OV en (deel)fiets: vriend of vijand?
Inzichten in gebruik en reizigersvoorkeuren

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Samenvatting

In beleid en onderzoek is steeds meer aandacht voor duurzame vervoermiddelen, zoals de fiets en het openbaar vervoer (OV). Integratie van fiets én openbaar vervoer kan de voordelen van beide systemen combineren: De fiets zorgt voor fijnmazige ontsluiting van herkomsten en bestemmingen, is duurzaam en bevordert een gezonde leefstijl. De kwaliteit van het OV neemt de laatste jaren toe, onder andere door de introductie van hoogwaardig OV (HOV): snelle, frequente en betrouwbare bus- tram- en metrolijnen met een hoog comfortniveau. De halteafstanden van deze systemen zijn, net als bij het spoor, relatief hoog, waardoor de fiets een belangrijke rol kan spelen in de gebiedsontsluiting. Echter, op kortere afstanden zijn de fiets en het OV, naast een nuttige combinatie, ook elkaars concurrenten.

Om inzicht te krijgen in de aanvullende dan wel concurrerende rol van de fiets en OV, is onderzoek nodig over hoe de reiziger zich nu en in de toekomst beweegt. Dit inzicht helpt om een optimaal integraal fiets+OV systeem te ontwerpen en gebruik van dit systeem te stimuleren en te faciliteren. Dit paper laat de resultaten zien van vier recente TU Delft onderzoeken op dit gebied.

Resultaten van een literatuuronderzoek naar de first- en last-mile laat zien welke factoren belangrijk zijn voor modaliteitskeuze, waaruit bijvoorbeeld blijkt dat mannen die bekend zijn met de omgeving vooral gebruik maken van de fiets. Onderzoek in Den Haag laat het bereik van de tramhalte zien voor de fiets. Fietsers zijn bereid tot 3 km te fietsen om bij een tramhalte in de stad te komen. Ongeveer 50% van de gebruikers fietst verder dan de dichtstbijzijnde halte als deze halte minder overstappen, betere parkeervoorziening en meer reisopties biedt. Voor het natransport is de deelfiets een relatief nieuwe optie. Onderzoek naar Mobike in Delft (dockless bikes) laat zien dat ca.19% van de deelfietsritten gebruikt wordt om van en naar het station te komen. Met name het gebruik van Mobike voor ritten naar station Delft Zuid, met beperkte andere mogelijkheden, valt op. Ook voor andere deelfietssystemen in Delft, zoals OV-fiets en Swapfiets is onderzoek gedaan naar het gebruik. Door de beschikbaarheid van deze systemen geeft 9-16% van de gebruikers aan meer gebruik van de trein te maken, tegenover 34-60% minder van de bus. Ook lopen wordt vervangen door deze nieuwe modaliteiten in 35-42% van de gevallen.

1. Introductie

In beleid en onderzoek is steeds meer aandacht voor duurzame vervoermiddelen, zoals de fiets en het openbaar vervoer (OV). De integratie van fiets én openbaar vervoer kan de voordelen van beide systemen combineren: De fiets zorgt voor fijnmazige ontsluiting van herkomsten en bestemmingen, is duurzaam en bevordert een gezonde leefstijl. De kwaliteit van het OV neemt de laatste jaren toe door onder andere de introductie van hoogwaardig OV (HOV): snelle, frequente en betrouwbare bus- tram- en metrolijnen met een hoog comfortniveau. De halteafstanden van deze systemen zijn, net als bij het spoor, relatief hoog, waardoor de fiets een belangrijke rol kan spelen in de gebiedsontsluiting. Echter, naast de aanvulling van fiets en openbaar vervoer, kunnen zij elkaar ook beconcurreren.

Om inzicht te krijgen in de aanvullende dan wel concurrerende rol van de fiets en OV, is onderzoek nodig over hoe de reiziger zich nu en in de toekomst beweegt. Dit inzicht helpt om een optimaal integraal fiets+OV-systeem te ontwerpen en het gebruik ervan te stimuleren en te faciliteren. Dit paper laat de resultaten zien van vier recente TU Delft onderzoeken op dit gebied.

In 2017 gaven we op het CVS een overzicht van eerdere onderzoeken op het gebied van de fiets en OV combinatie (Van Oort et al. 2017). Inmiddels is de aandacht voor het onderwerp toegenomen en daardoor ook de inzichten en toepassingen. Ook is het aantal deelfietssystemen in Nederland en wereldwijd sterk gegroeid, met verschillende interessante lessen. In 2018 en 2019 zijn verschillende onderzoeken over dit onderwerp uitgevoerd, waarvan de samenvattingen hieronder worden gegeven. Deze onderzoeken zijn uitgevoerd door het Smart Public Transport Lab van de TU Delft, in samenwerking met respectievelijk Witteveen en Bos, HTM, Mobike en het Active modes lab. De onderwerpen en bijbehorende papers en auteurs zijn:

- **Voor- en natransport, kenmerken en voorkeuren reizigers (hoofdstuk 2)**

Stam, B., N. van Oort, H. van Strijp-Harms, S. van der Spek, S. Hoogendoorn (2020), Travellers' preferences towards existing and emerging means of access/egress transport, TRB Annual meeting (submitted)

- **Fietsbereik van tramhaltes, case Den Haag (hoofdstuk 3)**

Rijsman, L., N. van Oort, D. Ton, S. Hoogendoorn, E. Molin, T. Teijl (2019), Walking and bicycle catchment areas of tram stops: factors and insights, Proceedings of IEEE MT-ITS conference, Krakow

- **Gebruik van dockless deelfietsen, case Delft (hoofdstuk 4)**

Boor, S., R. Haverman, N. van Oort, S. Hoogendoorn (2019), Ridership impacts of the introduction of a dockless bike-sharing scheme, a data-driven case study, CRB annual meeting

- **Reisvoorkeuren van gebruikers van OV-fiets, Mobike en Swapfiets, case Delft (hoofdstuk 5)**

Ma, X, Y. Yuan, N. van Oort, S. Hoogendoorn (2020), Investigating Impact of Bike-sharing Systems on Modal Shift: A Case Study in Delft, the Netherlands, TRB annual meeting (submitted)

2. Voor- en natransport, kenmerken en voorkeuren reizigers

Multimodal passenger transportation is gaining more attention with the ongoing climate change discussion and the increasing possibilities to combine existing and new means of transport to travel from A to B. The urban transportation sector will face a change in needs and preferences because of among others demographic shifts, urbanisation, and climate change. Because of this, there is a need for more personalized, efficient, and environmentally friendly passenger transport. Public transport seems to be an obvious solution, as it can transport a large number of people in an efficient manner. However, public transport has the disadvantage to be dependent on access/egress transport which are found to be the weakest links in a public transport chain (Krygsman et al., 2004).

The Netherlands has one of the densest rail networks in the world and is used by more than 1.2 million passengers every day. For all those trips, railway stations are the start and end of the train journey. The average access distance for Dutch residents to a railway station is 5.0 km. This value varies significantly between different regions in the Netherlands. Residents of the four largest cities in the Randstad (Amsterdam, Rotterdam, Utrecht, and Den Haag) live on average 2.5 km away from the nearest train station, while residents in the province of Zeeland have to travel on average 17.3 km to a station.

This research elaborates on access/egress transport in further detail and aims to provide insights in the preferences of travellers for existing and new means of access/egress transport such as shared vehicles and on-demand ride services. The outcomes can be used for both scientific and practical purposes. For scientists, additional knowledge helps to understand and make predictions regarding future access/egress mode choice. Urban planners, municipalities and transport authorities can benefit from the results of this study by considering the preferences of travellers when designing transit nodes and access/egress systems, for instance, regarding the number of vehicles that should be provided or amount of space that has to be reserved. Figure 1 shows the main factors and user characteristics of the majority of users per mode according to literature.

It can be seen that internationally, walking and cycling is more popular among men, while women are more in favour of the car and public transport (Creemers et al., 2014; Halldórsdóttir et al., 2017). More detailed information on these relations and the figure can be found in the research of Stam (2019).

The second part of the literature review elaborates on the impact of relevant trends regarding new and innovating means of transport for the next 20 years. The demand for access/egress transport is expected to be influenced by among others demographic shifts, urbanisation and climate change. The impact of these trends can be captured by the extent to which access/egress mode choice is influenced by different factors. As a result, new and innovating means of transport emerge, in combination with technological developments. Shared mobility, autonomous mobility and electric mobility are expected to play an important role and have the potential to change the supply of access/egress transport in the future. In 20 years, shared mobility, in particular, is expected to significantly change access/egress trips via the following services: (1) carsharing, (2) bike sharing, (3) e-scooter sharing, (4) individual on-demand ride services and (5) collective on-demand ride services.

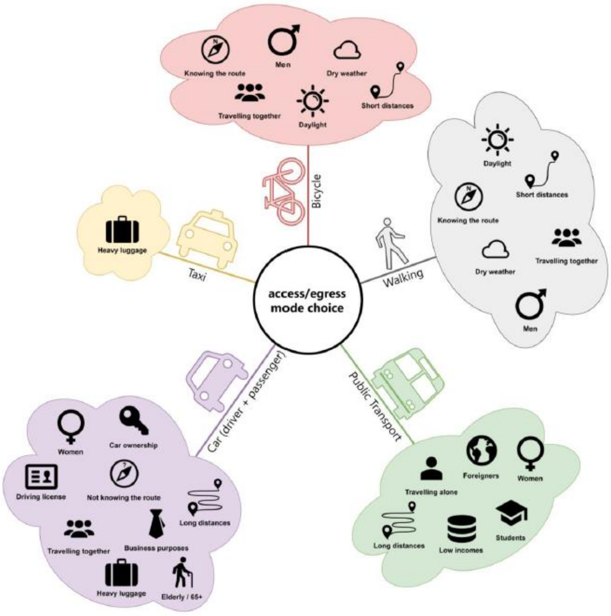

Figure 1 Factors with a strong relation towards a specific access/egress mode

3. Fietsbereik van tramhaltes, case Den Haag

An important aspect while investigating, planning and managing access and egress mobility is the catchment area of a stop. Most transit operators consider a fixed 400m buffer as catchment area, although differences in catchment area sizes have been observed for public transport stops of the same mode (El-Geneidy et al. 2014). Therefore, a more informative way to describe catchment areas is the distance-decay function (Gutiérrez et al. 2011), which is defined as a way to measure the impedance to travel and shows the distribution of distances travelled to a stop (Iacono et al. 2008).

Literature on the sizes of catchment areas has been present for a longer time, often focused on the bus, where median walking catchment sizes vary from 214-402 m (El-Geneidy et al 2014) to 393-760 m (Brand et al. 2017). Quantitative research about the factors that influence the size of catchment areas is limited. Van Mil et al. (2018) found several factors affecting the catchment area, but focused only on heavy railway stations. No research has yet been conducted on catchment areas for tram stops. And although the bicycle-transit combination has grown in popularity, less knowledge is available about the bicycle as a feeder mode compared to walking (Hochmair 2015). The influences on cycling catchment areas are especially important to know in urban areas, where more competition is present between cycling and transit for single trips, but where they can complement each other at the total trip level (Kager et al. 2016, Martin and Shaheen 2014).
Therefore, the objective of this research is to assess which factors affect feeder distance and feeder mode choice of the tram.

Data is collected using an on-board revealed preference survey among tram travellers in The Hague, The Netherlands. Six consecutive days in April 2018 (a week with no extreme weather conditions or tram disruptions) were used to gather a total of 629 useful returned surveys. These resulted in 713 feeder distances, both access and egress, for

which precise OD locations (six-digit postal codes or addresses) and street network distances were provided.
The data are used to test which factors affect feeder distance and feeder mode choice. Both bivariate and multivariate analyses (logistic regression) are applied to quantify the impacts. In addition, a qualitative analysis explores the motives of the tram travellers for using a stop further away than the nearest stop and the reasons for choosing the bicycle as a feeder mode. The outcomes of this research can be used as input for multi-modal transport models where bicycle and public transport are integrated. For a more detailed description of the survey and more detailed results, see Rijsman et al. (2019).

3.1 Feeder distance

The median overall feeder distance for the tram stops in The Hague is 400 m, consisting of walking (median of 380 m) and cycling (median of 1025 m), see Table 1. This means that exactly half of the respondents in the The Hague survey travel further than the fixed buffer area of 400 m that many transit operators consider in network planning and ridership studies, something Daniels and Mulley (2013) noted too. When comparing the median walking distances with the findings of (Brand et al. 2017), who examined bus feeder distances in the Amsterdam region, it can be noticed that the median feeder walking distances in The Hague are substantially shorter (380 m instead of 393-760 m). On the other hand, in comparison to Sydney (Daniels and Mulley, 2013), the median walking distance in The Hague is slightly longer (380 m instead of 364 m). The median cycling feeder distances in The Hague are considerably longer than those from bus services in Atlanta (904 m) and the Twin Cities (844 m) (Hochmair, 2015), which might be because, often, the tram is considered higher in quality than bus.

Table 1: Overall feeder distance values (in meters)

	N	min	max	median	mean
Walking	657	10	2470	380	466
Cycling	56	80	3170	1025	1159
Total	713	10	3170	400	521

3.2 Qualitative analysis

The motives for choosing a stop further away are mostly related to the quality of the transit service and comfort matters, where 'avoiding a transfer' is named most often (Figure 2). In Van Mil et al. (2018), similar results are found. When asked which out of three options (avoid a transfer, have more options and bicycle parking facilities) would tempt travellers to choose a stop further away, most do this to avoid a transfer or having more options to reach their destination. However, a large share of travellers state that they always choose the nearest stop (Figure 3 left). Respondents who sometimes cycle to the stop were less likely to state that they would always choose the nearest stop compared to all respondents (Figure 3 right). This indicates that they are more inclined to travel further to a stop that suits them better.

The percentage of bicycle-tram users among the respondents is almost 16%. By asking the motives for not cycling to or from the tram stop, three barriers for choosing the bicycle as feeder mode have been identified: no bicycle available, insufficient bicycle parking places and unsafe bicycle parking places (Figure 4). To solve the unavailability, emerging bike sharing systems are an interesting, potential solution.

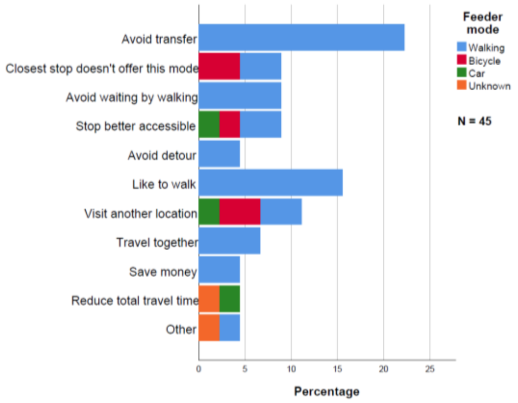

Figure 2 Motives for choosing a stop further away, as mentioned by the respondents

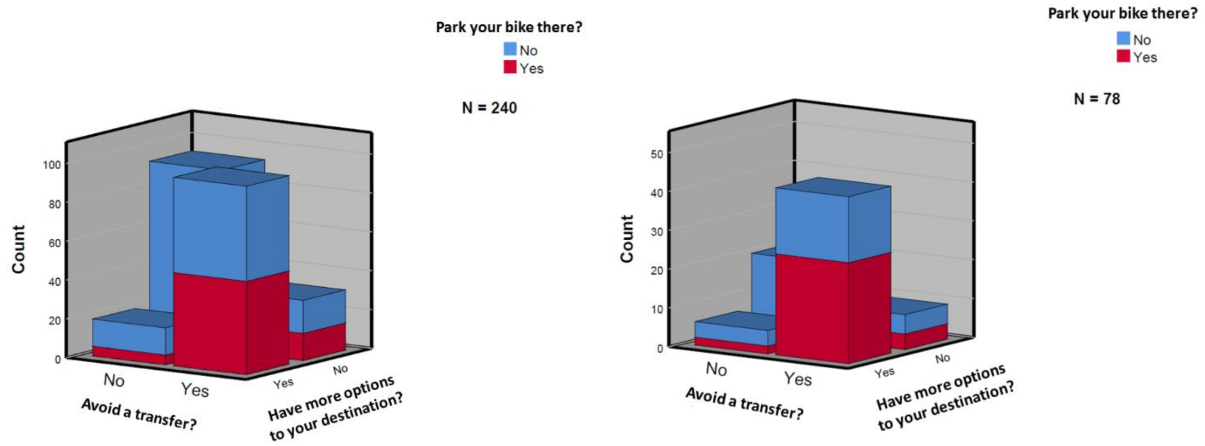

Figure 3 "Would you have chosen for a boarding stop further away if you could…?" (left all respondents; right respondents who cycle to the stop)

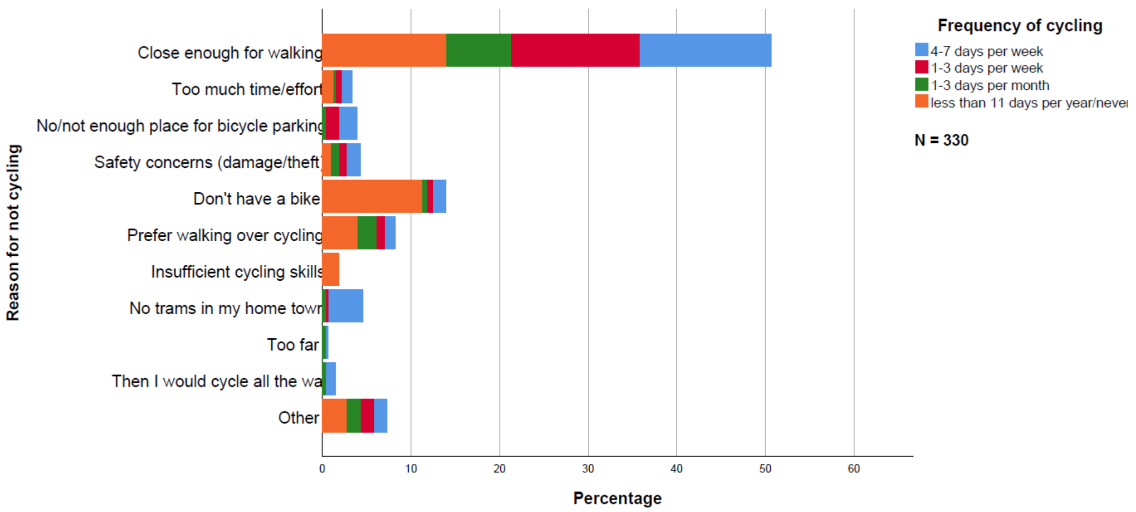

Figure 4 Reasons not to cycle to a stop

4. Gebruik van dockless deelfietsen, case Delft

As part of policy measures to promote cycling, bike-sharing programs were introduced in the past decades. Figure 5 shows a timeline illustrating the development of 4 generations of bike-sharing systems. The development of smart bicycle locks in combination with the possibilities of smartphones, made a new type of bike-sharing possible, in literature known as dockless, free-floating or fourth generation bike-sharing (Shi et al. 2018). In the new dockless model, users are able to start and end their trip at their origin and destination without having to find a nearby docking station. Compared to traditional bike-sharing programs, dockless bike-sharing systems integrate mobile payment and GPS into the system; these features greatly increase the ease of use and management of the system (Shi et al 2018).

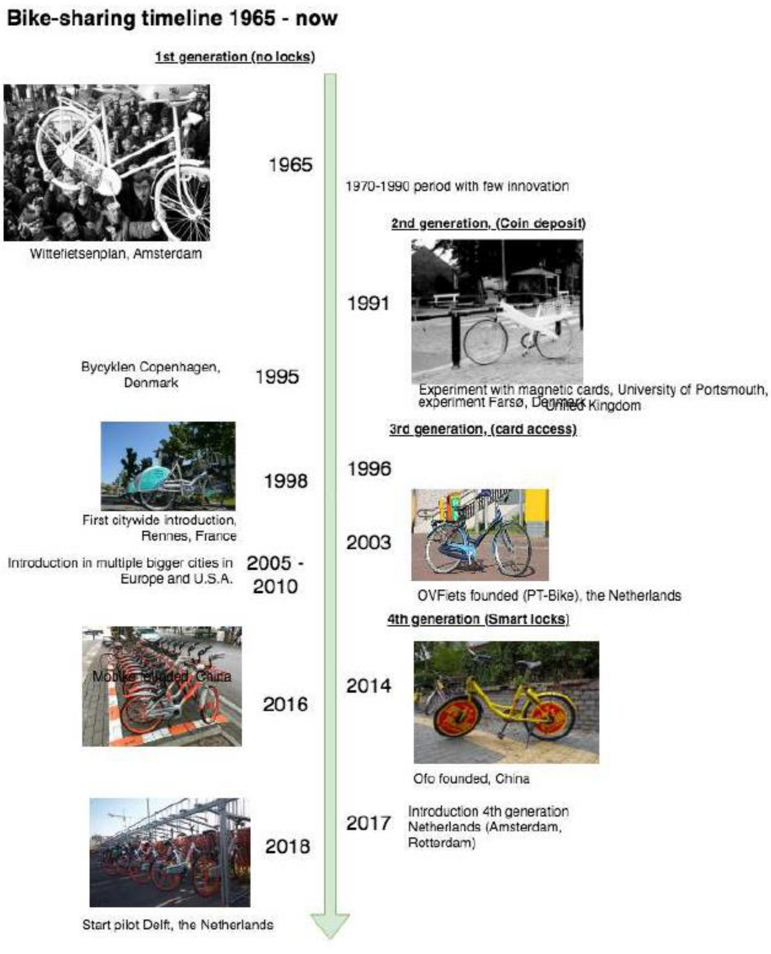

Figure 5 Time line development of bike sharing schemes

This research is set up around a pilot of the dockless bike-sharing system Mobike in Delft, the Netherlands. Our research deals with what can be learned from this pilot and analyses the critical success factors for a sustainable bike-sharing system based on the data of the Delft Mobike pilot. The focus of this research is on the combined bicycle and transit mode. More insights and other perspectives can be found in (Boor et al., 2019). This research is based on an experimental method for collecting operational data from a bikesharing system, being the first research based on trip data of a dockless bike-sharing system in Western Europe.

4.1 Mobike Delft pilot

Mobike was founded in 2015 in China. It was one of the first fully dockless bike-sharing services. Now it is the biggest bike-sharing platform in the world (Wu et al. 2017). Mobike started with the Delft pilot in March 2018. Delft has about 100,000 inhabitants and there are two railway stations, served by 4 and 10 trains per hour per direction respectively. Delft University of Technology is located in the south-east of the city, with 22,000 students and 5,000 employees.

The data is collected and stored in a database between 28th of May 2018 and 10th October 2018. In total 21,152,525 detections are stored in the database. During the research period 149,193 trips are collected in the data set. This is by far the biggest free-floating bike sharing dataset ever collected in the Netherlands and gives a unique insight in the performance of this new mobility concept.

4.2 Results

The data shows that between 1,000 and 2,100 trips are made daily with a Mobike in Delft. The value for the average daily trips per bicycle in Delft is 1.6. The average number of trips per active bicycle day by day is between 2.5 and 3.8. This indicates the average daily trips per bicycle may increase by controlling the quantity of shared bikes in the service area and by reducing the size of the service areas.

The average trip great-circle distance is 1.6 km, over the road between 1.7 and 2.3 km, depending on directness of bicycle routes. This rather short average distance corresponds to the distances found in research in the Chinese cities of Nanjing (Ma et al. 2018) and Beijing (Shi et al. 2018); Mobikes are mainly used for distances shorter than 3 km.

In Figure 6 the trips in the period 3 - 7 September 2019, the first college week, are presented on a map.

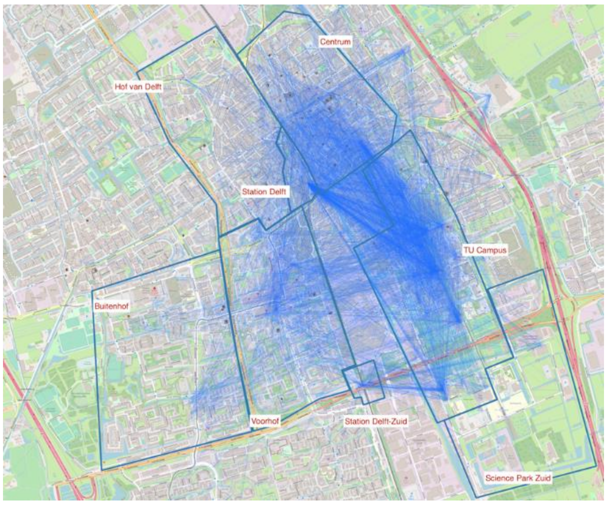

Figure 6 Overview all trips 3 - 7 September 2019 (Monday - Friday)

Most trips have their origin and/or destination in the University campus zone (TU campus). This indicates that many users are students or employees. Important relations are with the city centre (Centrum), the railway stations (Delft and Delft Zuid) and Voorhof, where several large student flats are situated. The share of trips related to/from one of the railway stations was 18.7%.

Especially the number of trips to/from the Delft Zuid station is interesting.
In the period between 27 Augustus and 16 September 2018 more than 1,000 trips started or had their destination there, that is on average 50 trips per day. This indicates the potential need for shared bicycle bikes here.

In Figure 7 the usage of Mobike in Delft is related to the general daily pattern in number of trips with all transport modes in the Netherlands (CBS 2018) on an average working day.

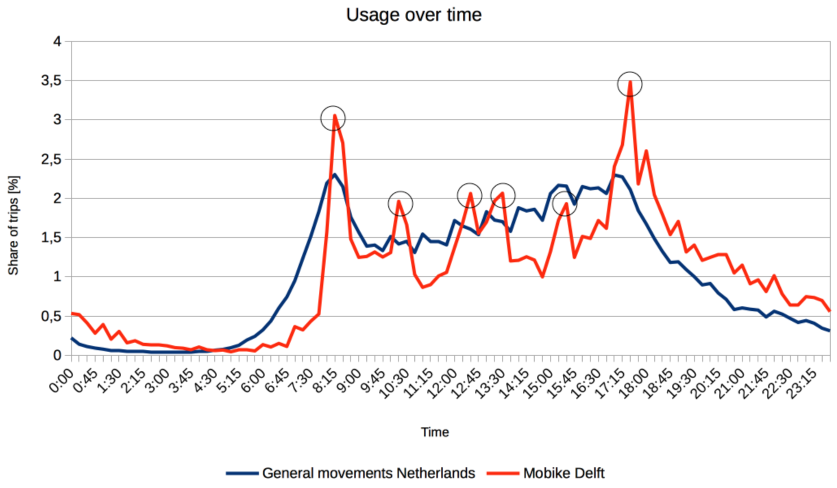

Figure 7 Comparison Mobike Delft usage with general movements Netherlands

During periods without public transport, for example during the night and during the weekends to and from the TU-Campus, the usage of Mobike is relatively high. Remarkable in this figure are the peaks in the usage of Mobike Delft, this pattern corresponds more or less with the start and ending times of lectures (08:45, 10:30-45, 12:30, 13:45, 15:30-45, 17:30).

The Netherlands have a unique issue compared with other countries: the bike use to and from railway stations is very popular and growing. Despite expanding the number of parking places at stations, bicycle shelters at many large train stations remain (over) full (KiM 2018). Further expansion of bicycle parking places is often not easily possible in terms of space or involves high costs. KiM concluded that bicycles parked at railways stations for transport to work, training or another activity (egress) provide 45% of the parking pressure. These bicycles are on average parked for about 2.68 day/train-trip. Bike-sharing may contribute to reducing the bicycle parking pressure at railway stations because shared bikes only need to stand still for a short time.

In Figure 8 the arriving and departing shared bikes at Delft Station is shown. During the rush hour in the morning there is a peak in the departing bicycles, in the afternoon the number of arriving bicycles is higher. Based on this pattern it is possible to conclude that more people are using Mobike at the activity side than at the home side of a train journey.

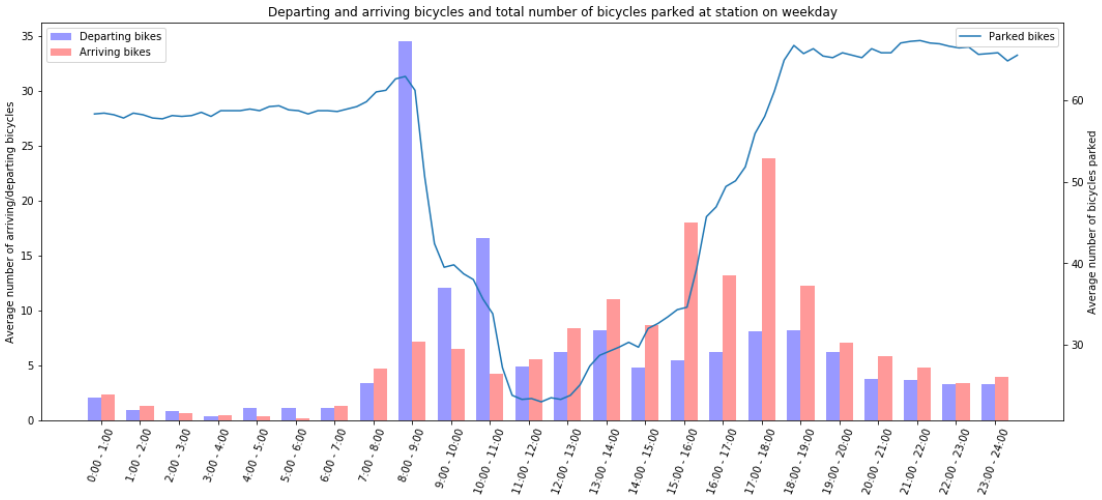

Figure 8 Average number of arriving, departing and parked bikes at Delft Station on workdays in the period 3 September 2018 and 16 September 2018

The blue line in Figure 9 shows the average number of parked bikes in het station area during working days. This average varies between 25 and 65. In the period between 8:00 and 11:00 hour on average 60 Mobikes depart from the station area. In this period on average 20 bikes arrive in the station area.

In comparison with the usage of second bikes or the OV-fiets (i.e. docked bike sharing scheme) at the activity side of a train trip, the use of shared bikes results in less needed parking places during the nights and weekends. During the nights and weekends the occupancy in het railway station bicycle shelters is very high. Regularly the shelter is completely full during the weekends. The higher use of shared bikes at the activity side than at the home side, indicates the potential for further reducing the number of bicycle parking spaces at the railway station. By stimulating the use of a shared-bike instead of an own bike at the home side of a train journey the number of arriving bikes in the morning peak and departing bikes in the evening peak may increase. The use of bike-sharing at the home side can be made more attractive by offering a preferred position in the bicycle parking, close to the access to the train platforms. A guaranteed place gives shorter transfer times with less spread. This, combined with an attractive subscription model, can tempt commuters to use the bicycle at the home side of the train journey.

5. Reisvoorkeuren van gebruikers van OV-fiets, Mobike en Swapfiets, case Delft

Bike-sharing systems are often used for short distance trips and have been widely deployed in numerous cities worldwide (Liu et al., 2019). These eco-friendly systems have resulted in modal shift impact on car, transit, and active transportation modes like walking and bicycling (Martin and Shaheen, 2014). The modal shift towards bike-sharing might improve the quality of the urban environment (Cerutti et al., 2019), reduce traffic noise (Beckx et al., 2013), alleviate congestion (Shaheen et al., 2013) and enhance the physical well-being (Lee et al., 2017). A deep understanding of modal shift in response to bike-sharing can offer meaningful input for policy makers and bike-sharing companies to improve their service. In this research we investigate the travel modal shift dynamics and the factors influencing users' choices in response to different bikeshare systems in a Dutch city with mature cycling culture - Delft, the Netherlands.

The general mode share of the inhabitants of Delft is as follows: car 40%, bicycle 27%, public transport 6% and walking 25% (Heinen and Handy, 2012). With a long-standing bicycle culture, positive attitudes towards cycling and good cycling facilities, Dutch cities possess the highest rate of bicycle use in the world (Heinen et al., 2013). In Delft there exists three bikeshare systems in operations, including OV-fiets (Docked bike-sharing system), Mobike (Dockless bike-sharing system) and Swapfiets (Bicycle-lease system), as shown by Figure 9.

Bike-sharing Type	OV-fiets	Mobike	Swapfiets
Image illustration			
Year Launched in the Netherlands	2003	2017	2014
Feature of systems	Docked bike-sharing system	Dockless bike-sharing system	Bicycle-lease system on a subscription basis
Way to use	1.Subscription online or on a NS App 2. Using the Personal public transport chip card (NS card) to rent a bike.	1.Subscription on a Mobike App 2.Using the Mobike App to open the bike.	Subscription online or on a Swapfiets App and get a Swapfiets bike within 1 day at a location of your choice
User pricing	€ 3.85/day	€ 12/month, 49.90/year or €1.5/20min	€ 15/month

Figure 9 Three types of bike sharing systems

5.1 Motivations for using bike-sharing

It is crucial to explore motivations for using bike-sharing, both to improve the attractiveness of bike-sharing systems and to help design the future bike-sharing systems (Fishman, 2016). Respondents who had used bike-sharing systems were asked to identify their main motivations from a defined set of options, as shown in Figure 10. "*No fixed pick-up and drop-off locations*" (59%) has been found to be most important motivator for Mobike users. This observation is consistent with an earlier study of Li (2018), who focused on dockless bike-sharing usage pattern and influencing factors. 52% of Mobike user noted "*Convenience of the app and payment method*" as one of the most important motivations, followed by "*Less effort than walking*" (43%). For OV-fiets users, "*Saving time*" (59%) has emerged as the most predominant motivation. This result is consistent with the previous research (Jäppinen et al., 2013), which emphasized the importance of time competitiveness as a motivation for bike-sharing. "*Less effort than walking*" (56%) was identified as the second strongest motivation, with "*Good quality of bicycles*" (44%) recognized as the third strongest motivation. Swapfiets users noted "*Less worried about being stolen/damaged*" (56%), "*Good quality of bicycles*" (53%) and "*Less effort than walking*" (38%) as the top three motivations. One of the advantages of Swapfiets is that the lease company will fix the broken bicycles themselves. Interestingly, "*Trendy travel mode*" was not a popular option by Mobike users (3%), OV-fiets users (1.40%) and Swapfiets users (8%). In addition, more Swapfiets users (53%) and OV-fiets users (44%) reported that they thought the quality of the bicycles were good, whereas only 6% of Mobike users reported that.

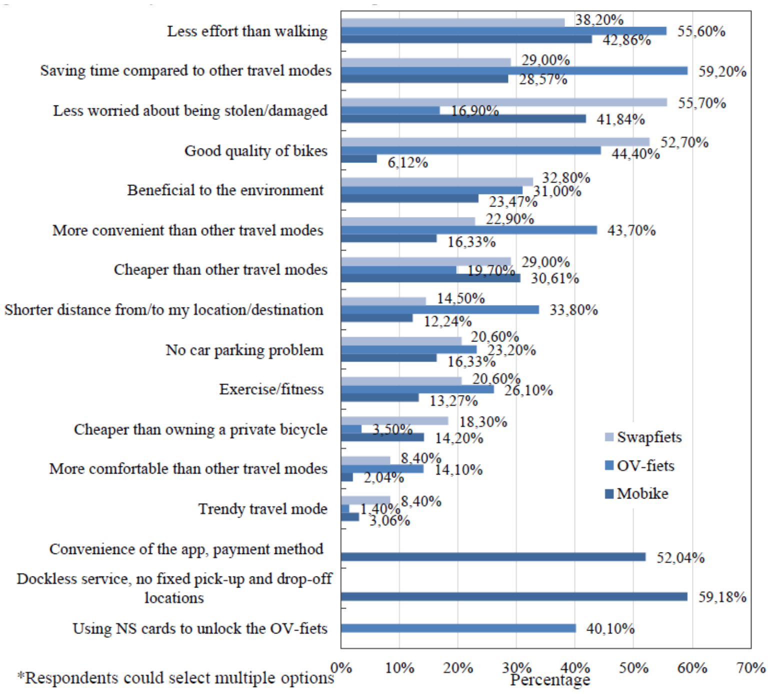

Figure 10 Motivations to become a bike-sharing user

5.2 Modal shift patterns

We measured the modal shift dynamics caused by bike-sharing systems for the following travel modes: walking, private bicycle, Swapfiets, OV-fiets, Mobike, private e-bike, bus/tram, train, private car (driver/passenger), taxi and carsharing. Given the distribution of the answers, we grouped the answers "*much more often*", "*more often*" into the category "*Increase*", and "*less often*" "*much less often*" into the category "*Decrease*". Figure 11 displays the differences in overall modal shift caused by three different bike-sharing systems.

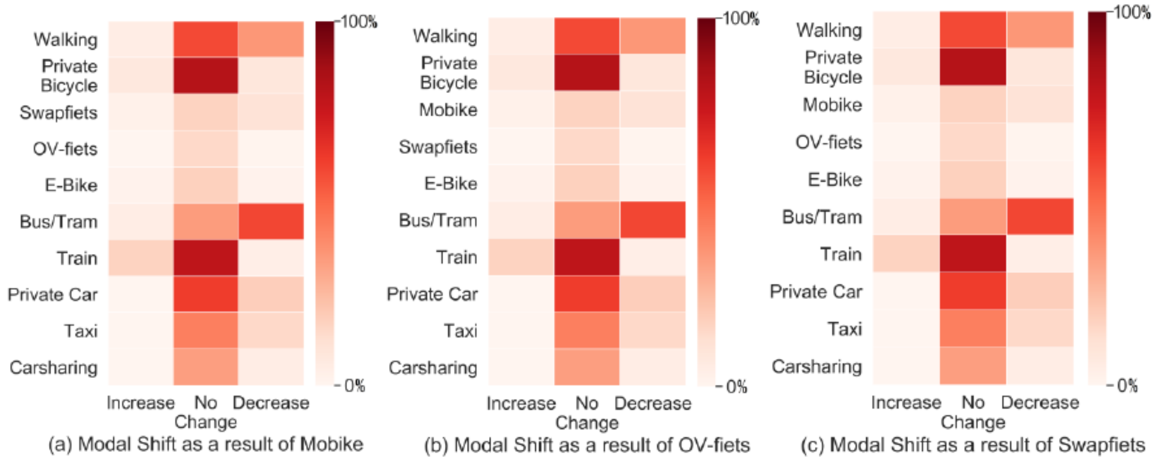

Figure 11 Modal Shift as a result of different bike-sharing systems

The sample exhibited a decrease in walking as a result of Swapfiets (by 42%), OV-fiets (by 36%) and Mobike (by 35%). Contrary to the finding of Martin and Shaheen (2014), who established that there was an increase in private bicycle use as a result of bike-sharing in both Minneapolis and Washington DC, more bike-sharing users in Delft shifted away from private bicycle than toward it. Specifically, 56% of Swapfiets users and 35% of Mobike users reported that they have reduced their private bicycle usage, while only 8% for OV-fiets users. This result indicates that Swapfiets and Mobike are more prominent modes in the replacement of their own bicycles. A marginal change in e-bike usage was reported by all the bike-sharing users. Train use increasing was reported by OV-fiets users (17%), Mobike users (14%) and Swapfiets users (10%) as they can park the shared bicycles in or near the train stations when accessing/egressing the train. The reason why OV-fiets users outperformed the other two systems is that OV-fiets was design by its nature to facilitate fist/last mile train trips. Meanwhile, more Mobike users (16%) reported that they used train less than Swapfiets users (10%) and OV-fiets users (4%), as Mobike works better to replace train for one-way trip because of the advantage of no fixed docking station. More bike-sharing users shifted away from bus/tram than toward them, which aligned with the result of Shaheen et al.(2013). Particularly, 60% of OV-fiets users reported they used bus/tram less than before, which was much larger than Mobike users (40%) and Swapfiets users (34%). In addition, compared to Swapfiets users (5%) and OV-fiets users (5%), more Mobike users (16%) reported that they used bus/tram more than before. The reason may be explained by the fact that Mobike users would access and egress bus/tram more conveniently as they have no concern about bicycle parking around bus/tram stations. Reductions on private car/passenger and taxi were similar for Mobike (37%), OV-fiets (34%) and Swapfiets (32%). As to the modal shift patterns within bike-sharing systems, 27% of Mobike users reported they used OV-fiets less than before. Besides, obvious decline in Mobike use (24%) and OV-fiets use (18%) were reported by Swapfiets users, which is in line with the findings of (Boor et al., 2019), which concluded that Swapfiets was one of the most direct competitors with the docked and dockless bike-sharing systems in Delft.

6. Conclusies

Dit paper laat de resultaten zien van vier recente TU Delft onderzoeken op het gebied van (deel)fiets en OV. Resultaten van een literatuuronderzoek naar de first- en last mile laat zien welke aspecten reizigers doet kiezen voor welke modaliteit, waaruit blijkt dat bijv. vooral mannen die bekend zijn met de omgeving gebruik maken van de fiets. Onderzoek in Den Haag laat het bereik van tramhaltes zien voor fietsen. Fietsers zijn bereid tot 3 km te fietsen om bij een tramhalte te komen in de stad. Ongeveer 50% van de gebruikers fietst verder dan de dichtstbijzijnde halte als deze halte minder overstappen, betere parkeervoorziening en meer reisopties biedt. Voor het natransport is de deelfiets een relatief nieuwe optie. Onderzoek naar Mobike in Delft (dockless bikes) laat zien dat ca.19% van de deelfietsritten gebruikt wordt voor van en naar het station. Met name het gebruik van station Delft Zuid, met beperkte andere mogelijkheden, valt op. Ook voor andere deelfietssystem in Delft, zoals OV-fiets en Swapfiets is onderzoek gedaan naar gebruik. Door de beschikbaarheid van deze systemen geeft 9-16% van de gebruikers aan meer gebruik van de trein te maken, tegenover 34-60% minder van de bus. Ook lopen wordt vervangen door deze nieuwe modaliteiten in 35-42% van de gevallen. De resultaten zijn de basis voor verder onderzoek en toepassing om te komen tot een optimaal en integraal Fiets-OV netwerk.

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