbourhood.

The Noorderplantsoenbuurt is located relatively close to the inner city of Groningen. This explains why there are many amenities in close proximity to the neighbourhood. Various shops and supermarkets are located in and close to the neighbourhood, which gives the residents many options to choose from in their vicinity. Moreover, the train station Station-Noord is also next to the neighbourhood. All these amenities have the potential to function as parcel locker location. Some of them, for example the Coop supermarket, already function as a 'Post-NL pakketpunt'.



Figure a: Noorderplantsoenbuurt (Zoomed out)



Figure b: Noorderplantsoenbuurt (Zoomed in)



Figure c: Tuinbouwstraat in the Noorderplantsoenbuurt (Google maps, 2020)

Reitdiep (Suburban neighbourhood)

Reitdiep can be found in the North-western corner of Groningen. It is located just outside of the ring road surrounding the city. There is plenty of water and green space (Figure e) in and surrounding the neighbourhood. The neighbourhood has 3035 residents and a surface area of 97 ha (Allecijfers.nl, 2021b). This leads to a population density of 31 residents per ha, which shows that the neighbourhood is sparsely populated. The average annual income per resident is €32.000,-.

Reitdiep has the characteristics of a suburban neighbourhood. The neighbourhood was built post-war (2000 – present) and the road layout is more curvilinear with dead ends. There is a bigger road connecting the neighbourhood to the ring road and to the University campus. Several smaller central roads are connected to this big road. Clusters of housing are connected to these central roads. All these clusters have dead ends, which is typical for a suburban neighbourhood. This road layout can be seen in figure e. Furthermore, the houses are also generally more set back in space (Figure g) and almost all of the houses have their own parking space(s) (Figure f).

Reitdiep is located on the outside of the city of Groningen and it is located several kilometres away from the inner city. However, the neighbourhood has its 'own' amenities. There is a supermarket that currently also functions as a 'Post-NL pakketpunt' and there are also several shops in the neighbourhood. Furthermore, there is one park and ride in the neighbourhood and one park and ride directly next to the neighbourhood. So the longer distances to amenities outside the neighbourhood invite the use of the car, but there are also some amenities in the neighbourhood itself and there are also other options available for traveling to the inner city. The previous amenities in Reitdiep itself could all potentially function as a location for a parcel locker.

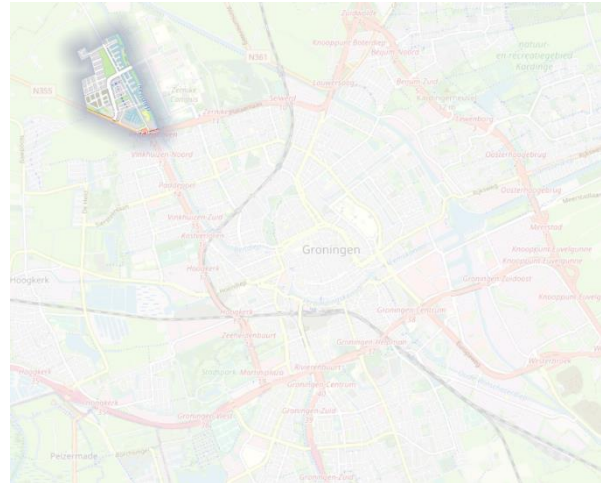


Figure d: Reitdiep (Zoomed out)



Figure e: Reitdiep (Zoomed in)



Figure f: Spijksterriet in Reitdiep (Google maps, 2020)



Figure g: Solwerd in Reitdiep (Google maps, 2020)

Appendix 2: The questionnaire

Question	Measurement level	Answer options	Aim of the question	Theoretical basis	Factor related to
General introductory questions (For grouping variables and to compare sample to population)					
Q1 – In welke buurt woont u? In which neighbourhood do you live?	Nominal	Reitdiep Noorderplantsoenbuurt	Will function as a grouping variable to test differences between neighbourhoods.	-	Travel behaviour and neighbourhood design
Q2 - Wat is uw leeftijd? What is your age?	Ordinal	0 - 25 26 - 35 36 - 45 46 – 55 56 - 65 65+ Zeg ik liever niet	Gathering general information about the sample. Also checking if sample is similar to population.	-	-
Q3 – Wat is uw geslacht? What is your gender?	Nominal	Man Vrouw Anders Zeg ik liever niet	Gathering general information about the sample. Also checking if sample is similar to population.	-	-
Q4 – Sport u tenminste één keer per week? Do you exercise at least once a week?	Binary	Ja Nee	Gathering general information about the sample and checking if sample is similar to population.	-	-
Q5 – Hoe zou u uw huidige woonsituatie omschrijven? How would you describe your current living situation?	Nominal	Eenpersoonshuishouden Huishouden met kinderen Huishouden zonder kinderen	Gathering general information about the sample and checking if sample is similar to population.	-	-
Introductory questions related to online shopping					
Q6 – Hoe vaak bestelt u iets online?	Ordinal	Tenminste 1 keer per week	Finding out how often the	Oliveira et al. (2017)	-

How often do you order something online?		Tenminste 1 keer per maand Tenminste 1 keer in de drie maanden Tenminste 1 keer in de zes maanden 1 keer per jaar of minder Nooit	respondents order something online, which will in turn determine how often they can make use of the parcel locker.		
Q7 – Welk soort producten bestelt u online? Which type of products do you order online?	Nominal (Multiple answer)	Kleding Boeken/films Apparatuur voor in huis Schoonheidsmiddelen Anders	Finding out what respondents mostly order online.	Oliveira et al. (2017)	-
Q8 – Welke manier van pakketbezorging heeft uw voorkeur? Which way of parcel delivery has your preference?	Nominal	Thuisbezorging Bezorging bij een collectiepunt (Bijvoorbeeld bij een winkel of pakketautomaat)	Finding out how people want their parcels to be delivered and thus finding out how much interest there possibly is for the parcel locker	-	-
Questions related to travel behaviour of residents					
Q9 – Welke van de volgende vervoersmiddelen heeft u tot uw beschikking? Which of the following modes of transport do you have at your disposal?	Nominal (Multiple answer)	Fiets Scooter of motor (Niet-elektrisch) Scooter of motor (Elektrisch) Auto (Niet-elektrisch), Auto (Elektrisch) Geen van bovenstaande	Finding out which modes of transport respondents have access to.	Iwan et al. (2016), Hofer et al. (2020), de Oliveira et al. (2017)	Acces mode options
Q10 – Stelling: "Ik zou een pakketje alleen ophalen van een pakketautomaat als ik dat kan combineren met andere uitstapjes die dag" Statement: "I would only pick up a parcel from a parcel locker if I can combine it with other trips that day"	Ordinal	Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens	Finding out if people are prepared to trip chain when going to the parcel locker.	Collins (2015), Hofer et al. (2020), Lemke et al. (2016), de Oliveira et al. (2017)	Willingness to trip chain
Q11 – Stel uw pakketje ligt in een	Nominal	Maximaal 1 dag Maximaal 2 dagen	Finding out how long people are prepared to wait	-	Willingness to trip chain

<p>pakketautomaat in de buurt. Hoelang zou u het daar maximaal laten liggen om het te combineren met een ander uitstapje?</p> <p>Suppose your parcel is delivered at a parcel locker. How long would you wait at maximum to try and combine the trip with other trips?</p>		<p>Maximaal 3 dagen Langer dan 3 dagen Ik zou niet wachten totdat ik het ophalen van het pakketje kan combineren met een ander uitstapje</p>	<p>when picking up their parcel in order to trip chain.</p>		
<p>Q12a/b/c/d – Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om lopend (a), fietsend (b), met de scooter of motor (c), met de auto (d) te reizen? (Mensen krijgen deze vraag alleen als ze bij Q9 gezegd hebben het vervoersmiddel tot hun beschikking te hebben)</p> <p>Suppose you make a trip especially to collect a parcel from the parcel locker. How long would you be prepared to travel by foot (a), by bike (b), by scooter or motor (c), by car (d)? (People will only get this question if they said they could use this mode of transport at Q9)</p>	<p>Ordinal</p>	<p>Ik zou niet bereid zijn om lopend, fietsend, met de scooter of motor met de auto een pakketje op te halen Maximaal 5 minuten 5 – 10 minuten 10 – 15 minuten 15 – 30 minuten 30 – 45 minuten langer dan 45 minuten</p>	<p>Finding out how much time people are prepared to travel to a parcel locker by foot, bike, scooter or motor or car, if they decide to make a specific trip to pick up a parcel from the locker. Distance is measured in time, as it is easier for the respondents to understand.</p> <p>The option of not being prepared to use a certain mode is given, as they might prefer another mode of transport, for example using the car over cycling.</p>	<p>Collins (2015), Hofer et al. (2020), de Oliveira et al. (2017), Weltevredden (2008)</p>	<p>Distance prepared to travel to the parcel locker</p>
<p>Q13a - Als er een pakketautomaat bij u in de buurt zou komen, waar had u dan het liefst dat deze pakketautomaat zou komen te staan?</p>	<p>Nominal</p>	<p>Bij P+R Zernike Bij P+R Reitdiep en tankstation Tinq (warwerd) Bij parkeerterrein Reitdiephaven</p>	<p>Finding out where in or close to the neighbourhood the inhabitants would prefer the</p>	<p>Collins (2015), Iwan et al. (2016), Lemke et al. (2016) de Oliveira et al. (2017),</p>	<p>Access mode options And Distance prepared to</p>

Which location would be best if a parcel locker were to be placed in your neighbourhood? (Only for respondents that answered Reitdiep at Q1)			placement of a parcel locker.	Weltevreden (2008)	travel to the parcel locker
Q13b - Als er een pakketautomaat bij u in de buurt zou komen, waar had u dan het liefst dat deze pakketautomaat zou komen te staan? Which location would be best if a parcel locker were to be placed in your neighbourhood? (Only for respondents that answered Noorderplantsoenbuurt at Q1)	Nominal	Bij Coop (Kerklaan) Bij Jumbo (Beren) Bij station Groningen Noord	Finding out where in or close to the neighbourhood the inhabitants would prefer the placement of a parcel locker.	Collins (2015), Iwan et al. (2016), Lemke et al. (2016) de Oliveira et al. (2017), Weltevreden (2008)	Access mode options And Distance prepared to travel to the parcel locker
Q14 - Stel de pakketautomaat komt op deze locatie. Welk vervoersmiddel zou u waarschijnlijk het vaakst gaan gebruiken om pakketjes op te halen uit de pakketautomaat? Suppose the parcel locker will be placed at this location. Which mode of transport would you mostly use to collect parcels from the parcel locker?	Nominal	Te voet Fiets Scooter of motor (Elektrisch) Scooter of motor (Niet-elektrisch) Auto (Elektrisch) Auto (Niet-elektrisch) Ik zou niet bereid zijn een pakketje bij een pakketautomaat op te halen	Finding out if respondents are prepared to use a parcel locker in their neighbourhood, if so, which mode of transport they would take when using the parcel locker.	Iwan et al. (2016), Hofer et al. (2020), de Oliveira et al. (2017)	Access mode options
Questions related to neighbourhood design					
Q15 – Stelling: “Ik zou me veilig voelen in mijn buurt als ik overdag	Ordinal	Helemaal mee eens Een beetje mee eens Niet eens, niet oneens	Finding out if people would feel safe to	Aditjandra et al. (2013), Bengtsson &	Subjective safety in the

<p>een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)</p> <p>Statement: "I would feel safe in my neighbourhood if I had to collect a parcel from the parcel locker during day time" (At the location previously chosen by you)</p>		<p>Een beetje mee oneens Helemaal mee oneens</p>	<p>collect a parcel from a parcel locker at their chosen location during the day.</p>	<p>Vikingson (2015), Lachapelle et al. (2018), Loewen et al. (1993)</p>	<p>urban environment</p>
<p>Q16 – Stelling: "Ik zou me veilig voelen in mijn buurt als ik in het donker een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)</p> <p>Statement: "I would feel safe in my neighbourhood if I had to collect a parcel from the parcel locker when it is dark" (At the location previously chosen by you)</p>	<p>Ordinal</p>	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	<p>Finding out if people would feel safe to collect a parcel from a parcel locker at their chosen location in the dark.</p>	<p>Aditjandra et al. (2012), Aditjandra et al. (2013), Bengtsson & Vikingson (2015), Lachapelle et al. (2018), Loewen et al. (1993)</p>	<p>Subjective safety in the urban environment</p>
<p>Q17 - Welke factoren zouden in uw ogen de locatie van de pakketautomaat veiliger maken in het donker?</p> <p>Which factors would improve safety at the parcel locker location in the evening</p>	<p>Nominal (Multiple answer)</p>	<p>Goede verlichting Bewakingscamera's Overzichtelijke omgeving Nabijheid van andere mensen</p>	<p>Finding out which factors would improve the subjective safety at the parcel locker location the most</p>	<p>Bengtsson & Vikingson (2015), Lachapelle et al. (2018), Loewen et al. (1993)</p>	<p>Subjective safety in the urban environment</p>
<p>Q18 – Stelling: "Wat betreft verkeersveiligheid, is mijn buurt een veilige buurt om in te wandelen of te fietsen"</p>	<p>Ordinal</p>	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	<p>Finding out the physical safety in the neighbourhood.</p>	<p>Aditjandra et al. (2013)</p>	<p>Subjective safety in the urban environment And</p>

<p>Statement: "When looking at traffic safety, my neighbourhood is safe for walking and cycling"</p>					Modes of transport that the environment stimulates
<p>Q19 – Stelling: "Ik gebruik soms de scooter/motor/auto omdat ik mij lopend/fietsend niet veilig voel in mijn buurt"</p> <p>Statement: "Sometimes I use my scooter/motor/car because I do not feel safe walking or cycling in my neighbourhood"</p>	Ordinal	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	Finding out if the subjective safety created by the neighbourhood design influences the modes of transport used.	Aditjandra et al. (2013)	<p>Subjective safety in the urban environment</p> <p>And</p> <p>Modes of transport that the environment stimulates</p>
<p>Q20 – Stelling: "Er is weinig criminaliteit in de buurt"</p> <p>Statement: "There is little crime in the neighbourhood"</p>	Ordinal	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	Finding out if people think crime makes their neighbourhood unsafe.	Aditjandra et al. (2013), Bengtsson & Vikingson (2015), Lachapelle et al. (2018), Loewen et al. (1993)	Subjective safety in the urban environment
<p>Q21 – Stelling: "Er zijn gedurende de dag veel mensen op straat in mijn buurt"</p> <p>Statement: "Throughout the day, there are many people on the streets"</p>	Ordinal	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	Finding out if people feel safe in their neighbourhood because of the amount of people on the streets.	Aditjandra et al. (2013), Bengtsson & Vikinson (2015), Lachapelle et al. (2018), Loewen et al. (1993)	Subjective safety in the urban environment
<p>Q22 – Stelling: "Mensen houden een oogje in het zeil in mijn buurt"</p> <p>Statement: "People look out for each other in my neighbourhood"</p>	Ordinal	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	Finding out if people feel safe in their neighbourhood because people look out for each other.	Aditjandra et al. (2013), Bengtsson & Vikinson (2015), Lachapelle et al. (2018),	Subjective safety in the urban environment

				Loewen et al. (1993)	
<p>Q23 – Stelling: “De opzet van mijn buurt nodigt uit om lopend te reizen”</p> <p>Statement: “The design of my neighbourhood invites to travel by foot”</p>	Ordinal	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	Finding out if the neighbourhood design influences the modes of transport used to travel.	Aditjandra et al. (2013)	Modes of transport that the environment stimulates
<p>Q24 – Stelling: “De opzet van mijn buurt nodigt uit om de fiets te gebruiken”</p> <p>Statement: “The design of my neighbourhood invites to travel by bike”</p>	Ordinal	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	Finding out if the neighbourhood design influences the modes of transport used to travel.	Aditjandra et al. (2013)	Modes of transport that the environment stimulates
<p>Q25 – Stelling: “De opzet van mijn buurt nodigt uit om de auto te gebruiken”</p> <p>Statement: “The design of my neighbourhood invites to travel by car”</p>	Ordinal	<p>Helemaal mee eens Een beetje mee eens Niet eens, niet oneens Een beetje mee oneens Helemaal mee oneens</p>	Finding out if the neighbourhood design influences the modes of transport used to travel.	Aditjandra et al. (2013)	Modes of transport that the environment stimulates
<p>Q26 – Als laatste willen we u nog vragen om uw postcode hier te noteren. Op deze manier kunnen we uw antwoorden koppelen aan een locatie in het onderzoek, zonder uw specifieke woonlocatie te vragen en dus uw privacy te respecteren.</p>	-	Open comment box	Finding out where the respondents live in order to see if some answers are dependent on the area in which respondents live.	-	<p>Access mode options</p> <p>And</p> <p>Distance prepared to travel to the parcel locker</p>
<p>Q27 – Heeft u eventueel nog andere op- of aanmerking over de enquête?</p>	-	Open comment box	Finding out if people have other important things to mention that were not fully	-	-

			captured in the questionnaire.		
Q28 - Heel erg bedankt voor het invullen van deze enquête! Dit gaat mij ontzettend helpen in mijn onderzoek. Als u kans wilt maken op de VVV waardebon van €25, dan moet u hieronder even uw e-mailadres en telefoonnummer achterlaten waarop ik u kan bereiken als ik de winnaar bekend maak! (Deze gegevens zullen alleen gebruikt worden voor de verloting van de prijs en ze zullen direct weer verwijderd worden na de verloting)	-	Open comment box	White space where people can leave their email address to win a gift card.	-	-

Appendix 3: An overview of which questions relate to which factors

The parcel locker as a sustainable last-mile alternative				
Travel behaviour			Neighbourhood design	
Access mode options	Distance prepared to travel to the parcel locker	Willingness to trip chain	Subjective safety in the urban environment	Modes of transport that the urban environment stimulates
Q9	Q12a/b/c/d	Q10	Q15 and Q16	Q23
Q14		Q11	Q17	Q24
GIS analysis of Q13a/b and Q26 together			Q20	Q25
			Q21	
			Q22	
			Q18 and Q19	

Appendix 4: Random sampling strategy

First, a layer showing a lot of information about each building in The Netherlands is loaded into QGIS. This layer originates from the PDOK Services plugin. It is called 'Verblijfsobject' and among other things, it shows the functions of each building. It is derived from the BAG (Basisregistratie adressen en gebouwen) of the Kadaster (2021). All the buildings in Reitdiep and the Noorderplantsoenbuurt were selected. A new layer was created containing only the buildings in Reitdiep (Figure h) and the Noorderplantsoenbuurt (Figure i).



Figure h: All buildings in Reitdiep



Figure i: All buildings in the Noorderplantsoenbuurt

For the distribution of the questionnaire, only the responses of the residents of these buildings were necessary. Therefore, all the buildings that had another function than residential, were removed from the layer by filtering on 'residential function' in the attribute table (Figure j).

gid	identifica	oppervlakt	status	gebruiksdo	openbare_r	huisnummer	huisletter	
1	4914198	0014010011083...	196	Verblijfsobject i...	woonfunctie	Kleiwerd	25	NULL
2	4914177	0014010011083...	187	Verblijfsobject i...	woonfunctie	Kleiwerd	24	NULL
3	4914200	0014010011083...	141	Verblijfsobject i...	woonfunctie	Kleiwerd	27	NULL
4	4914199	0014010011083...	150	Verblijfsobject i...	woonfunctie	Kleiwerd	26	NULL
5	4914202	0014010011083...	138	Verblijfsobject i...	woonfunctie	Kleiwerd	29	NULL
6	4914201	0014010011083...	138	Verblijfsobject i...	woonfunctie	Kleiwerd	28	NULL
7	4914204	0014010011083...	140	Verblijfsobject i...	woonfunctie	Kleiwerd	31	NULL
8	4914203	0014010011083...	148	Verblijfsobject i...	woonfunctie	Kleiwerd	30	NULL
9	4914206	0014010011083...	132	Verblijfsobject i...	woonfunctie	Kleiwerd	33	NULL
10	4914205	0014010011083...	129	Verblijfsobject i...	woonfunctie	Kleiwerd	32	NULL
11	4914208	0014010011083...	147	Verblijfsobject i...	woonfunctie	Kleiwerd	35	NULL
12	4914207	0014010011083...	146	Verblijfsobject i...	woonfunctie	Kleiwerd	34	NULL
13	4022161	0014010022196...	97	Verblijfsobject i...	woonfunctie	Reitdiephaven	175	NULL

Figure j: Using the attribute table to make sure that only residential buildings are selected

The random sample selection could now be applied, as all the buildings with a residential function in both neighbourhoods, were in the layer. The vector analysis tool 'random sample' was used (figure k). 130 addresses in each neighbourhood were selected. An absolute number was chosen, as the aim is to have an approximate even amount of respondents in both neighbourhoods for statistical analysis. The random sample tool selected 130 addresses in each neighbourhood (Figure l and m) where door to door questionnaires will be spread during the data collection period.

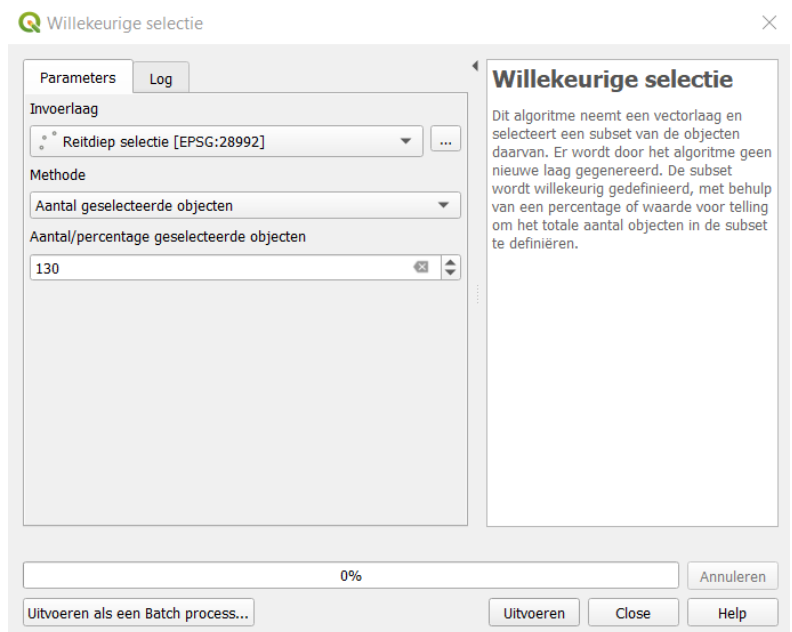


Figure k: Random sample tool



Figure l: Random sample of 130 addresses in Reitdiep



Figure m: Random sample of 130 addresses in the Noorderplantsoenbuurt

Deelnemers gezocht voor enquête over pakketautomaten in uw buurt



university of
groningen



Voor mijn afstudeeropdracht aan de Rijksuniversiteit Groningen doe ik onderzoek naar de implementatie van pakketautomaten in uw buurt

Voor dit onderzoek heb ik uw reactie nodig!

Het invullen van de enquête kost u 6 á 7 minuten.

Als u met uw mobiel de QR-code op deze flyer scant, komt u bij mijn online enquête terecht.

Als dank maakt u met uw deelname kans op een VVV cadeaukaart ter waarde van 25 euro!



Appendix 6: Questionnaire results

General introductory questions

Question 1: In welke buurt woont u?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Reitdiep	75	59,5	59,5	59,5
	Noorderplantsoenbuurt	51	40,5	40,5	100,0
	Total	126	100,0	100,0	

Question 2: Wat is uw leeftijd? (Reitdiep)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 25	2	2,7	2,7	2,7
	26 - 35	16	21,3	21,3	24,0
	36 - 45	26	34,7	34,7	58,7
	46 - 55	16	21,3	21,3	80,0
	56 - 65	9	12,0	12,0	92,0
	65+	6	8,0	8,0	100,0
	Total	75	100,0	100,0	

Question 2: Wat is uw leeftijd? (Noorderplantsoenbuurt)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 - 25	12	23,5	23,5	23,5
	26 - 35	12	23,5	23,5	47,1
	36 - 45	2	3,9	3,9	51,0
	46 - 55	10	19,6	19,6	70,6
	56 - 65	9	17,6	17,6	88,2
	65+	6	11,8	11,8	100,0
	Total	51	100,0	100,0	

Question 3: Wat is uw geslacht? (Reitdiep)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	32	42,7	42,7	42,7
	Vrouw	42	56,0	56,0	98,7
	Anders	1	1,3	1,3	100,0
	Zeg ik liever niet	0	0,0	0,0	100,0
	Total	75	100,0	100,0	

Question 3: Wat is uw geslacht? (Noorderplantsoenbuurt)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	25	49,0	49,0	49,0
	Vrouw	25	49,0	49,0	98,0
	Anders	0	0,0	0,0	98,0
	Zeg ik liever niet	1	2,0	2,0	100,0
	Total	51	100,0	100,0	

Question 4: Sport u tenminste één keer per week? (Reitdiep)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	57	76,0	76,0	76,0
	Nee	18	24,0	24,0	100,0
	Total	75	100,0	100,0	

**Question 4: Sport u tenminste één keer per week?
(Noorderplantsoenbuurt)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	35	68,6	68,6	68,6
	Nee	16	31,4	31,4	100,0
	Total	51	100,0	100,0	

Question 5: Hoe zou u uw huidige woonsituatie omschrijven? (Reitdiep)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Eenpersoonshuishouden	3	4,0	4,0	4,0
	Huishouden met kinderen	44	58,7	58,7	62,7
	Huishouden zonder kinderen	28	37,3	37,3	100,0
	Total	75	100,0	100,0	

**Question 5: Hoe zou u uw huidige woonsituatie omschrijven?
(Noorderplantsoenbuurt)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Eenpersoonshuishouden	14	27,5	27,5	27,5
	Huishouden met kinderen	15	29,4	29,4	56,9
	Huishouden zonder kinderen	22	43,1	43,1	100,0
	Total	51	100,0	100,0	

Introductory questions related to online shopping

Question 6: Hoe vaak bestelt u iets online? (Reitdiep)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tenminste 1 keer per week	41	54,7	54,7	54,7
	Tenminste 1 keer per maand	24	32,0	32,0	86,7
	Tenminste 1 keer in de drie maanden	8	10,7	10,7	97,3
	Tenminste 1 keer in de zes maanden	2	2,7	2,7	100,0
	1 keer per jaar of minder	0	0,0	0,0	100,0
	Nooit	0	0,0	0,0	100,0
	Total	75	100,0	100,0	

Question 6: Hoe vaak bestelt u iets online? (Noorderplantsoenbuurt)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tenminste 1 keer per week	11	21,6	21,6	21,6
	Tenminste 1 keer per maand	17	33,3	33,3	54,9
	Tenminste 1 keer in de drie maanden	14	27,5	27,5	82,4
	Tenminste 1 keer in de zes maanden	8	15,7	15,7	98,0
	1 keer per jaar of minder	1	2,0	2,0	100,0
	Nooit	0	0,0	0,0	100,0
	Total	51	100,0	100,0	

Question 6: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Hoe vaak bestelt u iets online?	Reitdiep	75	52,21	3915,50
	Noorderplantsoenbuurt	51	80,11	4085,50
	Total	126		

Test Statistics^a

Hoe vaak bestelt u iets online?	
Mann-Whitney U	1065,500
Wilcoxon W	3915,500
Z	-4,464
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: In welke buurt woont u?

Question 7: Welk soort producten bestelt u online? (Meerdere antwoorden selecteren is mogelijk) (Reitdiep)

	Kleding	Boeken/films	Apparatuur voor in huis	Schoonheidsmid delen	Anders
Count	66	35	59	23	32
Percentage of total amount inhabitants	88,0	46,7	78,7	30,7	42,7

Question 7: Welk soort producten bestelt u online? (Meerdere antwoorden selecteren is mogelijk) (Noorderplantsoenbuurt)

	Kleding	Boeken/films	Apparatuur voor in huis	Schoonheidsmid delen	Anders
Count	37	23	26	12	21
Percentage of total amount inhabitants	72,5	45,1	51,0	23,5	41,2

Question 8: Welke manier van pakketbezorging heeft uw voorkeur? (Reitdiep)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Thuisbezorging	61	81,3	81,3	81,3
Bezorging bij een collectiepunt (Bijvoorbeeld bij een winkel of pakketautomaat)	14	18,7	18,7	100,0
Total	75	100,0	100,0	

Question 8: Welke manier van pakketbezorging heeft uw voorkeur? (Noorderplantsoenbuurt)

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Thuisbezorging	33	64,7	64,7	64,7
Bezorging bij een collectiepunt (Bijvoorbeeld bij een winkel of pakketautomaat)	18	35,3	35,3	100,0
Total	51	100,0	100,0	

Question 8: Fisher's Exact test

		Welke manier van pakketbezorging heeft uw voorkeur?			
		Thuisbezorging	Bezorging bij een collectiepunt (Bijvoorbeeld bij een winkel of pakketautomaat)	Total	
In welke buurt woont u?	Reitdiep	Count	61	14	75
		Expected Count	56,0	19,0	75,0
	Noorderplantsoenbuurt	Count	33	18	51
		Expected Count	38,0	13,0	51,0
Total		Count	94	32	126
		Expected Count	94,0	32,0	126,0

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4,430 ^a	1	,035		
Continuity Correction ^b	3,596	1	,058		
Likelihood Ratio	4,370	1	,037		
Fisher's Exact Test				,040	,030
Linear-by-Linear Association	4,395	1	,036		
N of Valid Cases	126				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 12,95.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approximate Significance
Nominal by Nominal	Phi	,188	,035
	Cramer's V	,188	,035
N of Valid Cases		126	

Questions related to travel behavior

Question 9: Welke van de volgende vervoersmiddelen heeft u tot uw beschikking? (Reitdiep)

	Fiets	Scooter of motor (Niet-elektrisch)	Scooter of motor (Elektrisch)	Auto (Niet- elektrisch)	Auto (Elektrisch)	Geen van bovenstaande
Count	71	4	4	71	5	0
Percentage of total amount of inhabitants	94,7	5,3	5,3	94,7	6,7	0,0

Question 9: Welke van de volgende vervoersmiddelen heeft u tot uw beschikking? (Noorderplantsoenbuurt)

	Fiets	Scooter of motor (Niet-elektrisch)	Scooter of motor (Elektrisch)	Auto (Niet- elektrisch)	Auto (Elektrisch)	Geen van bovenstaande
Count	50	2	0	26	4	1
Percentage of total amount of inhabitants	98,0	3,9	0,0	51,0	7,8	2,0

Question 10: (Reitdiep)

Stelling: "Ik zou een pakketje alleen ophalen van een pakketautomaat als ik dit kan combineren met andere uitstapjes die dag"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	9	12,0	12,0	12,0
	Een beetje mee eens	20	26,7	26,7	38,7
	Niet eens, niet oneens	13	17,3	17,3	56,0
	Een beetje mee oneens	11	14,7	14,7	70,7
	Helemaal mee oneens	22	29,3	29,3	100,0
	Total	75	100,0	100,0	

Question 10: (Noorderplantsoenbuurt)

Stelling: "Ik zou een pakketje alleen ophalen van een pakketautomaat als ik dit kan combineren met andere uitstapjes die dag"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	1	2,0	2,0	2,0
	Een beetje mee eens	4	7,8	7,8	9,8
	Niet eens, niet oneens	5	9,8	9,8	19,6
	Een beetje mee oneens	14	27,5	27,5	47,1
	Helemaal mee oneens	27	52,9	52,9	100,0
	Total	51	100,0	100,0	

Question 10: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "Ik zou een pakketje alleen ophalen van een pakketautomaat als ik dit kan combineren met andere uitstapjes die dag"	Reitdiep	75	53,65	4024,00
	Noorderplantsoenbuurt	51	77,98	3977,00
	Total	126		

Test Statistics^a

Stelling: "Ik zou een pakketje alleen ophalen van een pakketautomaat als ik dit kan combineren met andere uitstapjes die dag"

Mann-Whitney U	1174,000
Wilcoxon W	4024,000
Z	-3,820
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: In welke buurt woont u?

Question 11: (Reitdiep)

Stel uw pakketje ligt in een pakketautomaat in de buurt. Hoelang zou u het daar maximaal laten liggen om het te combineren met een ander uitstapje?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Maximaal 1 dag	23	30,7	30,7	30,7
	Maximaal 2 dagen	28	37,3	37,3	68,0
	Maximaal 3 dagen	7	9,3	9,3	77,3
	Langer dan 3 dagen	1	1,3	1,3	78,7
	Ik zou niet wachten totdat ik het ophalen van het pakketje kan combineren met een ander uitstapje	16	21,3	21,3	100,0
	Total	75	100,0	100,0	

Question 11: (Noorderplantsoenbuurt)

Stel uw pakketje ligt in een pakketautomaat in de buurt. Hoelang zou u het daar maximaal laten liggen om het te combineren met een ander uitstapje?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Maximaal 1 dag	14	27,5	27,5	
	Maximaal 2 dagen	10	19,6	19,6	
	Maximaal 3 dagen	6	11,8	11,8	
	Langer dan 3 dagen	1	2,0	2,0	
	Ik zou niet wachten totdat ik het ophalen van het pakketje kan combineren met een ander uitstapje	20	39,2	39,2	
	Total	51	100,0	100,0	

Question 11: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stel uw pakketje ligt in een pakketautomaat in de buurt. Hoelang zou u het daar maximaal laten liggen om het ophalen van het pakketje te combineren met een ander uitstapje?	Reitdiep	75	58,91	4418,25
	Noorderplantsoenbuurt	51	70,25	3582,75
	Total	126		

Test Statistics^a

Stel uw pakketje ligt in een pakketautomaat in de buurt. Hoelang zou u het daar maximaal laten liggen om het ophalen van het pakketje te combineren met een ander uitstapje?

Mann-Whitney U	1568,500
Wilcoxon W	4418,500
Z	-1,780
Asymp. Sig. (2-tailed)	,075

a. Grouping Variable: In welke buurt woont u?

Question 12a: (Reitdiep)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om lopend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om lopend een pakketje op te halen	6	8,0	8,0	8,0
	Maximaal 5 minuten	17	22,7	22,7	30,7
	5 - 10 minuten	21	28,0	28,0	58,7
	10 - 15 minuten	19	25,3	25,3	84,0
	15 - 30 minuten	11	14,7	14,7	98,7
	30 - 45 minuten	1	1,3	1,3	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
	Total	75	100,0	100,0	

Question 12a: (Noorderplantsoenbuurt)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om lopend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om lopend een pakketje op te halen	2	3,9	3,9	3,9
	Maximaal 5 minuten	10	19,6	19,6	23,5
	5 - 10 minuten	16	31,4	31,4	54,9
	10 - 15 minuten	18	35,3	35,3	90,2
	15 - 30 minuten	5	9,8	9,8	100,0
	30 - 45 minuten	0	0,0	0,0	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
	Total	51	100,0	100,0	

Question 12a: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om lopend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)	Reitdiep	75	62,43	4682,50
	Noorderplantsoenbuurt	51	65,07	3318,50
	Total	126		

Test Statistics^a

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om lopend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

Mann-Whitney U	1832,500
Wilcoxon W	4682,500
Z	-,411
Asymp. Sig. (2-tailed)	,681

a. Grouping Variable: In welke buurt woont u?

Question 12b: (Reitdiep)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om fietsend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om fietsend een pakketje op te halen	3	4,0	4,2	4,2
	Maximaal 5 minuten	22	29,3	31,0	35,2
	5 – 10 minuten	26	34,7	36,6	71,8
	10 – 15 minuten	14	18,7	19,7	91,5
	15 – 30 minuten	6	8,0	8,5	100,0
	30 – 45 minuten	0	0,0	0,0	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
	Total	71	94,7	100,0	
Missing	System	4	5,3		
Total		75	100,0		

Question 12b: (Noorderplantsoenbuurt)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om fietsend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om fietsend een pakketje op te halen	3	5,9	6,0	6,0
	Maximaal 5 minuten	14	27,5	28,0	34,0
	5 – 10 minuten	18	35,3	36,0	70,0
	10 – 15 minuten	11	21,6	22,0	92,0
	15 – 30 minuten	4	7,8	8,0	100,0
	30 – 45 minuten	0	0,0	0,0	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
	Total	50	98,0	100,0	
Missing	System	1	2,0		
Total		51	100,0		

Question 12b: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om fietsend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)	Reitdiep	71	60,73	4311,50
	Noorderplantsoenbuurt	50	61,39	3069,50
	Total	121		

Test Statistics^a

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om fietsend dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

Mann-Whitney U	1755,500
Wilcoxon W	4311,500
Z	-,107
Asymp. Sig. (2-tailed)	,915

a. Grouping Variable: In welke buurt woont u?

Question 12c: (Reitdiep)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om met de scooter of motor dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om met de scooter of motor een pakketje op te halen	3	4,0	42,9	42,9
	Maximaal 5 minuten	2	2,7	28,6	71,4
	5 – 10 minuten	1	1,3	14,3	85,7
	10 – 15 minuten	0	0,0	0,0	85,7
	15 – 30 minuten	1	1,3	14,3	100,0
	30 – 45 minuten	0	0,0	0,0	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
	Total	7	9,3	100,0	
Missing	System	68	90,7		
Total		75	100,0		

Question 12c: (Noorderplantsoenbuurt)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om met de scooter of motor dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om met de scooter of motor een pakketje op te halen	2	3,9	100,0	100,0
	Maximaal 5 minuten	0	0,0	0,0	100,0
	5 – 10 minuten	0	0,0	0,0	100,0
	10 – 15 minuten	0	0,0	0,0	100,0
	15 -30 minuten	0	0,0	0,0	100,0
	30 – 45 minuten	0	0,0	0,0	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
Missing	System	49	96,1		
Total		51	100,0		

Question 12d: (Reitdiep)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om met de auto dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om met de auto een pakketje op te halen	17	22,7	23,9	23,9
	Maximaal 5 minuten	27	36,0	38,0	62,0
	5 – 10 minuten	13	17,3	18,3	80,3
	10 – 15 minuten	11	14,7	15,5	95,8
	15 – 30 minuten	3	4,0	4,2	100,0
	30 – 45 minuten	0	0,0	0,0	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
	Total	71	94,7	100,0	
Missing	System	4	5,3		
Total		75	100,0		

Question 12d: (Noorderplantsoenbuurt)

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om met de auto dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ik zou niet bereid zijn om met de auto een pakketje op te halen	23	45,1	76,7	76,7
	Maximaal 5 minuten	1	2,0	3,3	80,0
	5 – 10 minuten	2	3,9	6,7	86,7
	10 – 15 minuten	3	5,9	10,0	96,7
	15 – 30 minuten	1	2,0	3,3	100,0
	30 – 45 minuten	0	0,0	0,0	100,0
	Langer dan 45 minuten	0	0,0	0,0	100,0
	Total	30	58,8	100,0	
Missing	System	21	41,2		
Total		51	100,0		

Question 12d: Mann-Whitney Test: Test Statistics^a

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om met de auto dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)	Reitdiep	71	57,77	4102,00
	Noorderplantsoenbuurt	30	34,97	1049,00
	Total	101		

Test Statistics^a

Stel u gaat speciaal de deur uit om een pakketje op te halen van de pakketautomaat. Hoelang zou u dan bereid zijn om met de auto dit pakketje op te halen? (Hiermee bedoelen we de tijd van de heen- en terugreis samen)

Mann-Whitney U	584,000
Wilcoxon W	1049,000
Z	-3,746
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: In welke buurt woont u?

Question 13a: (Reitdiep)

Als er een pakketautomaat bij u in de buurt zou komen, waar had u dan het liefst dat deze pakketautomaat zou komen te staan?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bij P+R Zernike	2	2,7	2,7	2,7
	Bij P+R Reitdiep en Tankstation Tinq (Warwerd)	50	67,6	67,6	70,3
	Bij Parkeerterrein Reitdiephaven	22	29,7	29,7	100,0
Total		74	100,0		

Question 13b: (Noorderplantsoenbuurt)

Als er een pakketautomaat bij u in de buurt zou komen, waar had u dan het liefst dat deze pakketautomaat zou komen te staan?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bij Coop (Kerklaan)	31	60,8	60,8	60,8
	Bij Jumbo (Beren)	9	17,6	17,6	78,4
	Bij Station Groningen Noord	11	21,6	21,6	100,0
Total		51	100,0		

Question 14: (Reitdiep)

Stel de pakketautomaat komt op deze locatie. Welk vervoersmiddel zou u waarschijnlijk het vaakst gaan gebruiken om pakketjes op te halen uit de pakketautomaat?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Te voet	30	40,0	40,5	40,5
	Fiets	35	46,7	47,3	87,8
	Scooter of motor (Elektrisch)	0	0,0	0,0	87,8
	Scooter of motor (Niet-elektrisch)	0	0,0	0,0	87,8
	Auto (Elektrisch)	2	2,7	2,7	90,5
	Auto (Niet-elektrisch)	6	8,0	8,1	98,6
	Ik zou niet bereid zijn een pakketje bij een pakketautomaat op te halen	1	1,3	1,4	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 14: (Noorderplantsoenbuurt)

Stel de pakketautomaat komt op deze locatie. Welk vervoersmiddel zou u waarschijnlijk het vaakst gaan gebruiken om pakketjes op te halen uit de pakketautomaat?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Te voet	38	74,5	74,5	74,5
	Fiets	13	25,5	25,5	100,0
	Scooter of motor (Elektrisch)	0	0,0	0,0	100,0
	Scooter of motor (Niet-elektrisch)	0	0,0	0,0	100,0
	Auto (Elektrisch)	0	0,0	0,0	100,0
	Auto (Niet-elektrisch)	0	0,0	0,0	100,0
	Ik zou niet bereid zijn een pakketje bij een pakketautomaat op te halen	0	0,0	0,0	100,0
	Total	51	100,0	100,0	

Question 14: Fisher's Exact Test

			Te voet	Fiets	Auto (Elektrisch)	Auto (Niet-elektrisch)	Ik zou niet bereid zijn een pakketje bij een pakketautomaat op te halen	Total
In welke buurt woont u?	Reitdiep	Count	30	35	2	6	1	74
		Expected	40,3	28,4	1,2	3,6	,6	74,0
		Count						
	Noorderplantsoenbuurt	Count	38	13	0	0	0	51
		Expected	27,7	19,6	,8	2,4	,4	51,0
		Count						
Total	Count	68	48	2	6	1	125	
	Expected	68,0	48,0	2,0	6,0	1,0	125,0	
	Count							

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)	Point Probability
Pearson Chi-Square	16,346 ^a	4	,003	,001		
Likelihood Ratio	19,634	4	,001	,000		
Fisher's Exact Test	15,734			,001		
Linear-by-Linear Association	12,469 ^b	1	,000	,000	,000	,000
N of Valid Cases	125					

a. 6 cells (60,0%) have expected count less than 5. The minimum expected count is ,41.

b. The standardized statistic is -3,531.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	,362	,003	,001
	Cramer's V	,362	,003	,001
N of Valid Cases		125		

Questions related to the urban environment

Question 15: (Reitdiep)

Stelling: "Ik zou me veilig voelen in mijn buurt als ik overdag een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	68	90,7	91,9	91,9
	Een beetje mee eens	2	2,7	2,7	94,6
	Niet eens, niet oneens	2	2,7	2,7	97,3
	Een beetje mee oneens	1	1,3	1,4	98,6
	Helemaal mee oneens	1	1,3	1,4	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 15: (Noorderplantsoenbuurt)

Stelling: "Ik zou me veilig voelen in mijn buurt als ik overdag een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	45	88,2	88,2	88,2
	Een beetje mee eens	2	3,9	3,9	92,2
	Niet eens, niet oneens	3	5,9	5,9	98,0
	Een beetje mee oneens	1	2,0	2,0	100,0
	Helemaal mee oneens	0	0,0	0,0	100,0
	Total	51	100,0	100,0	

Question 16: (Reitdiep)

Stelling: "Ik zou me veilig voelen in mijn buurt als ik in het donker een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	38	50,7	51,4	51,4
	Een beetje mee eens	17	22,7	23,0	74,3
	Niet eens, niet oneens	7	9,3	9,5	83,8
	Een beetje mee oneens	11	14,7	14,9	98,6
	Helemaal mee oneens	1	1,3	1,4	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 16: (Noorderplantsoenbuurt)

Stelling: "Ik zou me veilig voelen in mijn buurt als ik in het donker een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	25	49,0	49,0	49,0
	Een beetje mee eens	14	27,5	27,5	76,5
	Niet eens, niet oneens	7	13,7	13,7	90,2
	Een beetje mee oneens	4	7,8	7,8	98,0
	Helemaal mee oneens	1	2,0	2,0	100,0
	Total	51	100,0	100,0	

Question 15 and 16: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ran
Stelling: "Ik zou me veilig voelen in mijn buurt als ik overdag een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)	Reitdiep	74	62,10	4595
	Noorderplantsoenbuurt	51	64,30	3270
	Total	125		
Stelling: "Ik zou me veilig voelen in mijn buurt als ik in het donker een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)	Reitdiep	74	63,11	4670
	Noorderplantsoenbuurt	51	62,84	3205
	Total	125		

Test Statistics^a

	Stelling: "Ik zou me veilig voelen in mijn buurt als ik overdag een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)	Stelling: "Ik zou me veilig voelen in mijn buurt als ik in het donker een pakketje moest ophalen van een pakketautomaat" (Op de zojuist door u gekozen locatie)
Mann-Whitney U	1820,500	1879,000
Wilcoxon W	4595,500	3205,000
Z	-,654	-,043
Asymp. Sig. (2-tailed)	,513	,965

a. Grouping Variable: In welke buurt woont u?

Question 17: (Reitdiep)

Welke factoren zouden in uw ogen de locatie van de pakketautomaat veiliger maken in het donker?

	Goede verlichting	Bewakingscamera's	Overzichtelijke omgeving	Nabijheid van andere mensen
Count	67	46	47	40
Percentage of total amount of inhabitants	90,5	62,2	63,5	54,1

Question 17: (Noorderplantsoenbuurt)

Welke factoren zouden in uw ogen de locatie van de pakketautomaat veiliger maken in het donker?

	Goede verlichting	Bewakingscamera's	Overzichtelijke omgeving	Nabijheid van andere mensen
Count	49	30	36	30
Percentage of total amount of inhabitants	96,1	58,8	70,6	58,8

Question 18: (Reitdiep)

Stelling: "Wat betreft verkeersveiligheid, is mijn buurt een veilige buurt om in te wandelen of te fietsen"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	50	66,7	67,6	67,6
	Een beetje mee eens	18	24,0	24,3	91,9
	Niet eens, niet oneens	1	1,3	1,4	93,2
	Een beetje mee oneens	4	5,3	5,4	98,6
	Helemaal mee oneens	1	1,3	1,4	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 18: (Noorderplantsoenbuurt)

Stelling: "Wat betreft verkeersveiligheid, is mijn buurt een veilige buurt om in te wandelen of te fietsen"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	39	76,5	76,5	76,5
	Een beetje mee eens	10	19,6	19,6	96,1
	Niet eens, niet oneens	0	0,0	0,0	96,1
	Een beetje mee oneens	1	2,0	2,0	98,0
	Helemaal mee oneens	1	2,0	2,0	100,0
	Total	51	100,0	100,0	

Question 18: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "Wat betreft verkeersveiligheid, is mijn buurt een veilige buurt om in te wandelen of te fietsen"	Reitdiep	74	65,40	4839,50
	Noorderplantsoenbuurt	51	59,52	3035,50
	Total	125		

Test Statistics^a

Stelling: "Wat betreft verkeersveiligheid, is mijn buurt een veilige buurt om in te wandelen of te fietsen"

Mann-Whitney U	1709,500
Wilcoxon W	3035,500
Z	-1,125
Asymp. Sig. (2-tailed)	,260

a. Grouping Variable: In welke buurt woont u?

Question 19: (Reitdiep)

Stelling: "Ik gebruik soms de scooter/motor/auto omdat ik mij lopend/fietsend niet veilig voel in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	0	0,0	0,0	0,0
	Een beetje mee eens	2	2,7	2,7	2,7
	Niet eens, niet oneens	4	5,3	5,4	8,1
	Een beetje mee oneens	6	8,0	8,1	16,2
	Helemaal mee oneens	62	82,7	83,8	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 19: (Noorderplantsoenbuurt)

Stelling: "Ik gebruik soms de scooter/motor/auto omdat ik mij lopend/fietsend niet veilig voel in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	1	2,0	2,0	2,0
	Een beetje mee eens	1	2,0	2,0	4,0
	Niet eens, niet oneens	4	7,8	8,0	12,0
	Een beetje mee oneens	1	2,0	2,0	14,0
	Helemaal mee oneens	43	84,3	86,0	100,0
	Total	50	98,0	100,0	
Missing	System	1	2,0		
Total		51	100,0		

Question 19: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "Ik gebruik soms de scooter/motor/auto omdat ik mij lopend/fietsend niet veilig voel in mijn buurt"	Reitdiep	74	62,16	4600,00
	Noorderplantsoenbuurt	50	63,00	3150,00
	Total	124		

Test Statistics^a

Stelling: "Ik gebruik soms de scooter/motor/auto omdat ik mij lopend/fietsend niet veilig voel in mijn buurt"

Mann-Whitney U	1825,000
Wilcoxon W	4600,000
Z	-,203
Asymp. Sig. (2-tailed)	,839

a. Grouping Variable: In welke buurt woont u?

Question 20: (Reitdiep)

Stelling: "Er is weinig criminaliteit in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	54	72,0	73,0	73,0
	Een beetje mee eens	13	17,3	17,6	90,5
	Niet eens, niet oneens	5	6,7	6,8	97,3
	Een beetje mee oneens	2	2,7	2,7	100,0
	Helemaal mee oneens	0	0,0	0,0	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 20: (Noorderplantsoenbuurt)

Stelling: "Er is weinig criminaliteit in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	18	35,3	36,0	36,0
	Een beetje mee eens	20	39,2	40,0	76,0
	Niet eens, niet oneens	7	13,7	14,0	90,0
	Een beetje mee oneens	4	7,8	8,0	98,0
	Helemaal mee oneens	1	2,0	2,0	100,0
	Total	50	98,0	100,0	
Missing	System	1	2,0		
Total		51	100,0		

Question 20: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "Er is weinig criminaliteit in mijn buurt"	Reitdiep	74	53,06	3926,50
	Noorderplantsoenbuurt	50	76,47	3823,50
	Total	124		

Test Statistics^a

Stelling: "Er is weinig criminaliteit in mijn buurt"

Mann-Whitney U	1151,500
Wilcoxon W	3926,500
Z	-4,017
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: In welke buurt woont u?

Question 21: (Reitdiep)

Stelling: "Er zijn gedurende de dag veel mensen op straat in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	29	38,7	39,2	39,2
	Een beetje mee eens	26	34,7	35,1	74,3
	Niet eens, niet oneens	9	12,0	12,2	86,5
	Een beetje mee oneens	8	10,7	10,8	97,3
	Helemaal mee oneens	2	2,7	2,7	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 21: (Noorderplantsoenbuurt)

Stelling: "Er zijn gedurende de dag veel mensen op straat in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	27	52,9	52,9	52,9
	Een beetje mee eens	19	37,3	37,3	90,2
	Niet eens, niet oneens	2	3,9	3,9	94,1
	Een beetje mee oneens	3	5,9	5,9	100,0
	Helemaal mee oneens	0	0,0	0,0	100,0
	Total	51	100,0	100,0	

Question 21: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "Er zijn gedurende de dag veel mensen op straat in mijn buurt"	Reitdiep	74	68,06	5036,50
	Noorderplantsoenbuurt	51	55,66	2838,50
	Total	125		

Test Statistics^a

Stelling: "Er zijn gedurende de dag veel mensen op straat in mijn buurt"

Mann-Whitney U	1512,500
Wilcoxon W	2838,500
Z	-2,026
Asymp. Sig. (2-tailed)	,043

a. Grouping Variable: In welke buurt woont u?

Question 22: (Reitdiep)

Stelling: "Mensen houden een oogje in het zeil in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	25	33,3	33,8	33
	Een beetje mee eens	32	42,7	43,2	77
	Niet eens, niet oneens	13	17,3	17,6	94
	Een beetje mee oneens	2	2,7	2,7	97
	Helemaal mee oneens	2	2,7	2,7	100
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 22: (Noorderplantsoenbuurt)

Stelling: "Mensen houden een oogje in het zeil in mijn buurt"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	12	23,5	23,5	23,5
	Een beetje mee eens	29	56,9	56,9	80,4
	Niet eens, niet oneens	6	11,8	11,8	92,2
	Een beetje mee oneens	3	5,9	5,9	98,0
	Helemaal mee oneens	1	2,0	2,0	100,0
	Total	51	100,0	100,0	

Question 22: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "Mensen houden een oogje in het zeil in mijn buurt"	Reitdiep	74	61,39	4543,00
	Noorderplantsoenbuurt	51	65,33	3332,00
	Total	125		

Test Statistics^a

Stelling: "Mensen houden een oogje in het zeil in mijn buurt"

Mann-Whitney U	1768,000
Wilcoxon W	4543,000
Z	-,647
Asymp. Sig. (2-tailed)	,518

a. Grouping Variable: In welke buurt woont u?

Question 23: (Reitdiep)

Stelling: "De opzet van mijn buurt nodigt uit om lopend te reizen"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	34	45,3	45,9	45,9
	Een beetje mee eens	27	36,0	36,5	82,4
	Niet eens, niet oneens	8	10,7	10,8	93,2
	Een beetje mee oneens	4	5,3	5,4	98,6
	Helemaal mee oneens	1	1,3	1,4	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 23: (Noorderplantsoenbuurt)

Stelling: "De opzet van mijn buurt nodigt uit om lopend te reizen"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	34	66,7	66,7	66,7
	Een beetje mee eens	12	23,5	23,5	90,2
	Niet eens, niet oneens	4	7,8	7,8	98,0
	Een beetje mee oneens	1	2,0	2,0	100,0
	Helemaal mee oneens	0	0,0	0,0	100,0
	Total	51	100,0	100,0	

Question 23: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ran
Stelling: "De opzet van mijn buurt nodigt uit om lopend te reizen"	Reitdiep	74	68,51	5070
	Noorderplantsoenbuurt	51	55,00	2805
	Total	125		

Test Statistics^a

Stelling: "De opzet van mijn buurt nodigt uit om lopend te reizen"

Mann-Whitney U	1479,000
Wilcoxon W	2805,000
Z	-2,280
Asymp. Sig. (2-tailed)	,023

a. Grouping Variable: In welke buurt woont u?

Question 24: (Reitdiep)

Stelling: "De opzet van mijn buurt nodigt uit om de fiets te gebruiken"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	50	66,7	67,6	67,6
	Een beetje mee eens	18	24,0	24,3	91,9
	Niet eens, niet oneens	5	6,7	6,8	98,6
	Een beetje mee oneens	1	1,3	1,4	100,0
	Helemaal mee oneens	0	0,0	0,0	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 24: (Noorderplantsoenbuurt)

Stelling: "De opzet van mijn buurt nodigt uit om de fiets te gebruiken"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	32	62,7	62,7	62,7
	Een beetje mee eens	15	29,4	29,4	92,2
	Niet eens, niet oneens	4	7,8	7,8	100,0
	Een beetje mee oneens	0	0,0	0,0	100,0
	Helemaal mee oneens	0	0,0	0,0	100,0
	Total	51	100,0	100,0	

Question 24: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "De opzet van mijn buurt nodigt uit om de fiets te gebruiken"	Reitdiep	74	61,92	4582,00
	Noorderplantsoenbuurt	51	64,57	3293,00
	Total	125		

Test Statistics^a

Stelling: "De opzet van mijn buurt nodigt uit om de fiets te gebruiken"

Mann-Whitney U	1807,000
Wilcoxon W	4582,000
Z	-,481
Asymp. Sig. (2-tailed)	,631

a. Grouping Variable: In welke buurt woont u?

Question 25: (Reitdiep)

Stelling: "De opzet van mijn buurt nodigt uit om de auto te gebruiken"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	6	8,0	8,1	8,1
	Een beetje mee eens	19	25,3	25,7	33,8
	Niet eens, niet oneens	25	33,3	33,8	67,6
	Een beetje mee oneens	14	18,7	18,9	86,5
	Helemaal mee oneens	10	13,3	13,5	100,0
	Total	74	98,7	100,0	
Missing	System	1	1,3		
Total		75	100,0		

Question 25: (Noorderplantsoenbuurt)

Stelling: "De opzet van mijn buurt nodigt uit om de auto te gebruiken"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Helemaal mee eens	0	0,0	0,0	0,0
	Een beetje mee eens	2	3,9	3,9	3,9
	Niet eens, niet oneens	10	19,6	19,6	23,5
	Een beetje mee oneens	9	17,6	17,6	41,2
	Helemaal mee oneens	30	58,8	58,8	100,0
	Total	51	100,0	100,0	

Question 25: Mann-Whitney Test

	In welke buurt woont u?	N	Mean Rank	Sum of Ranks
Stelling: "De opzet van mijn	Reitdiep	74	48,11	3560,00
buurt nodigt uit om de auto	Noorderplantsoenbuurt	51	84,61	4315,00
te gebruiken"	Total	125		

Test Statistics^a

Stelling: "De opzet van mijn buurt nodigt uit om de auto te gebruiken"

Mann-Whitney U	785,000
Wilcoxon W	3560,000
Z	-5,727
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: In welke buurt woont u?

Appendix 7: Comparing the sample to the population according to Allecijfers.nl (2021)

Question 2: What is your age? (Reitdiep)

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15 - 25	2	2,7	2,7	2,7
	26 - 45	42	56,0	56,0	58,7
	46 - 65	25	33,3	33,3	92,0
	65+	6	8,0	8,0	100,0
	Total	75	100,0	100,0	

Population		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15 - 25	255	11,8	11,8	11,8
	26 - 45	935	43,2	43,2	55,0
	46 - 65	780	36,0	36,0	91,0
	65+	195	9,0	9,0	100,0
	Total	2165	100,0	100,0	

Question 2: What is your age? (Noorderplantsoenbuurt)

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15 - 25	12	23,5	23,5	23,5
	26 - 45	14	27,5	27,5	51,0
	46 - 65	19	37,3	37,3	88,3
	65+	6	11,8	11,8	100,0
	Total	51	100,0	100,0	

Population		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15 - 25	1200	33,5	33,5	33,5
	26 - 45	1300	36,3	36,3	69,8
	46 - 65	775	21,6	21,6	90,4
	65+	305	8,5	8,5	100,0
	Total	3580	100,0	100,0	

I only asked adults to fill out my questionnaire, that can explain the smaller amount of people aged 15-25 in the sample of Reitdiep and the Noorderplantsoenbuurt. This is also the reason why the age group 0-15 was left out. Furthermore, it seems that the sample of the Noorderplantsoenbuurt contains a little bit less people aged 26-45 and a little bit more people aged 46-65. Overall there are no huge differences in age distribution between the sample and the population in both Reitdiep and the Noorderplantsoenbuurt.

Question 3: What is your gender? (Reitdiep)

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	32	42,7	42,7	42,7
	Vrouw	42	56,0	56,0	98,7
	Anders	1	1,3	1,3	100,0
	Zeg ik liever niet	0	0,0	0,0	100,0
	Total	75	100,0	100,0	

Population

Valid	Man	1550	51,0	51,0	51,0
	Vrouw	1485	49,0	49,0	100,0
	Anders	N/a	N/a	N/a	N/a
	Zeg ik liever niet	N/a	N/a	N/a	N/a
	Total	3035	100,0	100,0	

Question 3: What is your gender? (Noorderplantsoenbuurt)

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	25	49,0	49,0	49,0
	Vrouw	25	49,0	49,0	98,0
	Anders	0	0,0	0,0	98,0
	Zeg ik liever niet	1	2,0	2,0	100,0
	Total	51	100,0	100,0	

Population

Valid	Man	1860	48,3	48,3	48,3
	Vrouw	1990	51,7	51,7	100,0
	Anders	N/a	N/a	N/a	N/a
	Zeg ik liever niet	N/a	N/a	N/a	N/a
	Total	3850	100,0	100,0	

It seems that both samples contain more woman than both populations. Especially in Reitdiep. This may be due to the fact that woman are generally more likely to help out than man (Eisenberg and Fabes, 1998; Fabes and Eisenberg, 1998).

Question 4: Do you exercise at least once a week? (Reitdiep)

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	57	76,0	76,0	76,0
	Nee	18	24,0	24,0	100,0

Total		67	100,0	100,0	
Population		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	1942	64,0	64,0	64,0
	Nee	1093	36,0	36,0	100,0
	Total	3035	100,0	100,0	

**Question 4: Do you exercise at least once a week?
(Noorderplantsoenbuurt)**

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	35	68,6	68,6	68,6
	Nee	16	31,4	31,4	100,0
	Total	50	100,0	100,0	

Population		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ja	2541	66,0	66,0	66,0
	Nee	1309	34,0	34,0	100,0
	Total	3850	100,0	100,0	

The sample of Reitdiep seems a little bit more active than the population. The sample of the Noorderplantsoenbuurt seems just as active as the population.

Question 5: How would you describe your current living situation? (Reitdiep)

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Eenpersoonshuishouden	3	4,0	4,0	4,0
	Huishouden met kinderen	44	58,7	58,7	62,7
	Huishouden zonder kinderen	28	37,3	37,3	100,0
	Total	67	100,0	100,0	

Population		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Eenpersoonshuishouden	195	18,1	18,1	18,1
	Huishouden met kinderen	580	53,7	53,7	71,8
	Huishouden zonder kinderen	305	28,2	28,2	100,0
	Total	1080	100,0	100,0	

**Question 5: How would you describe your current living situation?
(Noorderplantsoenbuurt)**

Sample		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Eenpersoonshuishouden	14	27,5	27,5	27,5
	Huishouden met kinderen	15	29,4	29,4	56,9
	Huishouden zonder kinderen	22	43,1	43,1	100,0
	Total	50	100,0	100,0	

Population		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Eenpersoonshuishouden	1855	69,7	60,7	69,7
	Huishouden met kinderen	260	9,8	9,8	79,5
	Huishouden zonder kinderen	545	20,5	20,5	100,0
	Total	2660	100,0	100,0	

In both samples there are less one person households. This is especially apparent in the Noorderplantsoenbuurt. This may be related to the fact that the apartments and studios in both neighbourhoods were not physically approached. In the sense that their doorbell was rung, as this was not deemed useful, as talking over the intercom is still not personal. Therefore, the flyer was just put in their mailbox.

Appendix 8: Excel sheets derived from the GIS analysis

Excel sheet of the Noorderplantsoenbuurt

Postal code	Cost	Optional locations (Closest location(s) are in bold)	Chosen locations by respondents (Red if it is not the closest location)
9717AD	382,26 05798	Coop	3x Coop, 1x Station Noord
	1298,8 63283	Jumbo	
	1114,9 49635	Station Noord	
9717BP	447,49 12042	Coop	1x Coop
	1212,7 67631	Jumbo	
	1185,9 52862	Station Noord	
9717GD	247,20 8687	Coop	1x Coop
	994,44 9109	Jumbo	
	996,99 50481	Station Noord	
9717GJ	172,59 99724	Coop	1x Coop
	1084,3 2191	Jumbo	
	922,38 63336	Station Noord	
9717GT	187,77 73301	Coop	1x Coop
	1121,4 77339	Jumbo	
	937,56 36913	Station Noord	
9717GV	190,06 34662	Coop	1x Station Noord
	1123,7 63475	Jumbo	
	939,84 98273	Station Noord	
9717HE	143,14 12929	Coop	1x Coop
	1030,8 78121	Jumbo	
	892,92 76541	Station Noord	
9717HG	19,218 2568	Coop	1x Coop
	914,48 17517	Jumbo	
	730,56 81044	Station Noord	
9717HK	243,10 79645	Coop	1x Coop
	836,79 3416	Jumbo	

	783,83 02861	Station Noord	
9717HL	277,25 54588	Coop	2x Coop
	967,39 76067	Jumbo	
	904,23 21292	Station Noord	
9717HS	72,155 67324	Coop	1x Coop
	869,40 36955	Jumbo	
	685,49 00482	Station Noord	
9717HT	249,84 31449	Coop	1x Coop
	723,49 93841	Jumbo	
	583,60 45097	Station Noord	
9717HW	358,15 09158	Coop	2x Coop
	859,73 73759	Jumbo	
	391,63 54453	Station Noord	
9717JC	444,70 85206	Coop	1x Station noord
	620,34 56617	Jumbo	
	388,73 9134	Station Noord	
9717JD	368,79 91555	Coop	1x Coop
	696,25 50268	Jumbo	
	464,64 84992	Station Noord	
9717JE	323,02 33122	Coop	1x Jumbo
	773,61 76431	Jumbo	
	542,01 11154	Station Noord	
9717JH	676,27 11465	Coop	1x Jumbo
	457,85 10582	Jumbo	
	298,94 88887	Station Noord	
9717JJ	610,67 36456	Coop	3x Jumbo
	523,44 85592	Jumbo	
	297,51 37133	Station Noord	
9717JK	544,58 3079	Coop	1x Jumbo, 1x Station Noord

	520,47 11033	Jumbo	
	288,86 45757	Station Noord	
9717JP	302,50 16526	Coop	1x Coop
	786,14 20468	Jumbo	
	554,53 55192	Station Noord	
9717JT	474,69 87985	Coop	3x Coop
	587,79 53459	Jumbo	
	472,03 57912	Station Noord	
9717JW	475,93 99183	Coop	1x Coop
	589,03 64657	Jumbo	
	470,79 46714	Station Noord	
9717KA	644,61 19017	Coop	1x Station Noord
	600,82 5957	Jumbo	
	225,45 96176	Station Noord	
9717KP	741,90 60948	Coop	1x Station Noord
	392,53 75511	Jumbo	
	233,31 39404	Station Noord	
9717KS	577,72 22511	Coop	4x Station Noord
	710,99 44784	Jumbo	
	172,06 41101	Station Noord	
9717LD	97,566 52037	Coop	1x Coop
	1031,2 66529	Jumbo	
	847,35 28815	Station Noord	
9717LG	226,46 08854	Coop	1x Coop, 2x Jumbo, 1x Station Noord
	1160,1 60894	Jumbo	
	976,24 72465	Station Noord	
9717LS	125,26 89261	Coop	2x Coop
	922,51 69484	Jumbo	
	738,60 33011	Station Noord	

9717LW	217,29 9815	Coop	1x Coop
	862,60 15655	Jumbo	
	809,63 84356	Station Noord	
9717NB	212,38 48964	Coop	1x Coop
	878,61 50392	Jumbo	
	796,63 04625	Station Noord	

Excel sheet of Reitdiep

Postal Code	Cost	Optional locations (Closest location(s) are in bold)	Chosen locations by respondents
9746CG	1062 ,845	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tankstation Tinq
	1058 ,63	P+R Zernike	
	1505 ,056	Parkeerterrein Reitdiephaven	
9746CH	989, 7218	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tankstation Tinq, 1x Parkeerterrein Reitdiephaven
	1151 ,249	P+R Zernike	
	1431 ,933	Parkeerterrein Reitdiephaven	
9746CJ	929, 8444	P+R Reitdiep / Tankstation Tinq	2x Parkeerterrein Reitdiephaven
	1216 ,6	P+R Zernike	
	1372 ,056	Parkeerterrein Reitdiephaven	
9746CL	780, 64	P+R Reitdiep / Tankstation Tinq	2x P+R Reitdiep / Tankstation Tinq
	1279 ,811	P+R Zernike	
	1222 ,851	Parkeerterrein Reitdiephaven	
9746CM	700, 4594	P+R Reitdiep / Tankstation Tinq	2x P+R Reitdiep / Tankstation Tinq
	1199 ,631	P+R Zernike	
	1142 ,671	Parkeerterrein Reitdiephaven	
9746CP	534, 4612	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tankstation Tinq
	1033 ,633	P+R Zernike	
	976, 6727	Parkeerterrein Reitdiephaven	
9746CR	534, 8576	P+R Reitdiep / Tankstation Tinq	1x Parkeerterrein Reitdiephaven

	1034,029	P+R Zernike	
	977,069	Parkeerterrein Reitdiephaven	
9746CS	401,4349	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tankstation Tinq
	1089,447	P+R Zernike	
	843,6463	Parkeerterrein Reitdiephaven	
9746CT	580,6513	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tanksstation Tinq
	718,6951	P+R Zernike	
	839,4868	Parkeerterrein Reitdiephaven	
9746CV	766,4092	P+R Reitdiep / Tankstation Tinq	6x P+R Reitdiep / Tankstation Tinq, 1x Parkeerterrein Reitdiephaven
	1265,581	P+R Zernike	
	1208,621	Parkeerterrein Reitdiephaven	
9746CW	1101,964	P+R Reitdiep / Tankstation Tinq	4x P+R Reitdiep / Tankstation Tinq
	1308,352	P+R Zernike	
	1544,175	Parkeerterrein Reitdiephaven	
9746CX	430,4373	P+R Reitdiep / Tankstation Tinq	2x P+R Reitdiep / Tankstation Tinq
	1118,449	P+R Zernike	
	872,6487	Parkeerterrein Reitdiephaven	
9746DC	220,3897	P+R Reitdiep / Tankstation Tinq	4x P+R Reitdiep / Tankstation Tinq
	1071,805	P+R Zernike	
	662,6011	Parkeerterrein Reitdiephaven	
9746DD	620,5535	P+R Reitdiep / Tankstation Tinq	4x P+R Reitdiep / Tankstation Tinq
	1308,566	P+R Zernike	
	1062,765	Parkeerterrein Reitdiephaven	
9746DE	290,9619	P+R Reitdiep / Tankstation Tinq	2x P+R Reitdiep / Tankstation Tinq
	1119,673	P+R Zernike	
	733,1734	Parkeerterrein Reitdiephaven	
9746PC/PD/PE/PG	748,7158	P+R Reitdiep / Tankstation Tinq	4x Parkeerterrein Reitdiephaven , 3x P+R Reitdiep / Tankstation Tinq, 1x P+R Zernike
	716,2778	P+R Zernike	
	850,2833	Parkeerterrein Reitdiephaven	

9746PA	565, 111	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tankstation Tinq
	1102 ,033	P+R Zernike	
	535, 8973	Parkeerterrein Reitdiephaven	
9746PL	1134 ,161	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tanksstation Tinq, 1x Parkeerterrein Reitdiephaven
	805, 9464	P+R Zernike	
	1311 ,141	Parkeerterrein Reitdiephaven	
9746PV	1345 ,251	P+R Reitdiep / Tankstation Tinq	1x P+R Zernike
	1026 ,706	P+R Zernike	
	1531 ,901	Parkeerterrein Reitdiephaven	
9746PW	1349 ,404	P+R Reitdiep / Tankstation Tinq	1x Parkeerterrein Reitdiephaven
	1030 ,86	P+R Zernike	
	1536 ,055	Parkeerterrein Reitdiephaven	
9746PZ	1385 ,095	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tankstation Tinq
	1120 ,125	P+R Zernike	
	1625 ,32	Parkeerterrein Reitdiephaven	
9746RC	715, 3609	P+R Reitdiep / Tankstation Tinq	1x Parkeerterrein Reitdiephaven
	1561 ,874	P+R Zernike	
	158, 5876	Parkeerterrein Reitdiephaven	
9746RG	351, 6423	P+R Reitdiep / Tankstation Tinq	1x Parkeerterrein Reitdiephaven
	1252 ,613	P+R Zernike	
	205, 131	Parkeerterrein Reitdiephaven	
9746RH	393, 4757	P+R Reitdiep / Tankstation Tinq	4x P+R Reitdiep / Tankstation Tinq
	1093 ,482	P+R Zernike	
	364, 2619	Parkeerterrein Reitdiephaven	
9746RJ	399, 6986	P+R Reitdiep / Tankstation Tinq	1x Parkeerterrein Reitdiephaven, 1x P+R Reitdiep / Tankstation Tinq
	1300 ,669	P+R Zernike	
	157, 0747	Parkeerterrein Reitdiephaven	
9746RN	657, 1328	P+R Reitdiep / Tankstation Tinq	2x Parkeerterrein Reitdiephaven
	1194 ,055	P+R Zernike	

	526, 4067	Parkeerterrein Reitdiephaven	
9746RP	410, 3734	P+R Reitdiep / Tankstation Tinq	1x P+R Reitdiep / Tankstation Tinq
	1365 ,377	P+R Zernike	
	498, 2018	Parkeerterrein Reitdiephaven	
9746RT	449, 3612	P+R Reitdiep / Tankstation Tinq	2x Parkeerterrein Reitdiephaven, 3x P+R Reitdiep / Tankstation Tinq
	918, 7089	P+R Zernike	
	680, 3749	Parkeerterrein Reitdiephaven	
9746RV	509, 8431	P+R Reitdiep / Tankstation Tinq	1x Parkeerterrein Reitdiephaven
	846, 333	P+R Zernike	
	740, 8568	Parkeerterrein Reitdiephaven	