MASTER'S THESIS

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Identify the success factors of shared micromobility systems in European cities: How could a shared micromobility system be successful in the city of Bodø ?

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Abstract

As the use of shared micromobility is increasing in European cities, cities have already studied the potential of the new transport mode in achieving decarbonization and sustainable goals. However, there is a lack of knowledge on different aspects to understand how to successfully manage those systems. The recent introduction of escooters in the city of Bodø could favorise the societal, environmental and the economic development of the city and its residents, but are leading stakeholders' actions, interventions and measures enough to make shared micromobility successful ?

Based on the generalized costs of shared micromobility framework, the thesis gives an overview of the success factors for shared micromobility in Europe and is a case study of Bodø shared micromobility development, analyzing the role of different stakeholders involved in the decision-making and planning in that context. The analysis of this research paper is built on the mix of 2 methods. The first analysis is based on a scoping study to answer the first research question and the second is based on 5 interviews conducted from September to November 2022 with different stakeholders involved in the shared-micromobility development for the city of Bodø.

This thesis aims to identify the success factors for shared micromobility in Europe and to highlight the role of different stakeholders and needed actions for developing a successful shared micromobility system in an Arctic mid-sized city, Bodø.

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I am responsible for any inaccuries in this thesis

Ena Eminovic,
Oslo, 30.11.2022

Chapitre 1 Introduction

1.1 Background

Transport accounts for 37 % of CO2 emissions with the highest reliance on fossil fuels (IEA, 2022). In 2018, almost 75 % of transport emissions came from road vehicles with 45 % from passenger road including cars, motorcycles, taxis and buses. See Fig. 1 (Caballero. S & Tanzili. M, 2021; World Economic Forum, 2022). In addition to highly pollutant road vehicles, fuel is becoming more expensive and will become restricted to the use in the years to come (United Nations, 2021, p.4). The lock down and restrictions due to the COVID-19 pandemic have helped to decrease the use of transport emissions including road vehicles such as cars but, in 2021, the global CO2 emissions from the transport sector returned to their historical growth, growing by 8% (IEA, 2022). Yet, the transport sector is presenting a major climate challenge as it generates approximately 25% of the European total greenhouse gas emissions (CORDIS, 2022). The current transport system needs to be put on a more sustainable path and decarbonizing the transport sector should be on the top of the agenda. Under the European Green Deal, the EU has therefore committed to reducing the transport industry's carbon emissions by 90 % by 2050 (CORDIS, 2022). For achieving the European commission's carbon emission goals and making CO2 emissions from the sector fall by about 3% per year to 2030, there is a need for strong regulations and fiscal incentives, as well as considerable investment in infrastructure enabling zero-emission and low-carbon vehicle operations (IEA, 2022).

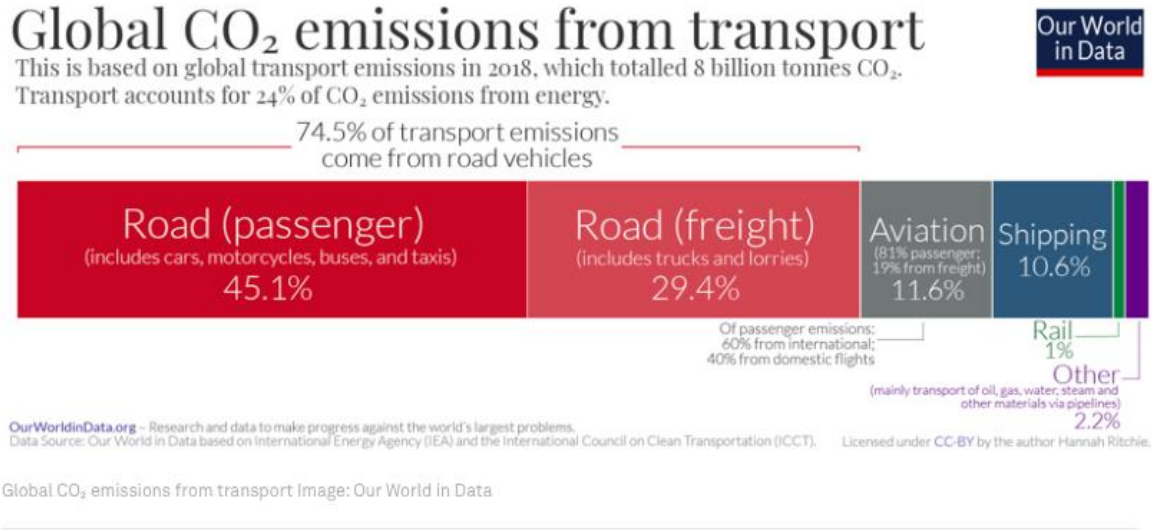


Figure 1: Global CO2 emissions from transport. Source: Ourworldindata, 2018. Retrieved from https://ourworldindata.org/co2-emissions-from-transport

Most of urban transport emissions come from car use that is responsible for 60% of transport greenhouse gas emissions in 2021 (See Fig. 2). Urban transport is a significantly increasing greenhouse gas emissions in cities, making mitigation efforts at the local level an important contributor to decarbonization. EU's ambitions goals urge cities to reduce pollutant transport emissions and to promote efficient and interconnected multimodal transport systems that are affordable, safe and convenient to their residents. Urban mobility systems keeps cities functioning and are crucial for the economic activity and citizens' welfare as it helps to connect residents to their jobs, gives them access to education, health and leisure activities. In this context, cities need to offer smarter modes of transportation by improving the current public transportation system as well as developing sustainable alternative transport options (European Environment Agency, 2018, United Nation Habitat and World Health Organization, 2020).

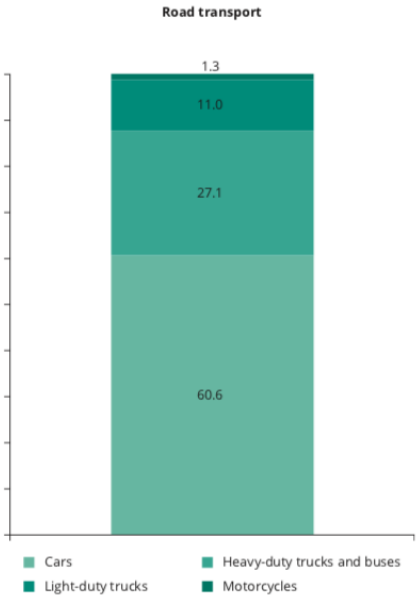


Figure 2: Share of transport greenhouse gas emissions in 2021
Source : European Environment Agency, 2022. National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism provided by European Environment Agency (EEA)

1.2 Sustainable transport systems

The transportation demand raise as cities' layouts are extending and population increasing. As a result of mobility-related patterns, urban areas are threat by high greenhouse gas emissions given that by 2050, more than 60% of the global population is projected to live in cities (Zhang, 2014). The goal in achieving sustainable mobility is that there should be zero growth in car traffic volumes and the transport demand should be meet by eco-friendly public transportation, as well as increase active modes such as cycling and walking (Tennøy. A., (b) TØI, 2022.). The way cities and urban transport systems are developed is crucial for main societal goals to be achieved, such as well-being, inclusion, public health. Smarter and more sustainable mode of transport can help to reach zero-growth in road traffic in urban area and create climate-friendly, and livable cities with attractive city centers (Tennøy. A., (a) TØI, 2022.).

Achieving sustainable mobility is not only about reducing carbon emissions, it is also about meeting people's needs and developing the transport sector in order to ensure the resilience of the mobility ecosystem for advancing economic and social development benefit of today's and future generations. According to the European Union Council of Ministers of Transport, a sustainable transport system « *allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promote equity within and between successive generations »* (ELTIS, 2019). The climate change and energy shortages need to be solve by decreasing the use of fossil fuels and implementing new alternatives that are convenient, affordable and accessible to the residents. Sustainable transportation systems should offer energy-efficient vehicles and fix flaws in public and transit systems enabling a better access to residents (Cohen, 2014). Through active participation and understanding of the mobility needs, cities can achieve a high public acceptance.

The Institute of Transport Economics stresses that cities need to transform the current urban mobility system and strengthen the attractiveness of environmental friendly transportations. A sustainable transportation system is *« the provision of services and infrastructure for the mobility of people and goods and it has to be developed in a safe, accessible, efficient and resilient way while reducing the carbon emissions and other environmental impact. »* (United Nations 2021, p.2). Public-private partnership can help to increase the use of sustainable transport options and develop efficient way to communicate real-time information for improving travelers' journey (Canales. D et al, p.21). The availability and provision of different services is a major strand in policies to achieve greater usage of public transport and to influence modal shift (Mulley. C & Nelson. J, 2003). For instance, a recent study shows that the available infrastructure influence the transport mode choice and affect the probability of commuting by public transport both in smaller and larger Norwegian cities. (Tennøy. A, Knapskog. M & Wolday. F, 2022. p 9). For developing sustainable transportation systems, there is a need for rethinking mobility options, reshaping urban layouts, creating a safe and pleasant environment for active mode of transportation (United Nations, 2021, p.2). In this context, cities' quest is to provide, improve and promote shared and public transportation systems and decrease the use of private owned cars (Simlett. J & Møller. T. H., 2020.p.2-10).

1.3 Shared mobility

As the costs of owning a car are considerably rising, such as fuel prices, maintenance costs, parking, insurance and time spend on traffic, the demand for alternative options and urban transportation is increasing. Vehicle sharing is now seen as a middle ground between the luxury of owning a car and the limits of current public transportation in terms of quality travel and access (Efthymiou, 2013).

These past few years, the shift towards cleaner transportation has also been accelerated by the introduction of electric vehicles in the public and shared transportation system (United Nations, 2021, P.47). Electrification and digitalization have helped to accelerate the adoption of shared modes of transportation as they are becoming more sophisticated, convenient, accessible and flexible (Metron, 2022). For instance, digital technologies integrated to micromobility devices and systems can enable a better traffic management and support sustainable trip choices by increasing multimodal transport efficiency (NESTE, 2022). To address numerous of challenges many vehicles and systems now rely on information and communications technology (ICT) to provide users the best service by giving them real-time information and ease of use. (Schade, 2014)

Shared mobility is part of innovative mobility trends that can provide affordable and sustainable mobility options for people and help to achieve sustainable goals (Neste, 2022) In general, shared mobility helps cities in reducing congestion and carbon emissions as it gives people a new alternative option to owning or using pollutant vehicles. According to different surveys on mode substitution, residents would have used their private owned fuel cars if shared electric cars, escooters or ebikes were not available. Moreover, it also prevents new generations from the ownership behavior and make it possible to choose a mobility provider to meet their mobility needs.

Shared mobility services are reshaping urban transportation patterns and helping to develop sustainable transportation systems. According to Uber's head of transportation policy and research, Andrew Salzberg, sharing is the critical element in enabling on demand mobility systems to deliver benefits to drivers, riders and cities. (MIT, 2016). Citizen's transport mode choice and way of commuting are constantly changing and our current context may increase the urgency of developing more sustainable transport options. However, providers and

authorities must develop these systems in the most cost-effective way to maximise their utilization.

1.4 Shared micromobility systems

The emergence of sophisticated shared micromobility systems in cities such as free-floating counts already 20 millions of users in Europe (Simlett. J & Møller. T. H., 2020.) As walking and bicycling, shared micromobility services are raising governments' attention for their potential in shaping sustainable cities and addressing numerous of current transportation challenges, such as accessibility, equity, congestion, and pollution (ITF, 2021 ; Abduljabbar. R. J, 2021, p.12-14).

Shared micromobility systems have the potential to become or complete the "door-to-door" mobility solution that makes it possible to maximize users' travel time with less traffic. Taking this into account, this new form of mobility is also important for the urban layouts as it can help to reduce the occupation of parking places by 86 percent and give place to rethink and optimize the current infrastructure and design (MIT News Office, 2022 ; Caballero. S & Tanzili. M, 2021). The reallocation of the urban space to new modes could consume less energy, space and create a more livable city (Popoya. Y & Zagulova. D, 2022, p.19). Furthermore, shared micromobility services could contribute to the economic development of cities if it is offered as a cheap, easy, faster and more convenient transport option. According to a study, public bicycle program can help to promote a greener and more friendly city better for health and wellbeing and reduce road traffic congestion by discouraging people from using their cars (Nikitas. A 2018, p.313)

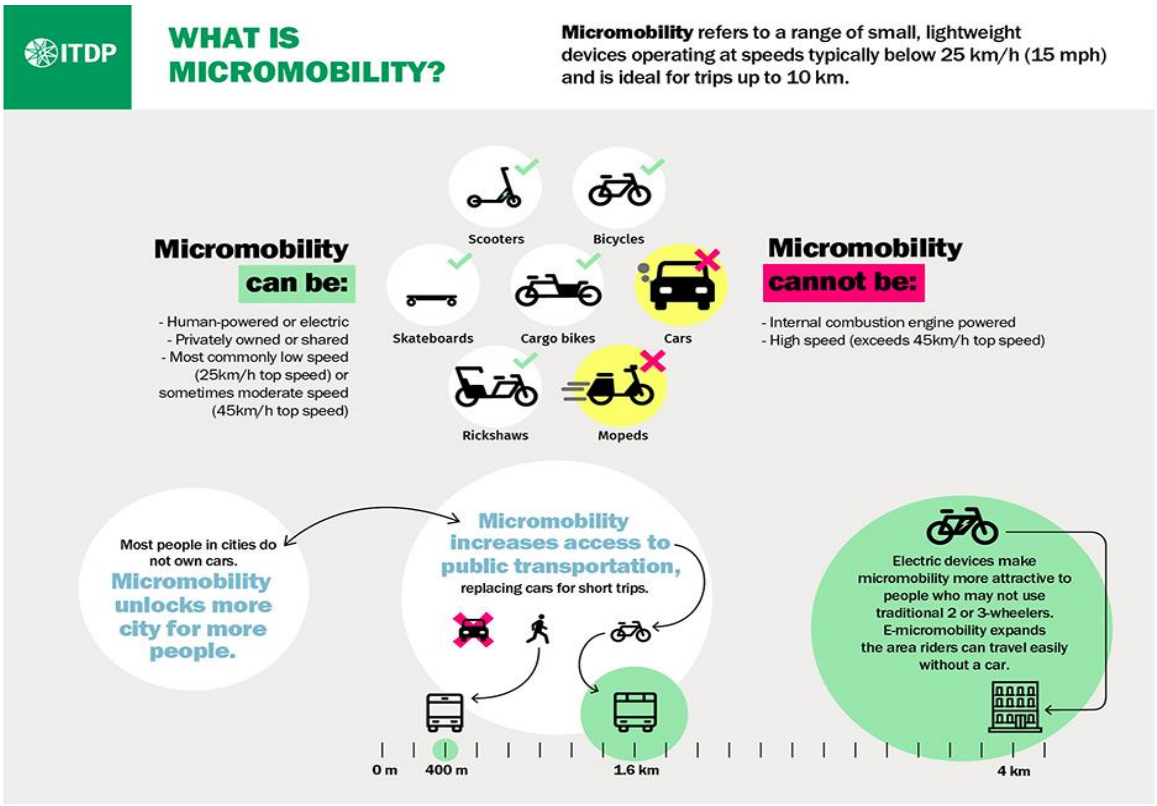


Figure 3 : What is micromobility ?

Source : ITDP, 2022. https://www.itdp.org/multimedia/defining-micromobility/

Shared micromobility systems, such as bikesharing or free-floating systems offer the use of shared devices fleet that are accessible to the public and serves as a form of public transportation (Lazarus. J et al, 2020). Bikesharing systems are still predominantly station-based and are covering maintenance, parking and storage costs. Therefore, users only need to pay for a certain period of time on the app for being able to lock or unlock the devices. Typically, docks systems have devices concentrated in urban and busy areas that creates a network of on-demand bicycles where users can access to bikes depending on their needs (Lazarus. J et al, 2020). In the literature review, authors argue that there are four different generations of bike sharing systems (Parkes et al, 2013). The first generation of shared micromobility systems emerged in Amsterdam, Netherland in the mid-1960, with the introduction of bike sharing systems that were free of use and residents could pick them up and drop off anywhere around the city. As numerous of the bikes were usually stolen, Parkes et al (2013) explain that in 1995, the city of Copenhagen integrated a coin deposit as a solution against thefts but still some users wouldn’t return the bikes or rented them for a long

period of time. In response to that, a French city introduced more sophisticated docking stations with automated smartcards to prevent from thefts and increase users' convenience.

According to Shaheen et al (2012), the fourth generation is built upon information technology (IT) that facilitates demand responsiveness and multimodal systems and enables an efficient spatiotemporal distribution of bicycles better matching system supply and demand (Lazarus. J et al, 2020). Nowadays, shared micromobility systems can provide real-time information and users can manage their account and needs on an app (Parkes et al, 2013).

Established providers and new entrants are now offering a wide range of smaller, bigger, faster, more comfortable devices such as e-bikes, e-scooters, e-mopeds. The dockless or free-floating systems are more convenient to users than bikesharing docked stations because they can be activated and dropped-off anywhere within a service zone by individuals (Ramboll, 2020 ; Huo J. et al, 2021). Previous research argue that shared micromobility became a popular alternative mode of transportation and is mainly used for short travel distance trips or so called for « first and last mile travel » (Baek. K et al. 2020). This has helped to promote active modes over the use of cars and to reduce pollution and noise in cities (Abduljabbar. R. J, 2021, p.5).

E-bikes are used as a first-last mile mean of transportation by 71.7% of their users, against 30.4% of e-scooter were used to get to, or from public transportation stops (VOI, 2021). Gerbhardt et al (2021), made their research on estimating how car trips could be replaced by escooters, and founds out that the devices could become an efficient mode of transportation for trips between 0.25 to 4.0km. (p.9). Similar results were reported for the city of Belgrade, in Serbia, as residents are willing to use e-scooters for distances between 3.0 and 5.0 km (Glavic. D et al, 2021. P. 20). According to the annual report, 14% of VOI users replace car trips' with scooter rides in 2020, and it is also found that e-scooters' use increased by 27% compare to the year before (VOI, 2021). Finally, the Norwegian national e-scooter user survey found out that if an e-scooter was not available at night, 60% of the users would have replaced those trips by motorized transport modes such as cars or taxis (Fearnley. N, 2022).

Furthermore, bike sharing usage can contribute to time saving for the users because bike is the fastest mode of transportation in the French cities for a distance less than 5 km (Tran et al, 2015. p.298). This is due to the fact that in bigger cities people need to consider spending time

in traffic congestion when using a car. For this reason, in Paris, 44% of escooters users commute to and from work with the devices and 32% of users take trips less than 10 minutes (Latinopoulos C., 2021, p. 12). Moreover, reducing the use of the car give cities the opportunity to build better connections to and from public transit networks (Kong H., Jin S.T., Sui D.Z. 2020).

Shared micromobility services are transforming urban access and transportation and have the potential to benefit suburban and rural areas in the future, particularly as integrated technology becomes more prevalent. Research shows that cost savings and comfort are reasons for shifting to a shared mode of transportation. Although shared micromobility has the potential to meet a variety of economical, social and environmental objectives, it is important to note that policy challenges remain on managing these systems and ensuring public safety.

Shared micromobility systems are sustainable transport options that can help to connect efficiently people to places, improve citizens' quality of life as well as strengthen the economy (Tangerine, 2020). In this research paper, a shared micromobility system refers to a service of different types of devices such as ebikes, escooters and ebikes that are made available to the general public as a shared option on a on needed basis. Generally, users must pay a fee per minute or per hour and lock or unlock the devices through an app. The devices are lightweight and small vehicles with a maximum speed of 45km/h (Mobycon, 2022). Two different types of shared micromobility systems will be studied in my thesis, the docked based station and the dockless or free floating. It is also important to note that public schemes are programs that are subsidized by the government such as bike sharing programs for instance (Parkes S.D et al, 2013 ; Movmi, 2022). While private schemes are privately owned by companies that can provide docked systems as well as sophisticated free floating devices such as escooters (Sebastian Bührmann, Rupprecht Consult Forschung & Beratung GmbH).

As argued previously, shared micromobility is not a new mobility option but as their popularity and use is considerably growing, cities face challenges and need to adapt their infrastructures and regulations. Furthermore, as micromobility has great potential for long term benefits it is important to increase its use in more efficient and safer manner. In this research paper I will study how European cities achieved successful implementation of shared micromobility systems. The findings will serve to discuss the case of shared micromobility

systems for the city of Bodø, a mid-sized city located in the Arctic region. Therefore, this research paper will provide an overview of successful shared micromobility systems and try to understand how could shared micromobility become a success in an arctic mid-sized city.

1.5 Bodø as a case

Bodø municipality is located in the Arctic region of Norway and counts a total of approximately 52 800 residents (Citypopulation, 2022). On the 20th of June 2017, Bodø was given the green light from the Parliament for the project Ny By- Ny Fly plass, new city- new airport as part of The National Transport Plan. Removing the airport has given to the city of Bodø the opportunity to develop and build an entirely new city that will provide sustainable and environmentally benefits to its residents (ISOCARPS 2017, p70).

According to Professor Rolf H. Jensen, actively involved in planning cities and consulting in urban development in Norway, a city like Bodø has a small city center and the residents are mainly living in rural areas so this makes them car dependent (ISOCARP, 2017, p. 48). Nevertheless, the city of Bodø wants to encourage active modes of transportation such as cycling by connecting green and recreational spaces, transforming small spaces, and redesigning places for car use such a big parking area. The County of Nordland County and Bodø municipality work in close collaboration to manage new pilot projects such as bikesharing programs, self-driving buses and to improve the whole public transportation system (ISOCARP, 2017, p. 78). Furthermore, as Bodø is becoming more attractive, especially with the creation of jobs in the city center, facilitating the urban access is more needed than ever (Smart by Bodø, 2020).

Nordlandsfylkeskommune won the prize of 50 million norwegian kroner from the national competition Smart Transport in order to try to reduce climate emissions by offering seamless travel experience and give the public access to information and services that contribute to more efficient transport solutions such as the use of walkways, bicycle and public transport (Smarteretransportbodo, 2022). The Smarter transport initiated, in June 2019, a pilot project with the introduction of a bikesharing program with ebikes available at different locations in and around the city center (AN, 2019). When publishing the final report on the use of bikesharing, authors identified that it was unsuccessful as most of the users found it inflexible and not convenient.

1.6 Purpose and research question

As argued previously the current transportation system is not sustainable as it is highly pollutant and becoming non affordable. Authorities and providers can help to solve the current challenges by offering new services that are accessible to everyone. The concept of shared micromobility remains significant to the transport sector as it has the potential to reduce greenhouse gas emission and to eliminate congestion. Through research, it is clear that a good collaboration between policymakers and other stakeholders will lead to greater transport systems. Shared micromobility started in the late 90's in Europe and recently, thanks to the emergence of new technologies, the systems became more sophisticated and easier to use. This new mode of transports are lowering greenhouse gas emissions and offering a numerous of benefits to cities such as empowering the economy. The governments and private parties are often the ones that have the strongest impact on transportation systems and can help to develop and run successful programs through good practices, initiatives and collaboration.

This research will map existing knowledge with respect to success factors for shared micromobility systems in Europe and discuss the case for the city of Bodø, a mid-sized Arctic city. As shared micromobility services have recently launched in the city of Bodø and as residents are highly dependent on the use of private car, it is relevant to understand how different stakeholders could encourage and increase the use of shared micromobility services. By using the mix of two methods, a scoping study and a qualitative research, the aim is discuss the role of leading stakeholders in regards to the factors that are needed for a successful shared micromobility development in the city of Bodø.

In respect to the above points, the whole purpose is fulfilled through research and on the following objectives :

- Design a framework to study the attractiveness of shared micromobility
- Identify the success factors for shared micromobility systems in Europe
- Discuss the role of leading stakeholders on the shared micromobility development in the city of Bodø

The study will shed a light on successful European shared micromobility systems to understand how different stakeholders can influence the attractiveness of this mode.

I have decided to answer the two following research questions :

1. **What are the success factors for shared micromobility in European cities?**
2. **How could shared micromobility be successful in the city of Bodø?**

The first research question will be answered by conducting a scoping review for collecting data from primary research, such as scientific literature as well as official documents, reports and articles. Then, I will answer the second research question by conducted semi- structured interviews with different experts in the field. This research will also highlight the barriers and challenges for the use of shared micromobility that will serve as a base and further facilitates the argument for explaining the factors that make shared micromobility systems successful.

I hope that the thesis can contribute to a deeper understanding on how could shared micromobility be viable in the city of Bodø. Moreover, as limited attention has been paid to shared micromobility systems in small and mid-sized cities in previous research, the Bodø-case may generate new knowledge for other mid-sized cities in Europe.

1.7 Thesis outline

My thesis is divided into 5 different chapters.

In the Chapter 1, the background, research questions and purpose have been presented.

In the Chapter 2, I will present and explain the use of mix methods to conduct my research, the scoping study and the qualitative method.

Under the Chapter 3, the theoretical framework is presented. I will give an overview general factors influencing the use of shared micromobility based on primary research and I will present the theory of the generalized costs for shared micromobility. The framework will be

used for identifying the success factors for shared micromobility in the scoping review and answering my two research questions.

The Chapter 4 will provide the success factors for shared micromobility that have been identified through the scoping review, in the scientific literature, articles, conferences as well as reports.

In the Chapter 5, I will discuss the current shared micromobility system in Bodø in respect to the success factors identified in the literature and the findings collected from the interviews.

The Chapter 6 will give concluding remarks

Chapitre 2 Methodological framework

This chapter describes the method of the study. For this paper the methodological framework is a mix of methods, divided into the Scoping review method and the qualitative method. Under both methods, research design and data collection are given and explained in detail.

2.1 The scoping study

The scoping study is adapted from the methodological framework proposed by Arksey and O'Malley (2005). There are different types of studies, the scoping study is a method for researchers that are studying a broader topic and it helps mapping the key concepts of a specific research area and the main types of sources and evidence that are available (Arksey and O'Malley, 2005). Doing a scoping study is in other words selecting the scientific research and non-research material on a specific topic, conduct an analysis and synthesize by classifying and clarifying the results. (Davis et al, 2009).

Reviews conducted on primary research are used by authors to be integrated into their research findings (Peters M et al. 2015). According to Grant and Booth (2009), there are 14 different types of literature reviews. The method chosen for this research paper is a scoping review. Arksey and O'Malley (2005) argues that there are four reasons to choose to conduct a

scoping review. In this thesis, the reason for conducting a scoping review is to study and summarize research findings that describe the success factors for shared micromobility systems (Arksey and O'Malley, 2005). The scoping review has a great utility for analyzing and synthetizing research evidence and are also called « mapping reviews ». (Peters M et al. 2015). It is becoming a more common approach for mapping the evidence on broad topics. By conducting a scoping study, the goal is to identify relevant scientific research and non-research material to review the success factors for shared micromobility. (Arksey and O'Malley, 2005). Principally, the material will be selected using the largest abstract and citation database of peer-reviewed literature such as scientific journals, books and conference proceedings, the Scopus data base. (ELSEVIER Scopus, 2022).

The methodological framework chosen for the thesis is proposed by Arksey and O'Malley (2005) and consists on 5 different stages presented under the next sub-section. The authors suggest to engage in a reflexive way in each stage as well as to ensure the literature to be covered in a reflexive way.

Stage 1: Identify the research question
Stage 2: Identify relevant studies
Stage 3 : Study selection
Stage 4: Charting the data
Stage 5: Collating, summarizing and reporting the results
(Arksey and O'Malley, 2005)

2.1.1 Identify the research question

As argued previously, the scoping review method is chosen for answering to the first research question. A specific review question must be clearly stated as it will help to select specific key words and inclusion criteria. (Peters et al 2015). In this case, the aim is to answer **« what are the success factors of shared micromobility systems in European cities?»**

According to the different authors and proposed guidelines, this stage is the key for starting the research process. (Arksey and O'Malley, 2005; Peters et al 2015). The Scoping review has been conducted in regard to the first research question with the focus on success factors and

shared micromobility systems, as presented previously. It is also important to note that the following research sub-question helped to guide the scoping review analysis :

- *Which factors influence the use of shared micromobility?*
- *What and who affects the attractiveness of shared micromobility systems ?*

2.1.2 Identify relevant studies

The inclusion criteria should be set and explained clearly as it will guide decisions when selecting the studies. (Peters et al, 2015). On the other hand, the criteria for the study selection are an important step as it will help in mapping a suitable review that will enable to answer the research question. (Arksey & O'Malley, 2005). First, the largest abstract and citation database of peer- reviewed literature SCOPUS was chosen to conduct the research. (Elsevier Scopus, 2022). As the term shared micromobility can be broad, a wide definition of shared micromobility was set and other concepts were associated such as key words for not missing any relevant document in the selection process. The search consisted on applying relevant terms in the title, abstract and keywords "TITLE-ABS-KEY". Finding articles in Scopus database by entering shared micromobility and success factors as title, key words, and abstract provided a limited scope of studies. Therefore, having a wide definition of the term shared micromobility and associated terms enabled to generate wider coverage. (Arksey and O'Malley, 2005).

Terms such as "micromobility*" OR "shared micromobility" AND "success factors" were selected for being the most relevant. Due to limited results, terms variation were added such as "bikesharing", "e-scooters", "successful". Using "OR" enabled to increase the findings and get a larger number of articles. Moreover, setting criteria is used in systematic reviews for eliminating studies that doesn't address the research question. (Arksey and O'Malley, 2005). For instance, irrelevant fields or subjects such as Medicine, Dentistry, physics, Biochemistry, earth and planetary sciences were excluded. Furthermore, as most of the articles were published after 2010, research that was published before that period were excluded. Finally, the language used in the articles were limited to English due to time constraint and as it is considered being the language of science. (Hanssen, Fromreide and Mathisen, 2021). After setting inclusion and exclusion criteria, on the 26 Mai 2022, a total of 128 articles were found.

Concept :

TITLE-ABS-KEY ("shared micromobility" OR e-scooters* OR bikesharing* AND "success factors" OR success OR factors OR "successful factors" OR successful OR use)

Time of publication :
(EXCLUDE (PUBYEAR , 2009) OR EXCLUDE (PUBYEAR , 2008) OR EXCLUDE (PUBYEAR , 2004) OR EXCLUDE (PUBYEAR , 2003) OR EXCLUDE (PUBYEAR , 2001))

Language :
(LIMIT-TO (LANGUAGE , "English"))

Field of study:
(EXCLUDE (SUBJAREA , "MEDI") OR EXCLUDE (SUBJAREA , "PHYS") OR EXCLUDE (SUBJAREA , "DENT") OR EXCLUDE (SUBJAREA , "BIOC") OR EXCLUDE (SUBJAREA , "EART")).

Source: adapted from Hanssen, Fromreide and Mathisen 2021

Secondly, according to Arksey & O'Malley (2005), searching for research evidence can be achieve by using different sources. Therefore, the use of references lists that were associated to the selected article allowed to integrate additional results to the research. Moreover, other press papers, articles and reports were added to the selected scientific articles on the Scopus data base as well as some articles covering the inclusion criteria on Google Scholar.

2.1.3 Study selection

The 128 articles were imported into excel with their title, data of publication, name and abstract. Classifying the articles in that way enabled to get an overview of the articles' main purpose and whether it was suitable or not to the topic. According to information based on the title and the abstract it was possible to determine if the articles were related to shared micromobility or related terms. The second criteria for selection was that the article should include quantified evidence to demonstrate a shared micromobility system effectiveness in line with any of the following outcome measures:

- Factors influencing shared micromobility use and adoption
- Users' related characteristics and behavior
- Strategic and optimal location of shared micromobility systems
- Number of trips with a shared micromobility device per time and day
- Regulations and interventions for the use of shared micromobility
- Quality of shared micromobility services and providers' interventions
- The relation between shared micromobility and public transports
- Analysis of the coverage and built environment factors

If the inclusion criteria were identify in the titles or abstracts then the article was selected. Finally, as the aim is to identify the success factors of shared micromobility in European cities when information on the study's location was provided in the abstract or the title, research conducted outside European cities were excluded. I set these requirements due to practical reason for guiding my selection to answer a specific research question. Therefore, it is important to note that research conducted in other continents could have provide relevant informations and viable results.

After applying the criteria, a total of 44 articles were selected as relevant. All of them were downloaded and fully reviewed. A study was selected as relevant when it was possible to identify different factors or determinants that had made or could make shared micromobility successful. Therefore, only the studies that provided useful informations to answer my research question were included as the research paper is aiming to map the success factors of shared micromobility in European cities. Most of studies were excluded because there were not relevant for answering the research question and some were not addressing any of the above criteria. At the end, a total of 26 articles were selected from the initial research on the Scopus data base and to that different sources such as reports were added to complete the findings.

2.1.4 Charting the data

According to Arksey and O'Malley (2005), an important step when charting the data is to find an appropriate way to classify the results. This enable time efficiency when reporting the findings as well as provide understandable outcome to the readers. It is important to consider how the results will be interpreted and a short summary of each article does not ensure that it

can help the readers that would have to make decisions based on the study findings. (Arksey and O'Malley, 2005). « Charting » refers to a technique that enables to synthetize and interpret qualitative data by sorting material according to common results. (Arksey and O'Malley, 2005, p.26)

According to Arksey and O'Malley (2005), using a descriptive analysis method provide a common analytical framework to all primary research. Moreover, to provide a common framework I identified the factors that had a positive influence on the monetary cost, the travel time, safety and convenience for the users of shared micromobility in respect to the generalized transport cost notion.

Secondly, the way authors' reported their results is also giving insights for answering the research question. Reporting data sources and methods used by the authors are giving relevant informations on their findings. For example, some authors used regression analysis as a method to determine which factors had statistically significant correlations to other factors. (Rixey 2013).

The findings for each article was charted under an excel file, template as below:

- Author's name and data of publication
- Title and journal name
- Field of study
- Data sources and method used
- City location
- Aim of the study
- The success factors for shared micromobility, generalized costs such as price, travel time, safety, convenience of shared micromobility (see Chapter 3).

Classifying the articles as previously presented shed a light on the dominant areas of research such as field of study and data sources as well as geographical location.

2.1.5 Collating, summarizing and reporting the results

A scoping review seeks to present an overview of all material reviewed so it is critical to organize the findings and find the best way to present it. Under the chart mapping, the generalized costs notion was use as a theoretical framework to summarize and report the success factors for shared micromobility under the following; monetary cost, other transport costs, travel time cost, safety costs, and will be presented under the chapter 4.

2.1.6 Limitation of the study and gaps in research

As the topic is broad, I needed to reduce the number of articles by setting up different criteria. For instance, it is important to note that studies conducted outside Europe could have been relevant to complete my findings. However, at the same time, evidence from studies conducting in the United States might not be directly transferable to our European cities but it could be still interesting to learn from other cities around the world.

A majority of the scientific research on shared micromobility appears in the Transportation Research journal and the quantitative method was chosen in 16 of the 26 scientific articles selected. Most of the research was based on surveys of escooters' or bikesharing users and 6 were recorded trips analyzed with the regression analysis method. Most of the articles reported evidence on users' characteristics and the built environment as well as factors influencing the use of shared micromobility that will be presented under the theoretical framework, under the chapter 3. The 22 articles were published after 2020 and the research on case studies were mostly conducted in big cities with favorable climate conditions such as Naples, Lyon, Paris, Vienna, London, Gdansk, Braga, Barcelona, Madrid and too little attention is given to small or mid-sized cities. There is also less analysis on optimization and distribution of current systems in and around cities as well as on their integration in the whole transportation system. Moroever, a gap remains in the Scopus database for understanding the processes and policies that cities and other stakeholders can introduce to increase their reliance on active modes of transportation such as shared micromobility.

2.2 Qualitative method

In addition to the findings from the scoping study, a qualitative method has been chosen to answer the second research question **« How could shared micromobility be successful in the city of Bodø? »**.

The qualitative research can be used to answer the hows and whys and the focus of a qualitative research on a specific topic and the processes occurring in this field makes it suitable for collaboration with practitioners (Bickman. L & Rog. D, 2019, p.222), (Tenny. S et al, 2017). In this case, the aim is to get a deeper knowledge of the topic and understand the process by how things happen in a particular context. As argued previously, when gathering information on the success factors of shared micromobility systems, I realized that the studies were mainly conducted in metropolitan areas and less information was found on systems in small and mid-sized cities. Bodø has been selected as a case study and will enable to study the stakeholders' role for the successful development of a shared micromobility system in the city of Bodø. The qualitative method has been chosen because it gathers informants' experiences and thoughts for the Bodø-case and are also a strength to explain processes that cannot be quantified. Futhermore, empirical findings may help to develop new ideas and gain an in-depth-understanding of the topic in its specific context (Ragin and Amoroso 2011). Therefore, I find the qualitative approach relevant for answering the second research question.

2.2.1 The research design

According to Maxwell. J, when conducting a qualitative research, it is important to define a clear goal or multiple goals because it serves to keep the focus of the study and to guide other design decisions. In addition, goals will shape the interpretations, descriptions and theories in creating the research (Bickman. L & Rog. D, 2019, p.219) The author distinguishes three different goals. First of all, the personal goal for conducting this study is the curiosity about shared micromobility systems in the arctic mid-sized city of Bodø. Furthermore, goals shape the research so keeping them in mind will help the researcher to answer the main research question (Bickman. L & Rog. D, 2019). To answer this second research question, the success factors identified in the scientific research are discussed in respect to the findings collected from the interviews.

2.2.2 Single-case design study

According to Ragin and Amoroso the qualitative method is a "basic strategy of social research that usually involves an in-depth examination of a relatively small number of cases" (Ragin and Amoroso 2011, p.230). Shared micromobility systems in Bodø has been chosen as a single-case design for this thesis which confirm to be focused and deal with the research question. The aim of the thesis is to understand the Bodø context as one single case and for this reason, it does not seek to generalised the results.

This research paper contain various scientific and literature sources and as often with case studies in qualitative research interviews are a way to gather meaningful findings and provide more information about a specific topic (Johannessen et al, 2011, p.89-91). Yin (2009) stresses that a single-case design will make it less broader in scope but the Bodø-case will be discussed in respect to the general success factors for shared micromobility systems previously identified in the scoping review research. However, evaluating only the success of shared micromobility systems in other mid-sized cities is beyond this thesis' scope.

2.2.3 The informants

In this study, the informants were selected based on their knowledge and expertise for helping to answer the research question. Behind the qualitative research, the idea is to select participants that are relevant in helping the researcher to understand the problem. After having identified the success factors, the findings show that different stakeholders can influence and affect the attractiveness of shared micromobility systems. In respect to the generalized costs of shared micromobility providers, authorities and other actors have an important influence on the attractiveness of the transport mode. Therefore, I decided to conduct interviews with experts in the field of shared micromobility, also called stakeholders such as municipality's representatives, researchers as well as other actors part of Bodø's shared micromobility ecosystem could help to increase knowledge for the Bodø case and provide more reliable results. The findings collected from the interviews will be discussed in respect to the success factors that have been identified through the scoping study.

Choosing the right informants is one of the critical aspect as there was a limited of people that were going be interviewed. Therefore, having a clear idea on the right people that would share

relevant knowledge to answer my research question was highly important for this thesis. The selection of the people I wanted to interview for this research project is a balance of experts working within the development and management of shared micromobility systems. All of them are stakeholders of the shared micromobility system. As the informants are stakeholders and experts in the field and can influence the shared micromobility development it can add validity to the results and make the analysis more robust. (Yin, 2009, p116).

Finding seven stakeholders was the goal set for this qualitative research as one could experience that more participants would not add new information but rather repeat that has already been said by others. At the end, I interviewed a total of five people that are stakeholders of shared micromobility. The participants in this research were people from the public sector and from the private sector. Discussing this topic with both sectors allowed to collect more varied answers as the interviewees had different perspectives and influence on shared micromobility systems, and it may also enhance the validity of the results.

Conducting interviews with residents could have been relevant for getting a deeper understanding of the opportunities and challenges with the current micromobility system in the city of Bodø. However, one of the interviewee that is a member of City Bylab and accepted to share its opinion and inhabitants' thoughts and perceptions regarding the use of escooters.

2.2.4 Data

According to Yin (2009, p114), using multiple data sources is adding valuable findings to a case study. During the analysis of the findings collected during the interviews, adding other corroborating results to the findings may make the research more robust (Yin, 2009, p116). Data such as local reports and newspapers as well as results from the scoping review in respect to the success factors previously identified will be discussed with the findings collected from the interviews. Combining multiple sources is called a triangulation technique and is used to strengthen the analysis and providing more validity (Yin, 2011, p79).

Yin (2009) stresses that previous knowledge is often needed for the case study methodology and living in Bodø has been a real asset for contacting the informants and observing the development and use of shared micromobility in the city. I decided to add a way of collecting data through observing, it is called an observation data collection method that involve watching (Dudovskiy. J, 2022). This data collection method is classified as a participatory study, because I immerse myself in the environment while watching and taking notes of shared micromobility systems. As no personal data were involved in the observation data collection method it was not associated with any ethical issues. In addition to that I am a user of the service and public services in general so I have been myself able to observe shared micromobility systems since 2019 and the city mobility ecosystem in general. These observations will be added to the discussion part for answering to the second research question.

However, it is also important to note that the process of collecting data was collected in a consistent and neutral manner that minimizes bias. The neutrality occurs during the interview process when the interviewer remains unbiased by not providing any indication of desired responses (Anderson-Knott, M, 2008). In research, the term neutrality implies that an inquiry is free of bias or is separated from the researcher's perspectives, background, position, or conditioning circumstances (Given, L. M. 2008). It was important to me to follow the interview guide and that the follow up questions would not have an influence on the respondents' answers.

2.2.5 Reliability

Construct validity and reliability make it possible to assess the quality of case studies. (Yin, 2017). Achieving a design with high reliability means that it would be possible to repeat and conduct the research and get the same results. However, as my research question is focusing on shared micromobility systems for a single case study that is continously developing, there might be some challenges with addressing reliability. Moroever, a qualitative research is based on semi-structured interviews and on a single case study so it does not seek necessarily for high reliability because each researcher could interpret the result differently. However, for the process to be tested and repeated, I have attached the interview guides to my thesis and I

keep the transcribed interviews 3 months after the submissions well as the information letters signed to make the research verifiable.

2.2.6 Validity

Whittemore, Chase, and Mandle (2001) identified 4 primary criteria about validation of a study. Authors stresses that the research should address credibility so the results are an accurate interpretation of the participants meaning. I tried to achieve the best level of credibility by sending the transcribed interview to the informants so they could confirm their answers or modify if they needed to.

According to Johannessen et al. 2011, p73-75, the external validity may be limited as a single case study do not seek for generalization of the results. As the goal of the thesis is to get an in-depth understanding about shared micromobility in the Bodø case and it can help to generate new knowledge and may be interesting to read for providers or municipalities. According to Yin 2009, p116, applying the triangulation method by providing other sources of evidence to the study may enhance the validity of research.

2.2.7 Ethics

Before I started conducting the interviews, I sent a form to the Norwegian Agency for Shared Services in Education and Research (NSD) to ensure that data could be collected, stored and shared, both safely and legally (NSD, 2022). Once I got approval for my project, I sent a guide with pre-decided questions to the participants but during the interviews I also had follow-up questions. I needed to classify all information based its need to be protected. The audio recording were made using the Nettskjema Dictaphone app (University of Oslo). This app has been downloaded to my mobile phone but the audio recording was sent directly to Nettskjema. To listen to the recording, I logged in to Nettskjema using my Nord FEIDE account. I used Google meet and Teams to conduct the interview. The meeting link was given only to the person to be interviewed and that no outsiders attend the meeting. I stored the data on a research server one drive, locked away. Files/folders are not shared with others. OneDrive doesn't sync to my private Mac automatically. After I transcribed the interviews

and I sent it to the participants so they could decide if it was acceptable and if not they could modify or remove some of their answers.

Regarding personal consent, all the participants were informed about their rights by email as well as in the information letter that I asked them to sign. (See Appendix 2). Before starting recording the interview I informed them once more orally as follow;
" You can withdraw your consent at any time. The simplest way to do this is to contact directly me. You can also contact the data controller. When transcribing the interview, all information that could identify you will be anonymized and recording deleted as soon as I have the interview transcribed. All the personal data that can identify you as a person will be protected and stored inside One drive and the recording are made on the Diktafonapp and will be deleted after the submission of my thesis on the first of December 2022. The transcribed interview will not be shared with anyone else. If you believe that your personal data is incorrect or incomplete, or you have protested against the processing, then you are entitled to require that your personal data should be temporarily limited. That means that processing will be limited until I have either corrected your personal data, or Nord University have been able to assess whether your protest is justified. In other cases, you may also require a more permanent limitation of your personal data. In order to be entitled to require the limitation of your personal data, the terms of GDPR's article 18 must be met. If Nord University receive a request from you about limiting personal data, they will consider whether the terms of the law are being met. You can also find contact information in the information letter and please let me know if further information are needed. "

2.2.8 Interview Guide

The interview guide was designed with main themes, such as background, monetary and non-monetary costs of shared micromobility. In addition to that, more specific sub-questions or follow-up questions were asked during the interviews.

The choice of conducting semi-structured interviews enabled flexibility as the informants can express themselves more freely and bring up points that could be missed if only structured interviews were conducted. (Yin, 2011, p135). Moreover, conducting semi-structured

interviews were useful as I could ask follow up questions on some points brought by the participants. However, I always tried to ask question related to the generalized costs of shared micromobility to keep in mind the main research question I needed to answer.

Authors suggest that up to 15 people can take part in the qualitative interview as it can bring forward nuances but it is still difficult to know in advance how many participants are needed to answer the research question. (Johannessen et al. 2011, p108; 145). For the scope of the thesis, I determined beforehand which people would be relevant to answer the research question. Those people were mainly working with projects relating to the development of shared micromobility in Bodø. Often during the interviews, the informants recommended me other people I could contact.

I planned to interview seven people but due to no answer from two of them, only five people were interviewed at the end. Each interview had a timeframe of 1 hour and spanned approximatly 45 minutes. It was important for me to respect interviewees time and not exceed it. I transcribed the interview in the same day to minimize the risk of forgetting something but also to contact back faster the participants in case I had more questions after the transcription. The follow-up questions were asked during the interview when one of the interviewees had brought an important point for example. The interviews were conducted in English.

As argued previously, stakeholders in the public sector and the private sector were interviewed, therefore I decided to create 2 interview guide (see Appendix 1 (Interview Guide – English ; Appendix 2 (Interview Guide 2 – English)). To keep in mind the goal of the research and collect answers that would serve the thesis, the questions were classified under the monetary costs of shared micromobility,

Chapitre 3 Theoretical framework

In this section, I will present the theoretical framework of my research paper.
On the first hand, I will provide an overview of the general factors explaining the use of shared micromobility found in the litterature review. The theoretical framework will be used

to explain the success factors for shared micromobility and to discuss on the success of shared micromobility in Bodø. Looking at the different factors influencing the use of shared micromobility and the generalized costs for shared micromobility will provide a framework to answer my research questions.

3.1 Factors influencing the use of shared micromobility

A general overview of the factors influencing the use of shared micromobility services will be presented in the theoretical framework.

3.1.1 User related factors

By reviewing the litetature for docked and dockless micromobility systems in Europe, most of the articles included a set of common factors related to users characteristics. In this section, I will give an overview of the factors affecting the use of shared micromobility in Europe found in the literature.

The user related factors such the age, gender, income, education, activity patterns and image of shared micromobility services can influence the use of shared micromobility services. (Gioldasis. C et al 2021, p.10). The studies that investigate users characteristics bring similar results where users are not older than 45 years old, have no children, no cars and live in or close to the city center. (Tran et al, 2015, p.296, Latinopoulos. C et al, 2021, p.11). In general, users of shared micromobility devices are young, males, aged from 18 to 30 years old and have completed their secondary education (Hamerska. M, 2022, p.9). A comparative study between escooters and ebikes users conducted in Zurich, Switzerland, shows that shared escooters users are younger and more representative of the general population than bike sharing users' (Reck. D & Axhausen, K, 2021). Moreover, younger people use escooters to commute to leisure activities, social meetings, shopping centers or just ride for fun (Hamerska. M, 2022 ; Latinopoulos. C, 2021). In general, it is also find in the surveys that people older than 40- 50 years old who have children do not find it practical for them as they have to pick up or drop off their childrens at school so it can be a factor discouraging from the use of shared micromobility devices. (Bielinski. T, Wazna. A, 2020. p.8). Furthermore, the perceived risk is higher for older people that would argue that it is not comfortable or

convenient to use shared micromobility. Another explanation to that could be related to how one is familiar with the use of the technology, as most of the devices can be locked and unlocked only through the application it can seem complicated to find the right information and use the application (Bielinski. T, Wazna. A, 2020, p.8)

The income is also be a factor influencing the use of shared micromobility services. For instance, a survey conducted in the city of Greek, Drama, aiming to identify the factors for using a bike-sharing scheme, found out that people living in households earning less than 2000 euros were more likely willing to use frequently the public bicycle scheme than people earning more than that. (Nikitas, 2018, p.312-313). Authors also argue that the probability of being a bike share user increase if an individual has taken a degree, if an individual takes public transports everyday as well as if one has an active social life (D'Urso. P et al, 2021. p.676).

Some socio-cultural factors are also associated with the shared micromobility use as it is a shared mode of transport the image associated to the devices can vary from individual to individual. The image of the shared micromobility devices as a mode of transport can influence the use of the devices. As presented in the introduction, shared micromobility is a shared transport mode that can be used on a on needed basis. However, many cities are still car dependent with a high proportion of car ownership and this can influence the image perceived on shared micromobility services. According to Zhang, Duan and Bryde 2015, developing a sustainable bike sharing program can be viewed as a means of positive image-making (Nikitas. A, 2018. P.308). The respondents of the study conducted in Drama, Greek, show a positive attitude towards the introduction of public bicycle schemes as a transport mode as they believe that it is a low- cost, sustainable, enjoyable and healthy travel option. (Nikitas. A, 2018, p.311). As cycling is an activity that generates pleasure, escooters are also popular among users for being fun to ride. (Rietvield 2004 p.3 ; Popova Y & Zagulova D. 2022, P.4). Furthermore, the bicycle infrastructure can be influence the culture and the image perceived. For instance, Amsterdam has a proper bike dedicated infrastructure and people find it more convenient, healthier and cheaper to use bicycles. (Rietvield, 2004). Therefore, one can argue that the image perceived depends on the culture and values of each individual. On the other hand, the perceived level of safety is an important factor influencing the use of shared micromobility as some respondants proclaimed a certain reluctance due to a huge

concern in safety associated to the use of escooters (Fistola et al. 2021, p.12). The perceived level of safety is crucial in the decision making for women regarding whether or not they feel safe to ride the devices (Campisi. T, 2021, p.20).

3.1.2 Factors related to activity and trip patterns

In most of the studies, evidences show that socioeconomic, public transport, leisure and topographic or network variables are positively correlated with shared micromobility usage. In the scientific literature, different surveys were conducted to understand why users were choosing the devices at certain time of the day and during the same hours. The mode choice is nested and dominated by distance and time of day. A users's survey conducted in Tricity, Northern Poland stresses that 71.7 % MEVO's, bike sharing users commute to public transportation stops (see Figure 4) and the public transit variable was also find significant for bike sharing usage in the city of Lyon.

Tran et al (2015) recorded over 6 million bike sharing trips in the city of Lyon to explore the built environment factors related to the use of the bike sharing system, Vélo'V. Evidence show that the public transit variable such as the number of railway stations is significant in all model of regression as users combine bike sharing and train to commute to work in or outside the city. (p.296). The number of jobs in a city, student campus or universities as well as leisure activities can also influence shared micromobility usage. The population and job patterns affect bike sharing usage (MEVO) as 66.8% of the users are commuting to work or study places on weekdays at the same time of the day (see Figure 4). Vélo'V long term subscribers that are paying monthly tickets use the devices for commuting trips, such as work, study made on weekdays early in the morning and then in the afternoon when they are done. (Tran et al, 2015, p.297). In previous research, peaks of shared micromobility usage are in the morning and in the afternoon as a majority of users ride or combine the devices with public transportations to commute to and from work so the network density, number of station as well as location can affect bikesharing usage. (Tran et al, 2015, p. 296). In the city of Lyon, short term subscribers are those who use the devices mainly for occasional and leisure trips. (Tran et al, 2015, p.297). For instance, users get to restaurants, bars, caffees, cinema in the late afternoon on weekdays and during weekends. The trip purposes of bike sharing users are different than electric scooters' users as appointed by 51.8% of e-scooters users that ride just for fun and pleasure (See Figure 4, Bielinski. T & Wazna. A., 2020, p.6).

Figure 2. Trip purposes of MEVO or Electric Scooter sharing users (users of each mode of transportation could choose more than one trip purpose).

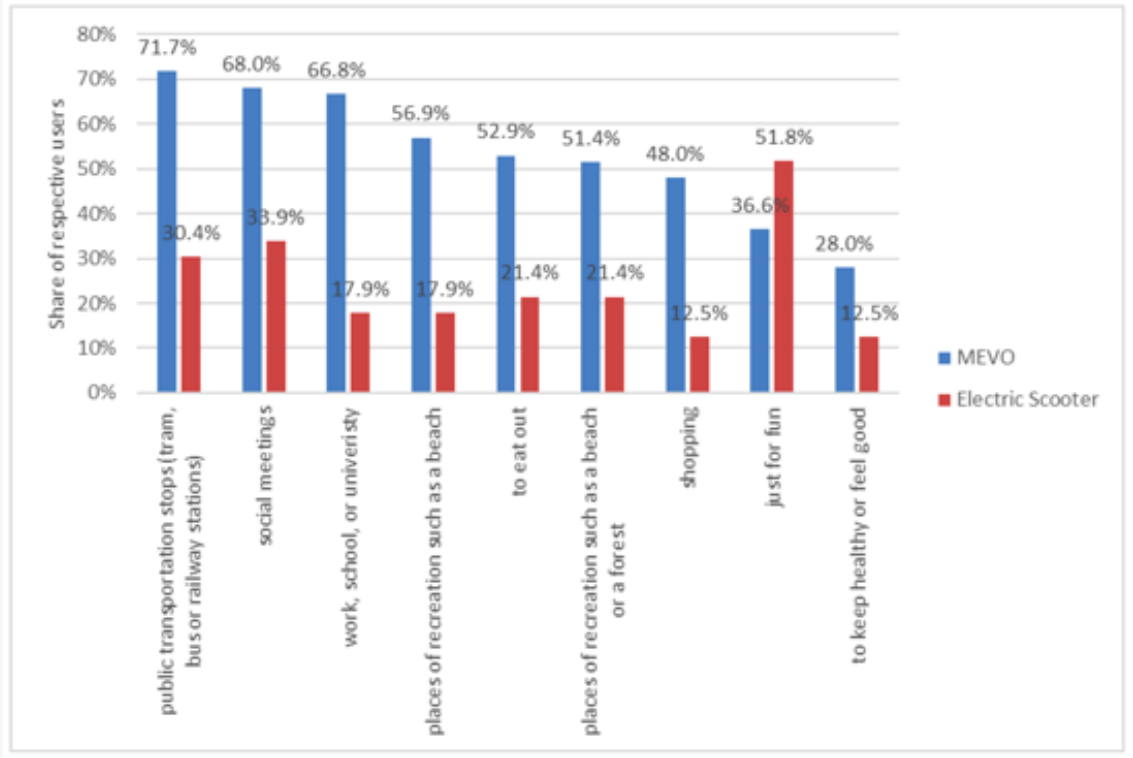


Figure 4: Trip purposes of MEVO (bikesharing) or Electric Scooter sharing users. Bielinski. T, Wazna. A, 2020. p.7

Therefore, usage frequency, time of the day, distance and trip purpose have a significant influence on bikesharing usage and the time value perceived can be different if the devices are not use for the same trip purpose. As long term subscribers are mainly commuting to work or schools, the duration of their trips can significantly affect bikesharing usage. The duration of trips is less important for short term users that will use the devices occasionally or just for fun. In a city with a huge number of cars and less cycling facilities, the distance to get from A to B may be perceived longer so the quality of an infrastructure can also affect the bike sharing usage.

The duration of trips can be affected by network density as well as capacity of the station such as availability. When the demand doesn't matches the supply, users of MEVO e bikes system

in Tricity, northern of Poland, are reluctant to the mode because there is a small number of available devices caused by both size of the fleet and faultiness of delivered e-bikes (Bielinski. T & Wazna. A, 2020, p.10). The more the availability at station level is improved, the more bike sharing demand can be satisfied. (Tran et al 2015, p.298). Knowing now that long term subscribers are commuting to work or universities and that peak of the day are more or less the same for all, early in the morning and in the afternoon. If there is a lack of availability of the devices, one could consider using another transport mode and if this happens more often, it can make shared micromobility less attractive to users.

Furthemore, Hamerska et al, 2022 surveyed 584 users' of e-scooters about the quality of the service provided according to their own experience in Poland. (Hamerska et al, 2022, p.8). When it comes to service related factors, the dimension of customer service can significantly influence users' satisfaction and affect the use of shared micromobility services. For instance, this could be the access to a hotline, helpful and patient staff with expert knowledge but also the device features such as charge level, security, design and stability of the vehicule. Another qualitative factor that can affect the use is mobile app functions such as real time information, intuitive application interface, the battery level compatible and ease of use for paying, locking and unlocking the devices. Moreover, most of the users find it also important that the fees in accordance to tariff and time and get access to loyalty programs. Those are variables measure the quality of escooters service and shape the user satisfaction. (Hamerska et al, 2022, p.10).

3.1.3 Conclusion

In most of the studies, users' of shared micromobility services are young males that are working or studying and earning approximatly the average income. The image associated to shared micromobility services can be affected by socio-cultural factors and varies from individual to individual in respect on to their personal convictions and reasons for using this mode.
On the other hand, the use of a transport mode is associated to travel patterns such as time of the day, distance and trip purpose. Therefore, policy efforts that can be taken in the form of actions to improve and encourage the ease of shared micromobility use. For instance, an appropriate spatial design and proper infrastructure where users have direct and easy access to city centers and public transit could make shared micromobility more attractive to users.

3.2 The generalized cost of transport notion

I choose the generalized costs as a framework because in order for shared micromobility to become a success the users' perceived costs, monetary and non-monetary, of shared micromobility as a transport mode need to be lower than other transport modes (Button. K, 2010, p.144).

According to Pienaar. W (2002), people travel because they want to get to a specific destination for a specific reason. Therefore, transport is a mean to an end and implies to do sacrifices. Futhermore, the money spend for transport, as well as the time to get from the point A to B are regarded as sacrifices and other qualitative aspects such as safety, comfort, walking times, service reliability and so on (Pienaar. W, 2002, p.1). The demand of transport is dependent on the overall opportunity costs involved (Button. K, 2010, p142). In other words, the demand for a transport mode is influenced by the total costs that reflect the effort calculated in money, time and discomfort factors for a traveller in completing his journey (Button. K, 2010, p.142 ; Koopmans. C et al, 2013, p 155).

According to the rational choice theory, individuals want to achieve outcomes that are aligned with their own personal objectives and therefore they use rational calculations to make rational choices (Ghanti. A et al, 2022). Those outcomes should provide people the greatest benefit and satisfaction. According to the theory of Transport Economics, the traveller decide to undertake its journey assuming the utility maximising behavior so he wants to achieve the greatest benefits. However, it is not simply the financial costs of a transport that are regarded by individuals when choosing a certain type of transportation mode. For example, an individual that has his own car and that is living outside the city center but working in the city could prefer to use his car as a main transport mode for personal reason such as time saving and convenience. Different types of transport are associated with the distances of trips such as cycling that is reserved for local travel and short distance trips for example (Button. K, 2010 p.142). According to Kenneth Button (2010) travelers take notice of the time it takes to make a trip and the money costs involved as well as the quality of the service associated to the transport mode (Button. K, 2010 p.142). The time travel can depend on multiples factors such as the quality of the infrastructure. Therefore, this individual, will not perceive only the

monetary cost of the car for making his decision even though the financial cost of a bus or a train would be lower.

As argued previously, when travellers make decisions, the money has only a small influence on their choice of transportation mode. The price of transport embraces considerably more than simple money costs because there are other components of price such as time costs, waiting time, insecurity. This is so called the generalized costs and can be defined as the overall opportunity costs of a journey and can be combined in a generalized cost index (Button. K, 2010 p.82).

The generalized cost of a trip is expressed as a single, usually monetary but it combines other costs that form the overall opportunity costs of a trip (Button. K, 2010, p. 143). The author defines generalized costs as :

G= g (C1, C2, C3,…, Cn) in which C1, C2, C3… Cn are various costs such as money, time, and other costs of travel that a user has to made (Button. K, 2010, p. 143).

In that case, the demand for trips can be expressed as a function single variable with generalized cost that formes a linear combination of the different costs such as money, time or distance (Button. K, 2010, p. 143). The author stresses that the non-monetary costs of the overall opportunity costs for a journey are divided into different determinants such as waiting time and usually form a larger part of the overall costs for a trip. For instance, the quality of the service in terms of infrastructure can be expressed and measured by the travel speed and travel time. In their paper Koopmans. C et al (2013) presented a generalized costs indicator that measures changes in the cost of a trip as the cost being all the effort factors that a traveller has to make to complete the journey from the point of departure to his final destination (Koopmans. C et al, 2013 p.55). It is an indicator for accessibility changes for policy making. According to Koopmans. C et al (2013), accessibility in transport policy can be measured in terms of partial indicators of the quality of the service provided by the transport infrastructure. The accessibility is the concept used in urban planning, for instance, that defines the possibility to do things at different places and depend on different factors (Koopmans. C et al, 2013, p.154 ; Geurs. K.T and Wee. B, 2004, p. 40). The authors classified also four different approches for measuring accessibility, such as the infrastructure based measures, location based measures, person based measures and utility based measures (p.24). The utility based

measures reflect the advantages for people to gain access to various places, such as with transport mode for travel (Guhlan. G et al, 2013, p .5). There are two different type of measures for utility based and in this case I will focus on the generalized transport costs measure that include all costs made by travellers for their trip (Koopmans. C et al, 2013, p.154).

Therefore, the non monerary cost refers to aspects such as the unreliability of travel times, frequencies of public transport lines for example and ease and comfort aspects as well (Koopmans et al, 2013, p 155). It is possible to divide the components of a trip costs by the distance to obtain average costs per kilometre.

According to the author it can be calculated as the following :

Cit = PCit + TTit (VOTit + VORit + DCit)

in which

Cit = average generalised costs per kilometre of trip i in period t.
PCit = average out-of-pocket costs per kilometre.
TTit = average travel time in hours per kilometre (inverse of
speed).
VOTit = average value-of-time per hour.
VORit = average value-of-unreliability per hour.
DCit = average inconvenience costs per hour.

Source : Koopmans. C et al 2013, p.155

3.3 The generalized costs of shared micromobility

On the basis of the above points, in this section, I will present the generalized costs of shared micromobility categorized under monetary and non-monetary costs. This will be used as a basis to answer my research question.

3.3.1 Monetary cost

In the generalized cost indicator, the notion of price is an important factor influencing the use of shared micromobility service and of transport choice in general. In most of the studies, when residents live inside the city and have jobs it is more cost efficient for them to use the shared micromobility services on short trips rather than owning a car (Dias. G et al. 2021. p.8). Mahoney, L. (2020) note that in some cities, the use of e-scooters per ride is more expensive than public transport (Glavic. D et al, 2021, p.9). The rental duration and cost are estimated between the unlocking and locking time and charge is directly drawn from the user's credit card (Gioldasis. C et al, 2021, p.3). The price that user pays has to be in accordance with the time they travel so the cost perceived by users is associated by the frequency of use for the devices. Moroever, pricing and payment options provided by operators should support equity goals. Sustainable transport systems should also include the notion of access to mobility, regardless of income or location (NESTE, 2022). As argued previously the individual features and socioeconomic variables influence the demand for shared micromobility. It is found in the literature that young users prefers that the price they pay is in accordance to their income and time they spend on an escooter for example. Another common determinant for the use of shared devices is that the frequency of use affect the price that an individual is willing to pay for this mode. For this reason, providers adopt different pricing strategies by offering the possibility to pay per minute, per day, per month or per year.

3.3.2 Non-monetary costs

3.3.2.1 Time cost

As argued previously, the time travel is an important cost that influence the overall opportunity costs of a journey. Travellers take in consideration the time it takes to complete a trip before making their decision. Herb Mohring (1976) stresses that the user costs is important in the urban public transport context because the frequency of use forms economies of scale effects that should be associated with saving passengers' time. According to Kenneth Button (2010), economies exist when travellers are using a service to not have to meet

discomfort factors such as waiting times at a stop, also linking public transports so the time walking between each transfer is shorter. Increasing the outputs of transports can reduce the waiting time and so the users costs of traveling (Button. K, 2010, p.143).

Local authorities initiatives policy and variables can influence the generalised cost of a mode by implementing direct actions in terms of the quality and capacity of the spatial structure for the use of shared micromobility. A well designed transfer facilitites, infrastructure, optimal stops, speeds and other qualitative aspects will reduce the generalized costs of a transport trip and increase users' willingness to choose a shared transport mode (Pienaar. W, 2002, p.3). Finally, Rietveld (2004) research, local authorities can take actions, or so called policies efforts, that encourage the use of the bicycle as a means of transport and improve the ease of cycling.

In smaller cities, improving the public transportation systems by enabling direct connections, higher frequencies and speeds is more important than reducing walking distances to bus stops for example (Tennøy. A, Knapskog. M & Wolday. F, 2022. p 13). On the other hand, the study shows that walking distances also affects the use of public transportation modes (Tennøy. A, Knapskog. M & Wolday. F, 2022. p 9).

As the spatial morphology is a primary factor influencing movement, the results from a study coducted in the Netherland show that adapted infrastructures can have the effect of reducing the number of stops or hindrances per bicycle trip, and of achieving a gain of time in comparison with the same trip done by car so it contributes to the attractiveness of the bicycle as a transport mode (Rietveld. P & Daniel. V, p.545). Some of the most important factors influencing bikesharing adoption identified in the scoping review are the distance of a bike sharing station from one's home or job, the proximity of stations for returning the devices or the ability for returning it in another station, and the availability of use and information at certain time of the day (Efthymiou. D et al, 2013 p.71). The availability and proximity of the devices influence users' decision as they calculate the time they need to spend to get the service and how long they would need to wait for getting the device.

3.3.2.2 Safety cost

When it comes to reflect on the future of shared micromobility, previous studies argue that regulation, enforcement and governance are a need to insure its deployment (Science Norway, 2022). The ITF report suggests for policy makers, city planners, operators and manufacturers to work in close cooperation in order improve the quality of the infrastructure and strenghen regulations on the use of shared micromobility services for ensuring Safe micromobility (ITF, 2021).

The different barriers to potential bike sharing usage are the road safety concerns and lack of cycling infrastructure can discourage citizens from using shared micromobility services. The main results show that residents are reluctant to this mode for the same reason as bicycling (Nikitas. A, 2018 ; Rietveld. P & Daniel. V, 2004, p.533).

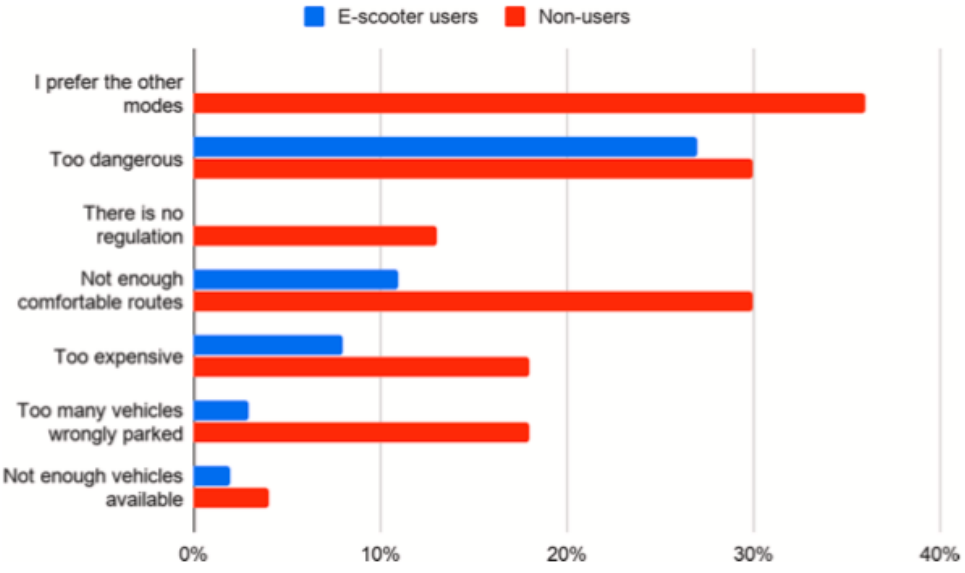


Fig. 5. Safety barriers for E-scooter users and non-users.

Figure 5. Safety Barriers for E-scooter users and non-users. Retrieved from Latinopoulos C et al, Transportation Research part D, 2021, p14. Safety barriers for E-scooter users and non-users.

On the Figure 5, a majority of the respondants, non-users and users, argued that the mode is too dangerous. Some of the explanation founded by the authors are that there is a lack of regulation, not enough comfortable routes, and too many vehicules are wrongly parked (See Figure 5). The young residents of Riga demand for legislative regulation and safety improvements regarding the use of e-scooters (Popoya. Y & Zagulova. D, 2022, p.19). Furthermore, when there are no regulations, it increases conflicts between pedestrians and escooters as non-users argues that the main barriers are that the vehicules are wrongly parked, and this an also costs safety issues.

When there is a lack of regulation, the risk of being injured with another transport mode is higher because micromobility users do not know where or how they should drive. From users' perspectives, the safety barriers for the use of escooter are also related to the lack of proper dedicated lanes. In their research, Latinopoulos C et al (2021) interviewed a member from the road safety Association in Paris, France stating that *"The speed difference between e-scooters and pedestrians is about 15 km/h. Injuries between pedestrians and e-scooters can be serious"* (p. 14-16). When escooters are riding on bicycle lanes it increased by seven times the risk of being injured (TRM, 2020, translate to english). On the other hand, a similar situation can be observed with motorized modes because the speed difference between micromobility devices and cars is also huge. The VOI safety report from 2021 shows that 31% of Europeans find the lack of dedicated lanes to be a key issue for escooter use. Moreover, 80% of fatal bicycle and escooter crashes are caused by heavy motor vehicles (VOI, 2021). The spread of the use of e-scooters in cities raised the problem of safety as many accidents have occurred in the last few months (Fistola. R et al, 2021, p.8). Nikitas. A (2018) conducted a survey to understand the reasons for not cycling and not be willing to eventually bike share among the population of Drama, a Greek city and the results show that the most important concerns are limited road safety and lack of adequate cycling infrastructure (See Figure 6). It is relevant to keep in mind that the safety is a generalized costs of shared micromobility and could be reduced by national and local authorities (Science Norway, 2022).

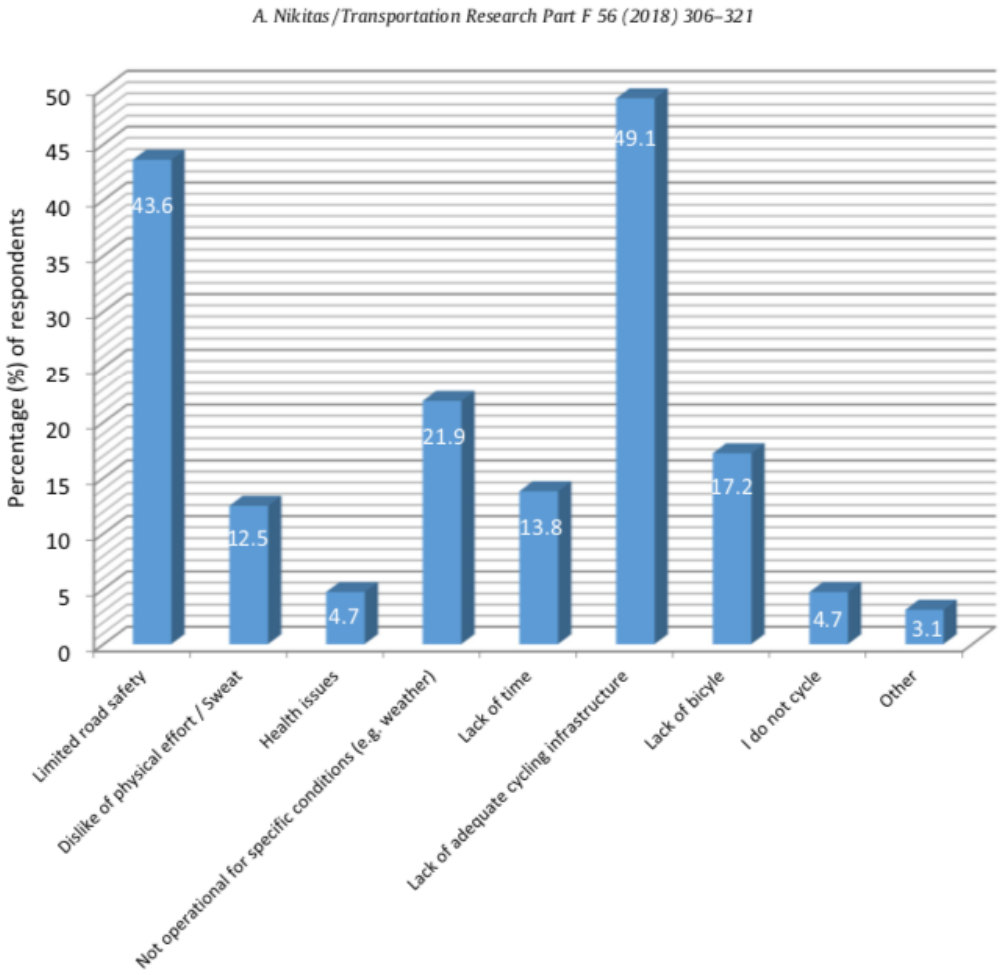


Fig. 1. Reasons for not cycling and not being willing to eventually bike-share.

Figure 6. Reasons for not cycling and not being willing to eventually bike-share. Retrieved from Nikitas. A 2018, Transportation Research Part F 56 (2018), p 314.

Previous research stresses that the integration of shared micromobility devices have impacted the public space and disrupted urban mobility. Therefore, authors recommend to integrate shared micromobility services with land use planning processes and decisions, such as allocating protected space for micromobility and regulate low speed micromobility vehicules as bicycles (ITF, 2021).

On the other hand, the risk-taking behavior is another aspect of safety concerns for users and non-users of shared micromobility. Uluk et al (2021) found out that the risk factors and injury patterns of e-scooter incidents in Berlin were often caused by a violation of traffic regulations by young drivers, the user's inattentiveness or a risk-taking driving style such as one-handed driving, jumping over herbs and alcohol consumption (see Figure 7) and occurred mainly in the afternoon and evening, during weekends. According to previous research, riding an electric scooter without a helmet, riding with more than one person on the electric scooter, and riding at higher speeds are the most common forms in regards to risk taking- behavior. Riding an electric scooter under the influence of alcohol seems to increase with age. There are 7 per cent of users aged between 13 and 15 years old who state that they have ridden an electric scooter while under the influence of alcohol, while 34 per cent for respondents that are aged between 18 and 19 year old, and 42 per cent for the age group 20 and 22 years old. The accidents related to the consumption of alcohol is increasing the older the respondents are (TØI, 1, 2022. p.3)

Table 2 Causes of incidents and analysis of risk factors with regard to inpatient admission and TBI

Causes of incident	Loss of control/balance			141 (57%)	
	Hurt themselves at E-scooter			27 (11%)	
	Tram tracks			20 (8%)	
	Hit an object			18 (7%)	
	Hit by motorised vehicle			12 (5%)	
	During braking			12 (5%)	
	Hit by E-scooter			9 (4%)	
	Tandem driving			5 (2%)	
	Trip over			3 (1%)	
	Twisted ankle while getting off			1 (<1%)	
Wearing a helmet	Yes	3 (1%)	Inpatient, n=2	Not applicable due to small patient numbers	
			TBI, n=1		
Alcohol consumption	Yes	48 (20%)	Inpatient, n=18	OR 2.1, 95% CI: 1.1 to 4.0	p=0.033
			TBI, n=15	OR 5.2, 95% CI: 2.3 to 11.6	p<0.001
Driving licence*	Yes	82 (68%)	Inpatient, n=17	OR 0.9, 95% CI: 0.4 to 2.5	p=0.968
			TBI, n=9	OR 0.7, 95% CI: 0.2 to 2.0	p=0.458
Previous experience*	Yes	58 (48%)	Inpatient, n=15	OR 1.6, 95% CI: 0.7 to 3.8	p=0.302
	1–3 times	15 (12%)			
	3–5 times	7 (6%)			
	>5 times	36 (30%)	TBI, n=11	OR 3.3, 95% CI: 0.9 to 11.2	p=0.042

Values as numbers and percentage.
Inpatient=inpatient admission.
*Referring to voluntary questionnaire (n=120).
TBI, traumatic brain injury.

Figure 7. Causes of incidents and analysis of risk factors with regard to inpatient admission. Source : Uluk et al (2021)

Gioldasis et al (2021) conducted a road survey to explore incident involvement history, driving attitudes and perceived risk among e-scooter users in Paris, France. The relationship was examined by using logit and mixed logit specifications and a structural equation model indicating that more than 40% of the ES riders aged between 17–24 stated have ridden an ES after having consumed alcohol, while 20% of them have ridden after having consumed drugs (Gioldasis et al 2021, p.8). In general, previous studies draw a user profile, young, living alone, male and trip profile as longer, frequent and found out that more distance trips were associated with risk taking behavior. Riding after having consumed alcohol, drugs and using the smartphone while riding is associated to the age and gender of users as well as the frequency of e-scooter use and its trip duration (See Figure 8). Municipalities need to tackle the risk taking-behavior such prohibit the alcohol consumption and enforce regulations as well as set up age limitations (ITF, 2021). Moreover, authorities could include micromobility in training programs and strengthen traffic rules between road to ensure mutual respect among all road users.

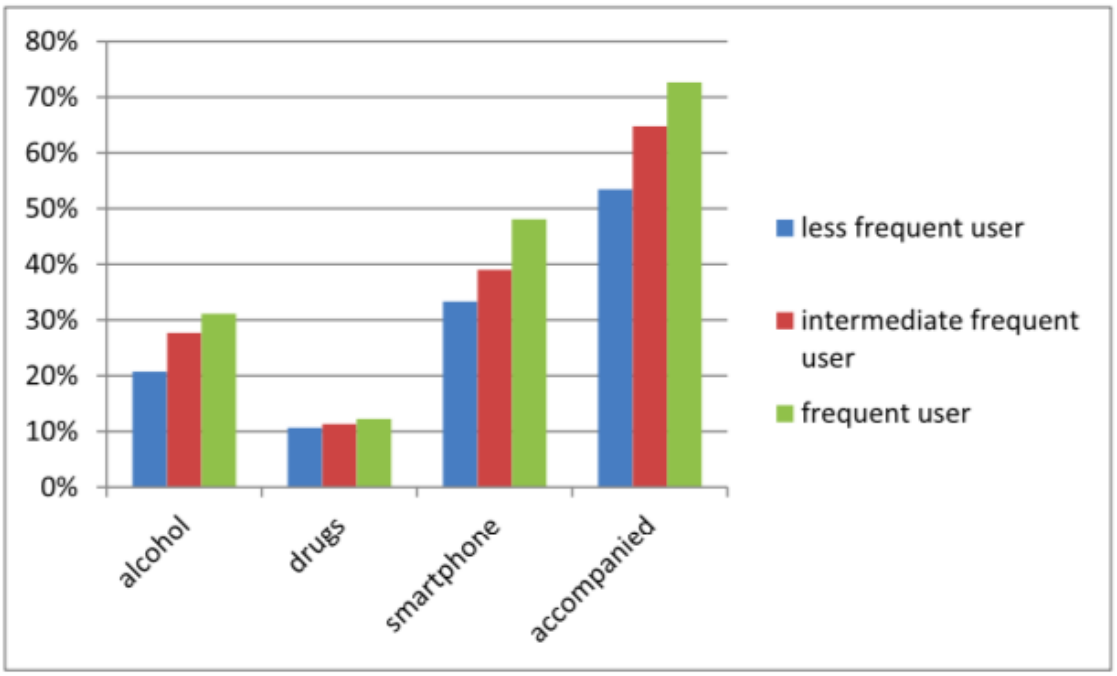


Fig. 5. Risk-taking behaviors per frequency of use.

Figure 8: Risk-taking behaviors per frequency of use. Source : Retrieved from Gioldasis et al (2021), p.9

Finally, the generalized costs depend also on users's decision to use the devices without being anxious about one's individual safety. According to the safety report from VOI, 16% of all crashes result in personal injury that occur during the first ride (VOI, 2021, p.6). This implies that escooters users' may need some practice and training before they can feel safer riding the devices.

3.3.2.3 Comfort

The generalized costs depend on the weather, pollution levels and topography as well as on the quality of the infrastructure that can makes it less comfortable to ride.

Different temperature and situations can influence users on their mobility mode choice. In the literature it has been studied that under bad weather conditions such as rain, snow, wind the use of shared micromobility service can decrease. Conditions that are favorable are low levels of pollution and appropriate weather because if the pollution level in the city is high or temperature are too warm it could be another factor discouraging the us. Due to the fact that most of the devices are designed without proper rain protection and wind falls, it might to a reason for not choosing this transport mode. Across the studies conducting in European cities, the services are often available only during the summer time and will close for winter. For example, Reiss. S & Bogenberger. K, (2015 p.587) argued that there are irregularities in trip numbers over the entire year in Germany. Their research investigated all trips by month and filtered between the workdays and weekend. According to the results, the bike trips on a day without precipitation exceed the average, especially in the morning and the evening peaks (Reiss. S & Bogenberger. K, 2015 p.588). The deduction they draw is that people are more suspicious of the weather if it has rained shortly before and will prefer to take public transport to avoid potential « showers » on the bike (Reiss. S & Bogenberger. K, 2015 p.588).

On the other hand, the notion of comfort can affect the generalized costs through the influence it has on time value and safety perceived. For instance this could be the case for the urban form or the quality of the infrastructure. Regarding the urban form, a hilly terrain can discourage balanced bike sharing use as users will prefer to return the bicycles at stations located on flat terrains (Mateo-Babiano. I et al, 2016). As a result, some of the stations might be empty and other completely full so users will spend time for finding a dock to return their bikes.

3.3.2.4 Convenience

Convenience is the primary reason for users to strenghen their relationship with the service provider as it influences users satisfaction (Moeller, 2019). The less time and effort a user spent on using a service the more convenient it is so the level of satisfaction will be higher. As convenience is critically important for users' satisfaction it can shape their intentions towards the service and affect their loyalty (Srivastava, 2014).
On the other hand, elements connected to infrastructure and hindrances that can be experienced by the user of shared micromobility in respect to the traffic or with other users from the road network can increase travel time. However, time and efforts costs are factors that have an important influence users' perception and influence the convenience aspect. Different hindrances that are imposed to users, such as the number of regulations, stops, detours, priorities at crossroads and other restrictions, will affect their travel time and affect their perception of convenience.

Finally, the implementation of laws, regulations and restrictions can make it confusing or could seem complicated for users' and negatively impact shared micromobility usage. The comfort and convenience aspects depend on the natural, built and the legal environment and can influence the value of time perceived and affect the generalized costs of shared micromobility. Therefore, the ability to minize the time and effort costs or non-monetary costs for users of shared micromobility will increase the convenience aspect of a service.

3.3.2.5 The attractiveness of other modes

The generalized costs of other transport modes can be also influenced through adapted pricing policies because it can contribute to the improvement of the competitiveness of a mode vis-à-vis the car (Rietveld. P & Daniel. V, 2009, p.545). The municipality has the possibility to implement pull measures and pursue active price setting policy of car parking fees, tax on fuel, or charging of tolls at the city entrance (Rietveld. P & Daniel. V, 2009, p.545). This can be a strategy to reduce the attractiveness of the car, and help increasing the 'no ownership' behavior (Engebretsen. Ø, 2003). As argued previously, different stakeholders can improve the attractiveness of a mode by pursuing strategies as well as adapting the urban form and

services. For instance, a study shows that the proportion of all trips made by public transport in the urban settlements is higher in Oslo than in Hamar, one reason could be that the public transportation system is more efficient in terms of the quality of the infrastructures and frequency in bigger cities (Engebretsen. Ø, 2003). These stakeholders can also implement more direct actions to reorganize spatial structure and provide an appropriate infrastructure adapted to the needs of shared micromobility users, both in terms of quality and capacity (Rietveld. P & Daniel. V, 2009, p.534).

3.3 Conclusion

In general, the use of shared micromobility services can be affected by the demographics, socio-cultural factors, weather as well as the city topography and institutional organization. Users' acceptance towards this mode of transport depend on users' related factors and users' satisfaction.

According to the generalized costs theory, the monetary and non-monetary costs of a transport mode can influence its use. When it comes to users' acceptance towards shared micromobility as a transport mode, the price, travel time and safety costs can affect the attractiveness of the mode. Nevertheless, according to different studies, the generalized costs of shared micromobility can be influenced by different interventions and policies. As argued previously, national and local authorities as well as providers of shared micromobility services are the leading stakeholders involved in the planning and decision-making of shared micromobility. The leading stakeholders can implement different interventions and approaches to reduce the generalized costs of the transport mode and it will be studied in more details under the chapter 4. In addition to that, other stakeholders can work in close collaboration with the leading stakeholders to increase the attractiveness of shared micromobility by using different tools and innovation. The figure 9 presented below will serve as a basis to interpret the results and findings collected from the scoping review and semi-structured interviews.

Other stakeholders :

- Innovation
- Tools
- Cooperation
- Management

Providers of shared micromobility vehicles :

- Price
- Availibility
- Quality

National and local authorities :

- Spatial design
- Regulations
- Subsidies & Taxes
- Agreements

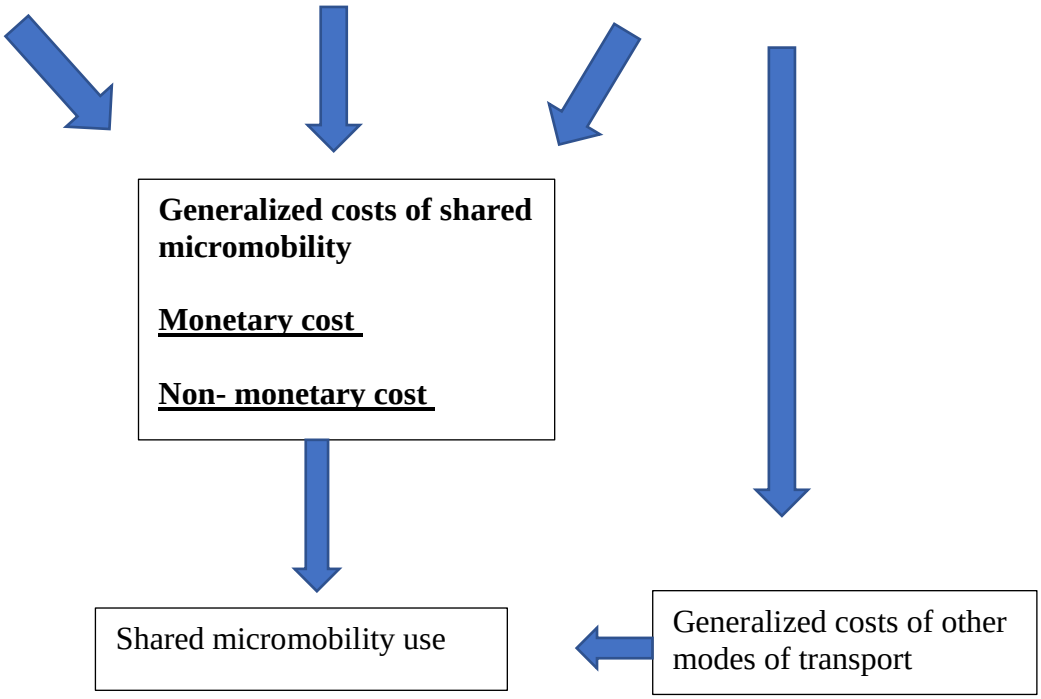


Figure 9. The stakeholders and factors affecting the attractiveness of shared micromobility as a transport mode

Chapitre 4 The success factors for shared micromobility

In this section I will answer the first research question, what are the success factors of shared micromobility systems. To answer this research question, I use the scoping study method and summarize the findings according to the generalized costs of shared micromobility as presented previously under the theoretical framework (See Figure 9). I will present the factors and the different stakeholders that makes shared micromobility systems successful in respect to the generalized costs of shared micromobility.

4.1 A low monetary cost for shared micromobility

As argued under the theoretical framework, the financial cost of a transport mode is part of the overall opportunity cost of a journey and can therefore influence the decision of an individual. The French city of Lyon has enabled the success of a shared micromobility system with the introduction of the Public Bicycle scheme, known under the name of Vélo'v. This public bicycle system is a service that was created from a public-private partnership between Grand Lyon and the billboard company JCDecaux (Buehrmann. S). In cities where there is a "bicycling" culture and good infrastructure in place, bike-sharing programs can help to increase inexpensive city based alternative transport option for long term users (Nikitas. A 2018, p.313).

For instance, this transport mode is also adaptable to different users as it is possible to choose between two different type of subscription. The first one is available for daily or short-term use and the other is for long term use. Financially, paying per month is more advantageous than paying per use for long term users. According to a survey conducting in the city of Lyon, the users that shortly rent the devices or on a daily base are mostly likely tourists or residents that commute occasionally and for fun. While long term users are those commuting to work or study places. Those two different types of subscription offered by the Vélib system give individuals the possibility to pay according to the frequency of use and is accessible of use by non-residents as well (Tran et al, 2015, p.298). It is a considerable advantage that reduce the generalized costs of shared micromobility in terms of financial costs and convenience because it enables to extend user's choice in terms of alternative transport options and increase the attractiveness of the mode by choosing the subscription that suits better to them.

Moreover, the reason Vélib is successful is that these bikesharing services work with public money as it is a subsidized service, it is attractive for users because it costs 3.10 euros per month with unlimited ride costs (Lomas. N & Dillet. R. 2020). In Madrid, Spain, the electric bike-sharing system BiciMAD was the first demand responsive system of electric bike-sharing with a fee per use of €0.50 for the 30 first minutes and a possibility for users to pay annually. BiciMAD is the cheapest one compared to other options, as users can pay only 0.25€ per a 15 min ride but the provider offers also complementary scheme for occasional users, with €4 per hour fee (Molinares-Arias. D, Julio. R & Monzon. A, 2022. p1309). Futhermore, bike sharing users have a system of transportation available 24h/24 which they can use when needed. A public bikesharing program enables citizens to get from a point A to

B by having easily access to a bike without being concern about the risk of thefts, bike parking and bike maintenance (Tran et al, 2015. p.298).

Based on previous research it is important to consider users' preferences and habits in order to better adapt pricing strategies and make it more attractive. In a city like Lyon, France, bikesharing is preferred as a transport mode for people commuting to work in the city center because it is cheap and convenient. A survey of shared e-scooter's users in Paris, show that the main motivation for use are money and time saving (Christoforou, Z.; Gioldasis, C.; de Bortoli, A.; Seidowsky, R. 2021). In certain context, when a transport option is convenient such as private car for example, some people do not think that the monetary cost matters, so they won't necessarily take this into consideration. However, the financial cost can be considered as one of most important generalised costs of shared micromobility as users are generally young and are students. In general, younger people or students do not have high incomes so they might be looking at the price before choosing a mode of transport. For instance, it was reported by the newspapers that some of young escooters' users, due to high pricing per minute, would take more risk to ride faster and therefore pay less attention regarding their own and other's safety.

Moreover, it is always an added value to a service if it is cheap and convenient for the users. Privately owned escooters can be more expensive than bikesharing but the devices gain in popularity due to their flexibility. Often, bikesharing programs are docked-based stations and can seem less convenient to users. However, availability such as a high number of devices and technology can also help to increase the quality of the services. BiciMAD, the electric bikesharing system in Madrid has 3000 ebikes in more than 258 stations in and around the city center. Furthermore, the ebikes have an integrated technology that allow the users to get real time information on where they can find an available ebike (Madrid Destino Cultura Turismo y Negocio S. A. 2022).

In contrary to public schemes, privately owned programs are looking for profit and often implement escooters. However, private companies that have recently implemented free floating systems with escooters are taking different initiatives to make their services cheaper. In Braga, after the pandemic, escooters' companies like Bolt and Bird started offering reductions and attractive prices such as 0.05 euros per minute traveled and Bird offered 15 min trips for 1 euro (See Figure 10 ; Dias G., Arsenio E., Ribeiro P. 2021). In addition to that,

since there is no need for docked and charging stations, free floating systems are easier and cheaper to implement and its public acceptance is such higher as it is more flexible to use on the demand side (Wilke, 2018).

Figure 10: Low prices by Bird and Bolt (Dias G., Arsenio E., Ribeiro P. 2021).

The company Bolt is highly active on their marketing strategy and is offering promo codes or referral code to get new users (see Figure 11).

1. Have the Bolt app for yourself (download from Google Play or App Store)
2. A friend, who also wants a free ride (it's a win-win)

Receiving bonus riding credit is easy – invite your friends to sign up and take a ride with Bolt with your code. You'll get a discounted ride once they have done their first ride using **your promo code**. And they also get a discount off their first ride.

To find your referral code, open the Bolt app and tap on the left side of the menu tab. From there, it's easy! Click on "Free Rides" and do as described – there are multiple ways to share your code with your friends. These include social media, SMS or simply copying your referral code and sending to friends.

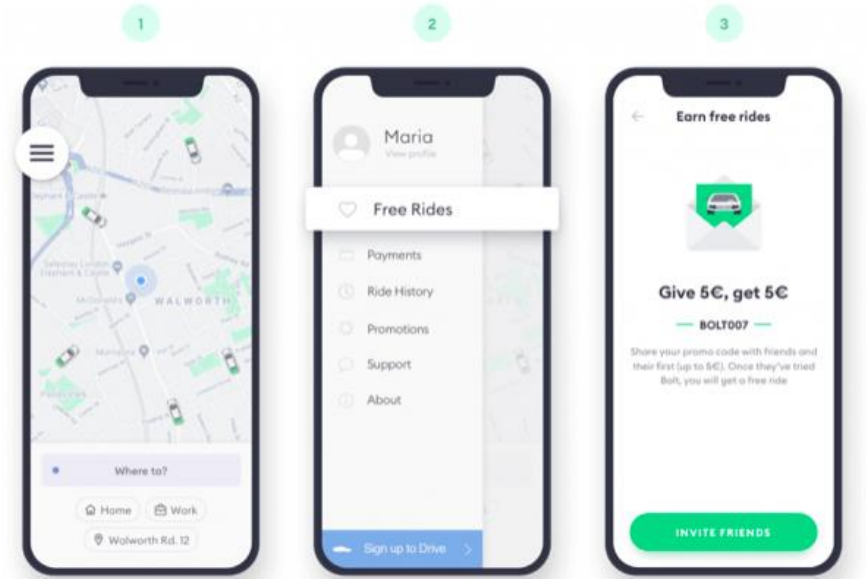


Figure 11: How you earn free rides with Bolt (Bolt, 2020)

The company offers other ways to get a discount or promo code as on their application it is possible to refer friends by using a promo code and in exchange the company gives to the person a ride discount as a reward (See Figure 11). They also promise to give to users' friends «a nice starting bonus! ». Moreover, Bolt host regular discount competitions so when there is a special event coming up, they send a voucher code that can be used to get a Bolt ride discount. Providers can attract new users to try their devices but also keep their current customers satisfied by keeping low prices (Bolt Technology OÜ, 2022).

Successful programs should support equity goals, and this can be done partly by offering cheap or affordable services. On the other hand, some shared micromobility systems are directly integrating with other public transportation in application and as one payment systems like the city of Helsinki and Hamburg (Ramboll, 2020, p57). As escooter users often combine other kind of public transportation to complete their journey, a collaboration between providers and local authorities could be oriented towards the development of a multimodal application. This can enable to create competitive alternative to the car and to make the use of shared micromobility smoother. For that there is a need to improve the availability of the vehicles in terms of number but also to find the right location. A solution could be to make the devices available at all public transit stops. The public sector could work in close collaboration with private actors on the development of new technologies that could also increase users' convenience by reducing their travel time and monetary costs. According to D'Urso et al, (2021) *"a user-centric, intelligent mobility distribution model in which all mobility service providers' offerings are aggregated by a sole mobility provider, the MaaS provider, and supplied to users through a single digital platform"* (p.688). Nowadays, more cities are working on pilot projects to offer shared services and public services on only one app that makes it cheaper for users to combine transport but also more convenient and easier. Gathering several passenger transport services on a common platform, such as micromobility services with buses, is a measure that can contribute to increasing the proportion of users of public transport services and micro-mobility services. An integrated platform is an efficient way for making the services more visible, accessible and easy to users. Nevertheless, the Mobility as a Solution (MaaS) service must be designed to meet the actual user needs (Krishman. S & Ødegaard. I, 2020. p.5).

4.1.1 Conclusion

Often, it is found in the literature that privately schemes are more expensive than publicly owned programs. Nevertheless, in general, shared micromobility systems are relatively cheap to use. Moreover, providers can increase the use of shared micromobility by offering different pricing strategies and marketing strategies can be applied to maintain current users as well as to attract new ones. Finally, as a result of collaboration between the municipality and providers, some cities are currently developing integrated payment solutions that make it cheaper and more convenient for users of shared micromobility. The next sub-section will

explain how increasing the generalised costs of other transport modes can make shared micromobility more attractive.

4.2 Increasing the generalised costs of other modes

Increasing the generalized costs of other transport modes could contribute to the success of shared micromobility systems as increase fuel prices positively influence the use of public transports (Eltis, 2021). National authorities can use different interventions such as push approach by introducing measures for increasing the costs of car use or imposing regulations to control or prohibit car use such as higher parking costs, taxes, fees, charges and tolls. Germany, Austria and Switzerland implemented more costly use taxation, fees and car restrictive policies to discourage the use of private owned cars in their streets. At the national level, the government is taxing higher on gasoline prices and increasing the cost for getting a driving license. At the local level, municipalities set up high fees on parking places and impose restrictions on the supply such as speed limits, car access, time for parking and places (Buehler. R et al, 2016. p.19). Increasing the number of hindrances for car passengers and restricting car access can positively contribute to increase the use of shared micromobility services. On the other hand, national authorities can also use a pull approach that consists on incentivizing the use of alternative modes through monetary incentives, improvement of public transport and biking infrastructure for example. Greener and smarter initiatives can help to attract the residents to use active modes, public transportation instead of cars. All these measures contribute to make cars less attractive to drivers as it increases drivers' time and monetary costs.

According to ITF (2014), regardless of the alternatives available to car use charging parking and road use based on demand will improve the efficiency of congested road systems. Moreover, reducing congestion by improving service speed and reliability, as well as accompanying investments for public transport will benefit bus passengers and create competitive alternatives to car-use. For example, in London, revenue from the Congestion Charge is used entirely to fund public transport. (OECD/ITF 2021, p26). The bus services can be improved through the allocation of more road space to buses and reliability of bus services improved within the charging zone as well as across the city. As shared micromobility is

preferred as a transport mode for first and last mile trips, improving the public transport could help to increase the use of the devices if one combines both transport modes.

In Norway, the relation between the state and municipalities is characterized by a form of control from direct interventions to indirect interventions and control with regulations and contracts. Even if the municipality level is in charge of land-use planning authority, the national authorities use several instruments that influence actors in their decisions planning. For instance, binding agreements serve to guide municipalities on the state is committing funding to develop public transport infrastructures or services (TØI (c), 2022). In 2014, the National Transport Plan adopted the "Zero Growth Objective" as a key target for transport policy in cities for no growth in private car traffic, in which the government put forward the goal of shifting travel to public transport, walking and cycling. The city of Oslo, via the Urban Environment Agreement has supported important investments in public transport as well as a reallocation of road and street space in Oslo (OECD/ITF 2021, p26). Traffic data collected within the city center showed that car traffic reduced by 11% in the period 2016 to 2018, and by 19% between 2018 and 2019 (Eltis, 2021). Moreover, according to Oslo budget proposal for 2022, the City Council wants to increase the number of people using environmentally friendly methods of transportation by asking its government to increase parking fees, the remove thousands of parking spaces, get more toll stations two-way collection and increased environmental differentiation of the rates (Oslo Kommune, 2022). As argued previously, policies and measures making car use less attractive can offer more space for micromobility services and other active transport modes.

4.2.1 Conclusion

In this sub-section, it was argued that the generalized costs of other transport modes can affect the attractiveness of shared micromobility. For instance, national and local authorities can implement push and pull measures against car use that will be favorable to the shared micromobility usage. Some interventions and measures can enable to increase proper and dedicated infrastructure for active modes such as bike lanes and decrease the number of hindrances for their users. On the contrary, car users are experiencing higher generalized costs and are nudged to shift towards shared and public transports.

4.3 Reducing travel time cost

Results from a survey from French cities show that 19% of e-scooter trips would have been private car trips and 36% would have been substituted by ride hail car trips (Ramboll, 2020, p.27). Escooters or ebikes could have the potential of reducing short car trips. In general, shared micromobility vehicles are seen as efficient mode of transportation for short distances, such as for trips less than 5km. Shared micromobility devices can also make travel faster and convenient when it can be easily combined with other mode of transport such as with subways and buses.

According to a study, results show that the public transport variable is significant in all the models of regression as the combination between the train and bike sharing seems to be the most important intermodality of bike sharing in the city of Lyon, France. (Tran et al, 2015). However, residents who lives in inner city do not need to combine bikesharing with other mode of transport such as trams and subways. As the number of jobs is one of the main explicative factor influencing the use of shared micromobility services, users combined bikesharing with train because they lived in the city of Lyon and worked far so they used the devices to get faster to the train station from their home and vice versa. Similarly, users combine bikesharing with public transport, such as train, when they lived outside the city and worked in Lyon (Tran et al, 2015, p.296). In the annual report from the provider of escooters, VOI, there is an evidence that 63% of VOI users in Europe claims that they combined escooters with public transport (VOI, 2021). On the other hand, leisure variables such as cinemas, bars, restaurants also influence the demand because short term users use bike sharing for occasional trips. As the use depends on the service area coverage and proximity of the devices to one's individual home, work place or other location, previous research stresses that a better distribution of this mode would be to place the devices in busy areas such as commercial centers, universities, city center, bars, cafes, main bus terminal stations, main trains station. This can help to efficiently match the supply to the demand by insuring that there are enough devices at busy points and reduce user's travel time as they have easily access and won't need to walk further or to wait to get the device.

It is possible to optimize the distribution of bikes by determining a specific and busy area and provide the bikes where and when they are needed would increase the availability and so their utilization (Reiss. S & Bogenberger. K (2015) analyse Munich's Free Floating Bike Sharing

system and apply an Operator based Relocation Strategy. p.588). The data collected from e-scooters locations in Lisbon, Portugal, during one week confirmed that spatial morphology at different scales, such as node, community and global network influences the use of public space by micromobility (Freire de Almeide. H et al, 2021, p.1-19). Moreover, increasing the number of stations and their capacity has a positive impact on the bike sharing flows (Tran et al, 2015).

Shared micro-mobility service providers could reposition their vehicles more efficiently by a measure of population density so a larger number of users would get faster access to the devices and this would increase its use (Reck et al, 2021). After analyzing over 6 million bike sharing trips recorded in 2011 to explore the built environment factors related to the use of bike sharing Vélo'V, authors argued that the more the availability at station level is improved, the more bike sharing demand can be satisfied (Tran et al 2015, p.298). Improving the availability of the devices when and where needed could increase access at places where their use is wanted. The challenge with docked station such as with the bikesharing program Vélib in Paris, is that users that want to unlock a bike cannot because some stations are empty, and others are completely full so it is impossible for them to return the bikes. Stations at greater elevations generally experience greater demand and there is a net inflow of bicycles from the outskirts to the city center earlier in the day, and a net flow outward in the evening. Thus, depending on the time of day, Vélib needs to manage the demand at its outermost and centermost stations. As a solution the public scheme Vélib implemented bonus points for users that take a bike in a full station will get 3 minutes as a bonus, those who drop off a bike at an empty station can also get 3 minutes of bonus and if one do both then they get 10 minutes of bonus. A 10 minutes of bonus means that an user can bike for free during 10 minutes (Smovengo, 2021).

Policymakers can guide the use and integration of shared micromobility services into the wider transportation system to improve first/last mile access and to foster their use as alternative commuting modes (Reck. D & Axhausen, K, 2021.) In Oslo, micromobility companies focus their business and pricing strategies in the city center because public transport access is the strongest but neighborhoods outside this area need improved first and last mile solutions as well (Ramboll, 2020, p57). Shared micromobility can help to complement public transportation in areas where residents have less access to those facilities.

After the pandemic, the city of Paris took advantage of empty streets to design a new infrastructure. For instance, the Rue de Rivoli, a major road that connects the Champs-Elysées to Bastille, as now two-thirds of the road is dedicated to bikes and e-scooters. (Lomas. N & Dillet. R. 2020). As the mode choice is nested and dominated by distance and time of day, developing the infrastructure could boost micromobility as an attractive alternative to private cars to tackle urban congestion during rush hours (Reck et al., 2021). For instance, the mayor of Paris, Anne Hidalgo, announced the idea of making the capital a fifteen-minute city, "la Ville des proximités" by creating neighborhoods where every essential residents' needs are easily within reach in 15 minutes by bike or walking (Paris, 2022). The city of Paris is following a universal concept that has already been adopted by Copenhagen for instance in order to limit polluting travel and improve the living environment. The goal is to create a more compact city consisting in limiting the perimeter of access to vital functions, such as food, work and leisure cultural activities. The goal is to increase active mobility and bring the city closer to its inhabitants by developing more cycle paths. In Paris more than 1000 km of cycle paths were built since 2014 (Paris, 2022). Creating cycle path and a more compact city were residents can get to work, shops or schools in 20 minutes is a favorable factor for increase the use of shared micromobility services such as bikesharing programs that are already popular in Paris (Vélib, 2022).

The municipality has a key role to play when it comes to infrastructure in the city and could also support the development of places for fast charging batteries at gas stations, points of sharing and catering places (Popoya. Y & Zagulova. D, 2022). As argued previously the city of Oslo was awarded the European Green Capital 2019 and invested in public transport and cycling infrastructure. The goal is to reduce the growth in car traffic and in 2016, Oslo launched the « Car-free Livability Programme » (Figg. H, 2021). The results showed that a dedicated cycling infrastructure can help to increase shared and public transport use, especially in densely populated areas. Moreover, the traffic data collected show that the new measures contributed to an overall traffic reduction in Oslo by making driving and parking in the city center more difficult. Investments in shared micromobility infrastructure have a positive impact on other forms of micromobility, from regular bicycles to escooters and make it less risky for other road users and pedestrians (Eltis, 2021).

In Oslo, the traffic regulation specifies that bicycle, escooters and other devices can be stopped or parked on a cycle path, footpath, pavement, pedestrian street or street garden if it is

not an unnecessary obstacle or inconvenience, it has been highly critize for not providing clear rules or obvious places for parking electric scooters. As a response to that, Voi and St. Hanshaugen district have carried out pilot trials with the deployment of parking stands in Oslo and Trondheim, while both municipalities have had trials with painted parking spaces. A month later the company provider VOI activated GPS areas around the racks that were detecting if the users parked the devices in the designated areas. For pushing users to respect the condition, VOI provided a discount of 10 NOK to users who parked the devices in the appropriate zone (TØI, 2021, p.4). Bolt adopted a user-based redistribution strategy of rewarding users by applying a discount of €0.10 for taking a bike from a full station and €0.10 for returning it at an empty station (Julio. R & Monzon. A, 2022. p1309). Data collected from GPS and the results from the questionnaire surveys conducted by Transportøkonomisk institutt (TØI) show that users are not willing to walk up to two minutes to park in one stand so the effect of parking the device in racks is higher when zones are closer to users' destination, as escooters is mainly used for first and last mile trips (TØI, 2021, p.51).

Therefore, for achieving success, cities need to show commitment for smart and sustainable urban planning and promotion of micromobility as a part of the whole urban transportation system by offering a proper and dedicated space (Bieliński T., Ważna A. 2020). Providing adequate spatial infrastructure can be done by increasing space to ride and park and linking e-scooters with public transports to create an attractive transport system (Gebhardt. L, 2021). Moreover, by upgrading the application and always making sure that it contains the right and real-time informations such as the location, availability, the battery level etc, providers could increase convenience aspects and reduce users' travel time. Finally, cooperation and collaboration between the municipalities and providers is highly important to understand users' needs for developing successful shared micromobility systems.

4.3.1 Conclusion

The travel time cost can be decreased with high availability and flexibility. For instance, a high number of devices located in busy areas will enable users to find an available device whenever they need. Furthermore, in cities where shared micromobility is combined with other kind of transports such as trains and buses it is important to place the devices near to transit areas. Finally, a proper and dedicated spatial design and cycling infrastructure would benefit the users of shared-micromobility as it will lower the number of hindrances.

4.4 Decreasing safety costs

Within the European Union, shared micro-mobility and other electrically powered micromobility vehicles are defined and characterized differently in national legislation from country to country. Some countries allowed shared micromobility on their streets without specific requirements or regulations, while others decided to wait and gain more information from the early adopters.

Medias have reported common and many issues with escooters such as wild parking, speeds because of the minute rental of providers that encourage riders to speed and can create accidents. Municipalities need to adopt new strategies for managing shared micromobility programs in a smarter and safer way (James, O. et al, 2022). Local authorities could also provide sufficient space for parking as well as racks or designated zones to reduce risks and complains (ITF, 2021). The Chief Research Economist at the Institute of Transport Economy, Nils Fearnley stresses that the future of micromobility will depend on national and local regulations (Science Norway, 2022).

Designated parking places, lanes, control the users can reduce the risk of injury but cannot be implemented and upgraded without the municipality. The Netherlands, Denmark and Germany are great example of countries that have succeed for making bicycling safe. For instance, Pucher. J and Buehler. R (2008) present different policies and measures that have been implemented by those countries to promote safe cycling. Local authorities can do improvements on the city's infrastructure with separate cycling facilities, parking facilities, intersections modifications as well as implement priority traffic signals, traffic laws and zones with lower speed. Shared micromobility providers could also educate users about the service and offer training programs.

Previous research have studied that electric devices such as free floating escooters were becoming an issue for other road users as well as for users themselves. In response to that, several countries have introduced measures, regulations and other mandatory requirements for the use of the devices because the inability to solve safety problems with e-scooters leads to strict regulations on the use of e-scooters. (Popova Y., Zagulova D. 2022. P.19). If shared micromobility meet certain country-specific requirements, they can be treated similarly to

bicycles in certain traffic codes. The maximum speed as well as the device's features and physical measurements, are described in national regulations and laws (Wedenoja, 2020).

The two main goals of road organization for urban areas is to reduce the average speed and to create separated infrastructures in Paris between different vehicle types. (Latinopoulos. C et al, 2021). The speed of a device is a fundamental factor affecting road safety because when there is low limitation it decreases the risk for accidents and injuries. (VOI, 2021. p.19). The mayor of Paris imposed speed limits of 20km/h and 8km/h in areas with heavy pedestrian traffic and riders are compelled to use urban areas cycling lanes or roads limited to 50km/h and to respect the traffic regulation (Europe consommateurs eu, 2020). Previous research show that accidents could be prevented with systems that limit maximum speed for new users, and gradually increase it with riding experience (Latinopulous et al, 2021). In the italian capital, Rome, speed limits are even lower than in France and authorities are restricting the use of e-scooters to those that can certify their age by sharing their ID card (Europe consommateur eu, 2020).

Some countries, like France, introduced fines for escooter users were riding on the sidewalk due to an increasing number of pedestrians complaining (Grothaus. M, 2019). According to a survey, the number of accidents is related to the influence of the use of smart phone, alcohol and drug consumption (Gioldasis C. et al, 2021). For example, France, consider that dangerous behavior driving is punishable by one year in prison and a fine of 1500 euros. Other prohibitions have also been implemented as for example riders need to be older than 8 years old, no possibility to carry passengers, the use of headphones is prohibited and users under 12 years old have to wear a helmet (Luko, 2022).

These past few months the number of requirements and strict regulations have increased. The minister of Denmark ensured that escooter users can travel safely by introducing requirements such as wearing a helmet, as well as introducing a ban on riding escooters at certain times and prevent driving under influence. (TRM, 2020, translate to english). On the other hand, shared micromobility providers should continue to promote the helmet use because it is proven that helmets use reduce the severity of head injuries (OECD 2020).

According research on shared micromobility injuries, drunk driving appears to be a real hazard to public health. A Helsinki-based Finnish report on shared micro-mobility injuries show that 53% of the accidents occurred at night between 20.00 pm and 04.00 am with 51% of patients that were under the influence of alcohol or drugs (Simpanen, 2020). In a research published by the Transport Økonomisk Institutt (2022), authors found out that the riding an escooter under the influence of alcohol increase with age. Due to an increase number of accidents at night times and particularly on weekends, cities like Oslo, Helsinki and Stockholm have already introduced nighttime bans and cut the numbers of escooters in their cities (Europe consommateur eu, 2020). In terms of equipment and hardware, the legislation can make it imperative for e-scooters to have lights both on the front and the rear, so riders are expected to wear reflective items at night and be seen by other. (Latinopoulos. C et al, 2021).

As proper dedicated lanes increase the way users and non-users perceived safety, municipal authorities may improve legislation taking into interests all parties and creating an infrastructure favorable for the traffic of all involved parties such as pedestrians, car-drivers, e-scooters drivers, bike riders because a safe living environment enables to solve problems. (Popoya. Y & Zagulova. D, 2022, p.19).

According to previous research, support bikesharing could be also done through endorsement, co-promotion, financial support, advertising, smartcard so building public-private partnership is also part of the success for shared micromobility (Parkes et al, 2013). Authors reported that the experience variable had a positive effect on the intention of use escooters. Therefore, if authorities or companies implement appropriated training programs online or offline, it would give the opportunity to improve the knowledge and experience for riding escooters safely (Popoya. Y & Zagulova. D, 2022). Municipalities and providers work in close collaboration for reducing safety hazards related to the use of escooters. For instance, rental companies track in real-time their devices and can limit their speed in the zone areas required by the municipality they do also give riders knowledge on the use of the devices and local regulations. On the other hand, to prevent from wrong and rogue parking, users are required to take pictures of the dropped off scooter (Europe consommateur eu, 2020). Furthermore, authors argue that information campaign could target the young user group to raise their awareness on the potential hazards of riding an escooter (Gioldasis C. et al, 2021). Finally,

violent actions should be investigated by local police authorities and a comprehensive plan that fosters personal security should be conducted as well (Campasi. T et al, 2021).

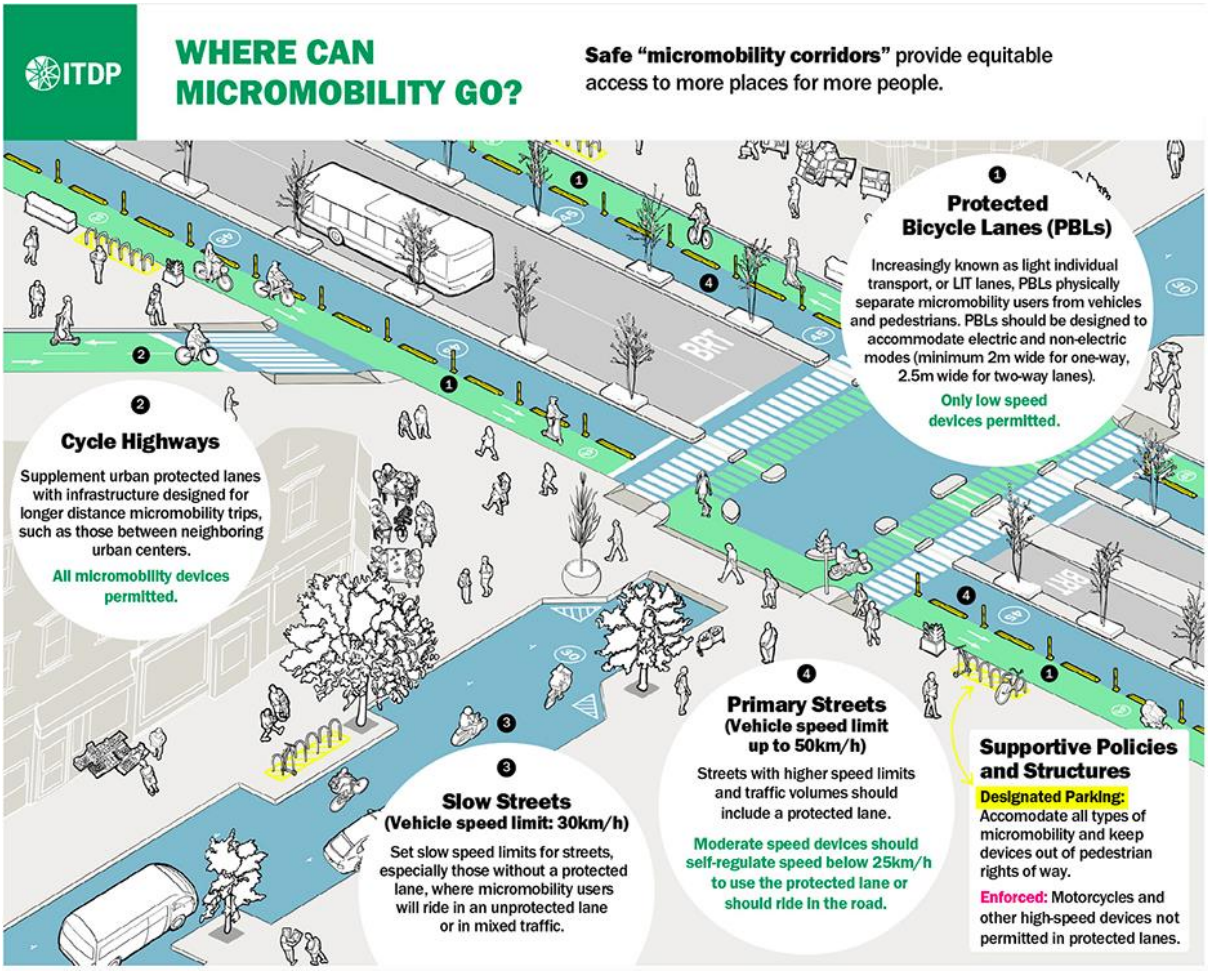


Figure 12 Where can micromobility go ? Source : ITDP, 2022. https://www.itdp.org/multimedia/defining-micromobility/

The successful swedish company Voi Technology started integrating multiples technologies such as computer vision technology that allows to know whether escooters are riden on a sidewalk, cycle lane or on a street (Huet. N, 2021). After testing the technology Voi started introducing it for the public use and the CEO Fredrik Hjelm said that will help to prevent from hazardous situations. On the other hand, the provider Lime tested a technology that relies on speed and vibration patterns to show sidewalk riding (Huet. N, 2021). The technology could be a useful tool for helping municipalities to adapt the infrastructure and

regulate the devices with geofencing, slow speed zones, dedicated parking spots, no park zones and penalties. The provider VOI introduced also a function called « helmet selfies », and a sobriety test on its app (Huet. N, 2021). In this case, companies can develop successful systems by improving their technologies and solving current micromobility issues in close collaboration with local authorities.

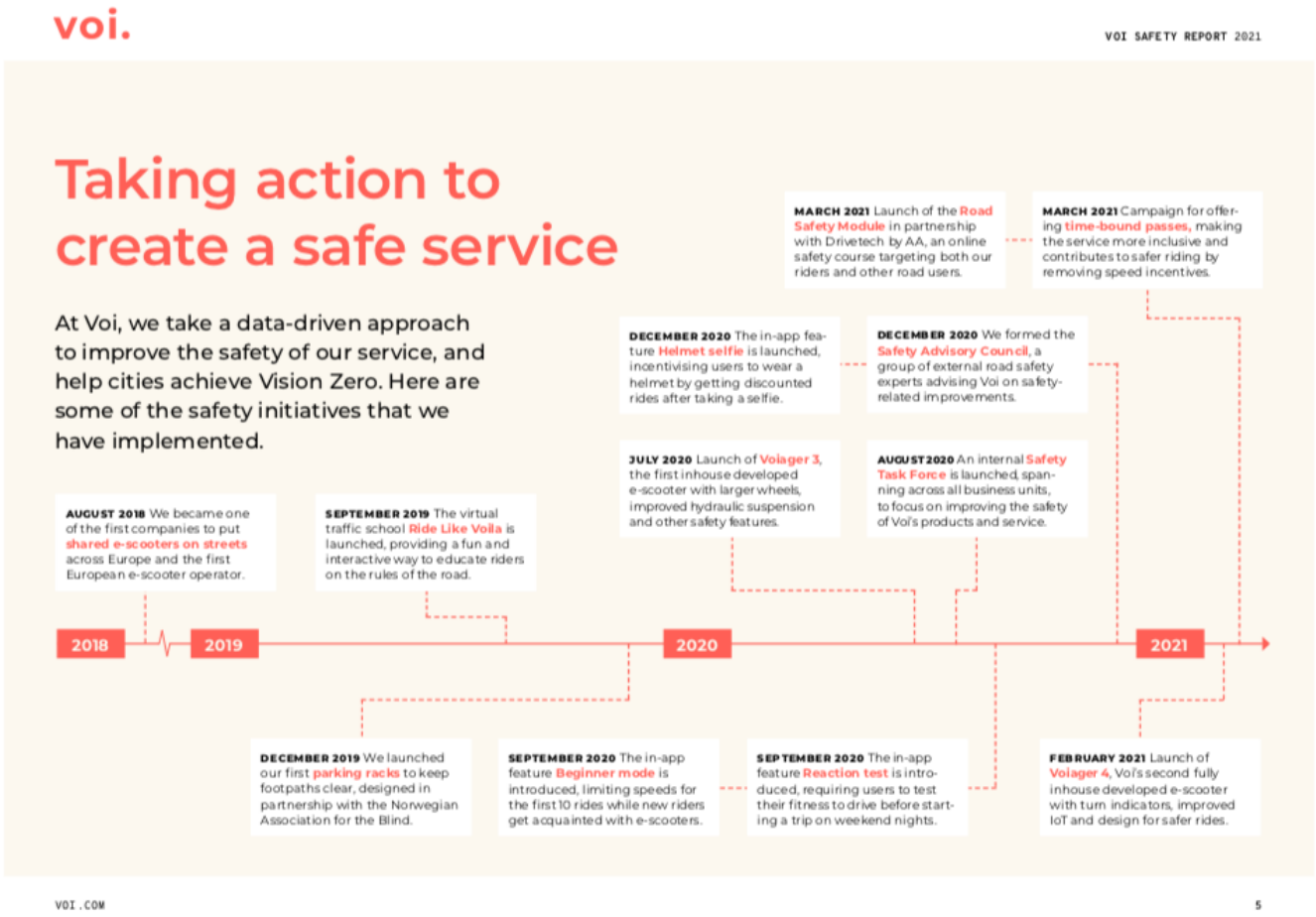


Figure 13 : Taking action to create a safe service. Retrieved from the Safety report, VOI 2021.

As argued previously, research shows that young people have a lack of knowledge about traffic rules and according to the International Transport Forum (2020) safety report incidents are more likely to take place during a user's first few rides on an e-scooter. In 2019, VOI launched the world's first digital traffic school for e-scooters, certified by The National Society for Road Safety in Sweden and The European Institute for Road Safety, Vias (VOI, 2022). The online traffic school is available for all on RideLikeVoila webpage and is free of charge. In addition to that, it rewards users for taking free rides and already more than 600 000 riders have visited the traffic school (VOI 1, 2022).

Moreover, through data sharing such as with MDS APIs, VOI allow cities to query current and historical vehicle availability and trip data. This allows cities to collect data that can affect real-time traffic management and public policy decisions to enhance safety and quality of life in urban environments (VOI, 2022). Furthermore, access data and engaging information on Voi operations offer valuable information, educate through data and give cities a deeper and more transparent understanding of their business and services.

4.4.1 Conclusion

The safety cost can be decreased by regulations and requirements enabling to prevent the risk of accidents. Safety issues are an important cost of shared-micromobility at one needs to feel safe for using the devices. Cities have taken different actions and those can be enforced by the providers of shared-micromobility services either on the application interface or in the electronics of the devices. For instance, it is found in the literature that young users are often taking risk by riding without a helmet, by riding with another person on one device as well as by riding under the influence of alcohol or drugs. However, the market is still new and cities need to be aware that they should regulate at the minimum level. The most common limitations and regulations that have been identified for leading to the success of shared-micromobility use are; imposing an age limit, requiring helmets use for young drivers, introducing nightbans on weekends, reducing the number of devices in the city center to keep a better control over its use and last but not least, developing new technologies that can control the use of the devices as well as verify that some of the requirements and regulations are being respected by the users.

Chapitre 5 Discussions

Findings and interviews. How could a shared micromobility system be successful in the city of Bodø ?

This section is aiming to understand the potential for the development of shared micromobility systems in the city of Bodø and discuss the role of the stakeholders on the attractiveness of shared micromobility in Bodø.

In this section, I will try to answer "*how could shared micromobility become a success in the city of Bodø ?"*. To answer this research question, the section will summarize the findings collected from the interviews conducting with stakeholders involved in the planning and decision-making of the shared micromobility system in the city of Bodø. In addition to that, some observations and findings from Bodø's local reports, newspapers will be added to the analysis. The findings will be discussed according to the Figure 9 as presented under the theoretical framework.

5.1 An overview of the success factors for shared micromobility

As argued previously, the price, the cost of other modes, the number of hindrances encountered during a trip, the regulations as well as the quality of the infrastructure are some of the factors that have an influence on the generalized costs of shared micromobility. When it comes to the monetary cost of shared micromobility, or the price that a user is willing to pay to use the service, the financial cost of a trip made by a shared escooter is relatively cheaper than the cost of driving a car. As argued previously, providers try to maintain their current users satisfied and to attract new ones by using different pricing and marketing strategies (Table 1). On the other hand, national and local authorities are initiating and implementing different policies and measures that contribute to reduce car use and make other modes more attractive. Leading stakeholders can also contribute to reduce users' travel time cost by ensuring that there are enough devices available at transit stops and busy areas as well as reducing the number of hindrances by building a proper infrastructure. In general, national and local regulations as well as proper spatial design in terms of the quality of the infrastructure are also positively correlated to the use of shared micromobility as it enables users to feel safer. Moreover, nowadays, shared micromobility devices have integrated technologies enabling to enforce requirements and regulations and to decrease safety concerns (Table 1).

The Table 1 is presenting the success factors of shared micromobility systems as reported under the chapter 4.

Generalized costs of shared micromobility	**Success Factors**
1. The financial cost of shared micromobility	Marketing and pricing campaigns, long term and short-term subscriptions, low prices, bonus, loyalty programs, integrated use with public transports
2. The position of shared micromobility in relation to the car	Pull and push measures such as high fuel prices, longer distances, detours, reduce parking places, taxes, tolls etc
3. The time travel cost	High availability, flexibility, location of the devices in busy areas, integration with other transports, spatial design, bike lanes, low number of hindrances
4. The safety cost	Policy efforts, laws and regulations, requirement, quality and structure of the infrastructure networks, providers' technology

Table 1 : The success factors of shared micromobility

To answer the second research question, "How could a shared micromobility system be successful in the city of Bodø ?" I will now discuss how the stakeholders can contribute to the success of shared micromobility systems in Bodø.

5.2 The leading stakeholders of the shared micromobility system in the city of Bodø

As argued previously, stakeholders that are involved in the planning and decision making of shared micromobility systems can influence the generalized costs of shared micromobility systems and enable to increase its use. The Norwegian state, Nordland county and the municipality of Bodø, as national and local authorities, can influence the success of shared

micromobility in Bodø and are involved with transport planning in general. However, they operate at different levels and have assigned role in the transportation system development.

According to Kuss. P, Nicholas. K, (2022) the transition management approach is useful for promoting local innovation, policy experimentation and urban climate action that support collective efforts for systems transitions (p.1495). The municipality of Bodø deals with the local infrastructure and cooperate with other stakeholders for developing new projects. Using the transition management enables to develop an action-oriented governance framework towards a mobility transition in the city of Bodø. One of the interviewees stated;

"I think, that the residents in Bodø have never being used to use shared and public transports. Most people are using their cars in and most of them are driving less than three kilometers. So it's all about how you could make them use greener modes."

5.2.1 The role of the Smart Transport Project in Bodø

At the city level, experiments such as innovation, initiatives and interventions are made to accelerate transition processes and address current mobility challenges (Kuss. P, Nicholas. K, 2022 p.1495). Moreover, cities are testing and innovating while acknowledging the results on innovations and learning. (Roorda et al, 2014). As the transition management aims to engage with other stakeholders towards a specific challenge that needs to be address, a transition team is created to introduce the transition management approach for implementing new interventions and engagement while complementing current measures (Loorbach et al, 2015). For instance, "The Smart Transport Project" was initiated through a collaboration between the municipality, Nordland county, Avinor and Telenor. The goal of this project is to nudge residents towards the use of smarter and more sustainable mode of transportation (SmartereTransportbodo pdf, 2021). In addition, the money invested in the Smart transport project by Bodø enables to develop new transport options that will benefit the residents in the long-term. The introduction of city bicycles in and around the city center, a docked based bike sharing system was part of the Smart transport project initiative in 2019. As confirmed by one of the interviewees;

"Docking ebikes was a part of a pilot project from the Municipality and Nordland County".

A year later, Nordland County Council (Nfk) requested an insight report to shed light on current travel habits in Bodø with a spotlight on mobility in and close to the city center. The employees from Smart Transport Project by Bodø conducted semi-structured interviews seeking to get an understanding of travel habits, and the factors maintaining them, as it is useful for being able to see how to design future sustainable and user-centered transport services. (Krishman. S & Ødegaard. I, 2020. p.6). In addition to mapping residents' travel habits in Bodø, authors investigated frustrations and wishes that the various target groups have in relation to walking, cycling, scooters, public transport and private cars. The authors reported the results into four different study groups, classified by different ages and sociodemographic features.

According to the results published in the online report, the first group « barnefamilier », families with children, were using their own car for picking up their children in kindergardens and didn't see the benefits of using citybikes as it was placed only at some specific locations in and around the city. (Krishman. S & Ødegaard. I, 2020. p.60). The second group that was interviewed were single adults and argued that using the devices wasn't relevant in their travel journey due to the location of stations but they are the group that is most willing to use shared and public services such as the bus. (Krishman. S & Ødegaard. I, 2020. p.60). The third group was identified as the young group and argued that the sharing bikes wouldn't be flexible and affordable if they use it for couple of minutes but had, for example, to pay per time. (Krishman. S & Ødegaard. I, 2020. p.60). As argued previously, docking stations may seem not convenient to residents as it might be not close enough to one's location or as users may experience empty stations or in the contrary full stations where they either can't get a bike or cannot drop it off. According to the interviewees the residents of Bodø consider flexibility as a priority and the municipality want to implement viable systems that are not too costly. One of the interviewees stated;

"It is a problem of scalability. Convenience is the main reason why free-floating works because it is extremely convenient for users. To have a viable dock-based solution that is convenient enough you need a huge amount of costly infrastructure and it doesn't scale at all in the city like Bodø. Climate in Bodø makes it complicated for maintenance because of bad weather but bikes where also vandalized so you need a good program with a good business

model. Taking also into consideration that each bike with a charging station is extremely expensive so to compete with escooters this is not viable at all."

As explained under the chapter 4, public bikesharing schemes are more viable in cities like Paris or Oslo where there is a higher amount of money that is invested, and the population density is more important than in Bodø. In addition, citybikes are popular in bigger cities as residents combine them with other public transportation. Moreover, in metropolitan areas, driving a car is less convenient due to a high number of hindrances such as waiting stops and intersections. Therefore, one could argue that public bike-sharing programs seem to be less attractive in a mid-sized city like Bodø.

As argued previously, the Smart Transport project is testing and developing digital solutions and mobility options as well as doing improvements in the current public transportation system. As found in the literature review, great public transportation system that can provide real time information and easy access to bus stops can positively influenced the use of shared micromobility services. In the past few years, new transport alternatives have already been introduced in the city of Bodø such as escooters by Ryde, electric buses and the world's northern self-driving bus, shared-cars by Otto as one of the interviewees explained;

"We are now in a position where we actually do have some type of tools in our toolbox where like, let's say five years ago, we didn't have this, we didn't have shared cars, we didn't have that enough amount of buses going in and out of Bodø. So we have more tools to work towards more sustainable transport solutions."

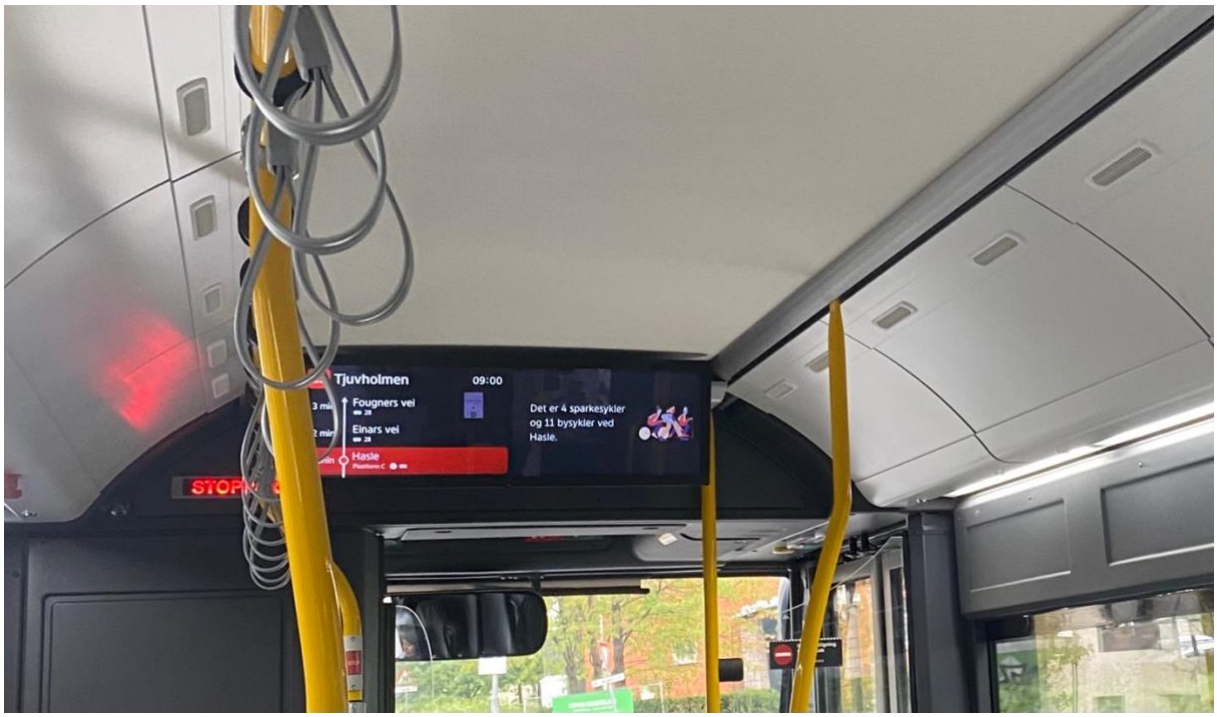
The Smart Transport Project in Bodø have ten sub-projects delivering both technological innovation, innovative infrastructure and services with a widespread involvement all over Bodø (Smarteretransportbodo, 2020). All the projects contribute to the vision of a smart and attractive mobility for making it easier to chose public transport. One of the sub-projects is MaaS, mobility-as-a-service solution and seek to solve the following issue, "How can we gather all the different services, which could be rather confusing for regular users and visitors?" (p.16). MaaS means mobility as a service and is realized by bringing together different transport services and forms of transport on a common digital platform that gives the user one interface, application, to deal with. In their year report published in 2020, the Smart Transport Project aims to offer a MaaS solution for Bodø in the beginning of 2023. Their goal

is to develop a service that will include bus, speedboat, train, car share, taxi and many more. I asked the interviewees if privately owned shared-micromobility could be part of it. One of the interviewees stated ;

« So how to get shared micromobility and better services into this new platform is also a matter of business case on how we can have collaboration with the other services. So it's not only what we want to provide, it's also that we need a business model where it's possible to have micromobility into our platform. »

A MaaS could make it easier for a traveler, especially if he decides to combine public transports and shared micromobility services such as escooters, because he will not have to handle booking and payment separately with different suppliers in different applications. Furthermore, a MaaS app can optimize the travel options that it proposes to the traveler by finding a combination that is best possible for the individual according to its preferences, price, travel time, comfort.

It is find in the literature review that the usage of shared micromobility can be increased when users can easily combine the service with public transports. Moreover, public transports can encourage and promote the use of shared-micromobility services by informing passengers. In the city of Oslo, the screen shows the number and location of shared-micromobility devices available. For instance, on the picture 1, the right side of the screen, it shows that there are 4 escooters and 11 citybikes available at Hasle bus stop. The nordland county, in charge of the public transportation in Bodø could follow this model as it provides residents real-time information and can contribute to increase the use of shared-micromobility services.



Picture 1 : A screen in a RUTER public bus in Oslo (number 21) informing passengers on the number of citybikes and escooters available at Hasle bus stop. Source: Eminovic. E, october 2022

In research, many of studies reveal that the use of escooters is high in not well deserve public areas as it is used as first and last mile solution to complement public transports. In Bodø, most of the caffees, restaurants, shops and commercial centers are located in City Nord and in the city center. Morkved is approximatly located 8 km outside the city center and due to the location of Nord University in Morkved there many students' campuses. For the students it can be convenient to take the bus as every 10 to 15 minutes there are buses going to the city center and bus stops are located near to the different campuses (ReisNordland; ENTUR). However, there are some areas in Morkved that still remains not well deserved by public transports, consequently for some residents driving a car seem to be more convenient than taking the bus to get to the city center as they might have to walk longer to get to a bus stop and their travel time cost will be higher. The availability of the devices in those areas could enable residents to get faster to a bus stop for example. The interviewees expressed that as a result of discussions with the municipality, they decided to extend the availability of escooters devices in the Morkved area;

"We had a meeting with the providers where we talked about how important the students were for Bodø and for Morkved and show them the area and all the students where actually living. And before that meeting and showcase, there were no escooters in Morkved. We showed them our local knowledge, so they understand better how what they actually need for the citizens. They have now included the area we recommended."

5.2.2 The municipality of Bodø

When it comes to local authorities, Bodø municipality has also some tools to work towards the reduction of car use in the city center. According to previous research, the results show that after push and pull measures were implemented in the city of Oslo, a considerable percentage of the residents decided to shift from car use to shared and public transportation. An expert working the field of shared micromobility confirmed as follow;

"The best way to discourage car use is to direct your policies towards car use, such as parking price, parking provision, toll roads, and of course signage it make it more difficult to drive in the city center. As a general principle, you need policies directly targeted on what you want to change. You can only reduce how much car use very marginally by, for example, improving public transport because users are not very sensitive to public transport prices or services."

The costs of owning a car have increased at the global level due to higher fuel prices as well as cities' goal that want to become carbon neutral. For instance, the European Union's "Mission Cities" initiative aims to deliver 100 climate-neutral and smart cities by 2030 (European Commission, 2021). One could argue that the Nordland county and municipality of Bodø are discouraging car use by increasing tolls, parking prices but also reducing the availability of parking places in the city center as one of the interviewees expressed;

"*There was a change in parking regulation last year but we haven't analyse yet the effect of that policy change. For new appartent buildings in Bodø, they are no requirements for parking area so appartement without parking places could potentially increase the use of shared and public mobility services".*

The municipality could also run a pilot project for reducing car use into the city center, such as the city of Oslo did with its project of car-free streets. Those experiments could be useful to study the competitiveness and the attractiveness of the current shared micromobility and public transportation systems.

In the city of Bodø, bicycles are mainly used for shorter journeys, over 60 per cent of bicycle journeys are less than five kilometres (TØI, 2017). Shared micromobility makes sense in cities that have a good level of cycling as urban transport mode so promoting cycling and active modes is part of the success for shared micromobility (Buehrmann. S). However, there is a need for more infrastructure such as proper, dedicated lanes, sufficient space for halt situations and intersections and parking facilities (Nikitas. A, 2018). Authors modeled the association between cycling network length and cycling mode share and found out that in European cities, expansions of cycling networks were associated with increases in cycling (Mueller. N et al, 2018). Increasing cycling networks could also help to promote the use shared micromobility services and be supplemented with top down approach and buttom up initiatives with priority schemes for users and active campaigns to raise awareness of the benefits for active modes (Becker. S & Rudolf.C, 2018).

According to the ISOCARPS report (2017), Bodø is looking to find ways to redesign the public realm by resorting to soft mobility and not-too-invasive features such as paving for secure use, reorganise parking, lighten up the city interrelating seamless technologies for public transportation with amusement and liveability (p.66). A joined team of Habitat Professionals Forum and International Society of City and Regional Planners (ISOCARP) designed a map with suggested location of cycle paths in Bodø (2017).

Illustration from ISOCARP (2017) p.41. A Map of the city centre of Bodø with suggested locations of cycle paths.

Knowing that escooters are used over short distances and that the proportion of bicycles in Bodø is the highest in the Sentrum, Bodøsjøen and Rønvik, one could argue that higher usage of shared micromobility such as escooters could probably be in and between those districts as the distances are short (TØI, 2017). In the city of Lyon Tran et al (2015) results' show that the bicycle infrastructure is not so important to bike sharing users because they are familiar with biking on the street (p.296). However, authors' studied that cyclists in Bodø are challenged by some intersections along the access roads to the city and are often in conflicts with motorists (TØI, 2017, p.2). One of the interviewees also argued that there could be a change in regulations as they have noticed that there are some conflicts between escooters users and pedestrians;

"One thing we have not deciding yet regarding what is the right thing to do is to the case of escooters on pavement. That is a tuff decision because when you allow escooters on the pavement then you make the pedestrians less safe and more vulnerable and their personal

feeling of safety decreases. But by forcing all escooters out in the streets we make it more hazardous to use escooters for people that are not so confident about riding in traffic."

Nevertheless, according to previous research, safety concerns for escooters users as well as all road users can be address with the creation of bike lanes. If escooters users have access to bicycle lanes in and around the city center of Bodø, the risk of accidents with pedestrians and motorized transport modes will decrease. Distinguished bike lanes and signage are necessary to ensure public safety (ISOCAP, Bodø, 2017, p.44). The project of removing the airport and building a new city could be favorable for increasing shared micromobility usage as new bicycle lanes could be created for cyclists and benefit escooters' users. One of the interviewees stated that;

"For planning this new city we will not differenciate between shared micromobility and personal micromobility devices. So if we make the city better for bikes in terms of regulations and infrastructure then we also make the city better for bikes then we also make the city better for shared micromobility".

A good investment for making Bodø a more attractive cycling city is a task that can be fulfilled by the municipality. Bicycle lanes and cycling infrastructure such as signage and priorities are positively correlated with the use of shared micromobility services. The case for better infrastructure with physical protection from motor vehicle traffic is needed to increase the use of shared micromobility but also to make it safe. In a city of very few cyclists, the Seville in Spain built a network of 50 miles of protected bike lanes in less than two years. The results are that over four years, cycling in Seville has grown by 11 times (Calvo. M, Markes. R.2020). Light segregation includes the use of intermittent separators and is a cheaper alternative to physical separation for creating a large and connected cycling network within a limited timeframe (Deegan, B, 2018). As argued previously, creating cycle paths and a more compact city were residents can get to work, shops or schools in 20 minutes is a favorable factor for increasing the use of shared micromobility services such as bikesharing programs that are already popular in Paris (Vélib, 2022). One of the interviewees stated;

"Another thing is that we do see that it's decreasing the amount of cars per household in Bodø, especially in downtown area, and that's also because we have more compact city center than we had before. So in regards the new city, new airport if we can build it as compact as

possible then people will not have that type of need for car use. They can get everything they need in the daily basis in their neighborhood."

Moreover, shared micromobility is a success in compact city were residents can get to work, shops or schools in 20 minutes. When it comes to Morkved, there is one commercial center and many shops but most of the jobs are in the city center (TØI, 2017). However, one could argue that after the COVID pandemic more people work from home. One of the interviewees confirmed ;

"So we do want to have more like the first mile last mile solutions and also more like compact neighborhoods, so you can have more or less all you need in Morkved so you have the Morkved center and you have shops where you can more or less get everything you need on a daily basis."

As a result of many students and a compact area in Morkved shared micromobility could become successful as its use could potentially be increased. In addition, as previously stated, there is a great potential for shared micromobility as a first and last mile solution in the Morkved area.

On the other hand, if one lives in Rønvik and need to get to the commercial center of Glasshuset there is approximatly a distance of 2.8 km. A trip made by car to cover this distance takes approximatly 8 minutes (GoogleMaps; ENTUR). However, a trip by car can be affected by waiting times, intersections, traffic jams and the probability to find a parking place just in front of Glasshuset. The convenience and comfort for a trip by car is also measured by the frequency of hindrances encountered on a trip, such as the number of stops imposed on drivers per unit distance, the proportion of time spending riding slowly due to traffic jam or other drivers' speed, the obligation to give the priority at a crossroads, the number of time that they have to ride one behind the other (Rietveld, 2004). This same trip made by an escooter will take about 8 minutes, taking into consideration that there are less frequency of hindrances encountered as there are no waiting times, intersections and no restriction for parking the escooters around Glasshuset so the probability that a trip with an escooter is faster and more convenient by escooter is higher than by car. Furthermore, it is not allowed for car passengers to drive in Storgata street while escooters can with a limited speed of 6km/h. In this same case the cost for a trip by escooter is approximatly 20 kr but with a car

the cost only for the toll is already 20kr. (Fremtindservice, 2022). For a trip with a car, one should take into consideration the costs of the tolls when entering the city, fuel and the parking place.

As argued previously safety is a prerequisite for enabling shared micromobility success. Regarding the regulations, all the informants seemed to agree that there is obviously a need to implement a regulatory approach to prevent safety related issues. Nevertheless, the economics of shared micromobility are not robust enough so choosing soft regulation is a smarter approach. Moreover, escooters are accepted and popular for their flexibility so regulations should not affect this. If there are too much regulations, then there is less flexibility of use as well as a lower number of available devices and this could affect the usage. One of the expert stated;

"Local regulations are needed and at least on the minimum level, but many cities now are very inflexible with legislation, I think this could be more dynamic market by based mental performance based, so if there are no problems then they shouldn't be a problem to increase the fleet for example."

Another interviewees confirmed;

"We need to educate cities with implementing as less regulation as possible but still some so that you get as much as the best out of it, as possible. If they're too much rules there will be like a poor service poor user experience. So we told them to start with the minimum and then they could expend it."

The Law *"Lov om utleie av små elektriske kjøretøy på offentlig grunn"* gives local authorities the legal basis for local regulations. The Lov says that municipalities can have general rules (§ 3) and/or they can restrict market access and fleets (§ 4) (Lovdata, 2021). At the moment, the city of Bodø impose certain number of restrictions to providers and users such as limit the number of devices, no parking places, slow speed zones and no riding zones. In the city of Bodø, the escooters companies are not allowed to operate in the cities if there are not sharing their data. The municipality of Bodø is working with a start-up, Nivel, that has developed a digital tool that enables to regulate the public space in regards to the use of shared mobility in order to balance all the different kind of needs in the public space to get a good mobility

service but also still a good accessibility. The tool is using standardized data streams that gives the cities lots of different kind of parameters to adjust, the city are deciding drawing zones with different rules attached to them or fees or subsidies and this is being pushed on an a programmable interface or API (Nivel, 2022). One of the interviewees from the municipality explained;

"We have set no riding zones so you can not ride inside the cemitary, as it is hazardous riding in the VGS school in Bodø so we made a zone around the school no parking and slow speed are required. It is also enforced in the electronics of the bikes and same for glass huset and on principal the road. The reason for that is because there are childrens, people walking slow so we want users to choose other routes and not go down this route. By doing this we get nice and tidy roads with the better distribution of the vehicles which and then of course will be tidier streets which are internal so we'll give you safer roads with fewer accidents because there are noted to stable."

Furthermore, the tool enables the providers to share right and real time information to their users. For instance, users get to see where they ride and not ride an escooter, as well as where they should reduce their speed, where they can park or not and so on. As one of the interviewees stated;

"The scooter company that is consuming this API can provide to their end users the information that they cannot park wherever they want, it also show the no go zones or restrictions, as well as different pricing and different zones throughout the city."

Flexibility and availability are important factors that affects the use of shared micromobility services. The city of Bodø imposed to providers a limit of 500 escooters in and around the city of Bodø but it seems that as a result of cooperation they agreed to reduce the area and to restrict only the number of escooters in the city center. The provider and the municipality have agreed that the limit of 500 escooters should only be in the city center because the use is more focused in the ciy center and this is where the vehicles need to be regulated. One can argue that, in Bodø, the stakeholders are actively collaborating and sharing their expertise in order to increase the use of escooters. One of the interviewees from the municipality confirmed that they soften some of the regulations;

"Last week all this area in and around the city center was limited with only 500 escooters but now we limit only the area in the sentrum that is regulate by 500 devices max. So providers can establish how many escooters they want outside this area, morkved and such. When we will be informed of a problem we will regulate it harder so we apply the case of dialogue based regulation where we believe that users are going to be responsible if not then we take the lead."

On the other hand, investigations reveal that accidents on escooters were related to alcohol consumption and mostly happened during night times on weekends. Due to that, many cities introduced night bans. Nevertheless, one can note that Bergen is now opening up on the night time in the week days, Trondheim has done some testing in the summer, so it could potentially happen in Bodø as well. Moreover, some of the interviewees stated that making micromobility could become an alternative of transport for those working at night time. As one of the interviewees expressed;

"It wouldn't mean much more use, but I think it's quite important for the people who use it because imagine you're a nurse or you work the night shift on a railroad or whatever. Getting to and from work at night is difficult if you don't have your own car because there is no public transportation offering, or at least very limited taxes are expensive, and then you can use micromobility."

The studies investigating users' mode choice adoption reveal that the availability of a service regarding the time of the day and location affect the use of a transport mode. According to the bus schedule, available on Reisnordland application, buses in Bodø stop around 00.30 and start again at 06:00 so allowing escooters at night time on weekdays could benefits to some of the residents. As stated by one of the interviewees;

" It's affordable, it's easy to use, and it's available, so it's sort of feels strange that those should be locked out from using that service."

Some of the interviewees do not seem to agree as with the night bans and expressed their statement as follow;

"It's illegal to ride an escooter when you're intoxicated, but at the same time you ban people from riding it but it is not banned to drive a car after midnight. If drink driving is handled by other legislation then night time ban might not be needed. But at the moment my many cities have very inflexible legislation so metric regulation is needed."

If there are residents in the need of transport during night time on weekdays, opening up for shared micromobility and removing night bans during weekdays could be reconsidered by the municipality of Bodø. Furthermore one interviewees expressed that;

"It is the role of police to ensure that the requirements are respected and the suppliers should inform the users"

If night bans on weekdays are removed, the police should ensure that the riders are not under the influence of alcohol and this can also be enforced by the providers of escooters that could distribute intoxications tests. Moreover, the role of the police is to ensure users' safety in general and as previous research show risk of accidents can be decreased if users are wearing a helmet and are riding alone on the device. In regards to that, the next sub-section will discuss how the providers can contribute to ensure users' safety and prevent from the risk of accidents.

5.2.3 Providers

As argued previsouly, providers are important stakeholders as they can influence the generalized costs of shared micromobility. In Bodø, escooters' users pay as they go and can choose between daily and monthly passes (Ryde technology, 2022). In the city of Bodø, a trip with Ryde's escooters cost approximatly 3kr per trip per minute, taking into consideration the cost of a car for instance that is around 40kr each way to get to the city center, and adding to that the cost of the fuel and parking place, it is an advantage to use escooters as the financial cost is lower. However, Ryde should reduce the use of a system that charges riders per minute and should charge users either per trip or per month. The reason is that previous research found out that charging per minute is an incentive to disrespect the rules of the road and take risks.

According to previous research, customers' satisfaction can be achieved if the providers are offering a good quality of the service. One of the interviewees stated;

"We are concerned about making escooters affordable and also the app should be a smooth experience and so all of these things combined should sort of gives a good value to use the right scooter."

For instance, a good customer service can be achieved by providing users easy access to technical service points, having staff with expert knowledge and replying quickly, offering loyalty programmes and discounts as well as if needed parking in designated zones (Hamerska. M et al, 2022). Ryde Technology AS has a support page where users can find information on "Payment & Ride Pass; Riding & Parking; Account & App; Zones & Safety". Moreover, if the user doesn't find the information he is looking for it is possible to contact the provider by email (Ryde Technology AS, 2022). In addition to that, Ryde is organizing marketing campaigns by included a loyalty program for its current users as well as providing bonus points to those who recruit a friend with the purpose of attracting new users for example. Those different strategies are aiming to both attract new customers and make sure to retain the customers but the provider is also very conscious of providing a high quality product. One of the informants stated that;

"It should be a very nice experience, customer experience that's I think the most critical to maintain the customers and then attract new users."

A good customer experience is when the users are satisfied with the mobile application functions, the device features as well as the customer service (Hamerska. M et al, 2022). By improving those variables, providers can contribute to achieve users' satisfaction. For instance, fees should be charged in accordance with the time and the tariff and battery level should be compatible with the information on the application. Moreover, it is important that the devices are easy and convenient to use with adequate technical conditions and a charge level that is enough for users' ride. Furthermore, it is possible for the users to report a scooter on Ryde's app if they believe that it is damaged (Ryde Technology AS, 2022). Ryde is seeking to offer security at a high level for the devices to be safe to use as well as to ensure a high quality of the service with the necessary battery capacity to make a trip. One of the interviewees expressed;

"All the quality inspections our team do with the scooters and other sort of things is to make sure that the scooter is safe to use."

Design the devices in a way that is less prone to falling could help to reduce the risk of injuries. Moreover, the implementation of certain type of equipment such as frontal dampers, indicators for turning as well as integrated technology to control speed is highly important to limit the risk of injury. As stated on their webpage, "Safety is the top priority at Ryde. To make sure that we are continually improving our safety systematics, our team reviews every part of our organization on a continual basis." (Ryde, 2022). Furthermore, Ryde try to encourage the users to wear helmet by offering different sort of incentives for them to do where a helmet (see Figure 14). Moreover, users need to pass the age verification and can't be below 15 years of age to be able to use their escooters. (Ryde, 2022).

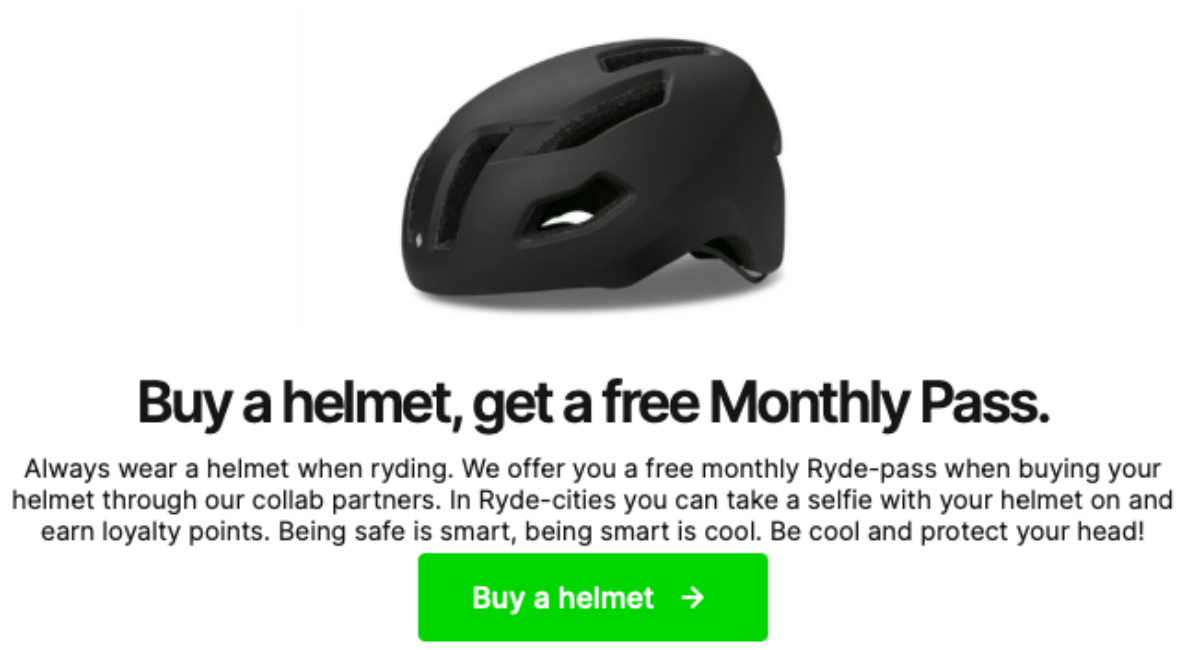


Figure 14 Buy a helmet and get a free Monthly Pass.

Legislations and regulations for safety regarding the use of escooters can be strengthen by provider's technology as argued previously. The informants seem, from both sides, to be very satisfied regarding the collaboration and cooperation they have together. The municipality of Bodø work in close collaboration with the providers to improve and ensure users' safety. As argued by one of the interviewees;

"We have also implemented a sort of intoxication test. So there was some festivals in Bodø this summer, then we implemented those kind of tests to try and avoid people drinking and riding at the same time."

One interviewees from the municipality confirmed;

" We do collaboration when there are big events with the people responsible of the events and providers so we can make sure that we will do it the right way to ensure safety. For instance, for the festival of opptur and parken it worked really well".

Shared micromobility companies can also help to change people behavior by in-app informations and encouragements (Intelligent Transport, 2022). During the summer season of 2021, Bolt conducted several experiments by changing in-app information for a randomized set of users in selected European cities and commissioned The Institute of Transport Economics (TØI) to evaluate the effects of these experiments. The nudge experiment took place in 8 European cities were Bolt integrated in app encouragements consisted of replacing the second ride hailing option with an e-scooter option, such as showing users the nearest escooters, escooter price instead of a ride hailing price for the same trip, an escooter icon instead of a car and the results show that 60% decided to shift from a car to a scooter ride (TOI, 2022). According to Martin Villig, Bolt co-founder, the goal was to convert shorter journeys into escooter rides to show people there is an alternative to owning a private car in a city and the benefits that can have in making urban areas more people-friendly. (Peters. A, 2022). Moreover, the sensors on the e-scooters could help authorities to create a heat map of where things go wrong on the network. Moreover, the provider could organize meetings and workshops where stakeholders could discuss how shared-micromobility would benefit local businesses, the university, students and residents for example.

5.2.4 Other stakeholders

Other actors in the city could push their employees to use more active modes such as escooters by providing them incentives for using active modes. Authors conducted a research before and after public authorities in the state of Hesse, Germany, introduced a cost-free public transport ticket for all state employees. Their results show a substantial increase in the use of public transport for commuting and other trip purposes (Busch-Geertsema. A et al, 2021). Employers could pay monthly passes and tickets for escooters use. They could also build an agreement with the provider Ryde to offer to their employees a lower price for increasing shared micromobility attractiveness, saving money on the parking and encouraging modal shift away from the car. Furthermore, the company of food delivery Foodora in Bodø is paying their freelancers' fuel consumption and could instead build a partnership with Ryde allowing their freelancers to get a reduction for using the escooters to deliver food. The provider Bolt has open an app "Bolt food" and they created new jobs by having the deliveries handled by their professional team of Bolt Food couriers. *"We train them up and constantly monitor their ratings to ensure the best level of service for you and your customers"* (BoltFood, 2022). Finally, more research should be conducted for understanding the travel patterns and habits of the citizens in Bodø as it could enable to gather more knowledge on the actual needs.

5.3 Conclusion

In conclusion, the findings from this chapter show that promoting active and greener modes of transportation such as shared micromobility services seem to be a priority for the city of Bodø. Bodø is located in the Northern part of Norway and is a mid-sized city, due to that, some intangible aspects can become an obstacle to the development of shared micromobility systems, such as the weather, and the density of the population. On the other hand, the city is flat and national and leading stakeholders can take actions to increase the use of shared micromobility. The Smart Transport project is responsible for developing new innovations and solutions that would help the residents to shift away from cars and use greener mode of transports. In that context, a MaaS solution would benefit the residents living in Morkved for example as it could make it easier for travelers to complete their journey by combining public transports and shared micrombility services such as with buses and escooters on one single

application. In addition, the municipality of Bodø itself has different tools and can also help to increase shared micromobility use. For instance, investments could be made in the development of a cycling infrastructure and in creating more compact areas. As argued previously, for shared micromobility to become a success, there is a need for proper and dedicated infrastructure development and the city of Bodø is conscious of that. Moreover, residents living near to the city center, for instance, the Rønvik and Bodøsjoen area are already those who commute the most by bikes. Therefore, shared micromobility services could to be well suited their travel habits. On the other hand, Bodø municipality could continue to implement push and pull measures against the use of the car. When it comes to address safety concerns, the start-up Nivel seems to be an important intermediary actor that connect cities to providers. Their digital tool enables the municipality to introduce the needed regulations and requirements in certain zones to get tidier and safer streets. Those measures and changes are visible by the providers on a digital tool so they can be informed in real time, keep their users informed and improve their technology accordingly to the regulations and requirements imposed at the local level. One can note that the local authorities in Bodø are willing to reconsider some of the limitations and restrictions if they experienced that there is no need for it. Could that be also the case for removing night bans ? For shared micromobility to become a success, a provider should also contribute to decrease the generalized costs of micromobility. For instance, Ryde seems to understand the need of the market by offering different incentives to their users such as low prices, bonus, as well as promoting helmet use. Moreover, they are willing to collaborate with Bodø municipality and to improve the service to both, offer a good user experience as well as prevent the risk of accidents. They could continue to improve their technology and work with the Smart Transport Project to increase the use of the devices. Both stakeholders have great tools in place to find the best locations that could decrease users travel time cost and increase convenience. Finally, other stakeholders, such as businesses and employers can positively influence the use of shared micromobility by offering incentives to their employees or by developing partnerships with providers to reduce the costs of shared micromobility for the users.

Leading stakeholders involved in the development of shared micromobility in Bodø	**Actions towards the success of shared micromobility**

The Smart Transport Project	- Develop new technologies, digital tools to nudge people towards the use of smarter and greener transport modes. - Develop a MaaS solution that integrates shared micromobility, improve the public transportation system and provide real time informations. - Organize workshops with residents for targeting the mobility needs, collaborate with the provider for optimal location of the devices.
Bodø Municipality	- Work with Nivel for implementing and keeping soft and smart regulations, do not regulate too much if it is not needed. Dialogue based regulations. - Improve the cycling infrastructure and create more compact areas, Morkved for example. - Implement push and pull measures for reducing the car use. Initiate pilot project to reduce car use in the city center. - Impose standards with respect to how providers train users, how Ryde incentivize user behavior, how providers develop their hardware and software.
Provider Ryde	- Maintain free-floating systems as docked-based stations are more expensive and not convenient to the residents in Bodø. - Work in close collaboration with the municipality, Smart Transport Project to enforce regulations for users' safety, improve locations and availability of devices by studying data and travel patterns.

	- Continue to develop the electronics of the devices, technology and to work on internal as well as external aspects. - Integrate in app-encouragements for nudging residents and teaching the users for how to drive. Offer low prices, do not charge per minute as it increases the risk of accidents. - Organize meetings with other stakeholders, such as local businesses to increase the use.
Other stakeholders	- Study the potential benefits of shared micromobility for employees or local businesses with providers. - Build partnerships and create agreements to get the best price and service. - The police should make sure that regulations are respected.

Chapitre 6 Concluding remarks

This final chapter will give concluding remarks and present the results.

In regard to the generalized costs of shared micromobility, previous research studied that the financial cost as well as the travel time cost and the safety cost can be affected by different stakeholders. In order to promote and increase the use of shared micromobility services, different stakeholders involved in the decision-making can develop and implement new actions to strenghen the attractiveness of the shared micromobility system. As discussed in the previous chapter, the transition management approach seems to be well suited for addressing mobility challenges. In addition to that, a transition team such as The Smart Transport Project can be created to address mobility and societal challenges. In general, shared micromobility is a preferred mobility option for first and last mile trips. Viewing shared micromobility as a complement to public transport can ensure greater usage and trust in its availability. It is

important to provide real-time and right informations to increase users' confidence in the combined use of micromobility and public transport for their travel choices. Making sure that shared micromobility is available in high capacity near to public transport and transit stations would be positively correlated to its use. If one experienced that there are no devices available to complete its journey it will make it as a seamless experience. To support public transport services, the municipality could ask the providers to increase the fleets at busy areas, such as in the city center and commercial centers. Shared micromobility can also be a good solution to help society move towards sustainable goals and an integrated ticketing system could be an interesting option to explore in that context. If the goal of the Smart Transport Project is to offer new and innovative mobility options to compete with a private car, then there can be good reasons to explore the shared micromobility as an alternative or integrated transport option.

A shared micromobility system makes sense in cities that have a good and large cycling network and proper infrastructure. The case for better infrastructure is the a very urgent and efficient solution to promote the use of shared micromobility but also to make it safe. Light segregation is well suited to creating a large, connected cycling network within a limited timeframe. Proper infrastructure should be designed to feel safe, comfortable and convenient. System of signage, provide detailed maps of different facilities, planning to assist users in choosing the route that best serves their needs, routes avoiding intersections and heavy traffic are undoubtedly the cornerstone to make shared micromobility safe and attractive. It is positive that the Bodø municipality and other leading stakeholders are conscious of the needs for micromobility use in general and are willing to invest in cycling infrastructure in the future.

Cities are conscious that shared micromobility users, especially escooter users are often young and can take risks. Previous research show that riding without a helmet, riding with more than one person on an escooter, riding at high speeds, and other forms of inattention such the use of a phone while riding are reported as the most prevalent causes of accidents. Moreover, as the users get older the risk of riding under the influence of alcohol gets higher and so do the risk of accidents. However, cities can address those challenges by implementing regulations and requirements that could enable to reduce the risk of accidents. For instance, in Bodø, there are already some areas where escooters users are not allowed to ride such as near to schools and in the city center the speed is limited to 6km/h due to a high number of

pedestrians. Moreover, most of the cities, such as in Bodø, have decided of introducing a night ban. Nevertheless, this decision is now being discussed as there are less risk of accidents on weekdays and as there are already legislations that prohibit the use of escooter under the influence of alcohol. The municipality, the police and the providers can prevent from accidents by introducing the necessarily regulations and tools, but it is important to keep the regulations as soft as possible because the economics of shared micromobility is not very robust yet. The regulations and requirements should be at the minimum level to prevent safety issues but should also be flexible if there is less probability of accidents in certain case or lower usage. Moroever, providers can enforce current regulations by integrating technologies in their devices such as low speeds. It is important to keep in mind that shared micromobility is new and a successful deployment can be made through the learning-by-doing philosophy. The municipality of Bodø, together with providers and other stakeholders, is continuously learning how to best regulate and develop this market and has now accepted to deploy more escooters devices in the area outside the city center to reduce the probability for bad users' experience due to low availability. However, it is clearly stated that if the users are not responsible, the municipality will take actions as safety is a priority.

A good collaboration between the municipality and the providers is needed to ensure that cities can regulate smarter the use of shared micromobility and share informations to users for making the streets tidier and safer. Providers should work with their data to develop a better and safer service as well as help authorities to see where things go wrong on the network. Municipalities such as Bodø could require to the providers certain standards regarding their software and hardware development for users' safety. Moreover, providers should be conscious that charging users per minute can be an incentive to take risks. Providers that enforce the electronics of the devices and integrate frontal dampers, front and back lights, indicators for turning can help to reduce the risk of self-injuries and accidents with other road users. Finally, in app-encouragements, real-time informations and digital classes on how to correctly ride are actions taken by providers to reduce users' travel time cost and the risk of accidents.

There is a great potential for micromobility success in the city of Bodø as a result of a good cooperation and collaboration environment between the different leading stakeholders. Finally, other stakeholders such as local businesses could engage in workshops and meetings

to build partnership with the provider Ryde such as Bolt did in the past and even created the Boltfood app for instance.

The Figure 9 under the theoretical framework presented in this thesis can serve as a basis for further studies aiming to understand the development of shared micromobility systems in other mid-sized cities. Practitioners and other stakeholders could follow this method to identify effective and locally suitable interventions to increase shared micromobility use, and future research quantify the effectiveness of interventions to increase shared micromobility use using the standardized outcome measure of trips made by escooters. It could also be interesting to study actual residents' travel habits and patterns to better understand the needs and provide better solution. Conducting a research for assessing the resident's willingness to use shared mobility and public transport services for example. Assessing the quality of shared and/or public transport services in Bodø with a focus on the potential for car trips replacement.

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Appendix

Appendix 1 (Interview Guide – English)

Appendix 2 (Interview Guide 2 – English)

Appendix 3 (Information letter – English)

Interview guide 1

Hei ! First, thank you for taking the time to be interviewed. I am a master student from Nord University in Bodø. I am writing my master thesis on the topic of shared micromobility because I would like to understand how could shared micromobility systems be successful in the city of Bodø, an arctic medium-sized city in the northern part of Norway. Before we start, I would like to precise that the term of shared micromobility systems in this thesis refer to a program that can be publicly or privately owned such as bike sharing programs and free-floating systems . So I would wish to conduct an interview in order to ask you some questions regarding that topic. I would also like to let you know that the findings from this interview will help to conduct my research and will be used in my thesis. All the personal data will be deleted after the submission of my thesis on the first of December 2022.
You can withdraw your consent at any time. The simplest way to do this is to contact directly me. You can also contact the data controller. If you believe that your personal data is incorrect or incomplete, or you have protested against the processing, then you are entitled to require that your personal data should be temporarily limited. That means that processing will be limited until we have either corrected your personal data, or have been able to assess whether your protest is justified. In other cases, you may also require a more permanent limitation of your personal data. In order to be entitled to require the limitation of your personal data, the terms of GDPR's article 18 must be met. If we receive a request from you about limiting personal data, we will consider whether the terms of the law are being met.

When transcribing the interview, all information that could identify you will be anonymized. If that is not a problem for you, I would like to record this discussion and will delete it as soon as I have it transcribed. Is that ok ?

Background

1. Could you please start by telling me what is your position and what do you mainly work with ?

2. Why is free floating the only system available and not docked services in Bodø ?

3. Why escooters and not ebikes ?

4. Why shared-micromobility in Bodø ?

Monetary Cost

5. What is the current pricing strategy for the use of escooters ? Are there monthly passes ?

6. As mainly students and young people are principal users. Do you think that it is affordable to them ?

7. How do you keep attracting current users ? How do you get new users ?

8. Would an integrated pricing system with public transports be an advantage for you ? Could that encourage the use of escooters ?

9. In Bodø, do you think that shared micromobility can be a successful transport mode if the monetary cost is lower than another transport mode. For example the car here ?

10. Are there pull measures to reduce the use of private cars? Which ones?

11. Since free floating systems lauched in Bodø, have you observed a decrease for the use of cars ? increase use of the devices?

Legislations and regulations for safety

12. How are local standards, regulations or specific requirements in Bodø complementing the national legislation for shared micromobility use ?

13. Should there be any laws that clearly defines micromobility vehicles ? If yes, why?

14. What requirements is the city of Bodø imposing to providers and escooters' use ? Is it an advantage for increasing the use ?

15. How can those regulations affect the use of shared micromobility?

16. Are there differences for regulating the use between big and small cities ?

17. Which municipality in Norway is a successful in regulating shared micromobility and why?

18. How can operators help to increase and encourage users' safety? Do they have specific requirements ? Technology? What are they currently doing ?

19. Are there other key actors or tools that could help to increase the safety ?

20. Is there any challenge with having escooter users riding on the same path as cyclists because of the different speeds that a bike, e-bike, and e-scooter travel at?

21. Has there been any accidents on the use of escooters in Bodø ?

22. Has the weather a negative impact on users' safety or on the use of escooters in the city of Bodø? According to you what could providers or the municipality do to minize negative aspects, concerns ?

Infrastructure for safety and convenience

23. According to you, how is the current spatial design or infrastructure in respect to shared micromobility use ? Compared to other cities, is there anything to develop, improve ? Could that increase users' safety ?

24. Is the municipality of Bodø currently doing to improve cycling related infrastructure ? Is the city planning to reduce cars' parking places and related infrastructure? How could that benefits the use of escooters ?

25. With the project of building a new Bodø city, is there a discussion related to shared micromobility use in respect to improving the current infrastructure ? Is there a need for proper dedicated lanes for shared micromobility devices or for parking racks ?

Communication, dialogue between municipality and providers Multimodal trips For Convenience Time

26. . How are the municipality and providers working together to increase the use of escooters ?

27. . Could micromobility options be optimised to co-exist as option alongside public transport in Bodø?

28. Is the municipality itself promoting the use shared micromobility?

29. Could shared micromobility become more convenient to use than private cars in Bodø?

Other :

According to you, as micromobility is quite new, what can is the biggest challenge for users, providers and municipalities ? Acceptance? Safety ? Regulations ? Costs ? Convenience ?

Is that also the case for the city of Bodø?

Interview guide 2

Hei ! First, thank you for taking the time to be interviewed. I am a master student from Nord University in Bodø. I am writing my master thesis on the topic of shared micromobility because I would like to understand how could shared micromobility systems be successful and discuss the case for the city of Bodø, an arctic medium-sized city in the northern part of Norway.

Before we start, I would like to precise that the term of shared micromobility systems in this thesis refer to a program that can be publicly or privately owned such as bike sharing programs and free-floating systems . So I would wish to conduct an interview in order to ask you some questions regarding that topic. I would also like to let you know that the findings from this interview will help to conduct my research and will be used in my thesis. The interview is not seeking to get sensitive data. All the personal data that could identify you as a person will be anonymized and recordings deleted after the submission of my thesis on the first of December 2022.

You can withdraw your consent at any time. The simplest way to do this is to contact directly me. You can also contact the data controller. If you believe that your personal data is incorrect or incomplete, or you have protested against the processing, then you are entitled to require that your personal data should be temporarily limited. That means that processing will be limited until we have either corrected your personal data, or have been able to assess whether your protest is justified. In other cases, you may also require a more permanent limitation of your personal data. In order to be entitled to require the limitation of your personal data, the terms of GDPR’s article 18 must be met. If we receive a request from you about limiting

personal data, we will consider whether the terms of the law are being met.(Nord university, 2022).

When transcribing this interview, all information that could identify you will be anonymized. If that is not a problem for you, I would like to record this discussion and will delete it as soon as I have it transcribed. Is that ok ?

Background

1. Could you please start by telling me what is your position and what do you mainly work with ?
2. Why did you launched this market in Bodø ?
3. Why is free floating the only system available and not docked services in Bodø ?
4. Why escooters and not ebikes ?

Monetary Cost

5. What is the current pricing strategy for the use of escooters ? Are there monthly passes ?
6. As students and young people are principal users of escooters. Do you think that it is affordable for them ?
7. How do you keep attracting current users ? How do you get new users ?
8. Would an integrated pricing system with public transports be an advantage for you ? Could that encourage the use of escooters ?
9. In Bodø, do you think that shared micromobility can be a successful transport mode if the monetary cost is lower than another transport mode. For example the car here ?
10. Since it launched in Bodø, has the use of the devices been increased ?

Legislations and regulations for safety

11. Do you think that charging users per minute can encourage them to drive faster ? If yes, how do you minize this risk ?
12. Is that also the case for the city of Bodø?
13. What requirements is the city of Bodø imposing to providers and users ? Is it an advantage for increasing the use ?
14. Can those regulations make shared micromobility systems successful ?
15. Can night bans, limit of 500 escooters affect the use ?
16. How can you help to increase and encourage users' safety? specific requirements ? Technology? What are you currently doing ?
17. Are there other key actors or tools that could help to increase the safety ?
18. According to you, what are the current issues with the use of escooters in the city of Bodø ?
19. Has the weather a negative impact on users' safety or decrease the use of escooters in Bodø? According to you, what could help to minize negative aspects, concerns ?

Infrastructure for safety and convenience

20. According to you, compared to other cities, is there anything to develop, change or improve the infrastrcuture in respect to escooters' use ?
21. Could a better cycling infrastructure increase the use? Could that increase users' safety ?
22. Is there a need for proper dedicated lanes for shared micromobility devices or for parking racks ?

Communication, dialogue between municipality and providers Multimodal trips For ConvenienceTime

23. What is the biggest difference when operating between in bigger and smaller cities ?Is the municipality of Bodø open towards the development of this market ?
24. How are the municipality and providers working together to increase the use of escooters in Bodø ?
25. Is collaboration and cooperation between municipalities and providers important for the success of shared micromobility systems?
26. Could micromobility options be optimised to co-exist as option alongside public transport in Bodø?
27. Where to increase availability ? do you work on app improvements ?
28. Is the municipality of Bodø itself promoting the use of escooters?
29. Could shared micromobility become more convenient to use than private cars in Bodø?

Other:

Could you please share the biggest lesson you learned since you started with escooters ?

According to you, as micromobility is quite new, what can is the biggest challenge for users, providers and municipalities ?Acceptance? Safety ? Regulations ? Costs ? Convenience ?

Futur visions and project on the development of escooters that could benefit the Arctic region ?

Consent form

Are you interested in taking part in the research project
***"how could a shared micromobility be successful in the city of Bodø"*?**

This is an inquiry about participation in a research project where the main purpose is to understand how could a shared micromobility system be successfully designed for the city of Bodø. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

Thank you for taking the time to be interviewed. I am a master student from Nord University in Bodø. I am writing my master thesis on the topic of shared micromobility because I would like to understand how could shared micromobility be successful in the city of Bodø, an arctic medium-sized city in the northern part of Norway. So I would wish to conduct an interview in order to ask you some questions regarding that topic.

Who is responsible for the research project?

Handelshøgskolen Nord University, is the institution responsible for the project.

Why are you being asked to participate?

Different representatives and experts in the field have been asked to participate in this project. I believe that your knowledge and information can provide useful insights to my research.

What does participation involve for you?

I would wish to conduct an interview in order to ask you some questions regarding that topic. I would also like to let you know that the findings from this interview will help to conduct my research and will be used in my thesis. All the personal data will be deleted after the submission of my thesis on the first of December 2022. Furthermore all information that could identify you will be anonymized. If that is not a problem for you, I would like to record this discussion and will delete it as soon as I have it transcribed. Is that ok ?

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).

- Only me Ena Eminovic, master student, and my supervisor will have access to the audio recorded and the interview
- I will replace your personal details with a code and stored in TSD.
- The list of names, contact details and respective codes will be stored separately from the rest of the collected data, I will store the data on a research server one drive, locked away. Files/folders are not shared with others. OneDrive doesn't sync to my private Mac automatically. Additional protection (encryption) if I need to store red data
- Audio recordings must be made using the Nettskjema Dictaphone app (University of Oslo). This app is downloaded to your mobile phone. The audio recording is not saved on the mobile, but is sent directly to Nettskjema. To listen to the recording, you must log in to Nettskjema using your Nord FEIDE account. Tips and information can be found on UiO's website pertaining to Nettskjema.

- Digital interview: the meeting link is given only to the person to be interviewed and that no outsiders attend the meeting.

What will happen to your personal data at the end of the research project?

The project is scheduled to end 1st of December 2022.

The personal data, including any digital recordings will be deleted at the end of the project, and other information such as position, name will not be given and be anonymised at the end of the project

Your rights

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement with Nord University, Data Protection Services has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

- Handelshøgskolen Nord University via Thor-Erik Sandberg Hanssen.

- Our Data Protection Officer: contact the Data Protection Officer at Nord University, Toril Irene Kringen.
- Data Protection Services, by email: (personverntjenester@sikt.no) or by telephone: +47 53 21 15 00.

Yours sincerely,

Project Leader (Researcher/supervisor)

Student : Ena Eminovic

Consent form

I have received and understood information about the project *How could shared micromobility be successful in the city of Bodø* and have been given the opportunity to ask questions. I give consent:

☐ to participate in *an interview*

I give consent for my personal data to be processed until the end date of the project, approx. *[01.12.2022]*

(Signed by participant, date)