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Perceived safety of cargo bikes: A barrier against a “greener future"?

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Colophon

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Abstract

While cities are focusing on making logistics more and more environmentally sustainable by implementing “green deals”, the potential impact of the increase of cargo bikes remains unclear. This thesis investigates perceived safety that residents experience with a potential increase in cargo bikes, in this case, the residents of the inner city of Groningen. Feelings of unsafety might create tension between the municipality, courier companies and residents, leading to a potential barrier towards accepting an increase in cargo bikes and therefore a more environmentally friendly urban transportation network. In order to find the potential impact of an increase in cargo bikes on perceived safety, the following research question is studied: How would an increase of cargo bikes impact the perceived safety of the urban transportation network within the future zero emission zone of the city of Groningen?

The results, based on a literature study, a survey and a policy analysis, indicate that perceived safety is influenced by an increase in cargo bikes. Furthermore, the capacity to handle a cargo bike in the urban transportation network influences perceived safety. Therefore, this thesis calls for change. From policies implemented elsewhere it is possible to find three recommendations for Groningen: creating more space for bicycles and cargo bikes, creating more parking infrastructure for cargo bikes and providing experience with cargo bikes.

1. Introduction

1.1 Background

When it comes to climate change, urban freight transport poses a serious problem. Carbon dioxide, or CO_2, is a greenhouse gas partly consequent to the transport sector, as the transport sector is responsible for around 30% of CO_2 emissions in developed countries (UNECE, 2021). While the transport sector is currently responsible for 20-30% of travelled kilometres in urban areas, e-commerce brings a rise in direct-to-customer deliveries, meaning more travelled kilometres in urban areas, and more CO_2 emissions (DaBlanc, 2007; Savelsbergh & Van Woensel, 2016).

However, an increasing number of cities acknowledge the problem of urban freight transport by implementing a policy called a “green deal”. The city of Groningen is working on a policy that prohibits the use of traditional fossil fuel vehicles and aims to provide the right conditions for environmentally friendly urban freight transport, vehicles that require electricity, hydrogen or manpower to run (Gemeente Groningen, 2020).

Within cities, an increasing number of cargo bikes is already being used for various purposes. Companies such as Coolblue, Tringtring, PostNL, et cetera, are using cargo bikes to provide an increasingly environmentally friendly delivery service to their customers (Voermans, 2020). Families with children are also increasingly using cargo bikes to transport their children to and from locations (Riggs, 2016). This shows that the cargo bike can be considered a feasible option to replace the smaller urban freight transport modes, as they are designed for moving freight over smaller distances (Riggs, 2016).

However, perceived safety could provide a barrier to accept this increase of cargo bikes in urban areas (Hess and Schubert, 2019). In order for the cargo bikes to replace traditional freight transport modes in an urban transportation network, users of this network have to accept it, meaning use it but also accept sharing the urban infrastructure with it. Therefore, while Groningen might make cargo bikes more attractive to use for transportation in the city center, the perceived safety of its residents might stop them from using these modes of transport (Gemeente Groningen, 2020). Consequently, the following question is raised: how would an increase in cargo bikes impact the perceived safety of the urban transportation network within the future zero emission zone of the city of Groningen?

1.2 Relevance

The societal relevance of this thesis can be found in the implementation of “green deals” in various cities, such as Groningen. As the centres of these cities become accessible exclusively to environmentally friendly modes of transport, replacements have to be found in order to make deliveries to and from shops located there. As cargo bikes can be considered a feasible option to replace the smaller urban freight transport modes, it is important to examine their implementability. As perceived safety is one of the factors that could potentially obstruct the increase of cargo bikes in urban areas, this thesis aims to find out whether this is true for Groningen, and what factors are to blame. Using this information, interventions can be made in the urban transportation network of Groningen to facilitate the increase of cargo bikes.

The academic relevance of this thesis can be found in the details surrounding perceived safety. Most literature focuses on perceptions on cargo bikes in general, only providing observations, while this report goes into detail by focusing on perceived safety of cargo bikes, the factors influencing this and how to influence perceived safety itself. By doing so, this report provides a framework from which cities can learn how to successfully implement an increase in cargo bikes.

1.3 Research aim and questions

The aim of this study is to investigate to what extent an increase of cargo bikes in the cityscape would impact the perceived safety of the urban transportation network. Furthermore, from this information it is possible to derive whether or not this perceived safety could form a potential barrier against an increase of cargo bikes and which governmental interventions can mitigate this barrier.

Central question:

How would an increase of cargo bikes impact the perceived safety of the urban transportation network within the future zero emission zone of the city of Groningen?

Secondary questions

1. What are cargo bikes and how do they contribute to the transition towards sustainable logistics in the cityscape? (theory)
2. What factors influence the perceived safety in traffic? (theory)
3. To what extent will the actors of the urban transportation network of the city of Groningen distinguish perceived safety as a barrier from accepting increased numbers of cargo bikes? (empirical)
4. What proactive or reactive measures are government institutes elsewhere implementing to ensure the acceptance of increased numbers of cargo bikes, and how might these be inspirational to Groningen? (lessons)

1.4 Structure

This thesis will start with a theoretical framework in which the concepts “perceived safety”, “urban transportation network” and “cargo bikes” will be discussed and related .

Next, the methodology will discuss the setup of the literature review, survey and document analysis.

Subsequently, the results will discuss the data originating from the survey about perceived safety on cargo bikes, and the analysis of policy documents and how Groningen can learn from these documents.

Concluding, the conclusion will highlight the most important findings from the survey and analysis of policy documents, and show what interventions the city of Groningen can implement to ensure a successful increase in cargo bikes. Afterwards, the strong and weak points of the research will be discussed, along with recommendations for future research.

2. Theoretical framework

2.1 Defining concepts

This study centers around three main concepts:

- Perceived safety;
- Urban transportation network;
- Cargo bikes.

In this chapter, these concepts will be defined and combined in one conceptual model.

2.1.1 Perceived safety

When considering the word “safety”, terms such as “dangerous” or “accidents” are closely associated with “safety”. Therefore, in order to find a fitting definition for “perceived safety”, the definition for “hazard perception” could be used. Hazard perception describes the anticipation of possible accidents by participants in traffic (Meir and Dagan, 2020). However, as hazard perception focuses on a system that is already implemented, while this study focuses on both a system that is already implemented and its future scenario, this definition does not meet the requirements for the definition of “perceived safety”.

A definition which regards the acceptance and usage of regular bike sharing systems and its consequential increase in regular bikes in the cityscape comes from another article. This article defines perceived safety as “the degree to which individuals perceive that using a system is safe for them” (Jahanshahi et al., 2020). Rather than the previous definition, in which participants perceive accidents in existing traffic situations, this definition includes emotional values that a participant experiences before actually participating in a traffic network. Therefore, this definition is more fitting for researching a network that is yet to be implemented.

Nevertheless, this definition still calls for motives or factors that influence the perceived safety, as without these factors the study would not be able to identify what would be necessary to prevent possible barriers for an increase of cargo bikes. These factors can be found in an article by Haustein and Møllller (2016). This article studies, among other aspects, perceived safety among e-bike users. In this article two possible factors are identified that are able to influence the perceived safety of e-bikes:

- The first of these factors is the involvement of participants in accidents while using e-bikes. As the article shows, involvement in accidents while using a mode of transport creates a negative perceived safety of aforementioned mode of transport;
- The second influencing factor is the capacity to either ride or deal with e-bikes in traffic. The article showed that participants felt more safe after they tested e-bikes and possessed more experience with this mode of transport.

These two factors will be used in this study, as following:

- Involvement in dangerous situations or accidents involving a cargo bike;

- Capacity to either ride or deal with cargo bikes.

Lastly, it is important to define whose perceived safety is important to take into account when researching this topic. In order to find this, this research looks into an article by Ballantyne et al. (2013). Rather than using a traditional stakeholder model, Ballantyne et al. call for a distinction between stakeholders and actors when researching logistics. Stakeholders are those who are actively involved in the logistics sector, while actors are those who are influenced by the logistics sector but are not actively involved. As stakeholders are able to change the system and are the main cause for the increase of cargo bikes in the cityscape, this report focuses on those who are influenced but are not able to directly change the system, or actors, as they deal with consequences without being responsible for aforementioned consequences. In this study, the residents of the inner city of Groningen are considered as actors.

2.1.2 Urban transportation network

The independent variable in this research is the urban transportation network. As the urban transportation network in this study should be suitable for an increase of cargo bikes, a bicycle-friendly definition for the urban transportation network is needed. The definition is developed based on the article by Pucher and Buehler (2008), discussing bicycle-friendly infrastructure networks. Pucher and Buehler compare the bicycle infrastructure of several countries, showing that while in the United States of America only 1% of all trips are made by bicycle, cycling in the Netherlands is popular and safe due to its infrastructure and laws allowing safe travel for cyclists. The study indicates two main aspects for establishing an urban transportation network that is safe to use for cyclists:

- The urban transportation network should have bicycle-friendly infrastructure, such as for instance separate bicycle lanes, safe crossing roads for cyclists et cetera;
- The urban transportation network should have bicycle-friendly traffic laws, such as safe speed limits for cyclists to safely participate in traffic, safe right of way laws et cetera.

2.1.3 Cargo bikes

First, it is important to know what a cargo bike exactly entails. A cargo bike, or in the Netherlands more commonly known as a “bakfiets”, refers to a bicycle with a front-mounted box that has the capacity to transport up to 100 kilograms of cargo (Hess and Schubert, 2019). The cargo bike originates from England, where at the start of the twentieth century an Englishman decided to place a wooden box at the front of a bicycle, above the horizontal front axle (Kirkels, 2016). However, this idea was based on an even earlier design by another Englishman in the year 1877, who designed a carrier for transporting people and goods.

Figure 1.: The first variance of cargo bikes: a three-wheeled bicycle with a front-mounted box (RIPPL, 2019).

Furthermore, due to a newly found interest in cargo bikes, the traditional cargo bike has been innovated providing a new variance: the two-wheeled cargo bike. This current innovation originates from Denmark, where a wooden box was added to a Danish Long John bicycle (Kirkels, 2016). This provides drivers with a vehicle that is less broad and therefore more agile.

Figure 2.: The second variance of cargo bikes: a two-wheeled bicycle with a front-mounted box (INGKA, 2020).

However, the innovation does not end here. While the biggest difference in variances is the amount of wheels, further innovations have been made in terms of performance of cargo bikes. The most important of these innovations is the e-cargo bike: a cargo bike that has an electrical motor that provides pedal support for the driver, proving cargo bikes as a potential substitute for traditional modes of transport as less manpower is required (Lovejoy and Handy, 2012). These innovations show that cargo bikes are becoming increasingly easier to power and therefore faster, while still maintaining the ability to carry up to 100 kilograms of cargo.

This thesis will focus on all variances, as all variances can possibly be implemented in the zero-emission zone of Groningen for different purposes. While a family might be more interested in a Danish Long John cargo bike for transporting their children, a student might be more interested in a three-wheeled cargo bike to move furniture from one room to another. Companies could even consider the e-cargo bikes, as they require less manpower for more

performance, making it easier for couriers to deliver as fast as possible. Therefore, as all variances could have a potential purpose in the area of interest, all variances are taken into account.

On a local scale, the municipality of Groningen provides the option to rent a cargo bike free of charge in order to transport garbage to the disposal areas (Gemeente Groningen, 2021). In doing so, Groningen prevents residents from taking the car to transport garbage towards the disposal area, and are instead promoting the environmentally sustainable option. Through this, the usage of cargo bikes is being incentivized, through subsidies and other policies helping citizens choose cargo bikes over the latter, and in doing so, contributing to the transition towards sustainable logistics.

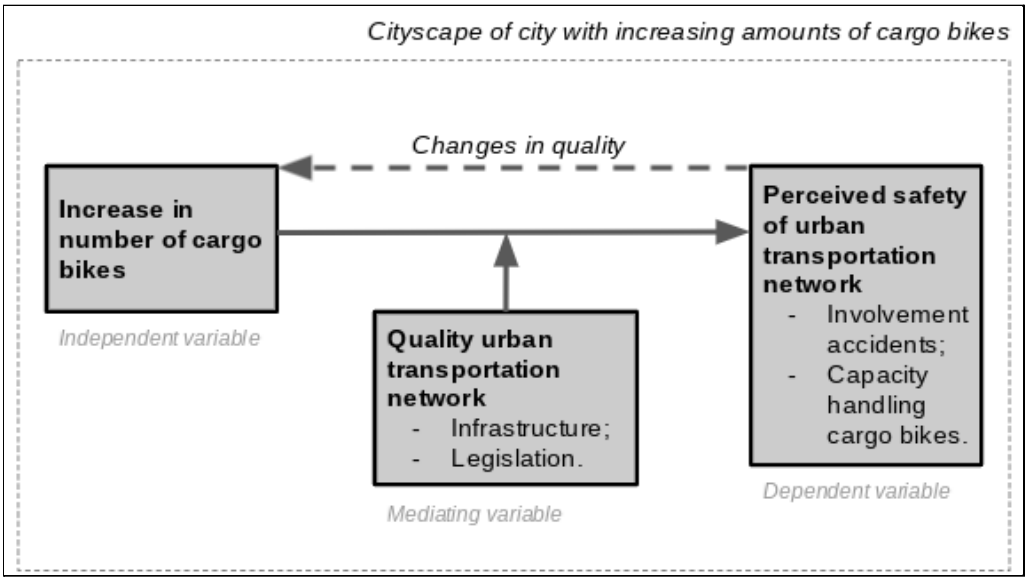

Figure 3.: Conceptual model used in this research.

2.3 Hypotheses

The central hypothesis to this research states that “if respondents were to make an estimation on their perceived safety in a scenario with an increased number of cargo bikes, the respondents would estimate a decreased perceived safety”, based on a similar claim from an article by Hess and Schubert (2019), which claims that perceived safety could potentially form a barrier against the usage of cargo bikes in Switzerland.

3. Methodology

This study is an explorative case study on how cargo bikes influence the perceived safety of users of public space in Groningen, based on a survey.

3.1 Literature review: sub questions 1 and 2

The first two questions aim to provide more insight into several aspects surrounding cargo bikes and perceived safety. For the first question the thesis will discuss what cargo bikes are, meaning where they originate from, what variances there are, what legislation they follow and what their uses are. For the second question, the thesis will discuss what factors influence perceived safety.

These questions will be answered by reading and analyzing literature found through several regular search engines and scientific search engines. These regular search engines are provided by Google while the scientific search engines are provided by the Rijksuniversiteit Groningen, such as Google Scholar and Web of Science. For the first question, the keyword that will be used throughout searches for information is “cargo bike”, as this research focuses on the increasing numbers of aforementioned modes of transport. This keyword will be combined with the following search terms:

- “Legislation for”: in order to gain insight into what legislation cargo bikes follow;
- “Uses of”: in order to see what uses individuals have for cargo bikes;
- “Sustainability”: in order to see why cargo bikes are considered sustainable.

For the second question, the keyword that will be used throughout searches is “perceived safety”. Through this, articles can be found on both the definition of “perceived safety” and factors influencing it.

3.2 Survey: sub question 3

The second of these secondary questions is an empirical question, which studies the extent to which actors of the urban transportation network distinguish perceived safety as a barrier to accepting the new cargo bike sharing system. For the boundaries of the research area, this study sets the future zero emission zone of Groningen as its research zone for a multitude of reasons. The first reason is that by 2025, this zone will only allow vehicles powered by electricity, hydrogen or manpower for the use of logistics within the set boundaries, therefore creating an opportunity for cargo bikes to take over some work from previous urban freight transport vehicles (Gemeente Groningen, 2020). The second reason is that within this zone most of the shops, restaurants and other facilities in need of urban freight transport are located, meaning that delivery to and from shops will take place in this area the most out of the city of Groningen.

Within these boundaries the studied individuals have to be identified, which in this case are the residents of the inner city of Groningen as they deal with the aforementioned urban transportation network on a daily basis. In order to prevent bias and ensure an equal distribution of stakeholders over the area, a random sample of 200 respondents is taken from the

population. The random sample will be performed through QGIS, in which random points will be assigned over a cadastre map of the inner city of Groningen (see figure 4).

Figure 4.: Map of the inner city of Groningen, with the buildings in green and the random sample in the white dots.

The respondents will be asked to fill in a survey through a flyer (see appendix A). 200 flyers will be distributed over the random sampled points by ringing the door and asking the respondent to fill in the survey through the flyer where possible, or by putting the flyer in the mailbox where necessary. This method will be used to ensure the best possible response rate while also maintaining the random sample. The flyer will show a QR-code that leads the respondent to the online survey.

The survey will provide the research with data through questions on information of the respondent, their experience with cargo bikes and the emotional values they have when considering an increased number of cargo bikes (see appendix B). The survey will mostly consist of multiple choice and rating questions, however, respondents will have the opportunity to elaborate on their choice through an open question. This open question will allow the research to see whether or not there might be further, underlying reasons for respondents to not feel safe or not accept an increased amount of cargo bikes, which in turn might provide interesting data for this research or even a cause for future research. The data will then be put into SPSS, where the following tests will be performed:

- Histograms of perceived safety of the current urban transportation network and the urban transportation network with an increased number of cargo bikes in order to compare distribution: this will allow the researcher to take a look into the differences in frequencies of grades of perceived safety. If both histograms show a different distribution it shows that an increase in cargo bikes does influence the feeling of safety of involved actors. If not, it shows that an increase does not influence the feeling of safety;
- Test correlations between the grades given on factors influencing perceived safety and perceived safety: this will allow the research to see whether or not these factors (capacity and involvement in accidents) have a correlation with the perceived safety. A significant correlation could mean that the factors influence the perceived safety;
- ANOVA-test of the grades given on acceptance of an increased number of cargo bikes per group based on differences in grading of perceived safety per scenario: this will allow the researcher to find out whether or not there is a relationship between acceptance and the feeling of perceived safety in both scenarios. If the means differ significantly, it means that perceived safety influences the acceptance of an increase in cargo bikes. If the means do not differ significantly, it shows that perceived safety does not influence the acceptance of an increase in cargo bikes.

3.3 Policy analysis: sub question 4

In order to provide inspiration for interventions that are able to help facilitate an increase of cargo bikes in Groningen, this thesis takes a look at various proactive and reactive measures, both Dutch and non-Dutch.

These policies can be found at Fietsberaad CROW (2021): this website highlights policies implemented in Dutch cities and elsewhere, specifically policies focusing on cycling infrastructure and legislation. Based on the article by Pucher and Buehler (2008), the following keywords will be used in the search engine on the website in order to find policies that change the cycling aspect of the quality of the urban transportation network:

- “Cargo bikes”: in order to find policies specifically aimed at cargo bike usage;
- “Cycling infrastructure”: in order to find policies specifically aimed at changing cycling infrastructure;
- “Cycling legislation”: in order to find policies specifically aimed at changing cycling legislation.

3.4 Ethical considerations

Lastly, it is important to take into account the ethical considerations of the research. As COVID-19 restrictions do not allow performing the surveys face-to-face, the surveys are filled in anonymously by respondents without an interviewer present. This provides two advantages in the aspect of ethical considerations: the first is that the filled-out forms will provide anonymity for the respondents, meaning privacy will remain among respondents. Another advantage is the lack of power relationship. Therefore, the respondent will not feel pressured by the presence of an interviewer to give a certain answer rather than their own answer. However, as a respondent might still feel a certain fear over their own privacy, the survey will also mention that their data will be stored in a separate file that will be protected with a password. Furthermore, it is

important to include an instruction for the survey, including points that ensure a sense of freedom while filling in the survey for the respondent. This instruction will include assurance of anonymity, information on the purpose of the data and the option to not fill in a question or stop the survey at any time.

4. Results

4.1 Survey results

In the Netherlands, cargo bikes are considered to be in the same category of vehicles as bicycles, as stated in Dutch traffic legislation (Ministry of Traffic and Water Management, 1990). However, since 1990 a lot has changed in the development of cargo bikes, meaning perhaps new, more adapted legislation is necessary to fit the subject. In order to see what the perceived safety of residents of the inner city of Groningens is, a survey was conducted. For this survey 200 flyers were distributed over the area shown in figure 4. Out of these 200 flyers, 39 respondents participated in the survey, leading to a response rate of 19.5%. From these 39 respondents, 31 have no prior experience using a cargo bike, 6 have experience using a cargo bike and 2 respondents use a cargo bike on a frequent basis.

4.1.1 The difference in perceived safety per scenario

Respondents were asked to grade their perceived safety for participating in traffic in two scenarios: the current urban transportation network, and the urban transportation network with an increased number of cargo bikes. The data from the comparison of these two variables formed the following histograms:

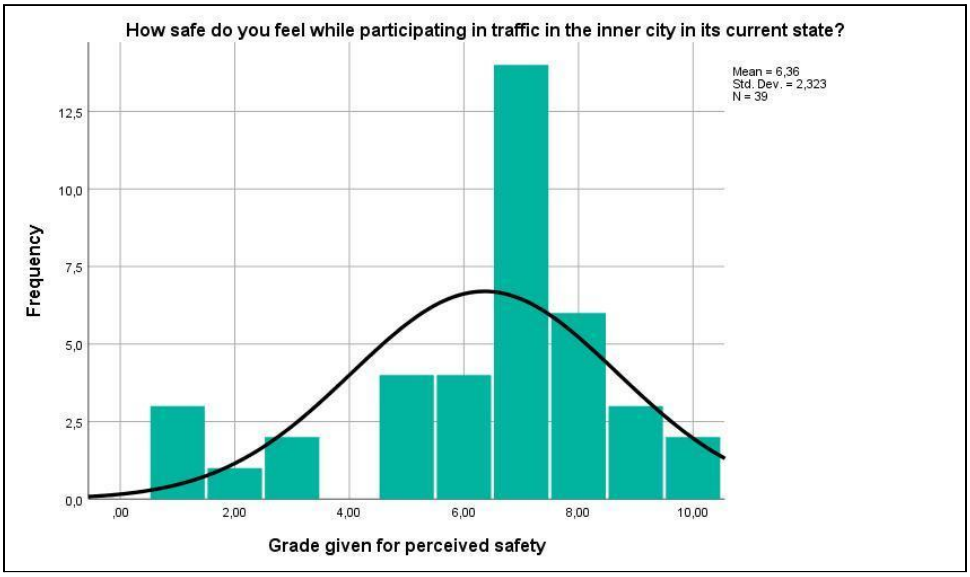

Figure 5.: The distribution of grades for perceived safety for the current urban transportation network.

Figure 5 shows that in the current urban transportation network, most respondents grade their perceived safety with a 7. The mean of the distribution is a 6.36, with a slightly left skewed distribution, meaning a preference for grades higher than 5 and 6.

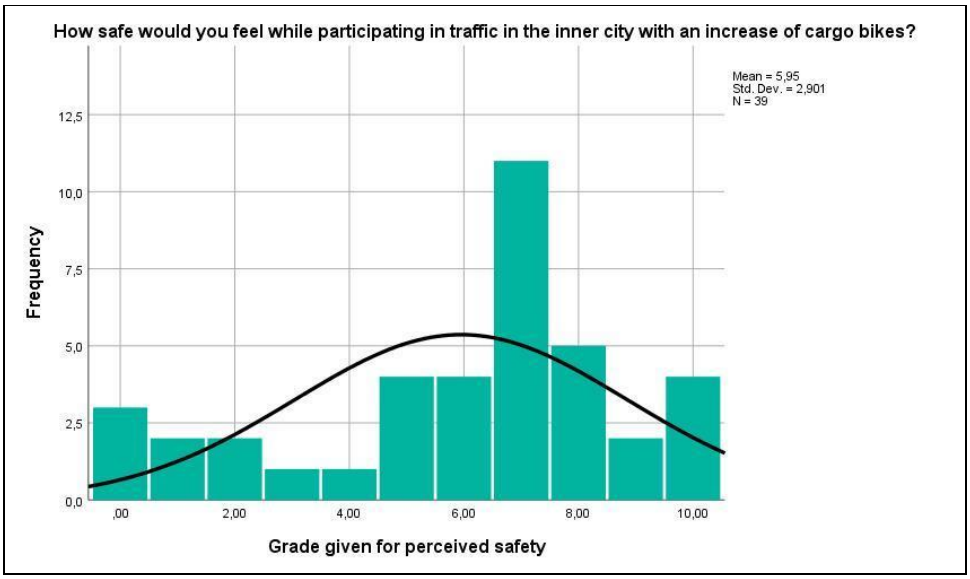

Figure 6.: The distribution of grades for the urban transportation network with an increased number of cargo bikes.

Figure 6 shows that when an increase of cargo bikes is introduced, the most frequent grade remains a 7. However, the mean of the distribution goes down to a 5.95, meaning a decreased mean of perceived safety. The left skewed distribution is less pronounced in figure 6, meaning a higher frequency of lower grades in the urban transportation network with an increased number of cargo bikes. This is in line with the hypothesis, as the respondents estimate a decrease in their perceived safety in the scenario with an increase in the number of cargo bikes.

4.1.2 Influences of factors on perceived safety

Respondents were asked to grade their capacity to drive or handle cargo bikes in the urban transportation network. These grades were tested for their correlation with the grade given for perceived safety in the scenario of an increased number of cargo bikes:

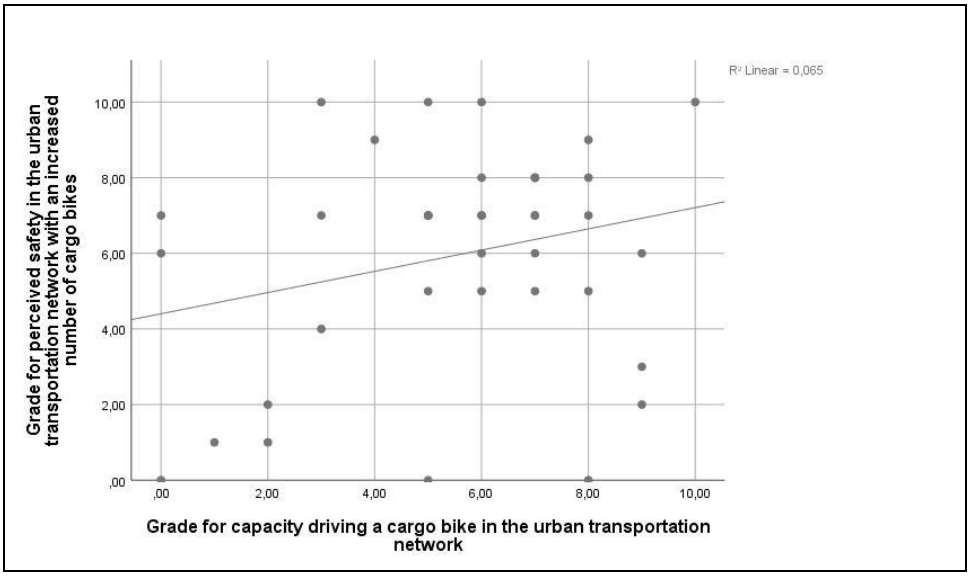

Figure 7.: Scatter plot showing the correlation between the grades given for capacity to drive a cargo bike and perceived safety.

In figure 7 no clear correlation is seen between capacity to drive a cargo bike and perceived safety. A Pearson correlation test confirms this, showing a weak correlation and a statistically insignificant result. This is contradictory to Haustein and Møllller (2016), who identified this as a factor that influences perceived safety. However, a possible explanation could be that 31 out of 39 respondents have no experience with using a cargo bike, meaning they do not know how good or bad they are at driving a cargo bike.

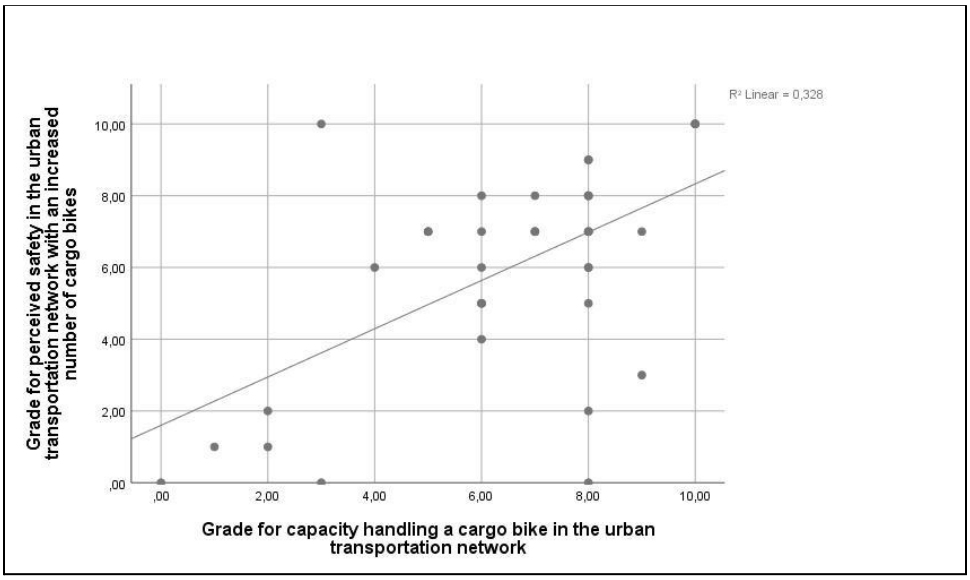

Figure 8.: Scatter plot showing the correlation between the grades given for capacity to handle a cargo bike and perceived safety.

In figure 8, however, a clearer correlation can be observed. A Pearson correlation test confirms a moderate and statistically significant relationship, meaning that the capacity to handle a cargo bike could influence the perceived safety of a respondent. This is in line with the article written by Haustein and Møllller (2016).

Furthermore, respondents were asked to indicate whether or not they had been involved in a dangerous situation or accident involving a cargo bike. This was tested in correlation with the grade given for perceived safety in the scenario with an increase in cargo bikes:

Figure 9.: Comparison of mean grade for perceived safety for involved and not involved in a dangerous situation or accident.

As can be seen in figure 9, there is a noticeable difference between the grading of perceived safety between those who have experienced an accident involving a cargo bike and those who did not. However, the significance for this is too high to show a significant statistical result, meaning that this relation can be considered non-existent, which is contradictory to Haustein and Møllller (2016). This could be blamed on the small number of participants that were involved in accidents, which was 3 out of 39 respondents.

Overall, the only possibility of a factor influencing the perceived safety was the capacity of handling a cargo bike in the urban transportation network. However, in future research, the differences between groups that have experience and that do not have experience with using a cargo bike can perhaps show whether or not this influences the way that respondents grade their own capacity at driving a cargo bike. Furthermore, a bigger group of respondents might create a significant result for the comparison between perceived safety and involvement in a dangerous situation or accident.

4.1.3 Perceived safety as a barrier to acceptance of cargo bikes

Respondents were asked to grade their acceptance of an increase in cargo bikes. This was compared to whether the respondents had a decreased, similar or increased perceived safety in a scenario with an increased number of cargo bikes:

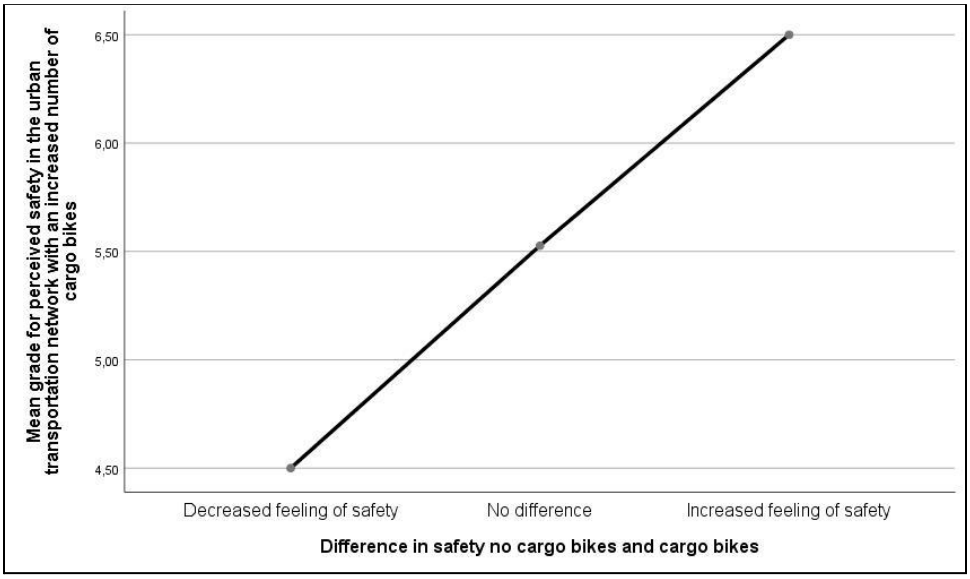

Figure 10.: Comparison of means of grades given for acceptance between different groups based on grades perceived safety.

Figure 10 shows that the grade given for acceptance increases along with their perception of safety, meaning perception of safety could influence acceptance of increased numbers of cargo bikes in the urban transportation system. This would be in line with the article written by Hess and Schubert (2019), however, the significance value of this ANOVA-test is too high to accept a relationship between these two variables. With a bigger group of respondents, a significant result could perhaps be reached.

4.1.4 Further findings of interest

Another interesting finding from the survey was that almost all respondents suggested interventions in the urban transportation network to ensure an improved perceived safety of an increase in cargo bikes in the open comment box. Most of these respondents suggested improving infrastructure, such as wider roads, wider intersections, parking places, et cetera, which is in line with the finding that people give lower grades in the capacity of handling a cargo bike driver in traffic. If more room is ensured for cargo bikes, people are less likely to come into dangerous contact with these cargo bike drivers and a decrease in accidents will ensue.

4.2 Policy analysis results

As highlighted in the conceptual model (figure 3), changes in the quality of the urban transportation network could possess the potential to change the perceived safety of the aforementioned urban transportation network. Therefore, the following section will focus on

proactive and reactive measures implemented elsewhere, and how these might be inspirational to the city of Groningen. As discussed by Pucher and Buehler (2008), the urban transportation network should have bicycle-friendly infrastructure and laws, thus, the analysis will focus on such measures.

4.2.1 Municipality Utrechtse Heuvelrug: Bliksemsnelle Baan

One of the factors influencing perceived safety, as seen in the results, is the capacity to handle a cargo bike in the urban transportation network. For instance, when overtaking a cargo bike, which is a broader vehicle, cyclists might be forced to leave the bicycle lane into oncoming cycling traffic or even the roadway. In order to make overtaking easier and safer, the municipality of Utrechtse Heuvelrug piloted the Bliksemsnelle Baan: a separate bicycle lane dedicated to overtaking slower cyclists (Fietsberaad CROW, 2020). In the case of cargo bikes in Groningen, this idea could be used for cyclists taking over slower, regular cargo bikes, or for faster e-cargo bikes to take over regular cyclists in an easy and safe manner.

Figure 11.: Bliksemsnelle Baan (blue) in the municipality of Utrechtse Heuvelrug (Fietsberaad CROW, 2020).

4.2.2 City of Cologne: Separating traffic

Another solution for the issue of the capacity to handle a cargo bike originates from Cologne. This city piloted giving a choice to cyclists: either to use the regular bicycle lane or use the roadway (Fietsberaad CROW, 2018). This could be used in Groningen for cargo bikes in order to separate slower cycling traffic from the faster and wider e-cargo bikes, as the faster and wider e-cargo bikes could fit into car traffic better than into the cycling traffic.

4.2.3 City of Den Haag: Cargo bike parking place

As respondents indicated in the open comment box, parking infrastructure for cargo bikes was also necessary. Respondents indicated that as parked cargo bikes blocked the sidewalk, they often had to use the adjacent road, leading to unsafe situations. Therefore, a separate parking infrastructure is necessary in Groningen. An example for this could be the city of Den Haag, who implemented similar infrastructure in 2009 (Fietsberaad CROW, 2009).

4.2.4 City of Gent: Shared cargo bike system

From the results it was possible to see that a lot of respondents did not know how to grade themselves in the capacity to drive a cargo bike, which could be due to the fact that 31 respondents indicated that they did not have any experience with using a cargo bike. Therefore, a policy that should be implemented is one that allows users to gain experience with a cargo bike without purchasing one or having to travel far in order to use one. An example could be the city of Gent, which implemented a shared cargo bike system (Fietsberaad CROW, 2013). This creates a more accessible manner for respondents of Groningen to familiarize themselves with cargo bikes, creating perhaps a better understanding of their capacity to drive a cargo bike.

5. Conclusion

5.1 Results

Concluding, from the results it is possible to state that the hypothesis, set in the theoretical framework, “if respondents were to make an estimation on their perceived safety in a scenario with an increased number of cargo bikes, the respondents would estimate a decreased perceived safety”, can be confirmed. The results indicate that respondents estimate their perceived safety in a scenario with an increased number of cargo bikes to be lower than in the current scenario of the urban transportation network. Furthermore, the theory shows that while new variances of cargo bikes have been developed over the past few years, legislation remains unchanged since 1990. Therefore, this thesis calls for change.

The results show that, contrary to what the theoretical framework states, the capacity to drive a cargo bike and experience of a dangerous situation or accident involving a cargo bike does not correlate with the perceived safety of a scenario with an increased number of cargo bikes. Thus, the results do not support the previous theory. However, 31 out of 39 respondents indicate to have never experienced driving a cargo bike, therefore not being able to answer the question about how they would grade their capacity to drive a cargo bike truthfully. Additionally, the results show that the capacity to handle a cargo bike in the urban transportation network does correlate with the grade given for perceived safety. This is in line with the theoretical framework and confirms the theory established by the articles mentioned.

While the results show that perceived safety does not act as a barrier for the acceptance of an increased number of cargo bikes, the perceived safety still decreases when the number of cargo bikes increases. Therefore, adjustments in the urban transportation network are needed.

5.2 Recommendations

From the policy analysis, multiple sources of inspiration can be found in both Dutch and non-Dutch cities, which can be translated into recommendations for the urban transportation network of Groningen. The first of which is creating more space for bicycles and cargo bikes. By doing so, overtaking cargo bikes and being overtaken by e-cargo bikes is made easier and safer for all participants, resulting in an increase of perceived safety and perhaps even improving the capacity to handle a cargo bike in the urban transportation network.

Secondly, more parking infrastructure is needed for cargo bikes. As respondents indicated in the open comment box, cargo bikes often block the sidewalk, forcing pedestrians to stray from the sidewalk onto bicycle lanes and roadways. In order to prevent this from happening specific cargo bike parking places are needed.

Lastly, it is recommended to give residents of a city the opportunity to try out a cargo bike for themselves in order to familiarize themselves with the environmentally friendly option. As 31 out of 39 respondents indicated to have no previous experience with using a cargo bike, a possibility to try a cargo bike could potentially help these respondents to gain some insight into how it is to drive a cargo bike, perhaps even changing their perception of safety for the mode of transport.

5.3 Methodological reflection

This research could still be improved on some aspects. One of these aspects is the bias within the survey: as random respondents were chosen for the survey, there is no way of knowing whether or not the respondents would be an accurate depiction of the population. This can for instance be seen in the experience that the respondents have using a cargo bike: 31 of 39 had no experience, while the other eight respondents were divided over the two remaining groups. This shows that there was no equal representation for each of the groups.

Another aspect is that respondents were asked to judge a scenario with which they could not have had any experience. Furthermore, this scenario was not described sufficiently for respondents to be sure that each respondent had a similar scenario in mind. Therefore, the results should only be used as an estimate of the situation, and not as a representation.

For future research, a more accurate representation of the situation can be made by creating a more equal representation and a better description of a possible future scenario.

5.4 Future research

Lastly, it would seem wise to do follow-up research after the policies have been implemented and after a potential rise in the number of cargo bikes. This could answer the question: did perceived safety influence the increase of the number of cargo bikes? Did policies have an influence? By answering this question in comparison with this thesis, the question can be made clear whether or not the change in legislation and infrastructure was really necessary or apparently abundant.

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Appendices

Appendix A: Flyer for survey

Appendix B: Qualtrics survey

Research Bachelor Project Cargo Bike

Start of Block: Introduction

Intro Dutch:
Beste deelnemer,

Hartelijk bedank voor het deelnemen aan dit onderzoek naar het veiligheidsgevoel van bakfietsen. Door mee te doen kunt u uw stem laten horen voor een toekomstbeeld voor Groningen en andere regio's.

Wat zal gevraagd worden?
In deze survey zullen een aantal vragen gesteld worden met betrekking tot het gebruik van een gedeeld bakfietsensysteem in Groningen, wat betekent dat door de stad heen bakfietsen staan die te gebruiken zijn door iedereen die een eventueel lidmaatschap heeft bij het bedrijf dat deze bakfietsen heeft verspreid. Deze vragen zullen focussen op het veiligheidsgevoel dat een bakfiets bij u oproept.

Wat zal er met uw gegevens gedaan worden?
De data die wij verzamelen door middel van deze survey zal anoniem behandeld worden. Deze data zal worden onderzocht om te kijken wat voor impact een gedeeld bakfietsensysteem zal hebben op het veiligheidsgevoel van de infrastructuur van een stad zoals Groningen. Aan de hand van deze data zal worden gekeken of een interventie nodig is om dit systeem te laten werken, zoals bijvoorbeeld aanpassingen aan de infrastructuur of een beleidsinvoering.

English:
Dear respondent,

Thank you very much for participating in this research towards the perceived safety of cargo bikes. By participating you are able to voice your interests for the future of Groningen and other regions.

What will be asked?
In this survey a couple of questions will be asked in regard to the implementation of a shared cargo bike system in Groningen, which means that throughout the city there will
be cargo bikes placed for usage by anyone with a membership at the company that spreads these cargo bikes. These questions will focus on the perceived safety that a cargo bike gives you.

How will your data be used?
The data that we collect through this survey will be treated anonymously. This data will be researched in order to see what the impact of a shared cargo bike system will be on the perceived safety of the infrastructure in a city such as Groningen. By researching this data it will be possible to see whether or not an intervention is necessary in order to make such a system work, for instance by adjusting infrastructure or implementing policies.

End of Block: Introduction

Start of Block: Consent

Q4 **Dutch:**
Betreffende de data zijn er een aantal punten van orde die eerst duidelijk moeten worden gemaakt. Deze punten zijn opgesteld om u, de respondent, een gevoel van vrijheid en veiligheid te geven tijdens het invullen van deze survey.

Vrijheid
U, de respondent, bent toegestaan op elk punt van de survey te stoppen met het invullen van de survey, evenals vragen over te slaan waatbij u zich niet comfortabel voelt deze in te vullen. U bent niet verplicht om de survey in te vullen, deze survey is op vrijwillige basis.

Veiligheid
De data die consequent is aan deze survey zal anoniem blijven en niet verstrekt worden aan andere onderzoekers of onderzoeksinstituties. De data zal verder worden bewaard op een bestandsmap die beschermd wordt door een wachtwoord. Hierdoor hoeft u zich als respondent niet zorgen te maken over de eventuele invloed die deze survey zal hebben op uw leven.

English:

Considering the data there are a few points of order that should be clarified first. These points have been set up in order to allow you, the respondent, to have a sense of freedom and safety during the filling in of the survey.

Freedom
You, the respondent, are allowed to stop fillling in the survey at any point during filling in the survey, just as skipping questions if you do not feel comfortable filling in these questions. You are not obligated to fill in the survey, the survey is on a voluntary basis.

Safety
The data collected from this survey will remain anonymous and will not be spread amongst other researchers or research institutions. The data will be stored in a file directory which will be protected by a password. Because of this, you as a respondent do not have to worry about any sort of influence that this survey will have on your personal life.

Q6 Ik heb de tekst gelezen en stem in met de inhoud.
I have read the text above and agree with its contents.

- Ja/Yes (1)
- Nee/No (2)

End of Block: Consent

Start of Block: Information cargo bike general

Image

Q1 Woont of werkt u in het bovengenoemde rode deel van de kaart (oftewel, de Binnenstad van Groningen)?
Do you live or work in the aforementioned red area of the map (or, the Inner City of Groningen)?

- Ja/Yes (1)
- Nee/No (2)

Q2 Heeft u in bovengenoemde rode deel van de kaart wel eens een bakfiets gebruikt?
Have you ever used a cargo bike in the aforementioned red area of the map?

- Ja, op frequente basis/Yes, on a frequent basis (1)
- Ja, maar niet op frequente basis/Yes, but not on a frequent basis (2)
- Nee/No (3)

Q3 Zo ja, hoe bent u aan deze bakfiets gekomen?
If so, how did you get this cargo bike?

- Ik bezit zelf een bakfiets/I own a cargo bike myself (1)
- Ik werk met een bakfiets/I work using a cargo bike (2)
- Ik heb een bakfiets gehuurd bij een verhuurbedrijf (bijvoorbeeld IKEA of Stadswerkplaats)/I rented a cargo bike at a rental company (for instance IKEA or Stadswerkplaats) (3)
- Ik heb een bakfiets geleend van een kennis/I borrowed a cargo bike from someone I know (4)
- Andere/Other (5)

Q38 Indien u "Andere" heeft ingevuld, kunt u hier toelichten hoe:
If you filled in "Other", you are able to explain how here:

_____

End of Block: Information cargo bike general

Start of Block: Information shared cargo bike system

Q4 Zou u een bakfiets gebruiken mocht deze tot uw beschikking zijn?
Would you use a cargo bike if this would be at your disposal?

- Ja/Yes (1)
- Nee/No (2)

Q5 Zo ja, hoever zou u willen lopen om aan te komen bij een beschikbare gedeelde bakfiets?
If so, how far would you be willing to walk to reach an available shared cargo bike?

- 50 meters (1)
- 100 meters (2)
- 150 meters (3)
- 200 meters (4)
- Further than 200 meters (5)

Q6 Zo ja, voor welke doeleinden?
If so, for what purposes?

- Transport van goederen/Transport of goods (1)
- Transport van passagiers/Transport of passengers (2)
- Recreatie/Recreational (3)
- Andere/Other (4)

Q7 Indien u "Andere" heeft ingevuld, kunt u hier toelichten wat voor doeleinden u bedoelt:
If you filled in "Other", you are able to explain what purposes you mean here:

_____

Q8 Hoe positief zou u een toename van bakfietsen in het huidig stadsbeeld ervaren (0 is heel negatief, 10 is heel positief)?
How positively you would experience an increase in cargo bikes in the current cityscape (0 is very negative, 10 is very positive)?

	Extremely	Extremely positive

	negative									positive
	0	1	2	3	4	5	6	7	8	9	10
Toename van bakfietsen in het huidig stadsbeels/Increase of cargo bikes in the current cityscape ()											

End of Block: Information shared cargo bike system

Start of Block: Information perceived safety

Q9 Welk cijfer zou u uw veiligheidsgevoel geven nu en mochten er meer bakfietsen verschijnen in het stadsbeeld van Groningen (0 is een laag veiligheidsgevoel, 10 is een hoog veiligheidsgevoel)?
What grade would you give your perceived safety now and if there would be an increase of cargo bikes in the cityscape of Groningen (0 is low perceived safety, 10 is high perceived safety)?

	Terrible			Poor		Average		Good			Excellent
	0	1	2	3	4	5	6	7	8	9	10
Veiligheidsgevoel nu/Perceived safety now ()											
Veiligheidsgevoel meer bakfietsen/Perceived safety increase cargo bikes ()											

Q10 Zou u uw route of tijdstip van vertrek aanpassen op basis van veiligheidsoverwegingen?

Would you change your route or time of departure based on safety concerns?

Ja/Yes (1)

Nee/No (2)

Q11 Welk cijfer zou u uzelf geven in de capaciteit tot... (0 is heel slecht, 10 is heel goed)
What grade would you give yourself regarding the capacity to... (0 is heel slecht, 10 is heel goed)

	Extremely bad			Somewhat bad		Neither good nor bad		Somewhat good		Extremely good
	0	1	2	3	4	5	6	7	8	9	10
Het besturen van een bakfiets?/Drive a cargo bike? ()											
Omgaan met een andere bestuurder op een bakfiets in het verkeer?/Deal with a driver of a cargo bike in traffic? ()											

Q12 Heeft u ooit zich bevonden in een gevaarlijke situatie waar een bakfiets bij was betrokken?
Have you ever experienced a dangerous situation in which a cargo bike was involved?

Ja/Yes (1)

Nee/No (2)

Image

Q13 Zijn er volgens u ingrepen (fysiek of institutioneel) nodig in het rode gedeelte om dit gebied voor te bereiden op een toename van bakfietsen?
Are interventions (physical or institutional) needed in the red area in order to prepare the area for an increase of cargo bikes according to you?

Ja/Yes (1)

Nee/No (2)

Q14 Zo ja, waar moeten deze ingrepen op focussen?
If so, what should these interventions focus on?

Verkeersregels/Traffic laws (1)

Infrastructuur/Infrastructure (2)

Anders/Other (3)

Q15 Mocht u uw antwoord eventueel willen toelichting, kan dat hieronder:
If you want to explain your answer, you have the opportunity to do so below:

_____

End of Block: Information perceived safety