THE LAST MILE CHECK-UP

INVESTIGATING DETERMINANTS OF SWEDISH CONSUMERS' ATTITUDES AND INTENTIONS TO USE SHARED MICRO MOBILITY SERVICES - BASED ON AN EXTENDED THEORY OF PLANNED BEHAVIOR

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The last mile check-up: Investigating determinants of Swedish consumers' attitudes and intentions to use shared micro mobility services – based on an extended theory of planned behavior

Abstract:

By 2050, an equivalent of two-thirds of the world's population will live in urbanized city areas. While urbanization has presented many opportunities, it also presents significant challenges in regard to urban transportation. Adherently to this trend, sustainable urban transportation is a challenge for Swedish city areas. Shared micro mobility services (SMMS), has quickly come to rise as a potential mode of future urban transportation.

However, the impact of SMMS on urban transportation is to a large extent dependent on an increased user-base, meaning a change in consumer behavior favoring SMMS. Consequently, understanding consumers' attitudes and intentions to use SMMS is essential for companies and other potential actors in favor of these services.

Thus, this thesis aims to investigate the consumers' attitudes and behavioral intentions towards shared micro-mobility services to better understand consumers, and which factors that drive actual behavior. This is done by using an extended version of the theory of planned behavior. The results show empirical support for attitude, subjective norm, social influence and knowledge being positively associated with intention to use SMMS. Furthermore, Hedonic attitude, subjective norm, was shown being positively associated with consumers' attitudes towards SMMS. Cognitive dissonance towards green claims was found being negatively associated with attitude towards SMMS. Finally, some similarities and differences are found between the respondent group based on gender, frequency of use and ownership.

Keywords:

Shared micro mobility services, Theory of Planned Behavior, Consumer Attitude, Consumer behavioral intention

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Glossary and definitions:

Attitude toward the behavior: "refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Icek Ajzen, 1991, P 188).

Shared micro mobility services: Shared micro mobility services refer to small electric driven vehicles e.g. electric scooters and bicycles, provided to users by an online application enabling them to have short term access to these modes of transportation when required.

SMMS: Shared micro mobility services.

Green Claims: "Green claims refer to the practice of suggesting or otherwise creating the impression (in the context of a commercial communication, marketing or advertising) that a product or a service, is environmentally friendly (i.e. it has a positive impact on the environment) or is less damaging to the environment than competing goods or services" (Extract of the Guidance for the implementation/application of Directive 2005/29/EC on unfair commercial practices)

Subjective Norm: "refers to the perceived social pressure to perform or not to perform the behavior" (Icek Ajzen, 1991, P 188)

Perceived behavioral control: "refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles" (Icek Ajzen, 1991, P 188)

Behavioral intention: "a person's intentions to perform various behaviors" (Fishbein & Ajzen, 1975, p. 12)

Behavior: "observable acts that are studied in their own right" (Fishbein & Ajzen, 1975, p. 13)

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1. Introduction

1.1 Opening

The world is becoming "smaller". By 2050 an equivalent of two-thirds of the world's population will live be residing in urbanized cities (World Bank, 2020). Sweden is no exception to this trend of extensive urbanization. Currently, 85% of the Swedish population resides in urbanized cities, a proportion that is expected to continue increasing (Urbact, 2020). While, urbanization presents many opportunities, it also presents significant societal challenges. As a result of urbanization, the number of vehicles and people using different modes of transportation has increased rapidly. This has generated increased emissions, traffic congestions, and problems with parking, putting a strain on both residents and urban planners in creating a sustainable development of Swedish cities.

In trying to address these problems, the micro mobility industry and the concept of shared micro mobility services (SMMS) have emerged on the global and the Swedish market, gaining significant attention. This due to a rapid increase of users, establishing SMMS a possible future of urban transportation (Zarif, Pankratz, & Ben, 2019). SMMS services focuses on shorter urban transportation, offering short-term access to a shared fleet of smaller and flexible vehicles, e.g. e-scooters and e-bikes according to the user's needs and convenience (CBS Insights, 2018). Since the launch of Voi in 2018, the first SMMS on the Swedish market, eight additional competitors have entered the market offering SMMS in Sweden's major cities. Between September 2018 and July 2019 Voi was used for approximately five million trips (in Europe), compared to two million during the same period the previous year (Statista, 2019).

With the demand for new ways of urban transportation, the number of new entrants and the rapid increase of users, the question of - which are the determinants of consumer intention to use SMMS, arises. Thus, this thesis aims to investigate the consumers' attitudes and behavioral intentions towards shared micro-mobility services to better understand consumers, and which factors that drive actual behavior.

1.2 Defining shared micro mobility services

There is an ongoing discussion regarding the definition of micro mobility in relation to other means of transportation. The most commonly used, define micro mobility as an electric driven mode of transportation weighing less than 500kg, focused on urban transport (Dediu, 2019). However, this could be considered too broad of a definition, as in most markets micro mobility is conceptualized to include shared e-scooters and e-bikes (Lambertz & Förster, 2011). Thus, in this thesis micro mobility refers to electric driven vehicles that can occupy space alongside, and in bicycle-lanes.

This means that in accordance with Transportstyrelsen's regulations, vehicles with a top speed of more than 20km/h or with an engine capable of generating power above 250 watts will not be included in the definition (Transportstyrelsen, 2020).

Subsequently, SMMS is defined as online applications enabling short term access of micro mobility vehicles e.g. e-scooters and e-bicycles to consumers on demand. The online application, often a smartphone application, is used to locate and access the micro mobility vehicle.

1.3 Historical Background

Event tough SMMS, as defined in this thesis is a relatively new service, the concept of shared micro mobility has its origin in the 1960's and the development towards today's SMMS can be divided into three sperate eras (Dediu, Horace, 2019).

The first era began in 1965, originating from *the white bicycle plan*, an initiative launched by political activists in the Netherlands (The Economist, 2017). The plan consisted of collecting hundreds of bikes, paint them white and scatter them around the city of Amsterdam, enabling residents to use them the free of charge (Dediu, Horace, 2019). This later evolved to a rack locking technology for bike sharing programs, first used in Portsmouth UK in 1995, which to some extent is still in operation today (DeMaio, Paul & Gifford, & Jonathan, 2004).

The second era, referred to as the "free floating era" began in 2005 (DeMaio P. , 2019). This era was initiated by technological advancements within GPS systems and smartphones, simplifying the user experience by making it easier for consumers to use bikes on the go (Krümmel, Gernant, Stolt, Stolze, & Moschner, 2019). The problem with a free-floating system is that it congests the city if too many bikes are deployed. This became evident in China 2018, when the billion-dollar valued company Ofo declared bankruptcy as a result of government probations (BBC, 2017). The problem with the free-floating system business model is that it requires too many bikes making them intrusive with city traffic (Dediu, Horace, 2019).

An unsustainable business model ultimately resulted in the third and current era i.e., the electric shared micro mobility era (Dediu, Horace, 2019). Originating in Santa Monica during 2017, Bird corporation combined cheap miniature electric motors, lithium Ion batteries, GPS, Smartphones and Market-making software developing an electric stand up scooter, which quickly attracted attention of the public (Hawkins, 2018). Soon afterwards many competitors entered the market and in 2018, Voi Technologies (Voi) introduced the first electric scooter to the Swedish micro mobility market (Björkman, 2018).

1.4 Industry overview in a Swedish context

Looking at the Swedish micro mobility market, it consists of eight competing actors offering two types of vehicles, e-scooters and e-bikes via their SMMS (SVD Näringsliv 2019). In 2019, Voi technologies were established market leaders providing 2000 e-scooters out of the totally available 7000 in Stockholm (Hjelm, 2019). As of January 2020, Voi SMMS and e-scooters are available in eight Swedish cities including, Stockholm, Gothenburg, Örebro, Västerås and three additional cities in Skåne County. In 2019 American based companies Bird corporation and Lime, the most prominent actors on the US market, launched their SMMS in Sweden, intensifying the competition (Osterberg, 2020).

In regard to the vehicles provided on the market, they are standardized with little product differentiation between competitors. The vehicles are generally based on the Chinese manufactured Xiaomi 365 (Murphy & Griswold, 2018). The lack of product differentiation has led to a highly competitive market that is yet to be profitable for most actors (Osterberg, 2020). Most of the competitors use the same pricing scheme, with a fixed price for unlocking the scooter (usually 10 SEK), and then a variable fee depending on time and distance (usually between 1-3 SEK/minute).

Additionally, in light of the recent Covid-19 pandemic, the Swedish and the international micro mobility market has experienced an extensive decline in trips conducted using SMMS. The three most prominent competitors in Sweden, Lime, Bird and Voi have all initiated different measure to reduce costs, one notable action being reducing the number of available vehicles. In a market already struggling for profitability, analysts predict only 2-3 companies to survive the effect from Covid-19 (Pehrson & Wisterberg, 2020).

1.5 Problem formulation and Research Gap

SMMS presents a possibility to face the current challenges of urban transportation that are putting strain on residents and urban planners. The impact of SMMS on urban transportation are to a large extent dependent on an increased user-base, meaning a change in consumer behavior favoring SMMS. Consequently, understanding consumers' attitude and intention to use SMMS is essential for companies and other potential actors in favor of these services.

Despite the perceived potential of SMMS in regard to urban transportation, there has been limited research on the topic. Past literature and research on intention to use shared mobility has focused on psychological factors such as safety, technology interest, or environmental concern regarding SMMS. (Peng et al, 2019).

To our best knowledge, studies on how behavioral intentions and attitude are formed related to shared micro mobility services has so far not been studied based on a rigorous theoretical background in a Swedish context. When attempting to interpret behavior intention, theory-based model provides a more systematic approach to identifying relevant determinants of the specific behavior, and thereby allows a deeper understanding of it.

We intend to develop an extended Theory of Planned Behavior (TPB) theoretical framework to explore the determinants of consumers' intention to use and attitude toward shared micro mobility. TPB has been shown to successfully predict behavioral intentions within transportation behavior research (Peng et al., 2019)

1.6 Purpose and Research question

This thesis aims to provide insight as to who the consumers of shared micro mobility are, and which determinants influence their attitudes and behavioral intentions.

The question posed to answer this is:

Which are the determinant factors affecting consumers' attitudes towards and behavioral intentions to use shared micro mobility services on the Swedish market?

1.7 Delimitations

This study is geographically limited to Sweden, as the authors aim to investigate the attitudes and behavioral intentions to use SMMS for consumers in Sweden. The study is also limited to people who meet the terms and conditions to use shared micro mobility services.

1.8 Expected Contribution

By extending the TPB theoretical framework to explore the determinants of consumers' intentions to use and attitude toward SMMS, the authors aim to help fill the research gap of which factors that drive actual behavior for Swedish consumers related to SMMS.

1.9 Thesis disposition

To answer the outlined research-question, this thesis will be divided into four parts. First, a literature review and theoretical framework will be presented. Secondly, the scientific approach to the research design will be presented. Third, the study's results will be presented. Finally, a discussion about the result and its implications for Swedish consumers will be presented.

2. Literature review and theoretical framework

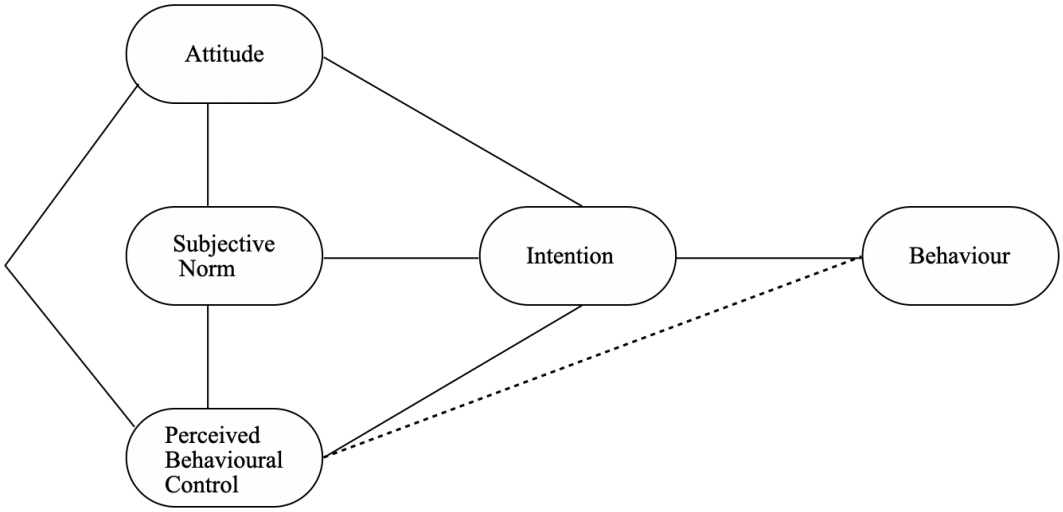
This thesis aims to model, identify and explore determinants of consumers attitude and intention to use shared micro mobility services, under the theory of planned behavior (TPB). As per purpose of the thesis (See section 1.6), the TPB theoretical framework focuses on modeling consumer behavior and consumer behavioral intention (Ajzen, 1991). Furthermore, by exploring prior research and studies in the fields of transportation behavior and transportation mode choice, the authors aim to extend the TPB-framework used in the study. This allows for exploring of a broader range of factors possibly influencing consumer *attitudes* towards, and *intention* to use, shared micro mobility services as per purpose of the thesis.

2.1 Theory of planned behavior

The theory of planned behavior (TPB) framework has become widely recognized for its usefulness in predicting and explaining human behavioral intention (Ajzen, 1991). Developed by Ajzen, the theory of planned behavior is derived from Ajzen and Fishbein's widely recognized Theory of reasoned action (1985), with the addition of accounting for incomplete volitional control (Ajzen 1991). Correspondingly to the original theory of reasoned action, the TPB maintain intention as the prominent factor capturing motivational factors driving behavior (Ajzen, 1991) and intention is assumed to be the immediate antecedent of behavior (Bamberg, 2006). However, according to the TPB a consumer's behavioral intention is explained as a function of, three conceptually independent determinants, i.e. consumer's attitude, subjective norms, and perceived behavioral control.

Thus, TPB is an extension of the theory of reasoned action, adding perceived behavioral control as an explanatory variable, giving rise to behavioral intention (Ajzen, 1991).

Figure 1: Visualization of the Theory of Planned Behavior as presented by (Ajzen, 1991)



These concepts are defined as follows:

Attitude toward the behavior: "refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, P 188).

Subjective Norm: "refers to the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, P 188)

Perceived behavioral control: "refers to the perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles" (Ajzen, 1991, P 188)

Behavioral intention: "a person's intentions to perform various behaviors" (Fishbein & Ajzen, 1975, p. 12)

Behavior: "observable acts that are studied in their own right" (Fishbein & Ajzen, 1975, p. 13)

TPB has been applied in a variety of research domains e.g. sustainable behavior, commodity purchases and health (Ajzen, 1991; Zhang et al.,2018; Peng et. al. 2019). The TPB is widely used among researcher in the transportation research domain. It has been used to investigate consumer adoption intentions, vehicle type acceptance and travel mode choice intention (Peng et al., 2019; Zhang et al., 2018; Bamberg et al., 2010; Eccarius & Lu, 2020). Furthermore, TPB has been applied to a large spectrum of travel mode, e.g. car use, public transport and cycling, and in a range if samples, e.g. commuter, students and city dwellers (Abrahams, 2019). Consequently, TPB has been found to be well supported by empirical evidence. The framework has high accuracy in predicting behavioral intention from attitude, subjective norm and perceived behavioral control and predicted accounts for considerable variance in actual behavior (Ajzen, 1991). Meta- analytic reviews of nearly 200 data set in a broad range of behavioral areas, comparing the TPB and theory of reasoned action showed that TPB accounted for more variance in behavioral intention and actual behavior than the theory of reasoned action (Anderson, 2004).

2.1.1 Attitude towards behavior (ATT)

Ajzen (1991) found that behavioral attitude is the main determinant of behavioral intention within the TPB. According to the TPB, if a consumer believes that performing the behavior in question generates positively valued outcomes, they will subsequently have a positive attitude towards that behavior (Ajzen & Fishbein, 2005). In 2018, Stark and Hössingberg (referred to in Peng et al., 2019) found that behavioral attitudes have the highest explanatory power for travel-related intention. Consequently, based on the viewpoints, the following hypothesis is proposed:

H1a: Consumers' behavioral attitude is positively associated with intention to use shared micro mobility services.

2.1.2 Subjective Norm

According to the TPB subjective norm is a determinant of behavioral intention, and subsequently a determinant of actual behavior (Ajzen,1991). In this thesis, subjective norms refer to a consumer's perception of salient peoples, e.g. friends and families, approval or disapproval of using use of SMMS.

Several studies have found subjective norm to have a significant positive influence on behavioral intention and a significant positive influence on attitude (Peng et al., 2019 and Zang et al. 2018). This is congruent with Fishbein and Ajzen (1980) research suggesting that perceived social pressure in favor of a behavior will positively influence the consumer's attitude towards that behavior. However, in a review of 16 studies presented by Ajzen (1991) it was found that whilst attitude towards the various behavior significantly contributed in predicting behavioral intention, the result for subjective norms were mixed. This suggests that, for the behaviors considered, personal considerations tended to overshadow the influence of perceived social pressure (Ajzen & Fishbein, 2005). Consequently, based on the presented viewpoints and per purpose of this thesis, the following hypotheses are proposed:

H1b: Subjective norm is positively associated with consumers' intention to use shared micro mobility services.

H2a: Subjective norm is positively associated with consumers' attitude towards shared micro mobility services.

2.1.3 Perceived behavioral control

Ajzen defines perceived behavioral control as the perceived ease or difficulty of performing the behavior (1991). According to the TPB perceived behavioral control is assumed to reflect past experience as well as anticipated impediments and obstacles (Ajzen, 1991). Perceived behavior control is viewed as determinant of behavioral intention and of the behavior itself within TPB (Ajzen, 1991). Ajzen, refers to systematic research programs conducted by Bandura, Adams and Beyer (1977) and Bandura et al. (1980) which showed that consumers' confidence in performing a behavior, i.e. perceived behavioral control, is a strong determinant of their intention to perform said behavior.

In studies presented by Peng et al. (2019) and, Eccaruis and Lu (2020) perceived behavioral control was significantly positively associated with intention to use, and attitude towards autonomous vehicles and e-scooter services. Previous research has shown that perceived behavioral control can be affected both *internal factors* e.g. a consumer's skills, knowledge and awareness, and *external factors* such as time and availability (Ajzen, 1991, and Peng et al.,2019). Consequently, the following hypotheses are proposed:

H1c: Perceived behavioral control is positively associated with consumers' intention to use shared micro mobility services.

H2b: Perceived behavioral control is positively associated with consumers' attitude towards shared micro mobility services.

2.2 Knowledge

Knowledge is an important construct in behavioral research (Kaplan 1991, referred to in Peng, 2019). This thesis applies Mothersbaug et al. (1994) conception of knowledge as the understanding of how to perform the intended behavior and to evaluate the usefulness of the behavior. Peng et al. (2019) and Mothersbaug et al. (1994) present studies showing that consumer's understanding about a product or service and its attributes was significantly correlated with their attitude towards a product, and the intention to choose that product.

The aforementioned studies respectively found empirical evidence suggesting a higher level of knowledge reduce the perceived risk of the product. Due to the limited amount of studies investigating shared micro mobility services, research regarding the potential effect of knowledge on the intention to use shared micro mobility services is limited. However, Krause et al. (2013) and Barth et al. (2016) suggest that knowledge of electric vehicles can significantly improve acceptance of electric vehicles. Conversely, limited knowledge can be an obstacle for acceptance. Furthermore, Klöckner and Simsekoglu (2019) found that lack of knowledge regarding e-bikes was a potential obstacle of e-bike use in Norway. Consequently, we propose the following hypotheses:

H1d: Knowledge about SMMS is positively associated with consumers' intention to adopt shared micro mobility services.

H2c: Knowledge about SMMS is positively associated with consumers' attitude towards shared micro mobility services.

2.3 Perceived Risk

Perceived risk has been shown to be a crucial factor in all types of consumer purchase behavior (V-W. Mitchell, 1992). There are multiple dimensions of risk e.g. physical, financial, environmental, social and functional risk (Roselius, 1971). Depending on how risk is conceptualized it can be viewed as consisting of two factors, uncertainty and consequences (Cunningham, 1967). Based on Cunningham (1967) this thesis defines perceived risk as consumers' perception of potential negative outcomes from using SMMS. Furthermore, the thesis considers perceived risk in terms of physical health, i.e. the perceived risk of hurting oneself physically while using a shared micro mobility service. Peng et al. (2019) showed that perceived risk, had a significant negative effect on attitude and behavioral intention for the

use of autonomous vehicles and shared autonomous vehicles. In research presented by Mitchell (1999) and Mariott and Williams (2018) it was found that perceived risk is negatively associated with consumers' attitudes towards and intention to use product and services that can be seen as innovate. In a study by Sjoberg (2003) is was found that risk perception can vary between risk targets (group) and that men and women perceive risk differently in different situation. Consequently, the authors suggest the following hypotheses in regard to perceived risk of using of SMMS:

H1e: Perceived risk of SMMS is negatively associated with consumers' intention to adopt shared micro mobility services.

H2d: Perceived risk of SMMS is negatively associated with consumers' attitude towards shared micro mobility services.

2.4 Social influence

The role of social influence is a growing area of research in transportation mode choice (Maness et al., 2015). Social influence refers to the process of a consumer having their beliefs, attitudes or behavior affected by of those another (Maness et al., 2015).

Thus, social influence is comparable to the concept of subjective norm in Theory of planned behavior (see section 2.1.2). The distinction between the concepts, however, is that subjective norm refers to the perception of others approval or disapproval of a behavior (Ajzen 1991) and Social influences create a normative pressure that directs the performance of a behavior (White et al., 2009). Social influence can be motivated either by a desire for accuracy, called informational influence, or a need for social approval, called normative influence (Maness et al., 2015). Sherwin et.al (2014) propose three levels of social influence, based on the type of reference group; family, friends, and broad social-cultural context where those with closer relationships are more influential affecting the consumer's behavior. Sherwin et al. (2014) found that social influence was a key influencing determinant in consumers' decision to start biking in England. Pike and Lubell (2018) presented a study showing that consumers' travel mode choice was influenced by the social influence of their networks. Consequently, the authors suggest the following hypotheses:

H1f: Social influence is positively associated with consumers' intention to use shared micro mobility services.

H2e: Social influence is positively associated with consumers' attitude towards shared micro mobility services.

2.5 Hedonic motivation

Hedonic motivation can be explained as the "willingness to initiate behaviors that enhance positive experience (pleasant or good) and behaviors that decrease negative experience" (Kaczmarek, 2017). This means that consumers strive to increase positive experiences and decrease negative experiences. In a New Zealand study by Fitt and Curl (2019) it was found that "fun" was one of the main drivers of people using e-scooters, especially for the first time. Therefore, the authors hypothesize that similarly to the study conducted in New Zealand, Hedonic Motivation will be positively associated with consumers' attitude towards and intention to use SMMS in Sweden. Consequently, the following hypotheses is proposed:

H1g: Consumers' hedonic motivation is positively associated with consumers' intention to use shared micro mobility services.

H2f: Consumers' hedonic motivation is positively associated with consumers' attitude towards shared micro mobility services.

2.6 Cognitive dissonance theory

The Cognitive dissonance theory by Festinger (1957) states that people prefer consistency in their thoughts and emotions rather than ambivalence which is associated with discomfort (Bell and Esses 2002; Hass et al. 1992; Nordgren et al., 2006). Nordgren, et al. (2006) goes further, arguing that consumers feel strong discomfort when they cannot attribute their ambivalence to green factors. Shared micro mobility services utilize the trend of being environmentally friendly (Eccaruis and Lu, 2020) by electric mobility and shared use mobility. Many actors within the Swedish Micro Mobility industry focuses their marketing on being environmentally friendly (Bröms, 2020). However, these claims of being environmentally friendly have been opposed in many instances. In a study presented by Hollingsworth, et al. (2019), it was found that an e-scooter is responsible for an emission of 125 grams of carbon dioxide per km, equivalent to half of the emission of an averaged sized car. This suggests, an e-scooter would need to replace half of a car-ride to have a positive environmental impact. Therefore, the authors argue the importance of considering the effect contradicting information might have on consumers' attitude towards and intention to use SMMS. Consequently, the following hypotheses are proposed:

H1h: Cognitive dissonance regarding the environmental impact of shared micro mobility services is negatively associated with consumer's intention towards Shared micro mobility services.

H2g: Cognitive dissonance regarding the environmental impact of shared micro mobility services is negatively associated with consumer's attitude towards Shared micro mobility services.

2.7 Socio-demographic factors

Multiple studies have shown that socio-demographic variables have a significant influence on consumers' travel behavior and travel mode choice (Durands et al., 2018). Amongst socio-demographic variables, gender, age, occupation and vehicle ownership have all been found to be interesting when studying travel behavior and travel mode choice (Curtis and Perkins, 2006). The shared micro-mobility industry and thus shared micro-mobility services is a newly established industry in a global and Swedish context (CB insights, 2019). Consequently, to the knowledge of the authors, there is limited research exploring the sociodemographic characteristics of potential user and users of micro-mobility services.

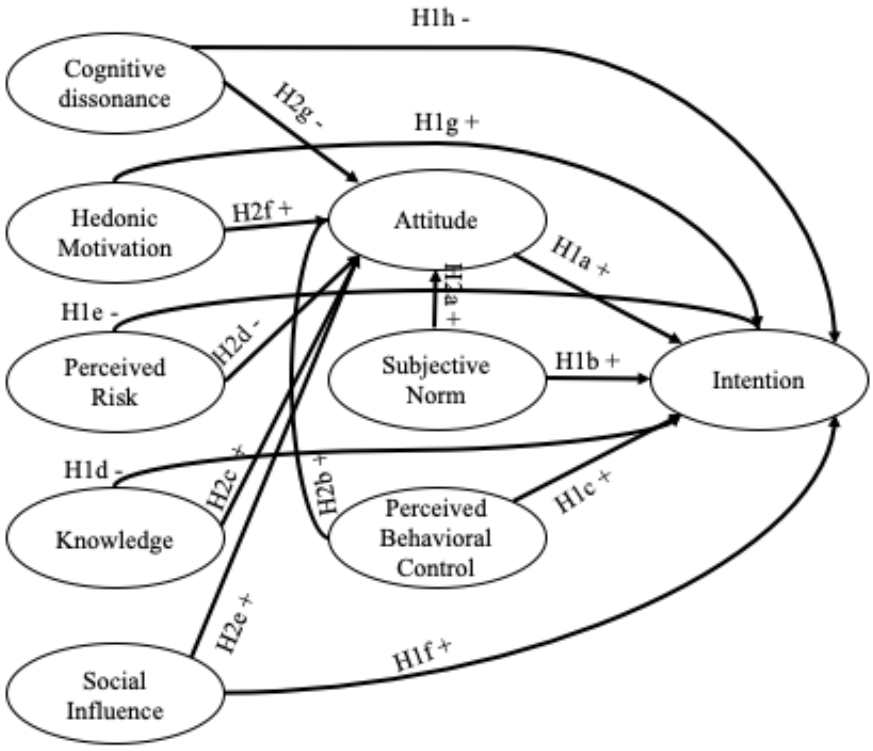
However, in 2018 Durands et al. presented an explorative literature review on mobility as a service based on research regarding travel preferences and behavior. According to Durand et al. (2018) the typical users of shared mobility services have a similar socio-demographic profile and are thus comparable across modes (e.g. car sharing, bike sharing and ride-sourcing). Durand et al. found that users generally are young, have a high education level, high income and are more likely to be employed than the average population. Bansal, P and Kockelman (2017), and Kyriakidis et al. (2015) found that socio-demographic factors including age, gender, income and education level was influencing consumers' intention to use autonomous vehicles and shared autonomous vehicles.

Durands et al. (2018) suggest that consumers with a low sense of ownership of private vehicles are more likely to use shared mobility services, e.g. car sharing. Sense of ownership can be conceptualized as psychological ownership (Peck and Shu, 2009). Pierce et al (2003), define psychological ownership as when a consumer feels as though the target of ownership is "theirs". Beggan (1992) showed that sense ownership as a sole factor is enough to increase the perceived value of a good. Merely visualizing the ownership of a good have been shown to yield more positive evaluation of that good (Peck and Shu, 2009).

In regard to the purpose of this thesis and the outlined research question, we find it imperative to gain insights into possible difference in attitude towards and intention to use SMMS comparing different socio-demographic variables.

2.8 Overview of hypotheses in the proposed extended TPB framework

Figure 2: Summary of Hypotheses related to SMMS.



3. Method

3.1 Scientific approach to the research design

This thesis uses a deductive research approach. Hypotheses based on relevant theories to the research question are tested empirically in a self-completion questionnaire. A quantitative research design was used, as it is preferred when quantifiable and generalizable results are being sought after (Eliasson, 2018).

3.2. Pre-studies

Pre-studies were conducted to gain further insights about consumer attitudes and intentions with regards to shared micro mobility in Sweden. One semi-constructed interview with the CEO of a micro mobility firm in Sweden was conducted in order to gain a better understanding of the industry landscape. Furthermore, a focus group was formed with Swedish users and non-users of micro mobility services. This group was used to pilot-tested the main survey, discuss relevant literature and propose variables for the study. For more information regarding the pre-studies, see appendix 1.

3.3. Design of questionnaire and variables

3.3.1 Questionnaire study

An anonymous self-completion questionnaire was designed based on the research framework and hypotheses in section 2.8. The self-completion questionnaire was conducted through the online platform “Qualtrics”. To prevent repeated answers, only one answer could be given per IP address.

The questionnaire originally consisted of 45 questions, but then shortened to 28 questions to improve response rates (Appendix 2) (Bryman & Bell, 2011). To further improve response rates, an attractive layout and page-brakes were used (Bryman & Bell, 2011). An “attention-check” question was also used at the beginning of the questionnaire, to sort out respondents performing “random clicking”. The self-completion questionnaire consisted of three parts.

In the first part respondents were introduced to the study and the definition of micro mobility. They were then asked about previous experiences with SMMS and their general transportation behavior. Depending on their previous experience with SMMS, different versions of the questionnaire was displayed. If they had used SMMS in the past 12 months, the entire questionnaire was displayed. If not, questions based on previous experiences was not shown. The second part was based on the theoretical framework developed in section 2 and was divided into five blocks. The order of the blocks was randomized for each respondent, to prevent order effect (cf. Schuman & Presser, 1981). To further prevent order effect, the different items within each theoretical framework were also randomized. Seven-point Likert scales were used in these questions, facilitating the computer analysis (Bryman &

Bell, 2011). In the third part, respondents were asked demographic questions and to evaluate the questionnaire. Further discussion about the evaluation of the questionnaire can be found in section, 3.5.

3.3.2. Variables

Based on the theoretical framework suggested by the authors in section 2, the following instruments are used to investigate the variables regarded to be relevant in exploring the outlined research question of the thesis.

Unless otherwise specified, the instrument have been used in their original format, for example, the number of items, phrasings, and scale points.

Attitude

Attitude is measured using an index of two items (Appendix 2, Q 14) (Icek A, 1991; Peng et al, 2019). The scale items used originates from Peng et al (2019), shortened from three items to two items, shortening the time required to complete the questionnaire. The items are scored using a Likert scale from 1 (very negative) to 7 (very positive) and 1 (very undesirable) to 7 (very desirable).

Attitude is expected to reveal respondents' view on micro mobility services.

Subjective Norms

Subjective norm is measured using an index consisting of three items (Appendix 2, Q 15). The scale items used originates from Peng et al (2019) adapted to the use of SMMS. The original scale was shortened by the authors from three to two items, shortening the time required to complete the questionnaire. The items are scored using a Likert scale from 1 (completely disagree) to 7 (completely agree).

Subjective norm is expected to reveal respondents' perceptions of the societal responses to their decision of using micro mobility services (i.e. approval from the people close to them).

Intention

Intention is measured using an index of two items (Appendix 2, Q 9) (Icek, A, 1991; Peng et al 2019). The scale items used originates from Peng et al (2019) adapted to the use of SMMS. The original scale was shortened by the authors from three to two items, shortening the time required to complete the questionnaire. The items are scored using a Likert scale from 1 (completely disagree) to 7 (completely agree).

Intention is expected to reveal respondents' planned behaviors regarding SMMS in the future.

Perceived behavioral control

Perceived behavioral control is measured using three separate items [1](Appendix 2, Q 9) (Icek, A, 1991; Eccaruis & Lu, 2020 Peng et al, 2019). The scale items used originates from Peng et

[1] *NB:* The decision to not index Perceived Behavioral Control is discussed in section 3.5

al (2019) adapted to the use of SMMS. The items are scored using a Likert scale from 1 (completely disagree) to 7 (completely agree).

Perceived behavioral control is expected to reveal respondents' perceptions of the ease or difficulty related to adopting SMMS (e.g. availability and affordability of micro mobility services in the future).

Perceived Risk

Perceived risk is measured using an index of three items (Appendix 2, Q 10) (Mariott & Williams, 2018; Peng et al 2019). The scale items used originates from Peng et al (2019) adapted to the use of SMMS. The items are scored using a Likert scale from 1 (completely disagree) to 7 (completely agree).

Perceived risk is expected to reveal respondents' potential perceived risk regarding the usage of micro mobility services.

Knowledge

Knowledge is measured using an index of three items (Appendix 2, Q 18) (Barth et al. ,2016; Kraus et al., 2013). The scale items used originates from Peng et al (2019) adapted to the use of micro mobility services. The items are scored using a Likert scale from 1 (completely disagree) to 7 (completely agree).

Knowledge is expected to measure the respondents' interpretation shared micro mobility technology.

Hedonic Motivation

Hedonic motivation is measured using an index of two items (Appendix 2, Q 11). The scale items used originate from Voss et al (2003) and Batra et al (1991), adapted to the use of SMMS. The original scale was shortened from five to two items, shortening the time required to complete the questionnaire. The items are scored using a Likert scale from 1 (Not fun at all) to 7 (Very much fun) and 1 (Not pleasant at all) to 7 (Very much pleasant).

Hedonic motivation is expected to reveal respondents' sensations derived from experience or imagined sensations from using SMMS.

Cognitive dissonance (cognitive dissonance towards green claims)

Cognitive dissonance is measured using an index of two items (Appendix 2, Q 13). The scale items used originates from Chang (2011) adapted to the use of SMMS. The items are scored using a Likert scale from 1 (completely disagree) to 7 (completely agree).

Cognitive dissonance is expected to measure the believability of claims made about SMMS being green, and how the ambiguity might affect the attitude and intention toward SMMS in a negative manner.

Social influence

Social influence is measured using an index of three items (Appendix 2, Q 17). The scale items used originates from Eccaruis and Lu (2020), adapted to the use of SMMS. The items are scored using a Likert scale from 1 (completely disagree) to 7 (completely agree).

Social influence is expected to measure if respondents' travel mode choice is influenced by their networks.

3.4. Data collection

The main survey was conducted between April 20th and April 24th, 2020. During this period 220 complete responses was recorded. The survey was distributed in different forums on Facebook (See Appendix 3 for more details). The purpose of this method and the different forums was to reach a representative group for both users and non-users of SMMS.

The data was collected through Qualtrics and then analyzed in IBM SPSS version 26. Prior to analyzing the data, a case screening and a variable screening were performed.

In the case screening, the authors looked for missing data in rows, the attention check-question, involvement in the study, unengaged responses and outliers (in continuous variables). Two responses were removed because of them failing the attention check and one removed because of the involvement in the study[2]. The overall involvement in the study was high with a mean of 5.47 and median of 5.75. In total 217 responses were deemed as legitimate.

In the variable screening, the authors looked for missing data in variables. One missing value was observed in the variable Hedonic motivation. By looking at the surrounding values of other indicators for the Hedonic motivation, and the mode value, the missing value could be imputed. It was also found that Qualtrics had faulted the values for the dependent variable attitude. Scale points (2)-(7) corresponded to values between (22)-(27) while scale point (1) still corresponded to the value of (1), meaning the values ranged between (1)-(27) in a seven-point Likert scale. This was corrected by recoding the corresponding values between (22)-(27) to the values between (2)-(7)[3].

3.5 Reliability, Validity

Reliability express if it exists discrepancy between the observed value and the actual value, i.e. the consistency of measure (Söderlund, 2005). To increase the reliability of the study, items used stemmed from academical research and were tested with Cronbach's alpha, a measurement of internal consistency. The range of Cronbach's alpha lies between 0 and 1 and a value above 0.70 is considered to indicate high reliability (Cortina, 1993). Instruments showing a Cronbach's alpha of 0.7 or more were then transformed into index variables for the

[2]The respondent removed scored a 1 in all items used to measure involvement in the study, indicating a low involvement in the study.
[3] The faulted scale points were not displayed to the respondents in the survey.

statistical analysis[4]. More details of Cronbach's alpha for each instrument can be found in Appendix 4.

Validity refers to the extent to which a measure is freed from both random and systematic measurement errors (Söderlund, 2005). To improve validity, the questionnaire was in Swedish. The items used were all carefully translated to Swedish and adapted to the context of the questionnaire. As per mentioned in section 3.3 steps were taken to combat order effect and respondents performing random clicking, improving validity. To further ensure validity, respondents were asked to rate their involvement in the study. The scale items used originates from a Mehta et al (2011) and intends to measure how much a person enjoyed and were motivated participating in the study. The index indicated a high involvement in the study.

[4] In previous studies by Peng et al (2019), Eccaruis and Lu (2020), perceived behavioral control have shown significant positive effect on intention to use, and attitude towards autonomous vehicles and e-scooter services. In the pilot-test conducted by the authors, the variables for Perceived Behavioral control showed a Cronbach's alpha above the suggested threshold of 0.7. Despite this, in the data analysis of the real test it was found that the Cronbach's alpha for Perceived behavioral control variable was 0.224. Looking at the mean for the three separate variables (4.95), (5.84) and (6.17), they all show high values. Based on results in previous research this would indicate that the respondents in this study recognize a high perceived behavioral control. Perceived behavioral control is relevant to the outline research question and proposed framework; thus, it was decided to separate the items into three separate variables and test them individually.

4. Results

4.1. Descriptive statistics of respondents

The main survey was conducted between April 20th and April 24th, with 217 valid responses collected[5]. The average age of respondents was 37 years old (SD=11.4) with an annual income between 500-600 thousand SEK (post-tax). The majority (65%) stated that Covid-19 had no effect on their usage of SMMS or that they used it less often (24%). Table 1 presents descriptive statistics for all valid respondents in further detail.

Table 1: Descriptive statistics (demographics) for the respondents used in the study of SMMS.

Variable		Frequency	Percent	Sweden's national average (SCB 2019)
Gender	Male	140	65	50
	Female	76	35	50
	Other			*
Education	Elementary school	4	2	18
	High school degree	54	25	45
	Bachelor's degree	88	41	37
	Master's degree	48	22	*
	Vocational training	20	9	*
	Doctoral education	1	.5	1
	Other	2	1	*
Main occupation	Student	36	17	3
	Employed	174	80	50
	Un-employed	2	1	3
	Retired	1	.5	22
	Sick leave	1	.5	*
	Other	3	1	22
Driver's license (multiple choice)	Am (moped)	36	**	**
	A (motorcycle)	18	**	**
	B (passenger car)	183	**	**
	Other	12	**	**
	No license	28	**	**
County	Stockholm county	151	70	23
	Västra Götaland county	19	9	17
	Skåne county	17	8	13
	Other	30	14	47

Note: * Not applicable in SCB's statistics, ** Not applicable, N =217

The descriptive statistics for the respondents show somewhat similar demographics to Sweden's national average. One difference can be found in counties, where a higher percentage of respondents live in big counties compared to Sweden's national average.

[5] See section 3.4 for details about case screening and variable screening in the data collection

4.1.2 Descriptive statistics for users, non-users and owners of micro-mobility vehicles

In addition to demographical data, information was gathered about the respondent's transportation behavior and ownership of micro-mobility vehicles. Findings show that 123 respondents (57%) had used micro-mobility services in the past 12 months and that 94 (43%) had not. Less than 52 respondents (24%) owned a micro-mobility vehicle. Table 2 presents a comparison in demographics and transportation behavior between users, non-users and owners of micro-mobility vehicles.

Table 2: Descriptive statistics and transportation behavior for three respondent groups used for the study of SMMS.

Variable		Users of SMMS in percent	Non-users of SMMS in percent	Owners of a micro mobility vehicle in percent
Gender	Male	65	64	83
	Female	35	35	16
	Other	-	1	1
Education	Elementary school	2	2	4
	High school degree	26	23	23
	Bachelor's degree	37	45	39
	Master's degree	24	20	31
	Vocational training	11	7	4
	Doctoral education	-	1	-
	Other	2	1	-
Main occupation	Student	20	12	4
	Employed	77	84	91
	Un-employed	1	1	2
	Retired	-	1	2
	Sick leave	-	1	-
	Other	2	-	2
Driver's license (multiple choice)	Am (moped)	16	17	37
	A (motorcycle)	15	13	17
	B (passenger car)	81	89	92
	Other	2	10	8
	No license	18	6	4
County	Stockholm county	76	59	57
	Västra Götaland county	12	9	10
	Skåne county	6	10	6
	Other	6	23	27

Note: Users: N=123, Non-users: N=94, Owners: N=52

The three respondent groups show similar socio-demographics and transportation behavior, except for a difference in geographical location, where there are more non-users and owners in other counties than Stockholm county, Västra Götaland county and Skåne county[6].

[6] A one-way ANOVA test is conducted in section 4.2.5, comparing intention, attitude and perceived risk between the different counties.

Table 3 presents frequency of use, for respondents who stated that they had used SMMS in the past 12 months.

Table 3: Descriptive statistics for the frequency of usage for users of shared micro-mobility services

Variable	Daily	4-6 times per week	2-3 times per week	Once a week	1-3 times per month	Less than once a month	Used once or twice
Frequency	1	2	4	14	34	31	37
Percent	1	2	3	11	28	25	30

Note: (N=123)

4.2 Segmented analysis for consumer behavior related to shared micro mobility services

A segmentation analysis was performed to study attitude, intention and perceived risk based on socio-demographic variables of interest suggested in section 2.7 [7] (Curtis & Perkins, 2006).

4.2.1 Comparison of *Attitude, Intention* and *Perceived Risk* between users and non-users of micro mobility services

Table 4 presents descriptive statistics for the variables attitude, intention and risk, between users and non-users of SMMS.

Table 4: Descriptive statistics for the variables attitude, intention and perceived risk between users and non-users of SMMS.

Variable	Mean for users of SMMS[a]	Mean for non-users of SMMS[a]	SD for users of SMMS[a]	SD for non-users of SMMS[a]
Attitude	5.03**	4.27**	1.54	1.28
Intention	5.61***	4.04***	1.37	1.80
Perceived Risk	4.59	4.39	1.41	1.42

Note: [a]MMS: Micro mobility services. N users=123, N non-users =94

*p<0.05 **p<0.01 ***p<0.001.

One sample t-tests were conducted comparing means for users and non-users of SMMS to the sample mean[8]. Prior to conducting the t-tests, the assumption of normality was evaluated and determined to be satisfied since the three groups' distribution was associated with skew and kurtosis of less than |2.0| and |9.0|[9], respectively (Schmider, Ziegler, Danay, Beyer, Büner 2010). The results of the one sample t-test showed:

[7] See section 2.7 for more details on socio-demographic factors influence on travel behavior.
[8] Population means for attitude, intention and perceived risk can be found in table 5.
[9] See appendix 5 for the skew and kurtosis for *attitude, intention and perceived risk*

- Users of SMMS reported higher attitudes (*M=5.03, SD=1.28)* compared to the sample mean, $t(122) = 2.37$, $p = 0.02$
- Users of SMMS reported higher intention (*M=5.61, SD=1.37)* compared to the sample mean, $t(122) = 5.5$, $p = 0.00$
- Non-users of SMMS reported lower attitude (*M=4.27, SD=1.54)* compared to the sample mean, $t(93) = -2.28$, $p = 0.025$
- Non-users of SMMS reported lower intention (*M=4.04, SD=1.8)* compared to the sample mean, $t(93) = -4.8$, $p = 0.000$
- Perceived risk showed no statistically significant result between users and non-users of SMMS.

4.2.2 Comparison of *Attitude, Intention* and *Perceived Risk* toward shared micro mobility services between genders

Table 5 presents a summary of descriptive statistics for the variables used in the comparison between genders.

Table 5: Summary of descriptive statistics for attitude, intention and Perceived Risk between genders.

	Attitude M (SD)	Intention M (SD)	Perceived Risk M (SD)
Males (N=140)	4.85 (1.66)	5.08 (1.73)	4.30 (1.42)
Females (N=76)	4.42 (1.81)	4.63 (1.76)	4.91 (1.31)

Prior to conducting the ANOVA, the assumption of normality was evaluated and determined to be satisfied as the three groups' distribution was associated with a skewness and kurtosis of less than |2.0| and |9.0|, respectively (Schmider, Ziegler, Danay, Beyer, 2010)[10]. Furthermore, the assumption of homogeneity of variances was tested and satisfied based on Levene's F test.

The independent between-groups ANOVA yielded a statistically significant effect, $F(1, 215) = 5.76$, $p= 0.004$, $\eta p2 = 0.033$, indicating that women perceives a higher risk related to SMMS than men.

No statistically significant results were found for *intention* and *attitude* between males and females.

4.2.3 Comparison of *Attitude, Intention and Perceived Risk* toward shared micro mobility services between owners and non-owners of micro-mobility vehicle(s).

The descriptive statistics associated with *attitude, intention* and *perceived risk* between owners and non-owners of micro-mobility vehicles can be found in table 7.

Table 6: Summary of descriptive statistics for *attitude, intention and Perceived Risk* between owners and non-owners of micro-mobility vehicles.

[10] [10] See appendix 5 for the skew and kurtosis of *attitude, intention and perceived risk*

	Attitude M (SD)	Intention M (SD)	Perceived risk M (SD)
Owners (N=52)	5.45 (1.64)	5.3 (1.68)	4.19 (1.57)
Non-Owners (N=165)	4.47 (1.69)	4.81 (1.76)	4.6 (1.36)

A one-way ANOVA was performed testing if ownership of micro-mobility vehicles had a positive effect on attitude, intention and a negative effect on perceived risk. Prior to conducting the ANOVA, the assumption of normality was evaluated and determined to be satisfied, as the three groups' distribution were associated with a skewness and kurtosis of less than |2.0| and |9.0|, respectively (Schmider, Ziegler, Danay, Beyer, Büner 2010)[11]. Furthermore, the assumption of homogeneity of variances was tested and satisfied based on Levene's F test.

The between-groups ANOVA yielded a statistically significant effect for attitude, $F(1, 215) = 13.58$, $p= 0.000$, $\eta p2 = 0.058$, indicating that owners of micro mobility vehicles are more positive towards SMMS.

No statistically significant result was found for intention and perceived risk between owners and non-owners of shared micro mobility vehicles.

4.2.4 Comparison of *Attitude, Intention* and *Perceived Risk* toward shared micro mobility services between users of micro mobility services

A one-way ANOVA was performed testing if frequency of use had a positive effect on attitude and intention, and simultaneously a negative effect on perceived risk. Users of micro mobility services were divided into three sub-categories (see table 3 for frequency details):

- Category (1) consisted of groups, less than once a month and used once or twice (n=68).
- Category (2) consisted of group 1-3 times per month (n=34)
- Category (3) consisted of group Once a week, 2-3 times per week, 4-6 times per week and daily (n=21)

Prior to conducting the ANOVA, the assumption of normality was evaluated and determined to be satisfied as the three groups' distribution was associated with a skewness and kurtosis less of than |2.0| and |9.0|, respectively (Schmider, Ziegler, Danay, Beyer, Büner 2010)[12]. Furthermore, the assumption of homogeneity of variances was tested and satisfied based on Levene's F test.

The between groups yielded a statistically significant effect for:

[11] See appendix 5 for the skew and kurtosis for *attitude, intention and perceived risk*
[12] See appendix 5 for the skew and kurtosis for *attitude, intention and perceived risk*

- Attitude, F(2, 120) = 18.65, p = 0.00, ηp2= 0.24. Meaning 24% of the variance in attitude was accounted for in frequency of use.

- Intention F(2, 120) = 12.33, p = 0.00, ηp2= 0.17. Meaning 17% of the variance in intention was accounted for in frequency of use.

- No statistically significant result was found for perceived risk.

To evaluate the nature of the differences between the three means in attitude and intention, the statistically significant ANOVA was followed up by a Tukey's HSD post-hoc test.

For attitude, Tukey's HSD indicated that attitude was lower for category (1) compared to (2) and (3), at a significance level of p = 0.000, however it showed no statistically significance between category (2)-(3).

For intention Tukey's HSD indicated that intention was lower for category (1) compared to (2) and (3), at a significance level of p= 0.000 and p=0.00. However, it showed no statistically significance between category (2)-(3).

4.2.5 Other observations

Two One-way ANOVAs were performed testing differences between counties and age groups respectively. However, no significant results were found. For more details, see appendix 6.

4.3 Results for consumer intention related to shared micro mobility services

To examine consumer *intention* related to SMMS, using the proposed extended theory of planned behavior, a hierarchical regression was performed. A hierarchical regression was used since variables can be added in steps. This align with the nature of the research question. Furthermore, it allows the authors to compare the original TPB framework to the extended version, thus contributing to the purpose of the thesis. Predictors hypothesized to explain consumer intention related to SMMS were added in three steps[13].

In a first step, predictors included in the original theory of planned behavior were added[14].

In a second step, predictors used in related studies (Peng et al., 2019) were added[15].

In a third step, the additional predictors in the extended theory of planned behavior based on pervious and related research were added[16].

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[13] A fourth step with socio-demographics was initially added. However, a negative *R - change* was obtained and no significant results were found, which is why it was excluded.
[14] See section 2.1 for the original theory of planned behavior.
[15] See section 2.2 & 2.3
[16] See section 2.4-2.6 for the extended theory of planned behavior developed by the authors.

Table 7 present descriptive statistics for the predictors tested in the hierarchical regression analysis for consumer intention related to SMMS.

Table 7: Descriptive statistics for the predictors tested in the regression analysis

Variable	M entire sample (SD)	M users of SMMS (SD)	M non-users of SMMS (SD)
Intention	4.93 (1.75)	5.61 (1.37)	4.04 (1.80)
Attitude	4.71 (1.55)	5.03 (1.54)	4.27 (1.28)
Perceived Risk	4.50 (1.75)	4.59 (1.41)	4.39 (1.42)
Subjective Norm	3.82 (1.42)	4.10 (1.31)	3.45 (1.54)
Social Influence	3.88 (1.26)	4.17 (1.55)	3.5 (1.59)
Knowledge	5.30 (1.50)	6.08 (0.89)	4.28 (1.67)
Perceived Behavioral Control (1)	4.95 (1.59)	5.49 (1.15)	4.24 (1.81)
Perceived Behavioral Control (2)	5.84 (1.51)	5.85 (1.50)	5.83 (1.54)
Perceived Behavioral Control (3)	6.17 (1.22)	6.23 (1.08)	6.10 (1.40
Hedonic Motivation	4.93 (1.26)	5.24 (1.11)	4.51 (1.33)
Cognitive dissonance towards green claims	4.34 (1.50)	4.51 (1.45)	4.11 (1.54)

Note: The entire sample (*N=217),* Users (*N=123),* Non-users (*N=94).*

Prior to conducting a hierarchical regression, the relevant assumptions were tested:

- The sample of size of 217 respondents satisfies the eleven independent variables used in the analysis (Hair et al, 2010).
- The assumption of singularity is met for the independent variables.
- Collinearity statistics all placed within in the accepted limit (Hair et al., 1998).
- An examination of the Q-Q plot, skewness and kurtosis for the dependent variable, intention, indicate the assumptions of normality (See Appendix 7) (George & Mallery, 2010).

A Pearson's correlations test was conducted on the hypothesized predictors. For the full results, see Appendix 8.

Results of the Pearson's correlation indicates that there is a significant positive association between:

- Intention and attitude ($r(215) = .73$ $p < .000$).
- Intention and subjective norm ($r(215) = .64$ $p < .000$).
- Intention and Hedonic motivation ($r(215) = .65$ $p < .000$).
- Intention and Knowledge ($r(215) = .42$ $p < .000$).
- Subjective Norm and Social influence ($r(215) = .71$ $p < .000$).

And a significant negative association between:

- Intention and cognitive dissonance towards green claims ($r(215) = -.12$ $p < .05$).

Table 8 presents a summary of the hierarchical regression analysis for the independent variables predicting intention.

Table 8: Summary of hierarchical regression analysis for variables predicting intention.

Model	Predictor	*B*[a]	*SE B*	*Rs*	*Change*	*F*	Sig
1				.615	.615	67.28	***
	Attitude	.508***	.059				
	Subjective norm	.353***	.070				
	PBC_1	.145**	.049				
	PBC_2	.166**	.051				
	PBC_3	-.046	.063				
2				.678	.064	63.00	***
	Attitude	.499***	.054				
	Subjective norm	.334***	.064				
	PBC_1	.049	.047				
	PBC_2	.153**	.047				
	PBC_3	-.066	.058				
	Knowledge	.291**	.048				
	Perceived Risk	.124*	.050				
3				.707	0.029	49.78	***
	Attitude	.484***	.053				
	Subjective norm	.208*	.078				
	PBC_1	.062	.047				
	PBC_2	.173***	.047				
	PBC_3	-.062	.057				
	Knowledge	.277***	.048				
	Perceived risk	.110**	.049				
	Social influence	.174**	.062				
	Hedonic motivation	.249**	.077				
	Cognitive dissonance towards green claims	.058	.049				

Note: (N=217), [a]Unstandardized B, *p<0.05 **p<0.01 ***p<0.001, SE B=standard error of unstandardized B. PBC_1,2,3 = Perceived behavioral control (1), (2), (3)

The hierarchical regression revealed that model 1, consisting of the original theory of planned behavior variables explained 61.5% of the variance in intention to use SMMS (dependent variable). In model 2, the variables perceived risk and knowledge were introduced. This resulted in an additional 6.4% of variance in intention being explained. Lastly, the variables of the full extended theory of planned behavior were added increasing the variance explained by an additional 2.9%. In total 70.7% of the variance for the dependent variable, intention, was explained. A *Rs* of 0.7 or more is generally considered a strong effect size (Zikmund & William G., 2000).

4.4 Results for consumer attitude related to shared micro mobility services

To examine consumer *attitude* related to SMMS, a hierarchical regression was performed. A hierarchical regression was used since variables can be added in steps. This align with the nature of the research question. Furthermore, it allows the authors to compare the original TPB framework to the extended version, thus contributing to the purpose of the thesis. Predictors hypothesized to explain consumer attitude related to SMMS were added in three steps.

In a first step, predictors believed to explain the most of *attitude* were added.

In a second step, predictors from the theory of planned behavior were added.

In a third step, predictors used in related studies (Peng et al., 2019) were added.

Prior to conducting a hierarchical regression, the relevant assumptions were tested:

- The sample of size of 217 respondents satisfies the ten independent variables used in the analysis (Hair et al, 2010).
- The assumption of singularity is met for the independent variables.
- Collinearity statistics were all in the accepted limit (Coakes, 2005; Hair et al., 1998).
- An examination of the Q-Q plot, skewness and kurtosis for the dependent variable, attitude, indicate the assumptions of normality (See Appendix 9) (George & Mallery, 2010).

A Pearson's correlations test was conducted on the predictors seen in appendix 8.

Results of the Pearson's correlation indicates that there is a significant positive association between:

- Attitude and Hedonic motivation ($r(215) = .69$ $p < .000$).
- Attitude and subjective norm ($r(215) = .66$ $p < .05$).

And a negative association between:

- Attitude and perceived risk ($r(215) = -.04$ $p < 0.05$).
- Attitude and cognitive dissonance towards green claims ($r(215) = -.30$ $p < .000$).

Table 9 presents a summary of the hierarchical regression analysis for variables predicting attitude.

Table 9: Consumer *attitude* towards micro mobility services (N=217)

Model	*Predictor*	*B*[a]	*SE B*	*Rs*	*Change*	*F*	Sig.
1				.503	.503	108.26	***
	Hedonic motivation	.894***	.067				
	Cognitive dissonance towards green claims	-.206***	.056				
2				.601	.098	52.762	***
	Hedonic motivation	.603***	.075				
	Cognitive dissonance towards green claims	.-176***	.048				
	PBC_1	.-009	.046				
	PBC_2	.101*	.058				
	PBC_3	-.024	.058				
	Subjective Norm	.453***	.075				
3				.604	0.003	35.14	***
	Hedonic motivation	.605***	.77				
	Cognitive dissonance towards green claims	-.152**	.049				
	PBC_1	-.009	.048				
	PBC_2	.111*	.049				
	PBC_3	-.045	.058				
	Subjective Norm	.404***	.079				
	Knowledge	.006	.053				
	Perceived Risk	.043	.052				
	Social influence	.065	.077				

Note: [a] Unstandardized B, *p<0.05 **p<0.01 ***p<0.001, SE B=standard error of unstandardized B.

PBC_1,2,3 = Perceived behavioral control (1), (2), (3)

The hierarchical regression revealed that model 1, consisting of hedonic motivation and cognitive dissonance towards green claims, explained 50.3% of variance in attitude (the dependent variable). In model 2 the predictors from the original theory of planned behavior were added, subsequently explaining an additional 9.8% of variance in attitude. Lastly, the variables of the full extended theory of planned behavior were added increasing the variance explained by an additional 0.3%. In total 60.4% of the variance for the dependent variable, attitude, was explained. A *Rs* between 0.5 and 0.7 is generally considered a moderate effect size (Zikmund & William G., 2000).

4.5 Hierarchical regression comparing attitude and intention for users and non-users of micro mobility services

A hierarchical regression analysis testing the models presented in section 4.3 and 4.4 was performed in order to compare attitude and intention between users and non-users of SMMS. This was done with the purpose of comparing the explanatory value for the models between the two groups. The relevant assumptions mentioned in section 4.3 and 4.4 were all satisfied (See Appendix 10, 11, 12, 13, 14 for skewness, kurtosis and Q-Q plots).

Results for the hierarchical regression for consumer intention showed a greater explanatory value for non-users of SMMS with a peak value of 75.8% ($p < 0.01$)

The hierarchical regression for consumer attitude showed a greater explanatory value for non-users of SMMS with a peak value of 65.9% in model 2 ($p < 0.01$). More details regarding the result of the hierarchical regression analysis, for consumer attitude between users and non-users of shared micro mobility can be found in Appendix 13.

More details regarding the result of the hierarchical regression analysis for consumer intention between users and non-users of shared micro mobility can be found in Appendix 15.

4.6 Summary of hypotheses

In tables 10 and 11, a summary of hypotheses for consumer attitude and intentions in regard to shared micro mobility services are presented, together with the empirical findings of section 4.3 and 4.4.

Table 10: Hypotheses testing for consumer intention related to micro mobility services

H1a	Consumers' behavioral attitude is positively associated with intention to use shared micro mobility services.	Empirically Supported***
H1b	Subjective norm is positively associated with consumers' intention to use shared micro mobility services.	Empirically Supported**
H1c	Perceived behavioral control is positively associated with consumers' intention to use shared micro mobility services.	Not applicable[17]
H1d	Knowledge about SMMS is positively associated with consumers' intention to adopt shared micro mobility services.	Empirically Supported***
H1e	Perceived risk of SMMS is negatively associated with consumers' intention to adopt shared micro mobility services.	No Empirical support
H1f	Social influence is positively associated with consumers' intention to use shared micro mobility services.	Empirically Supported**
H1g	Consumers' hedonic motivation is positively associated with consumers' intention to use shared micro mobility services.	Empirically Supported***
H1h	Cognitive dissonance regarding the environmental impact of shared micro mobility services is negatively associated with consumer's intention towards Shared micro mobility services.	No Empirical Support

Note: *p < 0.05, ** p <0.01, *** p <0.001

[17] The findings of perceived behavioral control for intention to use SMMS could not be empirically supporter or rejected as the items failed to capture the variable.

Table 11: Hypothesis consumer attitude related to shared micro mobility services

H2a	Subjective norm is positively associated with consumers' attitude towards shared micro mobility services.	Empirically Supported**
H2b	Perceived behavioral control is positively associated with consumers' attitude towards shared micro mobility services.	Not applicable
H2c	Knowledge about SMMS is positively associated with consumers' attitude towards shared micro mobility services.	No Empirical support[18]
H2d	Perceived risk of SMMS is negatively associated with consumers' attitude towards shared micro mobility services.	No Empirical support
H2e	Social influence is positively associated with consumers' attitude towards shared micro mobility services.	No Empirical support
H2f	Consumers' hedonic motivation is positively associated with consumers' attitude towards shared micro mobility services.	Empirically supported***
H2g	Cognitive dissonance regarding the environmental impact of shared micro mobility services is negatively associated with consumer's attitude towards Shared micro mobility services.	Empirically supported**

Note: *p<0.05 **p<0.01 ***p<0.001

[18] The findings of perceived behavioral control for attitude towards SMMS could not be empirically supporter or rejected as the items failed to capture the variable.

5. Discussions and conclusions

The purpose of this thesis was to reduce the current research gap regarding consumers intention to use and attitude towards shared micro mobility services from a rigorous theoretical background. This was done by extending the TPB theoretical framework by incorporating additional behavioral psychological variables including knowledge, perceived risk, hedonic motivation, cognitive dissonance against green claims and social influence.

In this section, results are discussed in comparison with the theoretical framework developed in section two. First, the results and implications from the segmented analysis is presented. Secondly, the results for the theory of planned behavior are presented. Lastly, a discussion and implications for each separate variable is conducted.

5.1 Results for segmented analysis

A segmented analysis was performed comparing socio-demographic variables for the dependent variables, attitude, intention. In the segmented analysis perceived risk was additionally tested as a dependent variable. Previous studies have shown that socio-demographic variables have a significant influence on consumers' travel behavior and travel mode choice (Durand et al., 2018). Curtis and Perkins (2006), suggest the socio-demographic variables age, gender, location and vehicle ownership to be of special interest when studying transportation behavior. In addition to the variables suggested by Curtis and Perkins (2006), the socio-demographic variables, *users, non-users, frequency of use* and *geographical location* were added as the participants in the pre-study found them to be of special interest when studying attitude and intention for SMMS. The results of the segmentation analysis can be summarized as:

- A one-way ANOVA yielded no statistically significant results between age groups in attitude, intention and perceived risk. This contradicts previous findings of the typical consumer of shared micro mobility being young (Durand et al., 2018).

- A one-way ANOVA yielded no statistically significant results between geographical locations. This, despite SMMS mainly prevailing in Stockholm, Gothenburg and Malmö.

- A one-way ANOVA yielded statistically significant result in perceived risk between genders. The analysis indicated women perceiving higher risk for SMMS than men. This supports the research of Sjoberg (2003), stating that risk perception can vary between men and women.

- A one-way ANOVA yielded a statistically significant result in attitude between owners and non-owners of micro mobility vehicles. This indicates that owners are

more positive towards SMMS than non-owners, supporting the research of Curtis and Perkins (2006).

5.2 The extended theory of planned behavior

The theory of planned behavior has been extensively used in studies of human and transportation behavior (Bamberg et. al. 2010; Eccarius & Lu, 2020; Peng et. al 2019; Zhang et al. 2018). However, it has only been used to a limited extent in the shared mobility context. Section 5.2.1 and 5.2.2 discuss the implications of the hierarchical regression analysis for the theory of planned behavior related to the intention to use and attitude towards SMMS.

5.2.1 Implications for Intention

The results of the hierarchical regression analysis showed that the original theory of planned behavior explained 61.5% of the variance in intention to use SMMS. This supports previous research suggesting that the framework successfully explains behavioral intention in the transportation domain (Bamberg et. al. 2010; Eccarius & Lu, 2020; Peng et. al 2019; Zhang et al. 2018). It further implies that the TPB can be used to explain intention to use SMMS.

The second model added the variables, *perceived risk and knowledge*, to the TPB based on previous research by Peng et al (2019). The result showed a statistically significant increase in explanatory power of 6.4%, indicating that *perceived risk* and *knowledge* improves the explanatory power for TPB related to SMMS.

The third model added the, *cognitive dissonance towards green claims, hedonic motivation and social influence*, extending the theory of planned behavior. The results showed a statistically significant increase of 2.9% in explanation in the variance for intention, for a total of 70.7% explanatory power. This implies that the extended theory of planned behavior suggested by the authors, successfully improves the explanatory power of the original TPB related to SMMS, although marginally.

5.2.2 Implications for Attitude

The results of the hierarchical regression showed that the variables *cognitive dissonance towards green claims and hedonic motivation*, based on previous research relevant to intention (Bell and Esses 2002: Fitt and Curl, 2019: Hass et al. 1992: Nordgren et al., 2006,), accounted for 50.3% of the variance in attitude. This supports the previous research, Festinger cognitive dissonance theory (1957) and the hypotheses developed by the authors that the predictors have a significant impact on attitude towards SMMS.

The second model added the predictors, *perceived behavioral control (1,2,3) and subjective norms,* included in the original theory of planned behavior (Ajzen 1991). The results showed a statistically significant increase of 9.8% in explanation of variance for attitude. This indicates that the original TPB improves the explanatory power for attitude related to SMMS.

The third model added the predictors, *knowledge, perceived risk and social influence*, based on the previous research by Peng et al (2019). Social influence was also added, hypothesized by the authors to have a positive effect on attitude towards SMMS. The results showed a minor statistically significant increase of 0.3% in explanatory power, but no statistically significance for the added predictors. This is not in line with the previous research of Peng et al (2019) showing *knowledge* and *perceived risk* having a significant effect on attitude for shared autonomous vehicles.

5.3 Discussion and implications for the separate variables

5.3.1 Attitude and its implications

The result confirmed that attitude had a significant impact on consumer behavioral intention to use SMMS. Furthermore, the results showed attitude being the main predictor of intention to use SMMS within all the three tested regression models. These findings correspond with Peng et al (2019) research finding attitude to be an efficient predictor of behavioral intention within the shared mobility paradigm. It also, echoes Stark and Hössinger (2018) findings of attitude being the main predictor of intention in travel behavior context.

In this thesis attitude was defined and measured in accordance with the TPB, as the degree to which a consumer has a favorable or unfavorable evaluation or appraisal of SMMS. Thus, the result reflects the original paradigm of the TPB and its suggestion that attitude is the main determinant, positively associated with behavioral intention. This implicates that consumers' thoughts and feelings influence their behavioral intention i.e. consumers with a more positive attitude are more likely to use or plan to use SMMS.

5.3.2 Subjective norms, Social influence and its implications

According to the TPB, subjective norm is a determinant of behavioral intention (Ajzen, 1991). Several studies have found subjective norm to be positively associated with attitude within the TPB framework (Peng et al, 2019). However, research in various social behavior contexts have found subjective norm to show limited, or no significant influence on consumers behavioral intention (Ajzen, 1991). The result of this thesis showed subjective norm to be significantly positively associated with both consumer choice intention and attitude towards SMMS. Subjective norm was measured as the perceived approval or disapproval of friends and family in regard to using SMMS. Thus, the results of the thesis indicate that thoughts or opinions of friends and family around consumers are significant determinants of personal choice intentions in the context of SMMS. Parallel to the reasoning of Fishbein and Ajzen (1985), the results give an indication that subjective norm create social pressure, influencing the attitude toward and the intention to use SMMS.

Due to its growing importance in transportation behavioral research, Social influence was added as a complimentary variable to subjective norm. Social influence aimed to measure

how other consumers use of SMMS, in social environments, influenced their attitude towards and intention to use SMMS.

The results showed that other people using SMMS had no significant effect in consumers attitude towards SMMS, however it had a significant positive effect on choice intention. These finding correspond with previous research (Sherwin et al., 2014, and Pike and Lubell 2018) indications that other people using SMMS can affect consumers consideration of using SMMS, i.e. intention.

5.3.3 Perceived behavioral control and its implications

In previous studies by Peng et al (2019), Eccaruis and Lu (2020), perceived behavioral control have shown a significant positive effect on intention to use, and attitude towards autonomous vehicles and e-scooter services. However, in this study no conclusions could be drawn as the items measuring perceived behavioral were divided into three separate variables because of them showing a Cronbach's alpha below the threshold suggested by the authors. For more information, see section 3.5 and for critique against the measurement of perceived behavioral control, see section 5.5.

5.3.4 Knowledge and Perceived Risk

Knowledge showed a statistically significant positive effect on the intention to use SMMS. These findings correspond with the research of Peng et al (2019) showing knowledge to have a significantly positive effect on behavioral intention within the shared mobility paradigm. The results also correspond with research suggesting that knowledge of electric vehicles can significantly improve acceptance of electric vehicles (Barth et al., 2016; Kraus et al., 2013).

Perceived risk was not found to have a statistically significant negative effect on intention to use or attitude towards SMMS. This contradicts previous research on other types of shared mobility that have shown perceived risk having a significant negative effect on the intention to use shared vehicles (Peng et al 2019). Moreover, the finding deviates from previous research indications of perceived risk being negatively associated with consumers' attitudes towards and intention to use product and services that can be seen as innovate (Mitchell, 1999; Mariott and Williams, 2018).

In previous research by Mothersbaug et al. (1994) it was shown that a higher level of knowledge reduces the perceived risk associated with the product. However, these findings could not be supported as no statistically significant difference was found in the t-test conducted for perceived risk between users and non-users of SMMS.

5.3.5 Hedonic Motivation and Cognitive dissonance towards green claims

Hedonic Motivation showed a statistically significant positive effect on the intention to use and attitude toward SMMS. This corresponds with previous research and further implicates hedonic motivation being one of the main drivers for people using SMMS (Fitt and Curl, 2019).

Cognitive dissonance towards green claims showed a statistically significant negative effect on attitude towards SMMS. This supports previous research suggesting that consumers feel strong discomfort when they cannot attribute their ambivalence to green factors (Bell and Esses 2002; Hass et al. 1992; Nordgren et al., 2006).

5.4 Conclusions and implications

While urbanization has presented many opportunities, it also presents significant challenges. Shared micro mobility services has quickly come to rise as one of the potential modes of future urban transportation. This calls for a thorough understanding of consumers' intention to use and attitude towards shared micro mobility services. In this thesis, we carried out an empirical research on the determinant factors of Swedish consumers' attitudes and behavioral intentions to use shared micro mobility service. The main findings can be summarized as:

- Swedish consumers intentions to use SMMS are positively associated with attitude, subjective norm, hedonic motivation, social influence and knowledge.
- Swedish consumers attitudes towards SMMS are positively associated with hedonic motivation, subjective norm and negatively associated with cognitive dissonance towards green claims.
- Attitude was shown to be the main predictor for behavioral intention related to SMMS.
- Hedonic motivation was shown to be the main predictor for attitude related to SMMS.
- Perceived risk associated related to SMMS is higher for women than men.
- Socio demographics between users and non-users of SMMS appear to be similar.

5.5 Limitations and criticism of the study

This thesis should be considered with its limitations in mind.

The items used to measure perceived behavioral control showed a Cronbach's alpha below the threshold suggested by the authors. This indicates that the items did not capture the same underlying effects making them unsuitable to capture perceived behavioral control as described in Peng et al (2019). Thus, the items were separated in the analysis weakening the analysis and the theory of planned behavior framework.

Another important point to make is the assumption of normality. By nature, a 7-point Likert scale can't be normally distrusted as it is not a continuous variable. Instead an approximation of normality was used as the dependent variables satisfied the conditions stated in section 4.3 and 4.4[19].

Also, there are certain risks associated with distributing a questionnaire on the web as respondents may not perceive the questions the same way and not answer as truthfully (Bryman & Bell, 2017). As the questionnaire was distributed on via Facebook groups, people could be influenced by previous comments made in the forum about the questionnaire. Söderlund (2018) refers to this as hypothesis guessing. There are also certain limitations regarding the length of the questionnaire, as investigating all variables more thoroughly would most likely lead to fewer respondents completing the questionnaire.

5.6 Suggested future research

A suggestion for future research is to attempt to use another scale origin for the questions measuring perceived behavioral. Successfully capturing perceived behavioral control would make the TPB relevant in studying intention and behavior related to SMMS.

Another suggestion would be trying to further explore the differences between socio-demographic variables. For example, a geographical analysis capturing attitude and intentions for more people not living in urban areas.

Lastly, a study exploring the relation between urban planning and SMMS would be interesting as it could give an indication, of how urban transportation might look in the future.

[19] By measuring the same variable with multiple items, a Likert scale approximates a continuous variable

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7. Appendix

Appendix 1: Details on pre-study participants

Table 12: An overview of participants in the pre-study

No.	Type of study	Participant
1	Semi-structured interview	Rickard Bröms. CEO and founder of Vässla AB.
2	Focus Group	Man, 22 years old. Users of SMMS Man, 21 years old. Users of SMMS Woman, 26 years old. Non-user of SMMS Man, 45 years old. Users of SMMS Woman, 19 years old. Non-user of SMMS.

Appendix 2:

Table 13: Displaying the questionnaire used in the study related to SMMS.

Number	Question and statements
Text	**Hur tar vi oss från Punkt A till Punkt B?** - Var med och utveckla branschen för mikromobilitet i rätt riktning! Svarar du på hela enkäten bidrar du till bekämpandet av den rådande COVID-19 Epidemin. För varje respondent skänker vi 5kr till WHO:s Solidarity Response Fund. För drygt två år sedan kom de första el-sparkcyklarna till Stockholms gator och stadsbor fick nu möjligheten att via mobilen, hyra en el-sparkcykel direkt från trottoaren för att ta dem från punkt A till B. Påverkar den nyetablerade mikromobilitets-branschen hur och vart vi rör oss i städerna? Detta är vad vår kandidatuppsats vid Handelshögskolan i Stockholm ämnar undersöka, med fokus på konsumenters attityder och beteenden relaterade till mikromobilitet i Sverige. Mikromobilitet syftar till fordon som kan åka på cykelvägen och drivs av en el-motor, exempelvis el-sparkcyklar och el-cyklar - tänk VOI, Lime, TIER, WHEELS mfl. Formuläret tar ungefär 5 minuter att svara på. Alla svar är anonyma. Fundera inte allt för länge över frågorna. Om någon tycks svår att besvara, försök ändå. Vissa frågor kan vara mycket lika varandra, de finns med av undersökningstekniska skäl. Besvara frågorna utan att försöka minnas tidigare svar. Du kan bara svara på enkäten en gång. Tack för du bidrar till vår examen, mikromobilitetsbranchens framtid och kampen mot COVID-19! Bästa hälsningar, Viktor Löfwensporr och Fredrik Brändström (24092@student.hhs.se)
Q1	Har du använt dig av en mikromobilitets-tjänst under de senaste 12 månaderna? VOI, Lime eller WHEELS är alla mikromobilitets-tjänster. En mikromobilitet-tjänst gör att alla användare kan hyra ett mikromobilitets- fordon, dvs. ett fordon som kan ta plats på cykelväg och är driven av elmotor, för en enskild resa. Efter slutförd resa kan andra användare hyra den från platsen där fordonet lämnats/parkerats. Ja Nej (Carry forward logic to Q7)
Q2	Vänligen ange hur väl du håller med om följande påståenden om varför du använder mikromobilitet-tjänster, t.ex. VOI, Lime eller Wheels (Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med För att det är prisvärt att använda mikromobilitets-tjänster (1) För att det är effektivt sätt att transportera sig på (2) För att det är lättillgängligt att använda mikromobilitets-tjänster (3) För att det är bra för miljön att använda mikromobilitets-tjänster (4) För att det är coolt att använda mikromobilitets-tjänster (5) För att använda i kombination med bil eller kollektivtrafik (6) För att det är det snabbaste sättet att ta mig till min destination (7)
Q3	Ungefär hur ofta använde du dig av en mikromobilitets-tjänst t.ex. VOI, LIME, Wheels före utbrottet av COVID-19 viruset? Dagligen 4-6 gånger i veckan 2-3 gånger i veckan 1-3 gånger per månad Mindre än en gång i månaden Har använt enstaka gång
Q4	När du reser med en mikromobilitets-tjänst, t.ex. VOI, Lime etc. och deras el-sparkcyklar, brukar jag använda den för.. Att genomföra en del av resan/sträckan Att genomföra hela resan/sträckan

Q5	Har COVID-19 påverkat hur ofta du använder dig av mikromobilitets-tjänster t.ex. VOI, LIME, Wheels? Nej inte alls Ja, jag använder mikromobilitet-tjänster mer sällan Ja, jag använder mikromobilitets-tjänster oftare än förut Annat, precisera …….
Q6	Om eller när du inte använder en mikromobilitets-tjänst för att resa, vad är dina främsta anledningar? (Du kan välja så många eller få svar du vill) Mikromobilitets-tjänster med delade fordon är inte tillgängliga i mitt område (1) Jag har aldrig behövt den här typen av tjänst (2) Jag tycker att kostnaden är för hög (3) Jag känner inte till tjänsten eller har inte tillräcklig med information om den (4) Jag åker hellre bil eller kollektivt. (5) Jag har inte velat använda den (6) Jag tycker det verkar osäkert (7) Jag har ett rörelsehinder som omöjliggör användandet av ett mikromobilitets-tjänster Jag har inte med mig hjälm / rätt utrustning (9)
Q7	Hur ofta använder du följande transportmedel. Vi ber dig att vänligen bortse från hur COVID-19 påverkat ditt användande. På en skala mellan (1) Aldrig använt, (2) Har använt enstaka gång, (3) Mindre än en gång i månaden, (4) 1-3 gånger per månad, (5) En gång i veckan, (6) 2-3 gånger i veckan, (7) 4-6 gånger i veckan, (8) Dagligen Bil Cykel Motorcykel Taxi (inklusive Uber eller liknande tjänster) Tunnelbana Moped/Scooter Buss Tåg/Pendeltåg Färja
Q8	Vi vill återigen påminna om att med mikromobilitet menas fordon som kan ta plats på cykelvägen och är drivna av en elmotor - t.ex. el-sparkcyklar. Vidare ber vi dig att summera 5+5 och klicka i rätt svarsalternativ. Detta är för att undvika slumpmässigt klickande. 5 8 10 12 14
Q9	De nedan följande påståenden tar ställning till din upplevda kontroll och intention vid användandet av mikromobilitets-tjänster. Vänligen ange i vilken grad du håller med om följande påståenden: ((Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Jag upplever att mikromobilitets-fordon finns tillgängligt när jag behöver dem (1) När jag använder mig av mikromobilitets-tjänster är det mitt val och inte för att mina vänner föreslagit det (2) Jag har tillräckligt med pengar för att kunna använda mig av mikromobilitets-tjänster (3) Jag ämnar använda mikromobilitets-tjänster i framtiden (4) Jag kan komma att använda mig av mikromobilitet-tjänster i framtiden (5)
Q10	De nedan följande påståenden tar ställning till din syn på risker vid användandet av mikromobilitets-tjänster. Vänligen kryssa för det påstående som bäst beskriver hur du ser på riskerna vid användandet av mikromobilitets-tjänster. ((Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Jag ser framförandet av mikromobilitets-fordon som riskfyllt (1) Jag är orolig för att ramla eller krocka när jag använder mig av ett mikromobilitets-fordon (2) Andra i min närhet är oroade för att jag ska skada mig när jag använder mig av ett mirkomobilitets-fordon (3)
END OF BLOCK 1	

Q11	Vänligen ange det adjektiv som bäst beskriver din känsla inför att använda mikromobilitets-tjänster (inkl. att åka själva fordonet). (Skala mellan (1), Mycket tråkigt, (2) Ganska tråkigt, (3), Något tråkigt, (4), Varken tråkigt eller roligt, (5), Något roligt, (6) Ganska roligt, (7) Mycket roligt
Q12	Vänligen ange det adjektiv som bäst beskriver din känsla inför att använda mikromobilitets-tjänster (inkl. att åka själva fordonet). (Skala mellan (1) Mycket obehagligt, (2) Ganska obehagligt, (3) Något obehagligt, (4) Varken obehagligt eller behagligt, (5) Något behagligt, (6) Ganska behagligt, (7) Mycket behagligt
Q13	Vänligen ange hur väl du håller med följande påståenden om hållbarhet och mikromobilitets-tjänster. (Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Jag tycker att påståenden om att mikromobilitets-tjänster är miljövänliga känns trovärdiga (1) Jag tycker att påståenden om att mikromobilitets-tjänster miljövänlighet är överdrivna (2) Jag tycker att påståenden om att mikromobilitets-tjänsters miljövänlighet är missvisande (3)
Q14	Vad tycker du om att använda mikromobilitets-tjänster såsom VOI, Lime eller Wheels? Om du inte redan använder mikromobilitet, föreställ dig att du skulle göra det. (Skala mellan (1) Användandet av mikromobilitet är mycket negativt, (2) Användandet av mikromobilitet är ganska negativt, (3) Användandet av mikromobilitet är något negativt, (4) Användandet av mikromobilitet är varken negativt eller positivt, (5) Användandet av mikromobilitet är något positivt, (6) Användandet av mikromobilitet är ganska positivt, (7) Användandet av mikromobilitet är mycket positivt,
Q15	Vad tycker du om att använda mikromobilitets-tjänster såsom VOI, Lime eller Wheels? Om du inte redan använder mikromobilitet, föreställ dig att du skulle göra det. (1) Användandet av mikromobilitet är mycket oönskat, (2) Användandet av mikromobilitet är ganska oönskat, (3) Användandet av mikromobilitet är något oönskat, (4) Användandet av mikromobilitet är varken oönskat eller önskat, (5) Användandet av mikromobilitet är något önskat, (6) Användandet av mikromobilitet är ganska önskat, (7) Användandet av mikromobilitet är mycket önskat,
Q16	Nedan följande påståenden handlar om hur personer i din omgivning använder mikromobilitets-tjänster, ange till vilken utsträckning du håller med påståendet. (Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Människor i min närhet (umgängeskrets) förväntar sig att jag kommer använda mikromobilitet-tjänster (1) Människor som är viktiga för mig (familj och nära vänner) är positiva till mitt användande av mikromobilitets-tjänster (2) Om mina vänner skulle använda sig av mikromobilitets-tjänster, är det troligt att även jag skulle göra det (3)
Q17	Följande påståenden tar ställning till vad personer i din omgivning tycker om mikromobilitets-tjänster. Vänligen ange hur väl följande påstående stämmer in på dig. (Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Om människor i min omgivning skulle använda mikromobilitets-tjänster, skulle jag vara mer benägen att använda dem (1) Människor i min umgängeskrets förväntar sig att jag skulle kunna använda mikromobilitet-tjänster (2) Om mina vänner skulle använda mikromobilitets-tjänster skulle jag vara med benägen att använda dem (3)
Q18	Vänligen markera det alternativ som bäst stämmer in om din kunskap om mikromobilitets-tjänster. Om du inte redan använder en mikromobilitets-tjänst , tänk dig då att du skulle göra det. VOI, Lime eller WHEELS är alla exempel på mikromobiltets-tjänster. (Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Jag är bekant med hur man använder mikromobilitets-tjänster (1) Jag vet ungefär hur mycket det kostar att använda mikromobilitets-tjänster (2)
TEXT	Den här delen av studien ämnar att undersöka hur konsumenter ställer sig till att äga ett eget mikromobilitets-fordon
Q19	Äger du ett mikromobilitets-fordon? (Exempelvis el-scooter eller el-cykel?)

	Ja Nej
Q20	Följande påståenden handlar om ägande av mikromobilitets-fordon. Vänligen markera det alternativ som bäst stämmer in på dig. Med mikromobilitets-fordon menas exempelvis el-sparkcykel eller el-cykel. (Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Om jag skulle använda ett mikromobiltets-fordon hade jag föredragit att äga det. (1) Om jag skulle använda ett mikromobiltets-fordonhade jag föredragit att hyra det. (2) När jag hyr mikromobilitets-fordonet ser jag det som mitt eget (3) Det är svårt för mig att se mig själv som ägare till ett mikromobilitets-fordon (4) Om jag vore ägare till ett mikromobilitets-fordon skulle jag ta hand om den bättre än vad jag gör när jag hyr den (5)
TEXT	Bra kämpat! Du är snart klar. Vänligen fyll i uppgifterna om dig själv nedan
Q21	Kön: Man Kvinna Annat Vill inte ange
Q22	Vilket år är du född? …..
Q23	Dem Har du körkort? Om ja, vilk(a)en? Jag har inte körkort Am (moped) A-körkort (motorcykel) B-körkort (personbil och lätt lastbil) Annat
Q24	Vad är din postkod? (Vi frågar om den för att kunna undersöka hur användningen av mikromobilitets-fordon skiljer sig inom Sverige. Din postkod kommer varken delas eller visas utan kommer användas för en övergripande geografisk analys)
Q25	Vilken är din högsta slutförda utbildning Grundskoleutbildning, realskola, folkskola eller motsvarande Gymnasieutbildning, folkhögskola eller motsvarande Universitets- eller högskoleutbildning på kandidatnivå eller motsvarande Universitetsutbildning på masternivå eller motsvarande Yrkesutbildning eller motsvarande Forskarutbildning eller motsvarande Annat
Q26	Vad är din huvudsakliga sysselsättning? Studerar Arbetar Tjänstledig Föräldraledig Arbetslös Pensionär Sjukskriven Annat
Q27	Vad är din årliga taxerade förvärvsinkomst 0 – 100 tkr 100 -200 tkr 200 – 300 tkr 300 – 400 tkr 400 – 500 tkr

	600 – 700 tkr 700 – 800 tkr 800 – 900 tkr 900 tkr eller mer
Q28	Slutligen ber vi dig att ge ett omdöme till detta formulär. (Skala mellan (1) Håller absolut inte med, (2) Håller i stort sett inte med, (3), Håller i viss grad inte med, (4) Tveksam, (5), Håller i viss grad med, (6) Håller i stort sett med, (7) Håller absolut med) Frågorna var bra formulerade (1) Jag var motiverad att genomföra denna studie (2) Jag ansträngde mig för att svara på denna studie (3) Jag tyckte denna studie var intressant (4)

Appendix 3: Distribution of questionnaire using social media forums:

Table 14:

Facebook groups	Publication	Number of members
Vässla Sverige	April 20th, 2020	531
Xiaomi Sverige	April 20th, 2020	1 400
Niu Sverige	April 20th, 2020	175
Reklamsnack	April 20th, 2020	11 995

Appendix 4:

Table 15: Displaying Cronbach's alpha for the variables displayed in section 2:

Variable	Cronbach's Alpha
Attitude	0.88
Intention	0.92
Subjective Norm	0.77
Perceived Risk	0.75
Knowledge	0.8
Hedonic Motivation	0.72
Cognitive Dissonance	0.78
Social Influence	0.77
Perceived Behavioral control	0.224

Appendix 5:

Table 16: Skewness and kurtosis for the dependent variables, attitude and intention

Variables	Skewness	Kurtosis
Attitude	-.50	-.704
Intention	-.73	-.26

Note: N=217

Appendix 6:

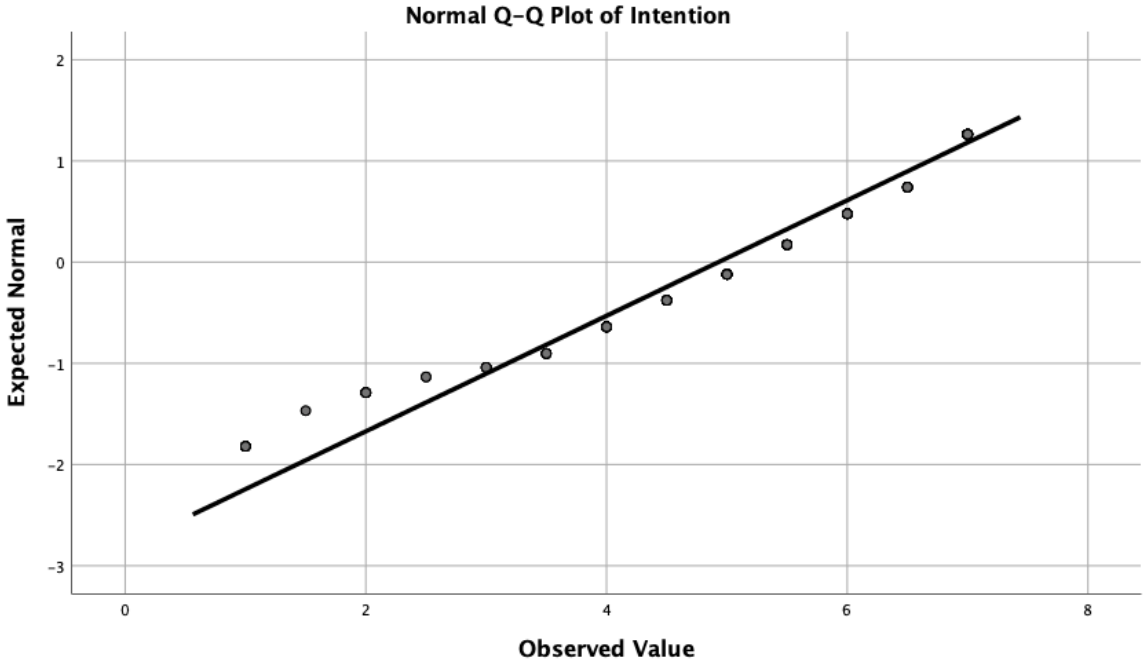
A one-way ANOVA was performed testing if geographical location effected attitude, intention and perceived risk. The groups were divided by counties[20]. However, no statistically significant result was found between the groups.

A one-way ANOVA was also performed testing if *age* effected *attitude intention* and *perceived risk*. The groups were divided in four different categories: (1), 18-24 *(n=35), (2*) 25-34 *(n=71) (3)* 35-54 *(n=92)* and *54 or more (n=17)*. However, no statistically significant result was found between the groups in the ANOVA analysis

[20] Four groups were formed. (1) Stockholm county, (2) Västra Götaland county, (3) Skåne county, (4) Other counties.

Appendix 7:

Figure 3: Displaying the Q-Q plot for the dependent variable intention



Appendix 8:

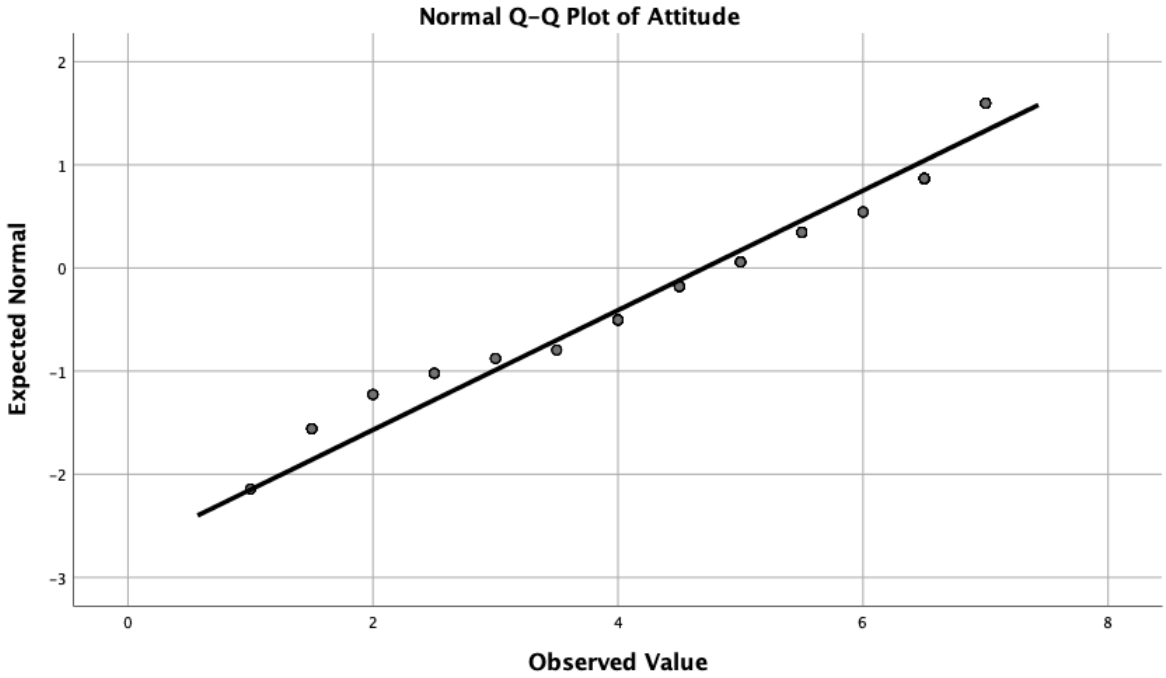
Table 17: Summary of intercorrelations (N=217)

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Intention	1.00										
2. Attitude	.73***	1.00									
3.Subjective-norm	.64***	.66*	1.00								
4.PBC_ (1)[a]	.26***	.147*	.18**	1.00							
5.PBC_(2)[a]	.20*	.13*	-.01	.03	1.00						
6.PBC_(3)[a]	.01	-.02	.03	.19**	.10	1.00					
7. Knowledge	.42***	.19**	.20**	.36***	.10	.08	1.00				
8. Perceived risk	-.04	-.15*	-.14**	.03	-.10	.12*	-.05	1.00			
9.Hedonic motivation	.65***	.69***	.56***	.19**	.11	-.04	.28***	-.24***	1.00		
10.Cognitive dissonance towards green claims	-.12*	-.30***	-.25***	-.06	.01	-.04	.19**	.01	-.18**	1.00	
11.Social influence	.55***	.51***	.71***	.08	-.11	-.01	.18**	-.03	.44***	-.16**	1.0

Note: [a] Perceived behavioral control (1,2,3), *p<0.05 **p<0.01 ***p<0.001

Appendix 9:

Figure 4: Displaying the Q-Q plot for the dependent variable Attitude



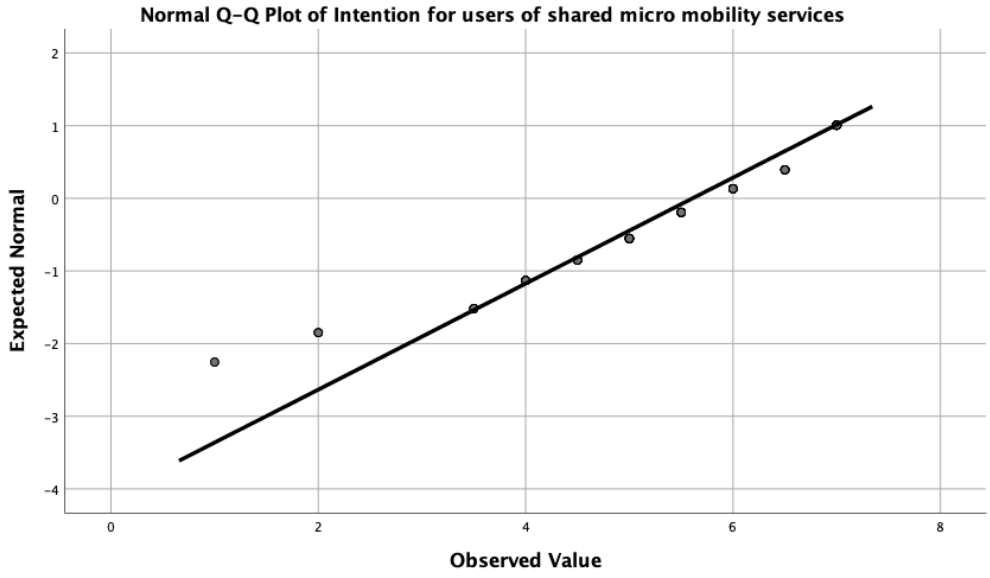
Appendix 10:

Table 18: Skewness and kurtosis for the dependent variables, attitude and intention between users-and non-users of shared micro mobility services

Variables	Skewness (Users of SMMS)	Kurtosis (Users of SMMS)	Skewness (Non-users of SMMS)	Kurtosis (Non-users of SMMS)
Attitude	-.623	-.367	-.239	-.1.05
Intention	-1.07	1.17	-.272	-.93

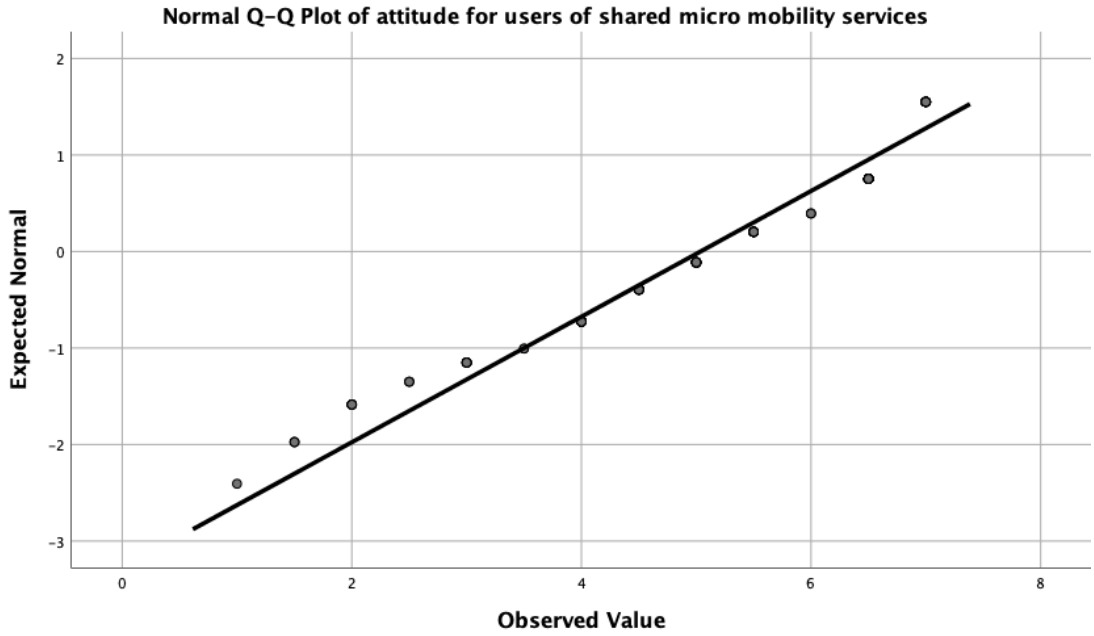
Appendix 11:

Figure 5: Displaying the Q-Q plot for the dependent variable intention for users of shared micro mobility services



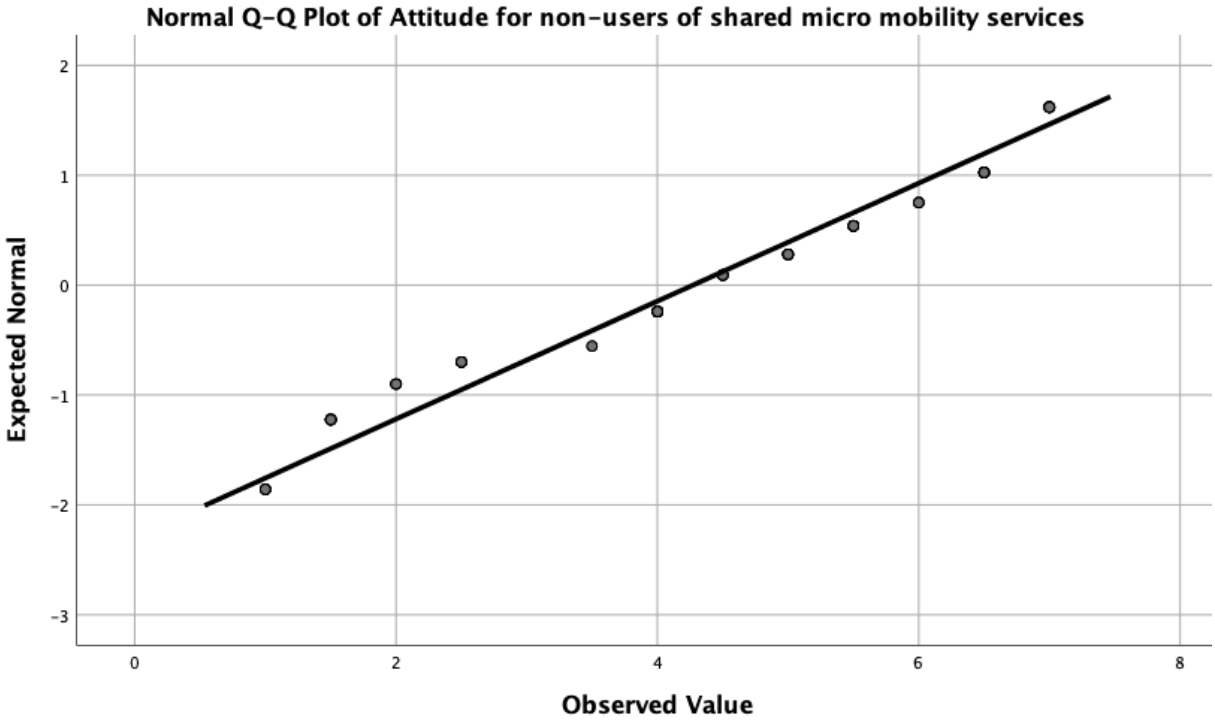
Appendix 12:

Figure 6: Displaying the Q-Q plot for the dependent variable attitude for users of shared micro mobility services



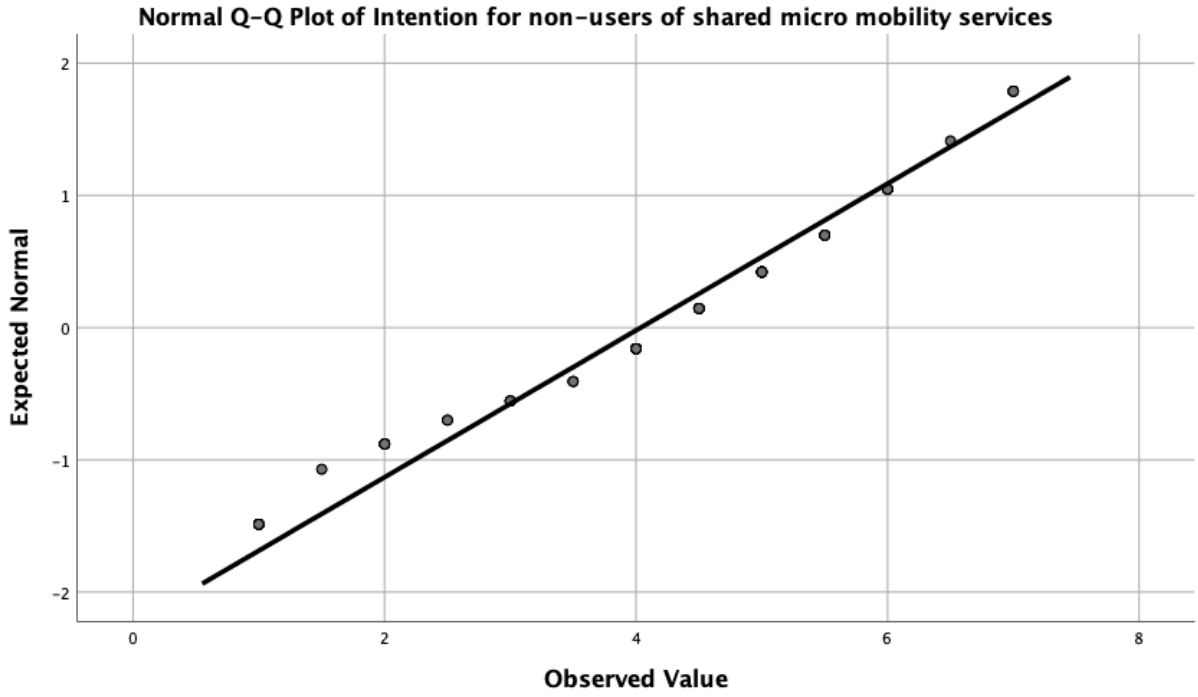
Appendix 13:

Figure 7: Displaying the Q-Q plot for the dependent variable attitude for non-users of shared micro mobility services



Appendix 14:

Figure 8: Displaying the Q-Q plot for the dependent variable intention for non-users of shared micro mobility services



Appendix 15:

Table 19: Hierarchical regression model for consumer *attitude* related to micro mobility services

Model	*Rs*	*Change*	*F*	Sig.
1 (Users of SMMS)	.411	.411	41.90	***
1 (Non-users of SMMS)	.551	.551	55.72	***
2 (Users of SMMS)	.531	.120	21.87	***
2 (Non-users of SMMS)	.659	.109	28.10	***
3 (Users of SMMS)	.545	.014	15.05	
3 (Non-users of SMMS)	.664	.005	18.411	

Note: Users (N=123), Non-users (N=94)

Table 20: Hierarchical regression model for consumer *intention* related to micro mobility services

Model	*Rs*	*Change*	*F*	Sig.
1 (Users of SMMS)	.535	.535	26.90	***
1 (Non-users of SMMS)	.686	.686	38.15	***
2 (Users of SMMS)	.542	.007	19.42	
2 (Non-users of SMMS)	.724	.037	32.20	**
3 (Users of SMMS)	.574	.032	13.15	
3 (Non-users of SMMS)	.758	.034	25.93	**

Note: Users (N=123), Non-users (N=94)

Table 19 and 20 show that the frameworks used in section 4.3 and 4.4 explains the variance in intention and attitude better for non-users than for users of shared micro mobility services.

Appendix 16:

Figure 9: displaying the usage of micro mobility in the past 12 months

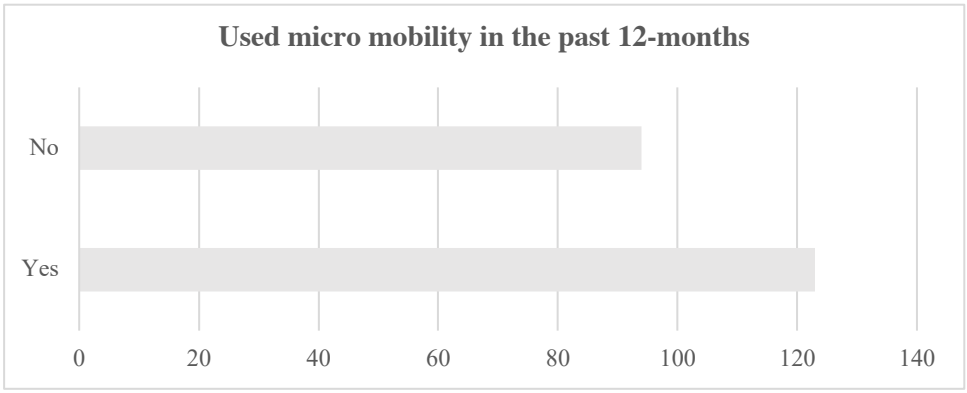


Figure 10: displaying the type of usage for micro mobility in the past 12 months

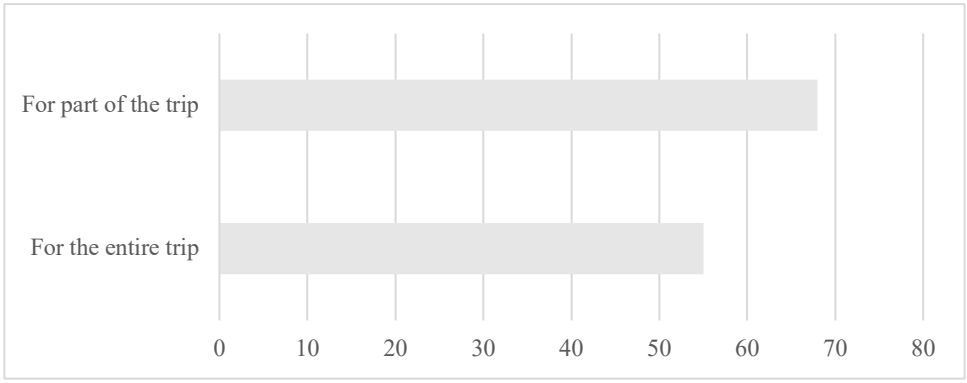


Figure 11: Displaying the reasons for not using SMMS amongst users. (Multiple choice)

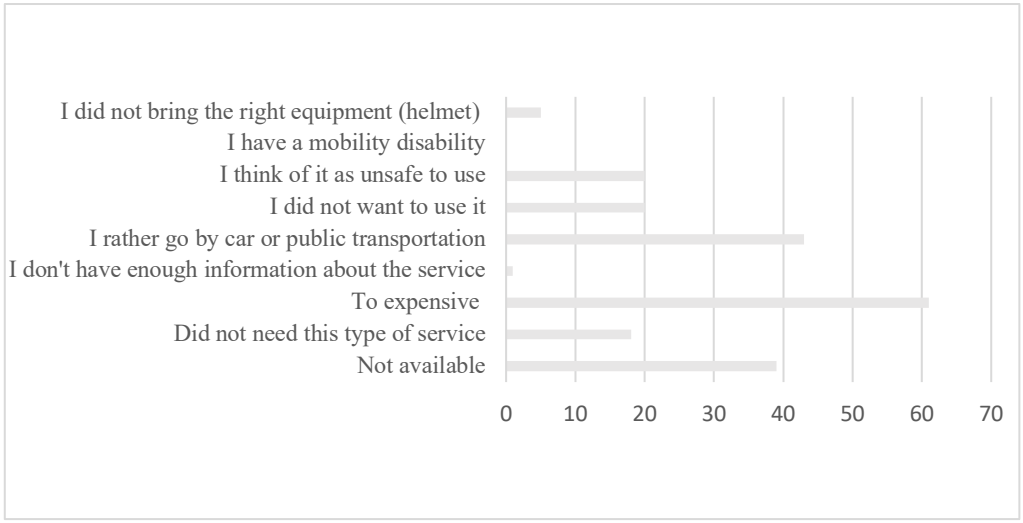


Figure 12: Displaying the reasons for not using SMMS amongst users. (Multiple choice)

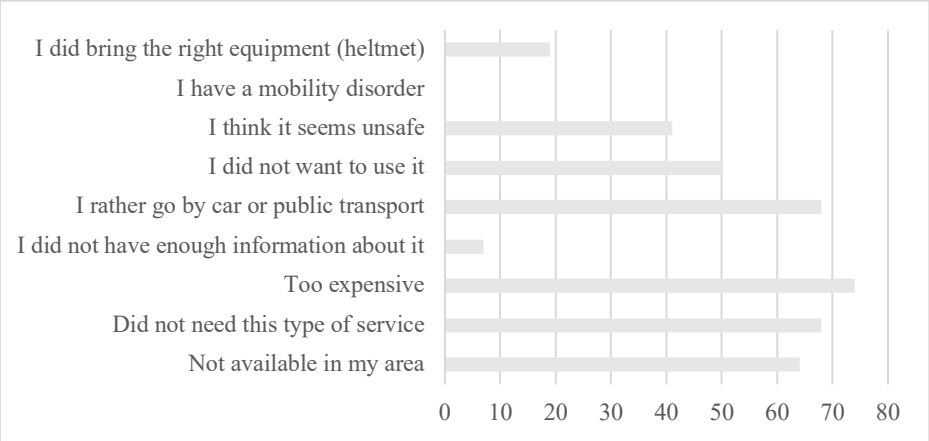


Figure 13: displaying the reasons for not using SMMS amongst non-users. (Multiple Choice)

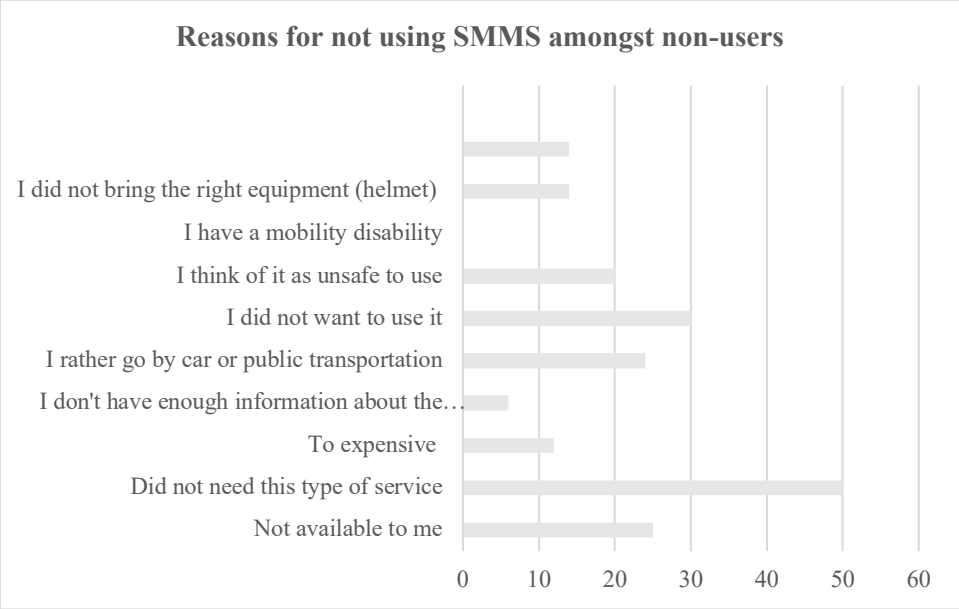


Figure 14: displaying the mean of mode of transportation for users of SMMS on a scale of between 1-8

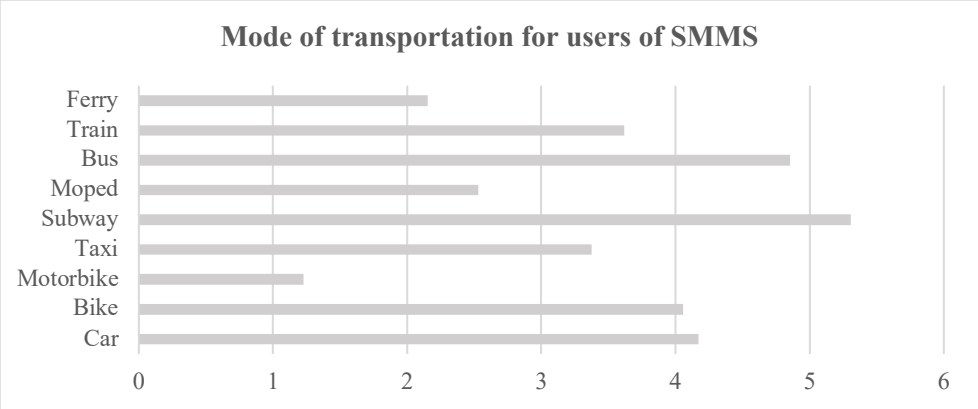


Figure 15: displaying the mean of mode of transportation for non-users of SMMS on a scale of between 1-8

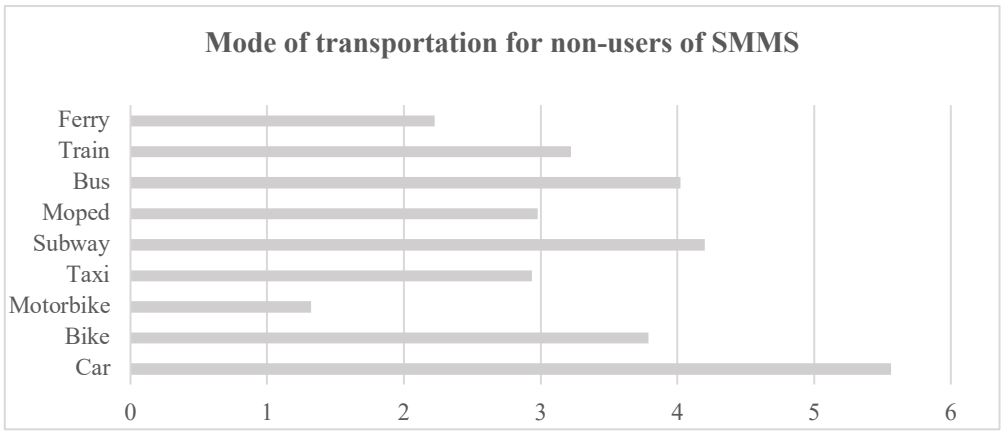


Figure 16: displaying usage of car for the entire sample

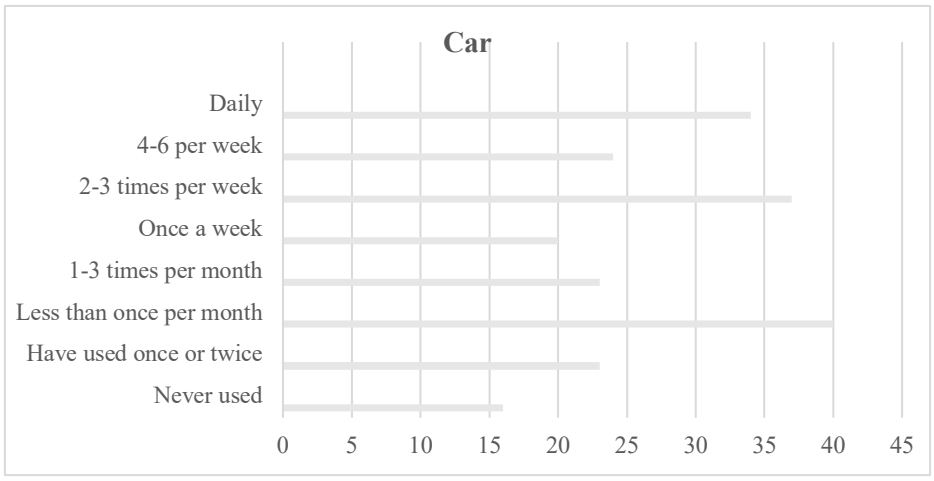


Figure 17: displaying usage of bike for the entire sample

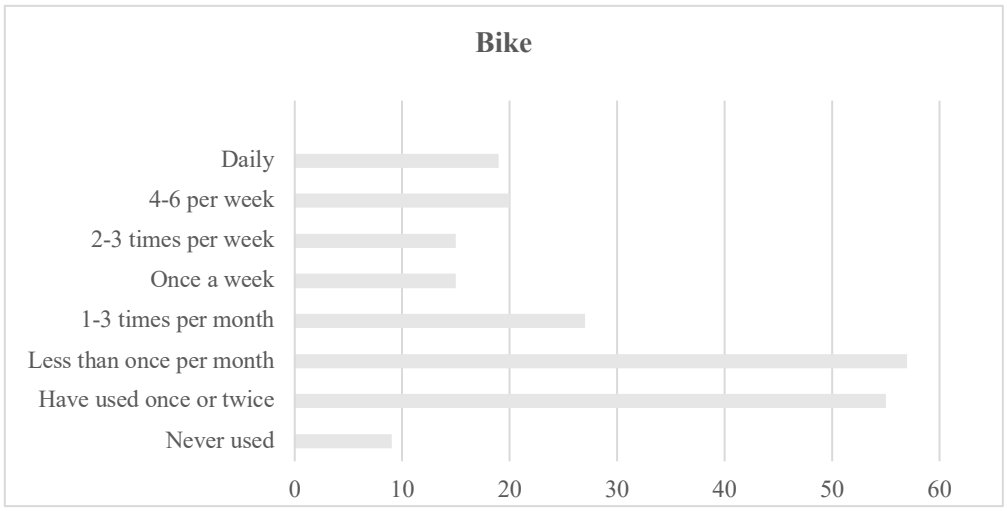


Figure 18: displaying usage of moped for the entire sample

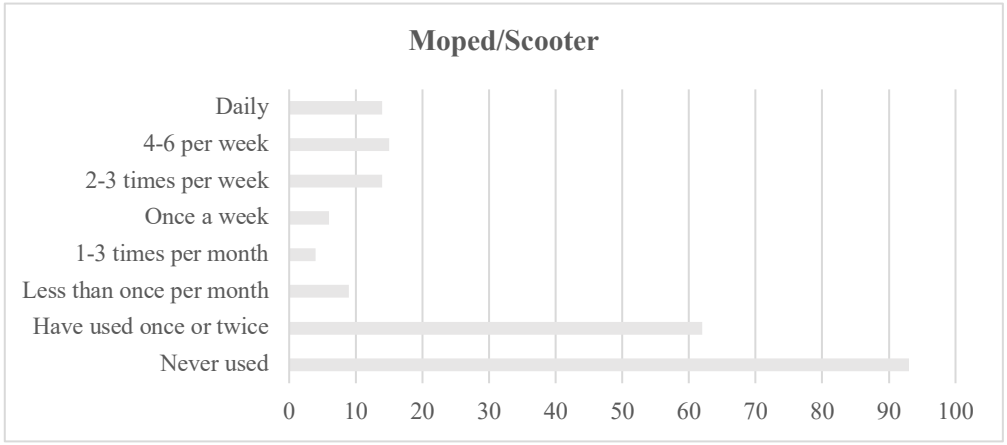


Figure 19: displaying usage of bus for the entire sample

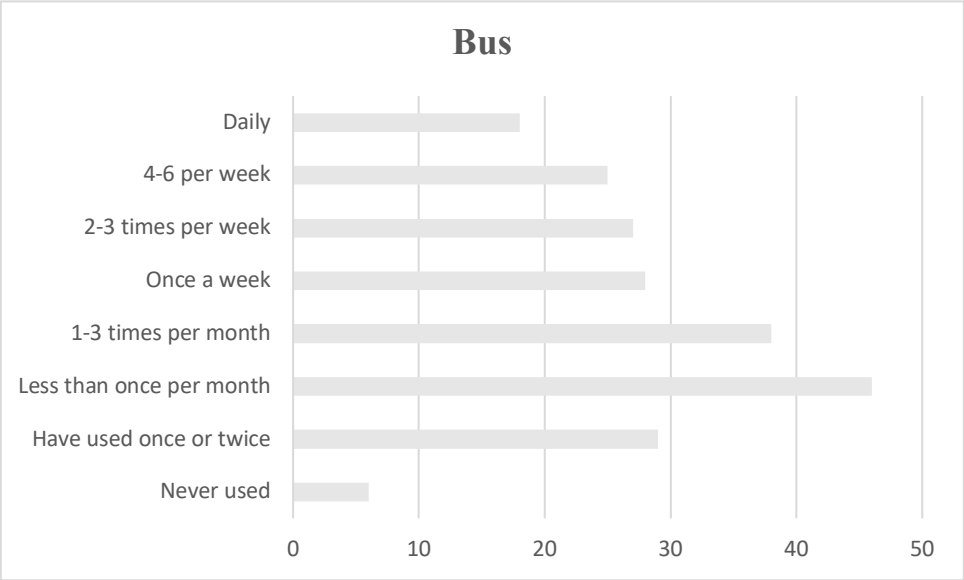


Figure 20: displaying usage of train for the entire sample

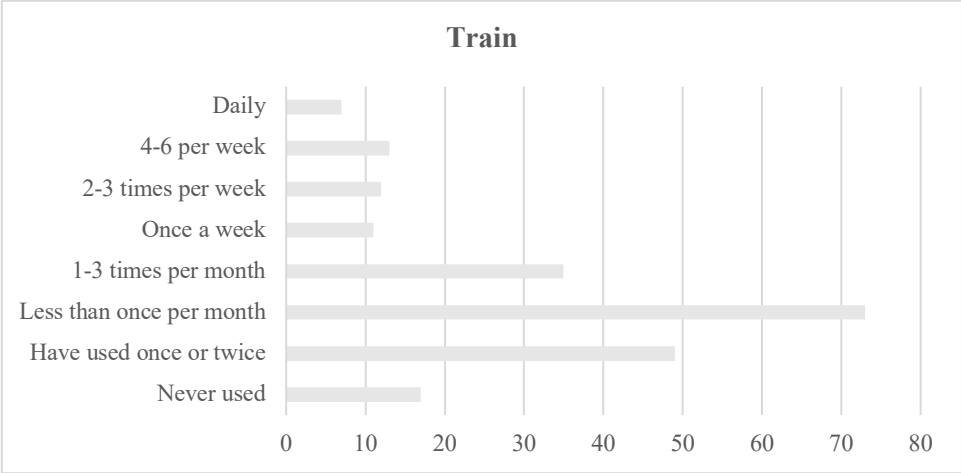


Figure 21: displaying usage of ferry for the entire sample