

Dette resumé er publiceret i det elektroniske tidsskrift
Artikler fra Trafikdage på Aalborg Universitet
(Proceedings from the Annual Transport Conference
at Aalborg University)
ISSN 1603-9696
www.trafikdage.dk/artikelarkiv



Shared mobility and public transport – foe or friend?

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Abstract

A large portion of greenhouse gas emissions are from road transport. If countries and cities are to reach national and international sustainability goals, car usage and car ownership needs to be reduced. Shared mobility services have appeared in the city picture, offering a promising solution to sustainable mobility challenges. However, literature shows that they often do not replace car travels, but instead public transit and walking. This research aims to better understand shared mobility and its potential use in coordination with public transport. The objective is to identify if and how it is possible to use shared mobility in connection with public transport to replace personal vehicle use. Through a stated preference survey, information is gathered about how commuters would respond to shared mobility integrated with public transport in their daily travel to work. A stated preference survey was disseminated to employees at Sluppen, a corporate area in Trondheim. The respondents were presented with commute choices related to electric kick scooters, electric bikes and shuttle buses where the shared mobility option was combined with existing bus services. Price, availability, preference on type of vehicle, and impact of infrastructure were considered within the survey. The results of this study can provide mobility companies, public operators, and decision-makers with information on how shared mobility services can be best managed to increase public transport usage.

Background

In 2016, the European Commission reported that the transport sector alone contributed to 27 % of GHG in Europe, and that 72 % of the transport emissions came from road transport (EEA, 2018). In Norway, the government is pushing forward sustainable mobility in The National Transport Plan. The cities of Trondheim and Oslo have entered into urban environment schemes with the State where the overall goal is to achieve zero growth in the use of private vehicles as a mean of transport. As a consequence, the mode share of other transport options needs to increase. Shared transport modes and alternative transit services (here termed as shared mobility) have the potential

to improve the environmental sustainability of transport, although this is not a given. For example, use of shared e-scooters in Oslo was found to not replace car use, but instead walking and public transport (Berge, 2019). A later study, done in 2020 by the same institute, concluded the same, but this time they also found that more people used the e-scooter as a part of a multimodal trip (Fearnley et al., 2020). Other studies regarding electric bicycles and ridesharing also point to the fact that shared mobility does not lead to fewer car trips (Fyhri and Fearnley, 2015, Shirazi, 2018). At the same time, shared mobility does though have the potential to increase comfort and reduce out-of-vehicle travel time for public transport travels, which are two commonly cited barriers for public transit use. Other key barriers, such as direct connections and reliability, are less likely to be reduced by shared mobility.

Existing research has identified different drivers and barriers for use of shared mobility, both by looking at cycling in general and recent studies on shared vehicles. In Oslo, a study concerning electric bikes found that insufficient cycling paths, safety and bad weather were important barriers for cycling (Fyhri and Fearnley, 2015). In addition, the study identified travel time and comfort as dominant factors in the mode choice. E-scooterists were found to value low risk for accidents, travel time savings and flexibility as important for daily travel, where the e-scooters satisfies the last two factors (Berge, 2019). In this same study, over half of the reported accidents happened without other road users present, which stresses the importance of good infrastructure. Looking beyond Oslo, a study from Chicago found that if there were parking constraints and other non-auto options competitive to driving, e-scooters were a strong alternative to cars for short trips up to 3 kilometers, (Smith and Schwieterman, 2018).

When it comes to who might use shared mobility, one study concluded that higher educated young travelers are the most likely to adopt shared mobility (Alonso-González et al., 2019). Other research concluded that the willingness to use a shared bike depended on the experience of the user; if a person had used a shared bike before, the preference for using both the private bike and the shared bike, largely increased (Arendsen, 2019). Another multinational project looked at willingness to replace short trips with walking and cycling. The Norwegian data indicated that the potential to change the mode choice depended on the climate, but also previous habits for walking and cycling (Stangeby, 1997). Together with other studies, it seems that familiarity, experience, education and age are the most important factors to determine willingness to utilize new transport modes.

The objective of this study is to examine if shared mobility can be utilized as a complement to public transport, rather than a competitor. The future magnitude and effect of shared mobility is uncertain with many yet unanswered questions. This study attempts to fill one of the knowledge gaps by exploring the user preferences for shared mobility and see if shared mobility availability would lead to increased public transport use when integrated with the existing public network.

Thus, the research questions addressed are:

- Can shared mobility increase usage of public transportation?
- How will availability and cost of a shared vehicle, and infrastructure affect use of public transport?
- Do commuters have a preference on type of shared mobility?

Methodology

A case study involving a stated preference survey was chosen as the methodical approach. The area, Sluppen in Trondheim, Norway, can be described as a business park with a high density of office buildings. The area is seen in Figure 1 and has two high capacity bus lines that operate about one kilometer from the majority of the offices. An earlier travel survey from the area revealed that

only 10% use public transport during the commute, and 60% drive a private car to work (Zhupanova and Tørset, 2017). This study also indicated that even if there was added a parking fee of NOK750/month, 35% of the car travelers would still drive to work.

Through a stated preference survey, employees in Sluppen are asked how they choose to travel after an introduction of shared mobility in the area. Each respondent could choose whether to take the bus with shared mobility or travel as they do today. The vehicles examined were electric kick scooter, electric bicycle and shuttlebus. Each vehicle had four questions where price and availability varied, and the respondent were also asked to rate how five different infrastructure measures would influence their previous mode choices.

The survey was distributed online in late March through Kjeldsberg, the property developers in the area (see figure 2). The potential number reached within the dissemination is around 2000 commuters.



Figure 1 – Map of Trondheim extracted from Google Maps. Red circle shows Sluppen.



Figure 2 – Map of Sluppen extracted from Finn Kart. Red pins mark buildings owned by Kjeldsberg.

Expected results

The results will give answers to if shared mobility can make public transport more attractive. The results will also determine the importance of price, availability and infrastructure for commuters. Given information about respondents' "first mile" travel, access to public transport, and current commuting patterns, it will be possible to see how these aspects impact preferences for shared transport. It is expected that the results will show that first mile conditions (travel from home to bus stops) will largely impact mode choice. That is, those with a "difficult" first mile are not likely to shift to public transport despite an improved last mile condition (travel from bus stop to work). For commuters with an "easy" first mile, it is expected that some commuters would still choose to travel as they do today, but more people may be willing to change mode choice toward public transport plus shared mobility, especially if the availability of a shared vehicle is high. Since many of the commuters in the area are at higher income levels, it is expected that price is of less importance. From the results, it will also be interesting to see if people who already take the bus would use shared mobility or prefer to continue to walk. The results are likely to depend on their familiarity with the different shared mobility options.

Expected impacts and implications

The results of this study can provide transport companies and city planners information and knowledge on how to implement and integrate shared mobility into cities in a way that will attract more public transport users. In considering the last mile of the commute, since all commuters share the same destination, it can be easier to implement measures and concentrated shared mobility

services near the workplace. If there is a strong correlation between familiarity with the shared vehicle and mode choice, specific measures, such as a free trial of the vehicle, can be implemented to increase experience and therefore willingness. If the results of this research show that an improvement of last mile does not affect mode choice, further research should be done on the first mile. The results from the case study area are expected to be largely transferrable throughout Norway, as well as Europe.

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