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Summary

This research has contributed to the understanding of how changing customer preferences, technological innovation, and environmental needs will shape future mobility services. Consequently, this thesis explores how the automobile industry should adapt their business models to offer mobility services as a response to these trends. To explore this concept, the study examines to what extent six independent variables of customer preferences- and characteristics affect the customer's willingness to adopt new mobility services. In turn, the findings have identified the most significant factors for a distributor to integrate when shaping future mobility services.

The six independent variables have been extracted based on a literature review on the topic of business models and mobility services, as well as the topic of customer innovativeness and environmentalism. An online survey was distributed to car-users in the greater Oslo region to collect data on the topic. To analyze the data, quantitative research has been applied by conducting a multiple regression analysis to test the hypotheses and to identify the effect of each independent variable on the willingness to adopt new mobility services.

The findings show that the significant predictors of a customer's willingness to adopt new mobility services are the customer preferences on *economic flexibility* and *availability*, and the customer characteristics on *environmentalism* and *attitude toward new mobility services*. As a result of the findings, the paper argues that the distributor should ensure a high level of economic flexibility for the customer and a high level of availability of the product when shaping new mobility services. Moreover, the distributor should brand future mobility service as environmentally friendly. Lastly, the findings indicate that there is a positive attitude toward new mobility services among the customers in the Norwegian market. Consequently, distributors should take action now by offering mobility services in order to capture economies of scale as a result of first-mover advantages and to avoid becoming industry laggards.

1.0 Introduction

The world is changing rapidly with regards to transportation of people. A major challenge in today's society is how the transportation of people will develop as the population grows and resources become scarcer. A higher degree of regulatory control is also putting great pressure with environmental policies on both car owners- and producers to reduce emissions of greenhouse gases. These regulatory drivers are forcing consumers in the automobile industry to rethink their choice of investing in car ownership (Gao, Kaas, & Mohr, 2016). As a result, customer preferences in the automobile industry are changing with regards to ownership. The products in the automobile industry are experiencing frequent technological innovation, which makes it harder for consumers to resell certain vehicles in secondary markets. Besides, the heavy media attention is influencing the consumer fascination around disruptive technologies, amplifying the great changes in customer preferences around ownership (Bert, Collie, Gerrits, & Xu, 2016). Consumers are expected to seek less commitment and more flexibility in the future, making them less willing to accept the fixed costs of ownership. This forces providers to explore new ways of meeting customer demand (Gao et al., 2016). According to Accenture, car manufacturers and distributors are facing three key challenges, namely customer expectations, profitability, and technology integration (Schmidt, Reers, & Gerhardy, 2018).

As a response to these challenges, McKinsey suggests that manufacturers and distributors should consider the opportunities of providing mobility services and create new business models accordingly (Bouton, Knupfer, Mihov, & Swartz, 2015; Gao et al., 2016). New mobility services are receiving increased attention from both practitioners and scholars. It is a concept that offers need-based and customized mobility solutions for the users, and consequently, the provider is selling the functionality of a product rather than the product itself (Jittrapirom et al., 2017; König, Eckhardt, Aapaoja, Sochor, & Karlsson, 2016). Thus, we can say that offering mobility services is a way of selling transportation rather than selling a car. The ownership of the car is retained by the provider of the service, and the car is shared by several consumers.

According to BCG, such sharing is contributing to the rapid growth and evolution of the concept called sharing economy, which is one of the most remarkable developments in the global marketplace of the 21st century (Bert et al., 2016). A report from PricewaterhouseCoopers predicts that the sharing economy and the traditional industry sector will have a 50/50 split of market shares by the year 2025, compared to a 5/95 split in 2013, respectively (Osztoivits, Kószegi, Nagy, & Damjanovics, 2015). In addition, the revenue from the sharing economy is expected to reach USD 335 billion by the year 2025, compared to USD 15 billion in 2013. The central idea in the sharing economy is the optimization of under-used assets by sharing them through digital platforms (Acquier & Carbone, 2018; Benkler, 2004). In fact, a car is only used approximately 3.5% of its lifetime, making it one of the most under-used assets existing (Bates & Leibling, 2012). Therefore, it is no wonder that the sharing economy has had a disruptive impact on the automobile industry, resulting in the birth of many business models focusing on the sharing of a car's functionality rather than the transferring of its ownership. As a result of shifting to diverse mobility solutions, McKinsey predicts that one out of every ten new cars sold in 2030 may likely be a shared vehicle (Gao et al., 2016). They also expect a 30% annual increase in shared mobility toward 2030. These predictions can to some extent be explained by a change in customer preferences, a higher focus on environmentally friendly solutions, more regulatory control, and technological advancements (Gao et al., 2016).

The abovementioned trends make the topic of mobility services a very interesting and timely topic to research. At the same time, vehicle distributors such as the Norwegian company Møller Mobility Group, are increasingly interested in knowing more about how they need to redesign their product offerings and distribution networks in order to meet customer demands in the future. Logistical services have evolved from a traditional role of transportation to a role of continuous innovation to gain a competitive advantage, with a more customer-oriented focus (Chapman, Soosay, & Kandampully, 2003; Soosay & Hyland, 2004). Sharing economy platforms are much more open-ended and designed to evolve based on the changing needs of the participants. In other words, the supply chain becomes more customer-oriented. In order to create a platform that offers a mobility service, it can be crucial to use the customers as an input-based resource and integrate them as early as possible in the service innovation process. New mobility

offerings are still in their infant stages, but what can be said is that consumers are learning to make trade-offs when it comes to evaluating costs, convenience, service, and time (Bouton et al., 2015).

Consumers may demand more flexibility to choose the best solution for different purposes, both on demand and via a smartphone, together with quality and affordability. McKinsey believes that this change will lead to new segments of specialized vehicles designed for specific needs (Gao et al., 2016). Therefore, future business models in the automobile industry are expected to require well-established distribution networks with sharing platforms based on selling the functionality of their products. The world has already seen how new business models have revolutionized other industries, and the automobile industry will be no exception (Gao et al., 2016). We are interested in investigating whether there is a substantial need for change in traditional logistics industries, such as the automobile industry, due to changing customer preferences, technological innovation, and environmental needs, and how they can redesign their product offerings and distribution networks accordingly. Based on this we have come up with the following problem statement.

Problem statement: How will changing customer preferences, technological innovation, and environmental needs shape future mobility services?

2.0 Literature Review

The scope of our thesis touches upon several different areas. As a consequence, this literature review does not reflect on only one theory or one single concept. The literature review will build a foundation from which we develop our conceptual model. Therefore, the selected theoretical concepts are aspects that are associated with the multiple concepts presented in our introduction and problem statement. To explore our problem statement, we will need a better understanding of mobility services. Thus, we will start by looking at services in today's economy, and then explore the concept of mobility services.

2.1 Services in Today's Economy

There is little doubt that services have grown to dominate world economic activity (Chapman et al., 2003). The concept of services is currently experiencing a paradigm shift, from being a sales category to becoming a perspective of new value creation (Edvardsson, Kristensson, Magnusson, & Sundström, 2012). Innovation in services is now seen as a value-creating activity that enables companies to increase their competitiveness (Edvardsson, Gustafsson, Kristensson, & Witell, 2011). In logistics, a service innovation refers to a new, helpful idea, procedure, or practice in logistics operations that is different from a company's current practice (Grawe, 2009). Service process innovation can improve the firm's market performance and efficiency, which can benefit both the provider and the consumer (Bakos, 1998; Garicano & Kaplan, 2001; Hackbarth & Kettinger, 2000; Wymbs, 2000). Moreover, they argue that efficiency, as a result of service innovation, can lead to improvements in productivity, cost-efficiency, quality of service, delivery times, inventory management, process improvement, value creation, price, information, etc. These elements of improvement have become the main factors of competitive advantages in the service sector (Hauknes, 1999).

The rapid growth in information and communication technologies, higher disposable incomes and economic growth in the past decades have been major drivers for the growth in service industries and continues to drive innovation in the service sector (Chapman et al., 2003). Similarly, Castells (2000) argues that this new economy is different from before, due to its effective use of information,

globalization, and networks. Grönroos (2006) actually advocates that firms now compete on the basis of services, and not on the basis of physical products. Chapman et al. (2003) agree on that note, stating that being aware of the service aspects of their product-service mix will offer the best chance of gaining sustainable competitive advantage. Moreover, they claim that poor levels of service or reluctance to innovate offers the greatest chance of losing customers. To compete at a high level in the modern global marketplace, firms need to constantly look for innovative strategies to improve their competitiveness (Chapman et al., 2003). According to Dickson (1992) and Ghemawat (1986), business models based on selling services are less easy to replicate compared to business models based on product manufacturing. Consequently, providers who are willing to make this shift could acquire a source of sustainable competitive advantage.

2.1.1 Mobility services

According to Kamargianni, Li, Matyas, and Schäfer (2016), the growing pressure on urban passenger transport systems has increased the demand for new and innovative solutions to increase its efficiency. A shift toward shared mobility services has emerged as one approach to tackle this challenge. The concept of Mobility as a Service (MaaS) builds on developments in information and communication technologies to provide transport without the need to own a private vehicle (Kamargianni et al., 2016). Therefore, MaaS represents a shift away from personally owned modes of transportation and toward mobility solutions that are consumed as a service. MaaS-platform users can use the service either as “Pay-As-You-Go”, also called pay-per-use, or they can purchase mobility packages based on their travel needs (Kamargianni et al., 2016). PricewaterhouseCoopers (2015) proves that there should be a potential for a sustainable business model in mobility services. They establish that 81% of consumers consider it less expensive to share goods rather than owning them individually, while 43% agree that “owning today feels like a burden” (Abhishek, Guajardo, & Zhang, 2016).

Mobility services can be described as a form of servicizing. Servicizing is by some authors defined as “selling a service instead of a product” (Makower, 2001, p. 8). This product is consequently shared as a service by consumers throughout the product’s lifecycle. According to Plepys, Heiskanen, and Mont (2015), business models that are more focused on selling a product’s function rather than a product’s

ownership can be defined by the concept of “servicizing” (sometimes “servitization” in the literature (Martinez, Bastl, Kingston, & Evans, 2010; Park, Geum, & Lee, 2012). Other terms used with similar or identical meaning as servicizing are according to Plepys et al. (2015) “product service systems (PSSs)”, “eco-efficient services”, or “functional sales”. Further, the transformation from a manufacturing company to a product-service provider has by some authors been called a “servitization journey” (Martinez et al., 2010).

According to Barnett, Parry, Saad, Newnes, and Goh (2013), the literature on servicizing is relatively new and the understanding of the phenomenon is developing quickly. Early literature on the topic, such as Vandermerwe and Rada (1988), introduces servicizing as a “value-added” activity, where services are added to products that are already supplied. Different types of value-added product-service businesses can be found in the literature on the topic of PSSs (Barnett et al., 2013). One could say that PSSs are the practical approach to the theoretical concept of servicizing, where any business model that adds services to create value beyond business-as-usual can be considered a “servicizing model” (Plepys et al., 2015). In his definition of servicizing, Neely (2008) focuses on the integration of product and service, where the value is in the use rather than in the exchange. However, there is still no consistent definition of servicizing (Toffel, 2008). Plepys et al. (2015) state that the concept of servicizing is based on the notion that what we want from products is not ownership per se, but the service the products provide (Hawken, Lovins, & Lovins, 2013). The underlying assumption of servicizing is the idea that the customer value of a product lies in its utilization and its benefits to the customer. The notion of economic value is in this case changing from ‘exchange value’ to ‘utilization value’ (Stahel, 1994).

Mobility services is clearly a new type of business model in the automobile industry. To explore the shape of future mobility services, we need to understand what a business model is, and what its components are. Morris, Schindehutte, and Allen (2005, p. 728) have done an extensive literature review on the varying definitions of a business model and have combined existing literature on the subject. As a result, they have come up with six main components. These six components are 1) *the offering* (how do we create value?), 2) *market factors* (whom do we create value for?), 3) *internal capability factors* (what is our source of competence?), 4)

competitive strategy factors (how do we competitively position ourselves?), 5) *economic factors* (how do we make money?), and 6) *personal/investor factors* (what are our time, scope and size ambitions?). With this understanding of a business model, we will apply these components going forward when exploring the concept of mobility services. However, the components 4) and 6) of *competitive strategy factors* and *personal/investor factors* will not be applied due to their more long-term and non-logistical nature.

Component 1) *the offering*, relates to factors such as whether the offering is standardized or customized, whether the firm offers products or services (or both), and whether the firm offers the product itself or only the access to it. When applying this component of a business model to the concept of mobility services, we will simplify by labeling it “**product**”.

Component 2) *market factors*, relates to factors such as who the customers are, where the customers are in the value chain, whether there is a broad or narrow segmentation, and whether there is a relational or transactional relationship. When applying this component of a business model to the concept of mobility services, we will simplify by labeling it “**customer**”.

Component 3) *internal capability factors*, relates to factors such as how the product or service is sold and distributed, how the supply chain is managed, how the distribution network is managed, and how resources are leveraged. When applying this component of a business model to the concept of mobility services, we will simplify by labeling it “**distribution**”.

Component 5) *economic factors*, relates to factors such as how the product or service is priced, the volumes, and the margins. When applying this component of a business model to the concept of mobility services, we will simplify by labeling it “**pricing**”.

In the following, we will review the literature on mobility services in light of these four business model components.

2.2 Pricing

As mentioned, servicizing represents a change in economic value from “exchange value” to “utilization value”. In other words, the provider of servicizing solutions is paid per unit of function delivered, not per unit of product sold. In these circumstances, customers become more interested in having a continuous fulfillment of their needs rather than in owning the product which is supposed to provide the function (Plepys et al., 2015). This could, for instance, be the actual transportation rather than owning a car. In addition to retaining the ownership of the product, the provider of the service keeps the responsibility for maintaining the product.

Since the goal is to provide the function at an agreed service-level, the service provider has an incentive to eventually repair or remanufacture the product (Plepys et al., 2015). According to Toffel (2008), servicizing involves a transfer of several processes from customers to providers. Thus, servicizing may be viewed as a form of outsourcing, since the customer no longer bears the cost of repairs, maintenance or replacements, and only pays for the functionality. These costs will be built into the service price (Toffel, 2008). Therefore, he argues that the post-contractual hazards associated with typical sales transactions are reduced. With typical sales, customers often pay dearly for required repairs and spare parts at prices and frequencies that often exceed their expectations when they purchased the product (Toffel, 2008). In addition, there are many conflicting objectives between the provider and the customers in typical sales transactions. The provider seeks to reduce costs of non-observable product attributes, whereas the customer seeks to ensure high quality and durability. At the same time, the provider seeks a high price, whereas the customers seek a low price (Toffel, 2008).

2.2.1 Pay-per-use vs. fixed price

The operating costs of the vehicle become a responsibility for the mobility service provider when they sell the functionality of a car, i.e. transportation. Typical operating costs are maintenance, repair, and insurance. Plepys et al. (2015) state that the transactions in servicizing solutions are made not for the product, but for the “service package” sold or the utilization value provided to the consumer. The pricing scheme for servicizing solutions often includes pay-per-use offers where

services are utilized simultaneously (car-pooling) or consequentially (car-sharing). However, one could argue that a servicizing solution also enables the service provider to aggregate all the operating costs into one fixed price which the consumer pays regularly, in exchange for the opportunity to use the service. Kamargianni et al. (2016) call this a mobility package. An example of this in Norway is how mobile network operators provide unlimited use of text messages and calls for a fixed monthly fee to their consumers, i.e. subscribers. Here, the value lies in the opportunity to use their network. Regardless, in servicizing literature, pay-per-use pricing is the typical pricing scheme mentioned (Agrawal & Bellos, 2016; Orsdemir, Deshpande, & Parlakturk, 2015; Plepys et al., 2015). Further, Cox, Considine, and Principal (2009) state that clear communication of the relationship between product and price is essential to any economic interaction. This means that in terms of a servicizing solution, the consumer must be able to comprehend the factors of the service that constitute the communicated price.

From the consumer's perspective, a pay-per-use pricing scheme may incentivize the consumers to reduce their usage due to more visible accrued costs. In addition, instead of providing each customer with one assigned product, the provider can hold a pool of products to meet customer needs when they arise (e.g. car sharing). This enables the provider to meet customer demand with fewer units, reducing total production costs, inventory costs and environmental impact (Bellos, Ferguson, & Toktay, 2017). Pay-per-use pricing also incentivizes the firm to provide more durable products with higher efficiency in order to reduce the costs associated with usage (Agrawal, Ferguson, Toktay, & Thomas, 2012; Bellos et al., 2017; Orsdemir et al., 2015). However, some authors claim that these benefits might be reduced to some extent by a phenomenon known as the "rebound effect" (Greening, Greene, & Difiglio, 2000). The "rebound effect" means that when a service provides several benefits and greater access, it becomes more attractive and thus more people will use it. Benjaafar, Kong, Li, and Courcoubetis (2015) support this claim, stating that collaborative consumption of cars can provide greater access, subsequently leading to higher usage.

2.3 Product

2.3.1 Quality

Servicizing solves many of the aforementioned conflicting objectives (*see Chapter 2.2.1*) that arise in traditional sales, such as when consumers seek high quality and durability, while the provider profits from frequent maintenance and repairs (Toffel, 2008). In servicizing, operating costs are borne by the provider, and thus the provider no longer profits from service calls and the sale of expensive spare parts. The provider is therefore incentivized to minimize the operating costs, and this will likely result in products of higher quality that require less maintenance and repair (A. Williams, 2006). However, the customer's perception of quality changes over time, which means that providers should track these changes to align their offering accordingly (Zeithaml, 1988). This could provide many benefits. In fact, many authors have argued that servicizing business models hold great potential to dramatically reduce industrial environmental impacts (Fischer, Steger, Jordan, O'Brien, & Schepelmann, 2012; Fishbein, McGarry, & Dillon, 2000; Goedkoop, van Halen, te Riele, & Rommens, 1999; Rothenberg, 2007; U.S. Environmental Protection Agency, 2009; White, Stoughton, & Feng, 1999). Plepys et al. (2015, p. 1) support this by stating that "servicizing is a business model that holds the potential to support a shift toward more sustainable production and consumption". Since providers are incentivized to minimize operating costs when selling services, they are incentivized to redesign products to expand their life span, thereby reducing energy and material intensity (Stahel, 1994). Servicizing models are not necessarily green by default though, but when function or efficiency is sold, chances are higher for the outcome to have a lower environmental impact (Mont & Plepys, 2008; Stahel, 1998; White et al., 1999).

2.3.2 Customization

According to Mont (2002), consumers benefit from PSSs because they receive a greater diversity of choices in the market, various payment schemes, and different schemes of product use that suit them best in terms of value through more customized offerings with higher quality. The consumers are also relieved from the ownership responsibility since the product stays under the ownership of the provider for its entire life span. In this context, the topics of mass customization and

service modularization are relevant to review because it relates to how the product- and service offering can be customized to meet individual customer needs.

According to Böttcher and Klingner (2011), customers are increasingly demanding individual services, which can be offered by applying concepts of mass customization (MC). Davis (1989) presented the concept of MC as the ability to supply products and services customized to suit specific customer demands through integration, agility, and flexibility. Later on, MC was described as the provision of multiple customer specifications through variation in supply with short lead times (Åhlström & Westbrook, 1999). The ability to manage the additional costs of increased product- or service customization is paramount for succeeding in implementing MC (Brun & Zorzini, 2009). Pine (1993) and Zipkin (2001) advocate that the degree of customization demanded should be precisely estimated through customer integration and surveys to avoid cost overruns. Research on customer relationship marketing reveals that a shift toward MC leads to the consumer becoming as important as the firm in determining the direction of the firm's offering (A. Williams, 2006).

The modularization approach aims at organizing complex products efficiently by decomposing complex assemblies into simpler portions that can be configured into a wide variety of end products and services (Baldwin & Clark, 2003; Pine, 1993). Thus, according to Carlborg and Kindström (2014, p. 314), modularity “involves the separation of an object into components (modules), and in turn, the combination of these components into customizable offerings”. Compared with manufacturing, the modularization of services has rarely been dealt with, despite its potential benefits (Geum, Kwak, & Park, 2012). The concept of service modularization was first introduced in the literature by Sundbo (1994), and the concept has developed since then. According to Böttcher and Klingner (2011, p. 325), “a service module offers a well-defined functionality via precisely described interfaces. It allows for a customer-specific configuration, as the customer can assemble a service offering from a given set of service modules”.

The current competitive environment calls for high flexibility and responsiveness in supply chains because of the complexity and uncertainty in demand (Brun & Zorzini, 2009). As a response to this challenge, the modularization of services has

been identified as a concept with the potential to manage the complexity of balancing customized services with efficiency (Araujo, Spring, Caldwell, & Howard, 2010). Therefore, it is crucial for providers to supply services that meet the requirements of individual customers (Hicks, Dietmar, & Eugster, 2005; Philipoom & Fry, 1992; Ray & Jewkes, 2004). Meeting the requirements of individual customers is in other words providing customizable offerings because customer needs tend to be diversified and heterogeneous (Bask, Lipponen, Rajahonka, & Tinnilä, 2011). Thus, service modularization is commonly considered as a way of developing services and managing heterogeneity or variability in demand (Geum et al., 2012).

Additional benefits of service modularization have been emphasized by Pekkarinen and Ulkuniemi (2008) as having the potential to enable cost-efficient operations of services. Furthermore, studies suggest a positive relationship between modularity and service performance (Vickery, Droge, & Markland, 1993). Offering customized services that are based on standardized service modules has the potential to increase productivity (Rahikka, Ulkuniemi, & Pekkarinen, 2011) through cost savings (Bask et al., 2011; Böttcher & Klingner, 2011) and increased flexibility and customer value (Rahikka et al., 2011).

2.4 Distribution

The basic function of distribution has been expressed as to “somehow bring together heterogeneous supply on the one hand and heterogeneous demand on the other” (Alderson, 1965, p. 200). This expression still counts, but the ways to bring together the heterogeneous supply- and demand might have the possibility to change. Distribution issues have become increasingly important during recent decades (Gadde, 2014). Stern and Sturdivant (1987, p. 34) stated that distribution was a neglected aspect of corporate strategy at the time. A decade later, other literature claimed that groundbreaking innovation in distribution had begun and that innovative firms experimented with their distribution channels to become more flexible and responsive (Narus & Anderson, 1996). Growth in global competition that put pressure on firms to cut costs, while providing even better customer service was among the concerning factors at the time (Oswald & Boulton, 1995). Technological developments in logistics and information exchange have made new

distribution solutions possible (Gadde & Hulthén, 2009). In fact, development in distribution solutions might be necessary for product- and service providers to meet emerging customer needs. One of the great developments in distribution is a shift away from mass-distribution toward customized offerings to individual customers (Gadde & Hulthén, 2009).

2.4.2 Selling process and lead times

The current competitive context puts providers of mobility services under increasing pressure to deliver services that meet the specific requirements of individual customers (Hicks et al., 2005; Philipoom & Fry, 1992). This situation requires providers to create a foundation for high flexibility and responsiveness in their supply chains to cope with the complexity of demand and the demand for short lead-times (Ray & Jewkes, 2004). High flexibility and responsiveness in the provider's supply chain affect the availability and accessibility of that mobility service from the consumer's perspective. More efficient logistics and technological developments contribute to shortened lead-times in distribution and should, therefore, be a focus for providers of mobility services (Gadde & Hulthén, 2009; Yang, Golany, & Yu, 2005). Developments in information technology have enhanced the exchange of information, both between firms and between firms and customers, which streamlines the information flow and reliability of product- and service flows (Garcia-Dastugue & Lambert, 2003; Lichtenthal & Eliaz, 2003). These changes create opportunities for the design of customized and cost-efficient mobility services at competitive delivery times (Gadde & Hulthén, 2009). The increased customization and demand for just-in-time deliveries require synchronization to a higher degree than earlier. The reduced lead-times and improvements in information exchange is a result of increased popularity in the concept of make-to-order (Gunasekaran & Ngai, 2005). As a consequence of these trends, increased interdependence and a need for efficient logistics become necessary. Customization and interdependence will require a mix of distribution solutions and supplier designs through omnichannel strategies (Weinberg, Parise, & Guinan, 2007).

2.4.3 Search and transaction costs

In contrast to mobility services where a car is shared between consumers, car-owners have access to a car without search- and transaction costs, instantly over its

lifetime. However, Benjaafar et al. (2015) state that recent technological advances in distribution and information management have made car-sharing more feasible by lowering the associated search- and transactions costs. These advances include the development of online marketplaces, mobile devices and platforms, electronic payments, and two-way reputation systems whereby users rate providers and vice versa. Other forms of advances include the development of digital car keys, such that the physical aspect of renting out the product is absent and decreases transaction costs. Despite this, transaction costs of searching, matching and contracting in sharing markets are still non-zero. For instance, there is no guarantee that there will always be a car available when needed (Benjaafar et al., 2015). According to Toffel (2008), these transaction costs need to be mitigated in order to attract customers. Bellos et al. (2017) discuss some potential downsides with the search- and transaction costs in car-sharing models. Such downsides might be the anxiety about potentially not finding a vehicle available when needed, the need to budget extra commute time in order to walk to where the car is parked, feeling pressed to curtail vehicle use since payment is directly linked to the duration of use and the lack of ownership pride. On the other hand, they expect the importance of some of these factors to diminish over time, as the model of car-sharing matures, and car sharing networks continue to expand and develop in more geographic areas.

2.4.3 Distribution network

Research conducted by De Lorimier and El-Geneidy (2013) shows that there are several factors affecting the distribution network of mobility services. They specifically looked at how these factors affect the monthly usage of vehicles and the availability of vehicles in a car-sharing program in Canada. One factor that we find interesting is the “closest station” (where the car is parked). They found that the distance for the customer to travel to the closest station where a car is parked will negatively impact the usage.

De Lorimier and El-Geneidy (2013) emphasize that the only way to achieve success in a car-sharing program is from increases in memberships and car usage. However, higher car usage and more members will logically reduce the overall availability of vehicles for members to use. Therefore, they stress that car-sharing providers need to revise their fleet size distribution on a regular basis to ensure a high level of

availability of cars. This is important for retaining existing customers and attracting new customers, leading to higher usage of the service and consequently the highest possible revenue for the provider. Moreover, a report by Dallaire, Lafond, Lanoix, and Viviani (2006) shows that each car-sharing vehicle in operation would replace 8.3 private vehicles on the road. This indicates that providing a mobility service with car-sharing will reduce the total inventory needed for the distribution of the service. Bellos et al. (2017) supports this, stating that customers' mobility needs can be satisfied through a smaller pool of vehicles than the number of customers.

A typical objective in logistical network design is to maximize profits or minimize costs whilst satisfying all established constraints (da Mota Pedrosa, 2012). Croxton and Zinn (2005) argue that a distribution network is focused on the locating of warehouses and determining which customers to be supplied from each warehouse. Davies (2003) and Araujo and Spring (2006) argue that during a transformation to a servicizing business model, providers are likely to change their strategies, operations and value chains, such as warehouse locations and inventory management. A network design is used to make decisions on multiple aspects of logistics networks and design, where a few of them relates to location-, number-, and size of warehouses, to best meet customer demands at lowest possible cost (Croxton & Zinn, 2005). Sharing and distributing resources is the essence of what networking is about. Christopher (2016) has expressed that a network is about upstream and downstream linkages in different processes and activities that produce value in the form of products and services in the hands of consumers. Harland (1996) states that consumers and providers are dependent on each other and that they are connected by the activities they perform and the resources they control. The activities between these actors happen in the transaction of mobility services, and the relationship between them is what creates value. The importance of well-established logistical networks stems from managements that historically have achieved significant cost reductions through good network designs, due to the great portion of costs involved in operating a network (Jimenez, Brown, & Jordan, 1998).

2.5 Customer

2.5.1 The shift toward an external focus in logistics strategy

In modern times, the area of logistics includes strategy, structure, and performance at a more top management level than previously (Chow, Heaver, & Henriksson, 1995). A strategy is defined as plans to meet relatively long-term organizational objectives with broad corporate functional implications. These developments explain why a well-established logistics strategy has moved from an internal focus to integration with other external functions such as marketing and corporate strategy, giving logistics a more external focus (Meade & Sarkis, 1998). An example of the external focus in logistics is the change from a planning and forecast-based push approach to a demand-based pull approach of products (Wanke & Zinn, 2004). Hagel and Brown (2008) state that pull approaches tend to be implemented on “platforms” designed to flexibly accommodate diverse providers and consumers of resources. These platforms are much more open-ended and designed to evolve based on new knowledge and changing needs of the customers. The decision to produce using a pull approach will be, among other factors, affected by the demand information visibility. Demand information visibility is about whether, and how far, the actual demand information penetrates a supply chain toward the initial supplier (Wanke & Zinn, 2004). This concept is also known as the demand decoupling point (Christopher, 2016). Consequently, we can say that the better a company is at integrating customer demand throughout the supply chain, the better it will be at producing based on real demand.

2.5.2 Customer integration

According to Mont (2002) and Martinez et al. (2010), earlier involvement of consumers and a higher level of customer integration is needed in the supply chain of PSSs. Involving key stakeholders like customers, suppliers and even competitors in innovation processes has actually been proven to be beneficial (Edvardsson et al., 2012). It has been observed that organizations who gain insight into their customers’ needs are more successful and better suited to develop tailored offerings (Malleret, 2006; Mathieu, 2001). Furthermore, it is argued by Chapman et al. (2003) that the focus on customer needs in the competitive global market requires firms to gain a comprehensive understanding of the customers (Chapman et al., 2003). The level of customer integration in the supply chain seems to increase as the level of servicizing increases. This can be illustrated with a figure (*see Figure 1*) from

Martinez et al. (2010), showing the customer-supplier interface. They call this the “servitization continuum”.

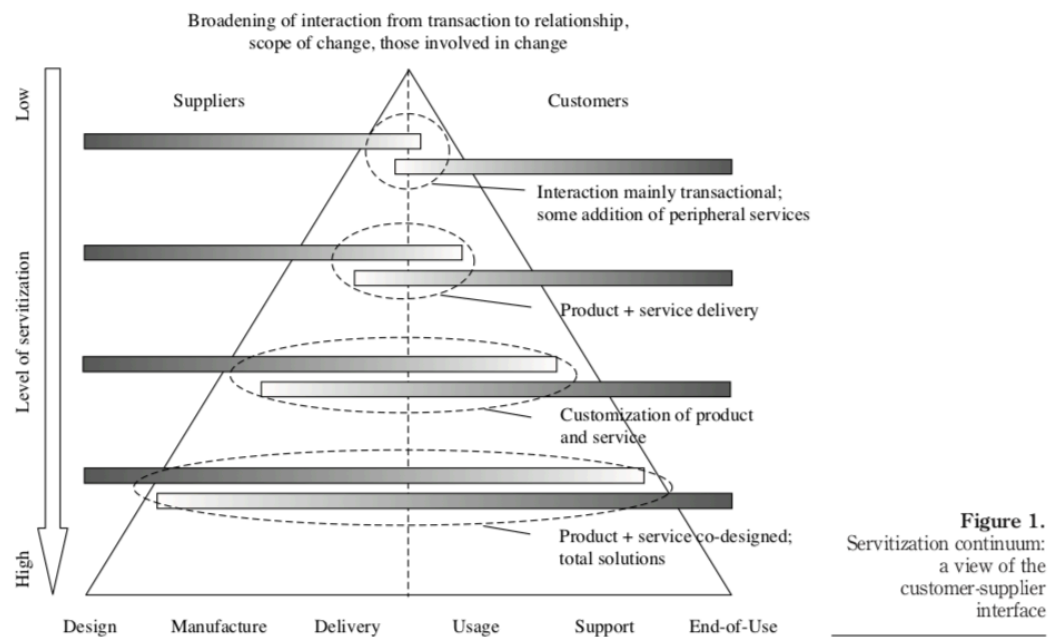


Figure 1 – “Servitization continuum” by Martinez et al. (2010)

Figure 1 showcases that customers are much more integrated in the supply chain processes from design to end-of-use, as the level of servicing increases toward a business model where product and service are co-designed into a total solution (almost the entire life cycle). According to Edvardsson et al. (2011, p. 301), “a higher degree of customer integration means a change from service innovation for the customer, to service innovation with the customer.”

Mont (2002) claims that in the functional economy, consumers are buying mobility instead of cars, and cleaning services instead of washing machines. This means that consumers shift from buying products to buying services and system solutions, which requires early involvement of consumers in the design of the service (Mont, 2002). This supports the claims of Martinez et al. (2010) that a higher level of customer integration is needed in the supply chain with a higher level of servicing. In today’s market, customers are gaining access to a greater number of options and more information about those options, which leads them to demand more from providers (Hagel & Brown, 2008). Consequently, they will require resources to be made available on their terms, when they want them, rather than when and where it is convenient for the provider to deliver them (Hagel & Brown, 2008). The provider

should, therefore, adopt more responsive and thereby flexible delivery systems for their customers. A. Williams (2006) states that through a long-term usage of a product or service, consumers might discover important facts relating to how to best reduce the environmental impact or improve the design.

2.5.2.1 Relationship

Figure 2 shows that the interaction between provider and consumer becomes a relationship rather than a strictly transactional interaction as the level of servicizing increases. The customer as a co-innovator of new services is a growing concept in service research. As a resource, customers are often seen as the raw material in the production process of service systems and are characterized by a relational interaction with the company (Edvardsson et al., 2011). However, the concept of innovation management in innovation development processes has been ignored by prior logistics research (Flint, Larsson, Gammelgaard, & Mentzer, 2005). Especially how customer-oriented companies integrate customers throughout the entire innovation development process. Carlborg and Kindström (2014) also state that the role of the customer is important in service processes because the customer typically is co-creating the service together with the provider. Therefore, they conclude that knowledge of the customers and how they use a service is essential for working with service innovation.

Servicizing requires closer coordination between provider and consumer because the transaction changes from an asset sale to a long-term service contract, which leads to what Toffel (2008) calls bilateral dependency. In other words, the provider and customer are dependent on each other. Further, the bilateral dependency in a servicizing relationship means that the provider is likely to gain more customer knowledge than with an arms-length relationship. This type of relationship indicates that research on how to integrate customer preferences in the design of a servicizing business model is of great value.

2.5.2.2 Segmentation

The greatest insight on what customers appreciate and value comes from direct interaction with customers with a research mentality, through observation, surveys, and open-ended in-depth interviews (Gale, Gale, & Wood, 1994; Woodruff & Gardial, 1996). By acquiring such knowledge about customer perceptions, the

providers can better segment the different customer groups and develop customized offerings that fit all.

According to Agrawal et al. (2012), offering both sales and servicizing options allows for better price discrimination by more effectively segmenting the customers. In particular, customers with higher usage rates choose the sales option and customers with lower usage rates choose the servicizing option (Abhishek et al., 2016). This facilitates for menu pricing where the provider can offer products and service packages that fits different consumer groups with different characteristics and needs. In addition, Gebauer, Fleisch, and Friedli (2005) state that firms believe that increasing services will deliver higher margins. On top of this, Vandermerwe and Rada (1988) believe that offering services, as well as products, increase the firm's level of differentiation. Moreover, in the context of services, we can draw links from the concept of service modularization mentioned earlier (*see Chapter 2.3.2*). Böttcher and Klingner (2011) state that offering service modules can help providers targeting specific customer segments while at the same time meeting the individual needs of each customer. Thereby increasing customer satisfaction and extending the customer base.

The total value perceived by the end-customer is an outcome of a complex set of value activities and firms involved. However, the end-customer evaluates the total impression as one entity or offering, which emphasize the importance of well-segmented and customer-oriented logistical networks as a component of a total business model (Ford, Gadde, Håkansson, & Snehota, 2002; Normann & Ramirez, 1993; Parolini, 1999). According to a statement by a project manager at Edison, a logistics provider might be able to design an operational business model or network, but they cannot offer a logistics service without a customer. The operations will only work if the customer is there, which is why customer-orientation in logistical operations is so important to create value (da Mota Pedrosa, 2012). An innovation does not necessarily need to be new to the world, but new in the eyes of a particular audience, e.g. consumers (Orr, 2003). As a consequence, every level of a business model is important for market success, including the logistical network and distribution. The customer's needs, desires or problems is what every company hopes to address through its segmentation in a business model. Understanding the customers' needs, activities and capabilities are important, as it influences the ability to segment the customer groups and customize the design of the offering and

the value activities required in its creation, distribution and consumption (Grönroos, 2006; Vargo & Lusch, 2008).

2.5.6 Customer diffusion of innovations

Diffusion of innovation (DOI) theory was first developed by Everett Rogers in 1962 and is one of the oldest social science theories. It describes the process where a new idea or product spreads (diffuses) over time through a specific population or social system (Rogers, 2010). Therefore, we should use DOI theory if we want to understand how a new product or service, (for instance a new mobility service) is adopted by customers. The time at which such new products or services (innovations) are adopted, is measured by the innovativeness dimension (Rogers, 2010). This dimension is typically illustrated with a bell curve that segments the customers into different groups based on when they adopt an innovation (*see Figure 3*). The people with the highest level of innovativeness are the “innovators” and are expected to represent around 2,5% of the population. These are the people who want to be the first to try an innovation. They are venturesome and interested in new ideas (Behavioral Change Models, 2018). In general, Rogers (2010) suggests that the rate of adoption of an innovation can be described by five attributes. These are *relative advantage* (the degree to which an innovation is perceived better than the idea it supersedes), *compatibility* (the degree to which an innovation is perceived as consistent with the existing values and needs of potential adopters), *complexity* (the degree to which an innovation is perceived as relatively difficult to understand and to use), *trialability* (the degree to which an innovation may be experimented with on a limited basis), and *observability* (the degree to which the results of an innovation are visible to others).

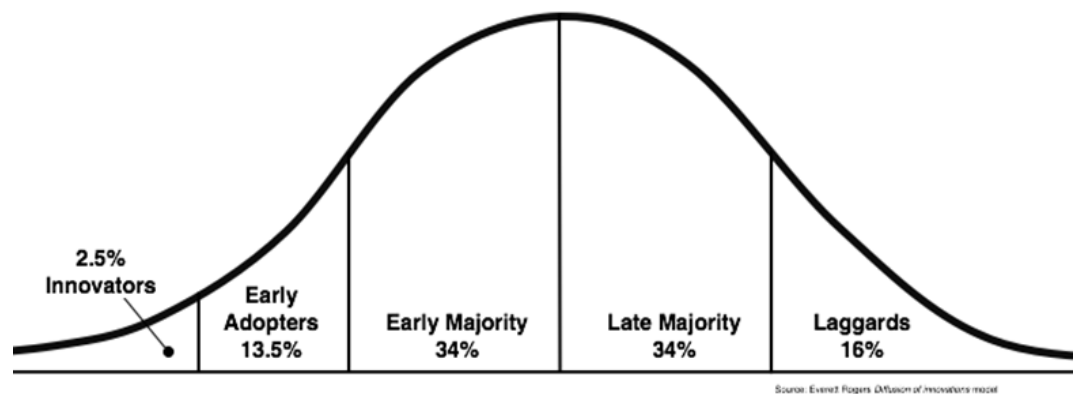


Figure 2 - “Adopter Categorization on the Basis of Innovativeness” by (Rogers, 2010).

2.5.7 Customer environmentalism

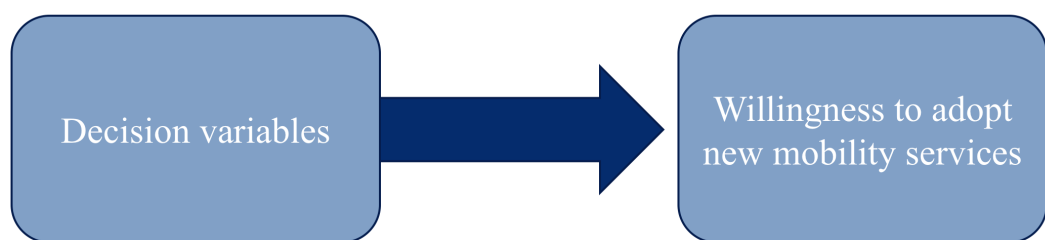
Plepys et al. (2015) claim that servicizing can offer direct environmental benefits by reducing material- and energy intensity in market transactions. If multiple consumers share a single product, the number of products needed to provide a certain function will be reduced (Mont & Plepys, 2008). In addition, selling services incentivizes manufacturers to redesign products to extend their lifespan, which further reduces energy and material intensity (Toffel, 2008).

According to Roberts and Bacon (1997), there has been a paradigm shift in the orientation of people toward the environment since the beginning of the 1990s. Many authors have suggested that individuals with a higher level of environmental concern are more likely to engage in ecologically conscious consumer behavior (Antil, 1984; Roberts, 1991; Shetzer, Stackman, & Moore, 1991). Meaning that if using mobility services is seen as ecologically conscious consumer behavior, then customers with a higher level of environmentalism should be more willing to adopt such services. In this context, we use the term environmentalism as a synonym for environmental concern. According to Roberts and Bacon (1997, p. 81), “research has, in general, indicated a positive relationship between environmental attitudes and behavior”. This emphasizes the need to consider the level of customer environmentalism when studying innovation adoption behavior of customers. Especially for innovations which have the potential to be environmentally friendly – in our case, mobility services.

3.0 Research Model

The aim of the literature review was to acquire theoretical knowledge of the relevant concepts identified in the introduction and the problem statement. The goal was to understand the effect of changing customer preferences, market trends and environmental needs on the shape of future mobility services. It is obvious that the concept of mobility services is a new business model that has come to stay. However, it is not obvious how customers will adopt the new mobility services, and what effect that will have on how distributors will shape the business model. In addition, the importance of integrating customer preferences in future business models in logistics industries has been emphasized by the literature. Therefore, we want to study the customers' willingness to adopt new mobility services as our dependent variable. The willingness is obviously driven by some decision variables, and we want to investigate the effect of these on the dependent variable. When investigating the willingness, we will acquire a deeper understanding of which factors are the most important for the distributor to pay attention to when shaping a business model. This variable is also expected to give implications as to how important it is for distributors to change their current business models.

Summing up, we propose the following research model, illustrated in *Model 1*.



Model 1: *Decision variables affecting the willingness to adopt new mobility services*

The literature has helped to extract valuable independent variables to develop a conceptual model and to consider for traditional logistics industries when adapting to the market changes addressed in the introduction. Hence, the independent variables can be divided into two groups, where one group has variables related to business model characteristics of a mobility service, and the other group has

variables related to customer characteristics. *Model 2* illustrates that these two groups of independent variables are expected to affect the dependent variable of the customer's willingness to adopt new mobility services.

From the literature review, we find the business model components of *pricing*, *product*, and *distribution* to be the most important characteristics of mobility services. When analyzing the *distribution* networks, the literature emphasizes the importance of looking into service lead-times, search- and transaction costs, after-sales and customer relationships, and the selling- and delivery processes itself. *Product* offerings should evaluate the demand and needs for different levels of quality, level of customization, and service modularization as a high-potential concept. Finally, *pricing* is of high importance when analyzing the potential for traditional logistics industries to target their customers more precisely, and they should identify whether to apply a pricing scheme of pay-per-use, fixed payments, or a mix.

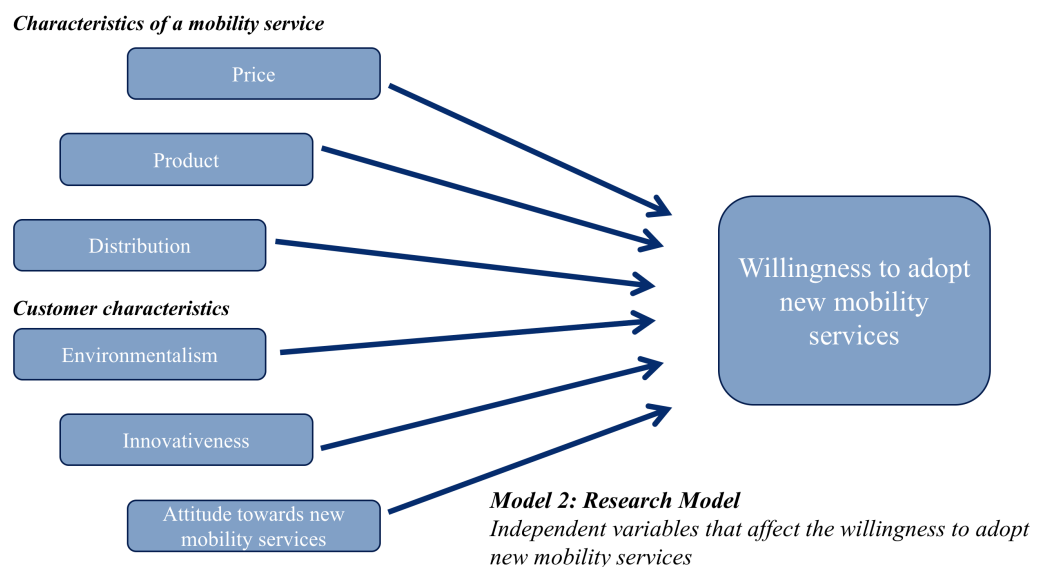
When considering the characteristics of the customers, we find *innovativeness*, *environmentalism*, and *attitude toward mobility services* to be three important characteristics that we anticipate affecting their willingness to adopt new mobility services. The literature emphasizes the potential environmental benefits of servicizing business models in the automobile industry, such as mobility services. Thus, it is interesting to see whether the level of *environmentalism* of the customers affects their willingness. In other words, this characteristic describes how important environmental issues are for the customer. Further, new mobility services are innovations that have the potential to replace current business models. Thus, it is interesting to see whether the level of *innovativeness* of the customers affects their willingness. In other words, this characteristic describes how innovative the customer is and if they are inclined to try new products and services. Lastly, we anticipate the *attitude* that the customers have toward mobility services to be an important factor affecting their willingness.

From the work with the literature and our discussions we are able to refine our problem statement and formulate the following research questions and hypotheses.

Research Question 1: To what extent do the customers' preferences related to pricing, product, and distribution affect their willingness to adopt new mobility services?

Research Question 2: To what extent do the customers' characteristics related to innovativeness, environmentalism, and attitude toward mobility services affect their willingness to adopt new mobility services?

The research model is illustrated in *Model 2*, including the independent variables as input with its output effect on the *willingness to adopt new mobility services*.



3.1 Operationalization

As elaborated in the literature review, customer integration is of the essence when redesigning business models in the logistics industry. The literature has emphasized that focusing on the customer is essential to a higher degree than earlier to keep up with global competition and the information access that customers have acquired. Consequently, we will base our research on input from customer preferences on the independent variables related to characteristics of mobility services in *price*, *product*, and *distribution*, and customer characteristics in *innovativeness*, *environmentalism*, and *attitude toward new mobility services* to detect the *willingness to adopt new mobility services*. These concepts are operationalized in

below, to explain how the concepts are translated into measurable elements (Bryman & Bell, 2015).

In order to answer our research question, we will test six hypotheses, where each independent variable has one hypothesis. These hypotheses describe the expected relationship between the independent variables and the dependent variable of *willingness to adopt new mobility services*.

The *pricing* structure (pay-per-use vs. fixed) is characterized by either fixed or variable costs, or a mix. Thus it affects the level of *economic flexibility* that the customers have (Agrawal & Bellos, 2016; Bellos et al., 2017; Kamargianni et al., 2016; Orsdemir et al., 2015; Plepys et al., 2015). A pay-per-use pricing structure changes the cost structure from fixed to variable for the customer. High economic flexibility is defined by costs related to usage, such as variable costs. In that sense, the consumer has a higher degree of flexibility in relation to when and how costs incur. On the other hand, low economic flexibility is defined by fixed costs that are not related to usage. In that sense, the consumer has a lower degree of flexibility to choose when and how costs incur. Thus, we can define economic flexibility as not being tied to economic commitments. As a result, it is more precise to refer to the variable of *pricing* as *economic flexibility*, when studying business models for mobility services. Based on this, the following hypothesis has been developed.

H1: There is a positive relationship between customer preferences related to economic flexibility and the willingness to adopt new mobility services.

The *product* that the distributor of mobility services offers, will be characterized by the level of *customization and quality of the product* for the customer (Mont, 2002; Pine, 1993; Stahel, 1994; A. Williams, 2006; Zipkin, 2001). The level of customization is related to how much the product is designed to the specific requirements of each individual customer. For instance, the customer might be able to choose between many different specifications such as color, size of the trunk, leather seats, gearbox, etc. The level of quality is related to how good the product is. For instance, a high-quality car will have more expensive components that are expected to have a longer lifetime. As a result, it is more precise to refer to the variable of *product* as *customization and quality of the product*, when studying

business models for mobility services. Based on this, the following hypothesis has been developed.

H2: There is a negative relationship between customer preferences related to customization & quality of the product, and the willingness to adopt new mobility services.

The *distribution* of the product in a mobility service will affect the level of *availability of the product* for the customer (Benjaafar et al., 2015; De Lorimier & El-Geneidy, 2013; Gadde & Hulthén, 2009; Ray & Jewkes, 2004; Yang et al., 2005). This is because the availability of the product will depend on the lead time and the search- and transaction costs, which further depends on the distribution network of the distributor. Thus, the availability is related to how close a car is and how fast it can be obtained when the need for it arises. For instance, when a customer always has a car outside their home, the product is very available. As a result, it is more precise to refer to the variable of *distribution* as *availability of the product*, when studying business models for mobility services. Based on this, the following hypothesis has been developed.

H3: There is a negative relationship between customer preferences related to the availability of the product, and the willingness to adopt new mobility services.

The level of *innovativeness of the customer* describes how the customer adopts innovations available on the market. A high level of innovativeness means that the customer is early to adopt the innovation and that they usually perceive it as better than the previous offering. In addition, the innovation tends to be in line with their values and needs, as well as easy to understand (Rogers, 2010). Based on this, the following hypothesis for the variable of customer innovativeness has been developed.

H4: There is a positive relationship between the customer characteristic of innovativeness and the willingness to adopt new mobility services.

The level of *environmentalism of the customer* describes how environmentally conscious the customer is. A high level of environmentalism means that the

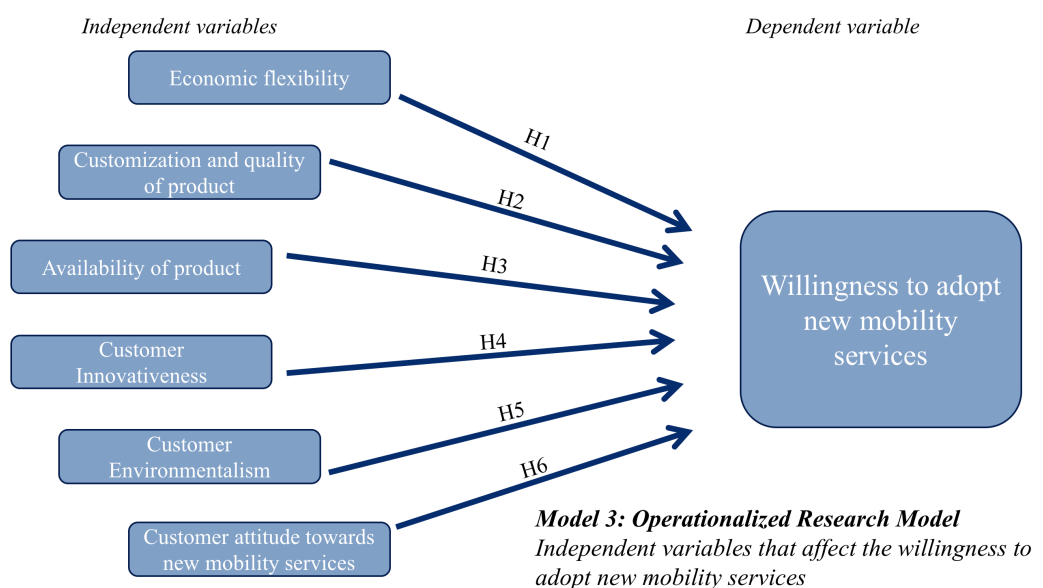
customer is highly conscious and aware of environmental issues. Their behavior also tends to be affected by their environmental concern (Antil, 1984; Roberts & Bacon, 1997; Shetzer et al., 1991). Based on this, the following hypothesis for the variable of customer environmentalism has been developed.

H5: There is a positive relationship between the customer characteristic of environmentalism and the willingness to adopt new mobility services.

The *attitude of the customer* toward new mobility services describes how the customer perceives new mobility services, how well they know them, if they usually try them, or if they have tried them before. We expect this attitude to affect how willing the customer is to adopt new mobility services. Based on this, the following hypothesis for the variable of customer attitude toward new mobility services has been developed.

H6: There is a positive relationship between the customer characteristic of attitude and the willingness to adopt new mobility services.

Model 3 illustrates our operationalized research model for data collection and analysis, with the six identified independent variables and its effect on the willingness to adopt new mobility services.



4.0 Research Method

4.1 Quantitative Research

The methodology used in this thesis is quantitative research. A quantitative research strategy aims to quantify aspects of social life and allows us to look for numerical relationships between concepts (Bryman & Bell, 2015). This thesis will apply a deductive approach, where we use what is known about our subject and the theoretical considerations within it to deduce hypotheses. These hypotheses are translated into researchable entities and operationalized terms (Bryman & Bell, 2015). Further, we can specify how data needs to be collected in relation with the concepts described in the hypotheses. We will use an explanatory (or analytical) survey for the quantitative research, because these surveys aim to answer “how” and “why” (Williamson, 2002). We answer “how”, in terms of how the independent variables in the hypotheses correlate with the dependent variable, and to what extent they do. We answer “why”, in terms of the analysis of the results, and the implications it will give for why the relationships are as they are. The tool used to create the explanatory survey and to collect the data was a web-based platform called Qualtrics. By utilizing quantitative research, we can discover patterns by generalizing from a larger sample size of a population. More specifically, a general conclusion can be drawn as to how customer preferences about *economic flexibility*, *customization and quality*, and *availability* and customer characteristics about *innovativeness*, *environmentalism*, and *attitude* affect a car user’s willingness to adopt new mobility services (Bryman & Bell, 2015).

4.2 Cross-Sectional Design

We will use a single cross-sectional design, where only one sample of respondents is drawn from the target population, and information is obtained from this sample only once (Malhotra & Birks, 2006). This allows for bigger samples and for examination of the relationship between variables. It also allows us to collect data on more than one element at a single point in time, and to discover patterns of how customer preferences- and characteristics affect the willingness to adopt new mobility services. All the data is collected once, at one point in time, making it relatively inexpensive and efficient compared to for instance a longitudinal design. In order to discover variations between different variables, the design requires a

systematic and standardized method for catching the variation, such as surveys (Bryman & Bell, 2015). With a cross-sectional design, we can examine relationships between variables and discover patterns of association. In addition, we might be able to draw certain inferences about causality (Bryman & Bell, 2015).

One alternative to the cross-sectional design could be a causal design. However, in a causal design, the independent variables should be manipulated in a controlled environment where the other variables that may affect the dependent variable are controlled and checked as much as possible. In a cross-sectional design, we will also look for “causal” relationships to determine the degree of association between variables. Although cross-sectional survey data are often used to provide evidence of “causal” relationships, these studies do not meet all the conditions required for causality (Malhotra & Birks, 2006). In our case, we cannot control for every single variable that affects the decision of adopting new mobility services. Therefore, it is more appropriate to use a cross-sectional research design in our case.

This research seeks to look for trends regarding the cause and effect relationship between the identified variables related to customer preferences- and characteristics and the dependent variable of the customer’s willingness to adopt new mobility services. A cross-sectional design is characterized by the prior formulation of specific research questions and hypotheses. Thus, the information needed is clearly defined. As a result, this design is structured and planned to answer our hypotheses, and to understand which of the variables of *economic flexibility, customization and quality of product, availability of product, customer innovativeness, customer environmentalism, and customer attitude toward new mobility services* (independent variables) that cause customers to be more or less *willing to adopt new mobility services* (dependent variable) (Malhotra & Birks, 2006).

4.3 Population and Sampling Strategy

In order to investigate the proposed hypotheses, we collect data using online surveys distributed to car-users in the greater Oslo region. We choose the greater Oslo region because we believe that it makes sense to capture the variety of preferences related to car-use in urban areas (Oslo) and in more rural/suburban areas (Akershus). With a cross-sectional design, it is essential to have an adequately large

and representative sample size (Kotrlík & Higgins, 2001; Malhotra & Birks, 2006). Statistics Norway show that the current size of the population in the greater Oslo region is approximately 1.3 million (SSB - Population in Oslo and Akershus, 2019). Here, the greater Oslo region is defined as the Oslo and Akershus region together. There was no data available on how many of those who are in the age range of 20-79. However, Statistics Norway show that the population in Norway in the age range of 20-79 is 3.8 million, which translates to 72.2% of the population (SSB - Norway's population divided by ages, 2019). We assume that this percentage is the same in the greater Oslo region, resulting in approximately 1 million people in the age range of 20-79. However, since the population proportion using cars is the only aspect of statistical interest, it is appropriate to determine a representative sample size based on the population proportion rather than the means (Bartlett & Il, 2001; Malhotra, 2006).

Statistics from Nasjonal Transportplan show that 73% of men and 66% of women had a driver's license and access to a car in 2013/2014 (Nasjonal Transportplan, 2017-2018). There was no similar statistics from 2019 available, so an assumption was made that these numbers are approximately the same today. This leads to an average percentage of 70%, to apply as the population proportion. By using a population proportion of 70% ($p = 0.7$), in addition to a confidence interval of 95% ($\alpha = 0.05$ and $z = 1.96$), and an error margin of 8% ($e = 0.08$), a sample size of 126 respondents was estimated to be sufficient (*see calculation below*).

Cochran's formula (Burns, 2016): $n = \frac{z^2 pq}{e^2} = \frac{1.96^2 * (1-0.7) * 0.7}{0.08^2} = 126$ where,

$n =$ sample size

$z =$ z-value found in a Z table based on the confidence level

$p =$ the population proportion

$q = 1-p$

$e =$ the desired level of precision (error margin)

However, a total sample size of 363 representative respondents was obtained, lowering the error margin to approximately 3.37%.

To collect a representative sample, the survey was distributed directly to 340 car users by email and social media in our own network. This is known as accidental

sampling, which is defined as a type of non-probability sampling where a researcher selects cases close at hand, such as his or her classmates or workmates (Williamson, 2002). They were all asked if they could share the survey with their parents, friends or colleagues because most of our personal network is in the younger age range and we needed respondents in all ages. In addition, the survey was published on the social media platforms Facebook and LinkedIn by us and six other people that wanted to help. This resulted in a total of 363 respondents who completed the survey.

4.4 Survey Development

The questionnaire consists of two main parts (*see Appendix 8.1*). The first part are questions related to demographics of the respondent. Here we acquire information such as gender, age, income, distance to workplace, and family composition. In addition, we are interested in two specific constructs that we believe could affect the willingness to adopt new mobility services, namely customer innovativeness and environmentalism. These constructs are based on established scales from Roberts and Bacon (1997) and Rogers (2010) for environmentalism and innovativeness respectively. These scales were translated from English to Norwegian which could have caused limitations. However, the relatively high internal consistency for the two constructs suggests that this limitation must have been minimal (*see Chapter 5.3*). These scales were measured using a 5-point Likert's scale. See the table below (*Table 1*) for the description of the established scaled statements.

Established scales		
	Attributes	Source
Innovativeness	Degree to which an innovation is perceived as better than the idea it supersedes	Rogers (2010)
	Degree to which an innovation is perceived as consistent with the existing values and needs	Rogers (2010)
	Degree to which an innovation is perceived as relatively difficult to understand and to use	Rogers (2010)
	Degree to which an innovation may be experimented with before purchase	Rogers (2010)
	Degree to which the results of an innovation are visible to others	Rogers (2010)
Environmentalism	Humans must live in harmony with nature in order to survive	Roberts & Bacon (1997)
	Mankind is severely abusing the environment	Roberts & Bacon (1997)
	We are approaching the limit of the number of people the earth can support	Roberts & Bacon (1997)
	Humans need not adapt to the natural environment because they can remake it to suit their needs	Roberts & Bacon (1997)
	When humans interfere with nature, it often produces disastrous consequences	Roberts & Bacon (1997)

Table 1: Established scales

The second part starts off with questions related to their attitude toward new mobility services, before we move on to the questions related to the constructs of economic flexibility, customization and quality of product, and availability of product. Respondents are asked to answer to what extent they agree with various statements within each construct. They are asked to answer the statements while imagining the specific setting of only having access to, and not owning a car. The statements are not based on any established scales, mainly because we could not find them, but also because they are highly contextual and specific in the case of mobility services. Therefore, the statements are based on important aspects identified in our literature review and are self-developed. See the table below (*Table 2*) for the development of the non-established scales and their source of inspiration.

Non-established scales		
Attributes	Source of inspiration	
Economic Flexibility	Degree of desire to have a pay-per-use structure <i>Plepys et al. (2015); Agrawal & Bellos (2016); Orsdemir et al. (2015)</i>	
	Degree of desire to forego economic responsibility for service- and maintenance costs <i>Toffel (2008)</i>	
	Degree of desire for flexibility related to due dates and size of costs incurred <i>Rahikka et al. (2011); Plepys et al. (2015); Toffel (2008)</i>	
Customization and quality of product	Degree of desire for a broad selection of product- and service offering <i>Mont (2002); Böttcher and Klingner (2011); Ray and Jewkes (2004)</i>	
	Degree of desire for customizable offerings <i>Mont (2002); Böttcher and Klingner (2011); Davis (1989); Ray and Jewkes (2004)</i>	
	Degree of desire for high-quality products <i>Toffel (2008); Agrawal et al. (2012); Bellos et al. (2017); Orsdemir et al. (2015)</i>	
	Degree of desire for new products <i>Zeithaml (1988)</i>	
Availability of product	Degree of desire for immediate access to consumption <i>Benjaafar et al. (2015); Toffel (2008); Bellos et al. (2017); De Lorimier and El-Geneidy (2010); Gadde & Hulthén, 2009</i>	
	Degree of desire to have the opportunity to switch between products for different use <i>Kamargianni et al. (2016)</i>	
Attitude toward new mobility services	I have great knowledge of new mobility services I usually try new mobility services that appears on the market I am generally positive towards development in the automobile industry I usually try new products earlier on than my acquaintances <i>Rogers (2010)</i>	

Table 2: Development of non-established scales

Toward the end of the second part, the respondents are asked about their willingness to adopt new mobility services, representing the dependent variable in our model. All the constructs related to our independent variables are measured using a 5-point Likert’s scale, and *Table 1* and *Table 2* are showcasing the established scales and the self-developed scales, respectively. The same scale was used for the questions

related to attitudes toward new mobility services and for the final question about willingness to adopt new mobility services. This ensured consistency and ease of comparison throughout the questionnaire. The respondents indicated their answer by selecting one of the 5 points on the scale, ranging from “strongly disagree” (1) to “strongly agree” (5) (Burns, 2016).

At the end of the second part, after the question about willingness to adopt new mobility services, we added one questions that we could use in a more descriptive manner if needed. We asked the respondents to what degree they wanted a specific business model available in the market. This was something we called a *car subscription* which was described in the following way to the respondents: “*A car subscription is an offering with a fixed monthly cost that covers all expenses throughout the year. It will include different packages with several cars for different purposes, with the opportunity to switch between cars when you want. The car is always outside your door.*” We believe that this question can provide an interesting basis that we can use to discuss and indicate what kind of product offering the customers want and prefer, and thereby, give some managerial implications. The idea of a car subscription, or a “mobility package” was inspired by (Kamargianni et al., 2016).

It was important to ensure the security of the information that the respondents gave. Therefore, we added text boxes explaining the aim of each part of the questionnaire to get the respondent in the right mindset. We highlighted the main goal of the survey in the introduction, where we also stated that the data collected is completely anonymous and that we follow the rules of GDPR. Moreover, we stated that all the data will only be used for research and deleted after the analysis, and that the data collection is approved by NSD (Norwegian Centre for Research Data).

4.4.1 Pre-test

We pre-tested our questionnaire on a small and representative sample in several rounds. The objective of the pre-test was to ensure that there were no errors in the survey, that the questions were clear and easy to understand, and that the question flow and scales were perceived as logical for the participants (Burns, 2016). This allowed us to gather feedback from the participants and thus improving the questionnaire. The representative sample consisted of students, friends, and family.

The participants were requested to look for errors in words, phrases, instructions, and question flow. When the pre-tests were finished, we looked for common problem themes that were mentioned by the participants (Burns, 2016). We ended up rephrasing many of the questions to make them clearer, as it was apparent that some of the participants did not clearly understand what we were asking for.

4.5 Data Assessment and Analytical Procedures

The dependent and independent variables were labeled abbreviations that will be applied when referring to the different variables throughout the rest of the thesis. An overview of the abbreviations is presented in *Table 3*.

Variable labelling

Variables	Variable name	Label
Economic flexibility	Economic flexibility	EcFlex
Customization and quality of product	Product	Prod
Availability of product	Availability	Avail
Customer environmentalism	Environmentalism	Env
Customer Innovativeness	Innovativeness	Innov
Customer attitude towards new mobility services	Attitude	Att
Willingness to adopt new mobility services	Willingness	WillMob

Table 3- Variable labelling

After the data was collected with Qualtrics, it was exported to SPSS Statistics to prepare it for analysis. The data was cleaned and a total of 29 incomplete and 10 faulty questionnaires were excluded. We did not have any major issues with respondents not answering certain questions, since we had “forced response” activated for the majority of the questions. All the statements were coded with names in SPSS that reflect which variable in our model and hypotheses they belong to. For instance, the four questions related to the variable economic flexibility, were coded with the labels “*EcFlex_1*”, “*EcFlex_2*”, and so on. In addition, some statements had to be reverse-scored so that a response of “*Strongly Disagree*” with a score of 1, would count as a response of “*Strongly Agree*” with a score of 5 and vice versa.

When all the required adjustments were made and the factor analysis was completed, we computed the means of all survey questions within each variable to obtain six independent variables for the multiple regression analysis. Subsequently, descriptive statistics for each construct was computed, assessing the frequencies of

each statement. To test our hypotheses, a multiple regression analysis was conducted. The dependent variable *Willingness* and the independent variables *Economic flexibility*, *Product*, *Availability*, *Environmentalism*, *Innovativeness*, and *Attitude* were all measured using 5-point Likert's scales, corresponding with a continuous scale in SPSS.

5.0 Results

We have examined the descriptive statistics and normal distribution of the sample. Furthermore, the validity and reliability of the survey have been examined to ensure that the data gathered from the questionnaire are of value and without any major errors (Malhotra, 2006).

5.1 Sample Descriptives

Sample Descriptives - Age						
	N	Mean	Std. Deviation	Range	Minimum	Maximum
Age	363	32.6	13	54	18	72

Table 4: Age distribution of the sample

Table 4 shows that the age range in the sample is fairly large ranging from 18 to 72 years old. 51.8% of the respondents are between 18 and 25 years old, and 28.3% are between 26 and 50 years old, while 19.9% are between 51 and 72 years old. This indicates that the sample is somewhat skewed, with significantly more respondents of a younger age. This is not very surprising, as the sampling strategy was accidental sampling where we distributed the questionnaire within our own network with similar ages as ourselves (20-30 years old). However, the necessary measures were taken to ensure respondents of all ages. Thus, a mean of 32.57 years old for the sample is satisfactory.

Sample Descriptives - Gender			
	Male	Female	Total
Frequency	196	167	363
Percent	54	46	100

Table 5: Gender distribution of the sample

Table 5 shows that the gender distribution in the sample is relatively even, with almost the same number of males and females. 54% of the sample is male, while 46% of the sample is female.

Sample Descriptives - Residence

	Frequency	Percent
Outside Oslo city border	160	44.1
Outside Ring 3, but inside Oslo city	33	9.1
Inside Ring 3	77	21.2
Inside Ring 2	61	16.8
Inside Ring 1	32	8.8
Total	363	100

Table 6: Distribution of residence within or outside Oslo city border

Table 6 shows that there is approximately an even split between respondents with residence inside (55.9%) and outside (44.1%) the Oslo city border. The sample has a fairly even distribution within the city border, where 9.1% live outside Ring 3 but within the city borders, 21.2% live between Ring 3 and Ring 2, and 16.8% live between Ring 2 and Ring 1. Finally, 8.8% live inside Ring 1.

Sample Descriptives - Car Ownership

	Car Owner	Car Leaser	No Car	Total
Frequency	161	15	187	363
Percent	44.4	4.1	51.5	100

Table 7: Car ownership in the sample

Table 7 shows that the sample consisted of respondents who have a driver's license and either own a car, lease a car, or have access to a car. 44.4% own a car, and 4.1% lease a car, while 51.5% do not own or lease a car but have access to one. This means that the sample is evenly split between people who have a car (owning or leasing) and people who do not have a car. However, we see that very few leases a car compared to those who own.

5.2 Normal Distribution, Skewness, and Kurtosis

To check for normal distribution of the scales, the skewness and kurtosis of each statement were assessed.

Normal Distribution, Skewness, and Kurtosis			
	N	Skewness Statistic	Kurtosis Statistic
Innov_1	363	-0.71	0.71
Innov_2	363	-0.49	0.44
Innov_3	363	-0.65	-0.45
Innov_4	363	-0.99	0.78
Innov_5	363	-1.25	1.44
Innov_6	363	-0.04	-0.86
Env_1	363	-1.07	0.90
Env_2	363	-1.27	1.29
Env_3	363	-0.43	-0.57
Env_4	363	-1.50	1.84
Env_5	363	-0.79	0.51
Env_6	363	-1.44	2.40
Att_1	363	-0.86	0.24
Att_2	363	-0.26	-1.23
Att_3	363	-1.35	2.50
Att_4	363	0.14	-0.90
Att_5	363	-1.95	4.04
EcFlex_1	363	-0.48	-0.60
EcFlex_2	363	-0.65	-0.42
EcFlex_3	363	-1.43	1.44
EcFlex_4	363	-0.53	-0.29
Cust_1	363	-0.37	-0.98
Cust_2	363	-1.09	0.71
Cust_3	363	-0.58	-0.68
Qual_1	363	-0.41	-0.86
Qual_2	363	-0.90	0.42
Avail_1	363	-0.11	-1.13
Avail_2	363	-0.45	-1.13
Avail_3	363	-0.48	-0.88
WillMob	363	-1.42	3.09
WillSub	363	-0.72	0.03

Table 8 - Normal Distribution, Skewness, and Kurtosis for all scale questions

The table above (*Table 8*) shows the skewness and kurtosis of all the scaled statements. There are different opinions among statisticians about what is an acceptable range for skewness and kurtosis, and it is clear that this depends on the sample size. According to Kim (2013), the absolute values of skewness and kurtosis is of the essence, without considering z-scores if you have a sample size greater than 300, which applies for this sample size. Further, he states that an absolute skewness value larger than 2 or an absolute *kurtosis proper* value larger than 7 can be used as a reference to determine substantial non-normality. SPSS provides the *excess kurtosis* value, which means that 3 has to be added to the values for kurtosis in the table to obtain the *kurtosis proper* value, which should not exceed 7 (Kim, 2013). Thus, we only have one scaled statement that does not meet these criteria, namely *Att_5* (*marked in Table 8*). The rest of the scaled statements meet the criteria for skewness and kurtosis according to the requirements by Kim (2013).

Att_5 has a kurtosis value of 4.04 (*kurtosis proper* = 7.04) and represents the statement “it is the immediate access that I value the most when owning a car”. It has a high mean value of 4.48 and a low standard deviation of 0.852, indicating that the sample distribution is heavy-tailed for this statement (Field, 2018).

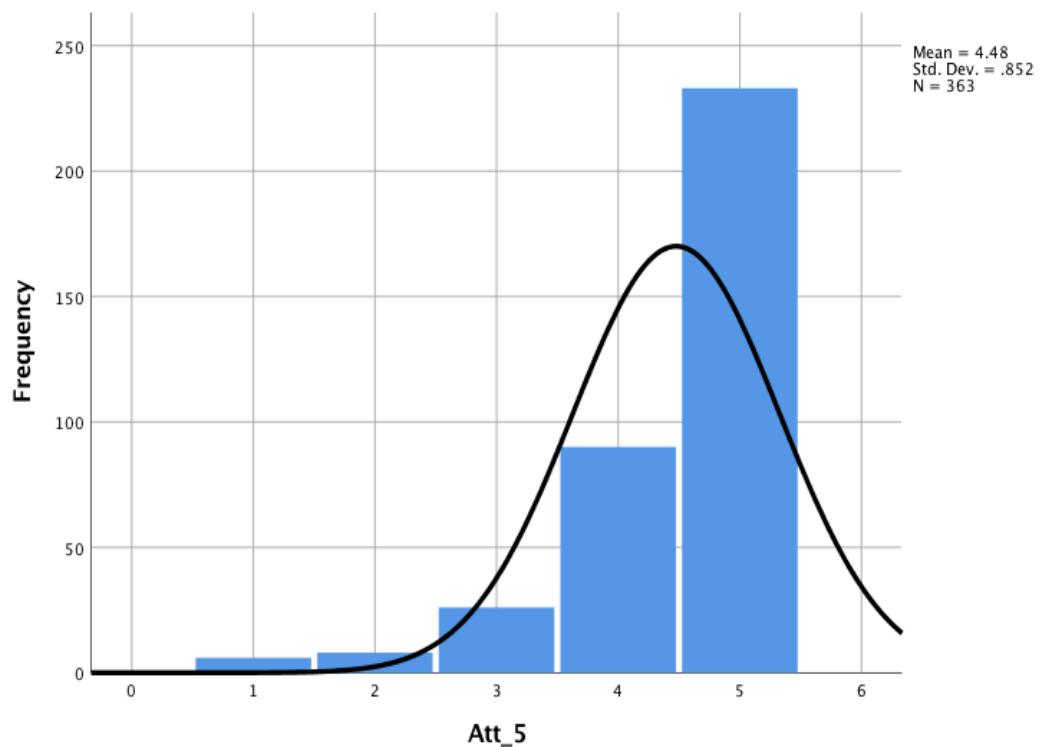


Figure 3 - Histogram of Att_5

In addition, Att_5 has a skewness value of -1.95, which is close to not meeting the criteria for skewness of an absolute value greater than 2. This indicates that the bulk of the values lie above the mean as we can see from the histogram (*Figure 3*).

5.3 Scale Statement Descriptives

Descriptive Statistics				
		Mean		
	N	Statistic	Std. Error	Std. Deviation
Innov	363	3.57	0.04	0.70
Att	363	3.56	0.04	0.75
Env	363	4.07	0.03	0.63
EcFlex	363	3.66	0.04	0.76
Avail	363	3.80	0.04	0.84
Prod	363	3.54	0.05	0.90
WillMob	363	3.85	0.05	1.00

Table 9 - Mean values for all constructs

Table 9 shows the mean values for all of the constructs in our survey. Each construct consists of several statements that were measured using a 5-point Likert's scale. In the appendix (*see Appendix 8.2*), we have described the statistics of each statement within every construct. However, this is a summary of the descriptive statistics for the constructs overall. Each construct has been computed by taking the average of all the statements within that construct. This was done after the factor analysis (*see Table 11, Chapter 5.2.2.1*), which gave us an indication of which statements that load together to create a factor or construct.

Innov is supposed to capture the level of innovativeness of the respondent and consisted originally of six statements. However, after the factor analysis, we ended up with two statements, namely "I usually perceive new products and services on the market as better than the existing offering" (10.2% *strongly agree*) and "I usually think that new products and services on the market are in accordance with my values and needs" (8.0% *strongly agree*). The mean value for

this construct is 3.57, indicating a moderately high level of innovativeness in the sample

Att is supposed to capture the attitude toward new mobility services, where a high value indicates a positive attitude. Originally, the construct consisted of five statements. However, after the factor analysis, we ended up with three statements, namely “I have knowledge about new mobility services” (24.2% *strongly agree*), “I usually try new mobility services that appear on the market” (19.0% *strongly agree*), “I am generally positive toward the development of new solutions in the automobile industry” (44.1% *strongly agree*), and “I usually try new products and services early compared to my acquaintances” (9.1% *strongly agree*). The latter statement was originally under the construct of innovativeness but ended up loading with the construct of attitude. The mean value for this construct is 3.56, indicating a somewhat positive attitude toward new mobility services.

Env is supposed to capture the level of environmentalism of the respondent, or in other words, how much they care about environmental issues. Originally, the construct consisted of six statements, all of which loaded together in the factor analysis. These statements are “humans need to live in harmony with nature to survive” (39.4% *strongly agree*), “humanity is severely abusing the environment” (44.9% *strongly agree*), “we are approaching the limit of people that the planet can withstand” (26.4% *strongly agree*), “humans do not need to adapt to nature since they can change it to fit with their needs” (58.4% *strongly disagree*), “when humans manipulate nature, the consequences can be catastrophic” (27.5% *strongly agree*), and finally, “I am more willing to use new products and services if I know that they are environmentally friendly” (39.7% *strongly agree*). The mean value for these constructs is 4.07, indicating a high level of environmentalism.

EcFlex is supposed to capture the respondent’s preferences around the level of economic flexibility they desire related to car use. Originally, the construct consisted of four statements. After the factor analysis, we ended up with four statements, namely “I only want to pay per km that I drive” (21.2% *strongly agree*), “I only want to pay for the time period that I use the car” (22.0% *strongly agree*), “I want to be relieved of the economic responsibility of service and maintenance of the car” (51.8% *strongly agree*), and “I need to have the opportunity to switch

between different cars for different use whenever I want” (16.8% *strongly agree*). The latter statement was originally under the construct of availability but ended up loading with the construct of economic flexibility, which makes sense, because the respondents might view the opportunity to switch cars as a way of having flexibility. The mean value for this construct is 3.67, indicating a relatively high desire for economic flexibility.

Avail is supposed to capture the respondent’s preferences around the level of availability they desire related to cars. Originally, the construct consisted of three statements. After the factor analysis, we ended up with two statements, namely “the car has to be outside my door at all times” (13.2% *strongly agree*), and “it is the immediate access to a car that I value the most when owning a car” (64.2% *strongly agree*). The last statement was originally under the construct of general attitude but ended up loading with the construct of availability. This makes sense because the last statement is related to immediate access, which translates to high availability. The mean value for this construct is 3.80, indicating a high desire for availability.

Prod is supposed to capture the respondent’s preferences around the level of customization and quality they desire related to car use. Originally, the construct consisted of five statements. However, after the factor analysis, we ended up with three statements, namely “it is important that I can choose from a large variety of car brands, car types, and/or specifications” (19.8% *strongly agree*), “it is important that I can always use cars that are relatively new” (20.7% *strongly agree*), and “it is important that I can always use high-quality cars” (27.3% *strongly agree*). The mean value for this construct is 3.54, indicating a relatively high desire for customization and quality of the product.

WillMob is the final construct and is also the dependent variable in our study. The respondents were asked to what extent they are willing to try new services related to car use, and their opinion was captured using a 5-point Likert’s scale here as well. Where a value of 1 is “to a small extent” and a value of 5 is “to a very great extent”. 22.6% said that they are willing to a very great extent to try new services related to car use, while 52.1% were willing to a great extent, resulting in 74.7% who are more willing than they are neutral. The mean value for this statement is 3.85, indicating a high willingness to adopt new mobility services.

5.2 Construct Validity - Factor Analysis

Construct validity raises the question as to whether the measures chosen fit together in such a way as they capture the essence of the construct (Straub, Boudreau, & Gefen, 2004). The credibility and to what extent the constructs accurately represent and measures what it intended to measure, can be assessed by examining the validity of this research (Hair, Black, Babin, Anderson, & Tatham, 2010). In other words, we are measuring whether our research measures the concepts well or not. When examining the content validity, we evaluated how well the content of the scales represented the desired constructs (Malhotra & Birks, 2006). We decided to apply a factor analysis for the purpose of validity testing.

Factor analysis is considered the preferred method for interpreting self-reporting questionnaires (Bryant, Yarnold, & Michelson, 1999). It is a multivariate statistical procedure for multiple purposes, three of which will be applied in this thesis (B. Williams, Onsmann, & Brown, 2010). Firstly, we will apply a factor analysis to reduce the number of survey questions into smaller sets of variables or factors. This is preferable since each factor with its belonging survey questions are meant to explain the same phenomenon. In that sense, reducing the number of survey questions within each factor in order to make it more consistent will only strengthen the interpretation of each factor, and reduce the errors of explanatory power. Secondly, a factor analysis will establish underlying dimensions between measured variables and examine the structure and relationship between them. Thirdly, it provides evidence of the different self-reporting scales (B. Williams et al., 2010).

5.2.1 Kaiser-Meyer-Olkin (KMO)

Prior to the factor analysis, we ran a few tests to assess the suitability of performing a factor analysis (B. Williams et al., 2010). According to Kaiser (1974), it is of interest to assess how good the solution is, in the sense of how simple and interpretable the final factor pattern matrix is. A Kaiser-Meyer-Olkin value measures the tendency of unifactoriality, both for a given row and for the entire factor pattern matrix (Kaiser, 1974). The Kaiser-Meyer-Olkin value was 0.73 (*see Table 26, Appendix 8.3.1*). The KMO exceeds the recommended value of 0.7 for a factor analysis to be relevant to execute (Kaiser, 1974). In addition, Bartlett's Test of Sphericity should be significant ($p < .05$) for a factor analysis to be suitable (Tabachnick, Fidell, & Ullman, 2007). In our case, we received a significant

Bartlett's Test of Sphericity at $\text{sig} = .00 < .05$. As a result, performing a factor analysis is highly relevant.

5.2.2 Factor analysis execution

Firstly, we executed an initial factor analysis using the method of maximum likelihood and direct oblimin, extracting factors with an eigenvalue exceeding 1. We screened the correlation matrix, to briefly check whether the correlations turned out as we supposed. As the correlations seemed reasonable and as expected, we studied the scree plot to check for the number of factors exceeding an eigenvalue equal to 1 (Field, 2018).

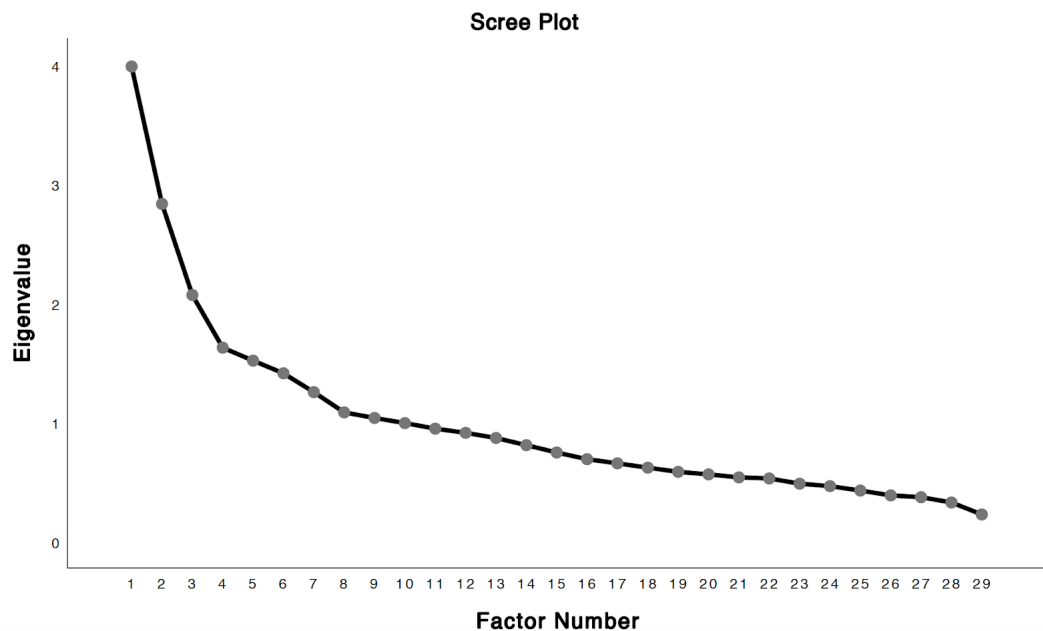


Figure 4: Scree plot including all constructs based on Eigenvalues > 1

We can see from the scree plot that there are at least four factors with high significance (*strongly decreasing curve interval between points*), and a maximum possibility of nine factors with an eigenvalue exceeding 1.

Finally, we analyzed the pattern matrix to look for survey questions that could fit in the same factor (*see Table 27, Appendix 8.3.2*). This initial analysis showcased nine different factors, where we seemingly could exclude three of the factors, as these became collections of survey questions we anticipated as being too vague to

fit in our six expected factors. These six factors were *Innovativeness*, *Environmentalism*, *Attitude*, *Economic flexibility*, *Availability*, and *Product*.

To back up the assertion of six factors being present, we applied the convergent validity method by running six independent factor analyses per factor to see which questions that correlated strong enough to pass as a part of the final factor. Convergent validity measures the sensitivity and correlation between survey questions within the same measurement scale (Bannigan & Watson, 2009; Sørenbø, 2003).

A total of three survey questions were included in the convergent validity test for factors that they initially did not belong to. These three survey questions were Att_5, Innov_6, and Avail_3. This is due to a high observed correlation with other factors than the one they were first assigned to when applying eigenvalues (see Table 27, Appendix 8.3.2). These questions also logically fitted well with the proposed factors. Att_5 correlated with the factor for *Availability*, which made sense as it captures the desire to have high access to cars. Innov_6 correlated with the factor for *Attitude*, which we also found logical, as it both was a self-made question outside the established scale for *Innovativeness* and was related to how early the respondents usually tried new products compared to their acquaintances. Finally, Avail_3 correlated with the factor for *Economic flexibility*, which logically fitted in that group as it was about the flexibility to switch car whenever they wanted, which is closely related to the psychological aspect of not being tied to economic commitments, which is the operationalized definition of economic flexibility (see Chapter 3.1).

We defined correlations above 0.3 as a benchmark to pass as a part of the factor, as it is difficult to argue for passing values below this level (Sørenbø, 2003). There exist examples of stricter benchmarks, for instance at 0.4. However, we did not find that reasonable due to the number of self-made survey questions, differing from established scales. The phenomena tested are quite new to test for, as customer preferences around new mobility services is an upcoming concept. Consequently, we could not find established scales for all the variables we intended to test. As a result, all questions that correlated less than 0.3 with the rest of the questions were rejected. See the execution of the convergent validity test (single factor analysis) to

see which factors that were excluded at this stage in the appendix (see *Table 28-33 Appendix 8.3.2*).

5.2.2.1 Final pattern matrix

After finalizing the convergent validity tests (*single factor analysis*) and excluding all survey questions that did not correlate above the benchmark within its respective factor, we ran a divergent validity test. Conversely to a convergent validity test, a divergent validity test assesses all the measurement scales together in order to confirm that the factors clearly correlate differently from the other factors (Bannigan & Watson, 2009; Sørrebø, 2003). In addition, a divergent validity test allows us to see whether some survey questions correlate with more than one factor, and consequently creates noise in the model.

As a result, we executed a factor analysis with the survey questions passing the benchmark in the convergent validity test. The method of maximum likelihood and direct oblimin were applied, and we extracted a fixed number of factors equal to six.

Factor Analysis - Divergent Validity Test, Pattern Matrix						
	Factor					
	1	2	3	4	5	6
Avail_1	0.95					
Att_5	0.32					
Avail_2	-0.30					0.21
Innov_2		0.93				
Innov_1		0.48				
Innov_3		0.20				
Env_2			0.81			
Env_4			-0.68			
Env_1			0.64			
Env_6			0.58			
Env_5			0.53			
Env_3			0.36			
Qual_1				0.80		
Qual_2				0.71		
Cust_1				0.41		
Att_2					0.72	
Att_1					0.57	
Innov_6					0.42	
Att_3					0.39	
EcFlex_3						0.68
EcFlex_2						0.56
EcFlex_1						0.44
Avail_3						0.35
EcFlex_4						0.27

Extraction Method: Maximum Likelihood.
Rotation Method: Oblimin with Kaiser Normalization

Table 10 - Divergent Validity Test, Pattern Matrix

Firstly, in the factor of *Availability*, we can see that Avail_2 has a cross-loading with factor number 6. Thus, Avail_2 is rejected as the difference between the two correlations, 0.30 and 0.21 does not exceed an absolute value of 0.1. There are no rules in the literature for what is an acceptable cross-loading in a factor analysis. However, we argue that the difference between the absolute values of the two correlations should not be lower than 0.1. This is due to the difficulties with arguing for a cross-loading with an absolute value difference lower than 0.1 to be a stable measure, as it would not be sufficiently loaded in one direction. In conclusion, *Availability* consists of Avail_1 and Att_5 after finalizing the factor analysis.

Further, in the factor of *Innovativeness*, we can see that *Innov_3* (0.20) does not exceed the correlation benchmark of 0.3 and is therefore rejected. In conclusion, *Innovativeness* consists of *Innov_1* and *Innov_2* after finalizing the factor analysis. In factor 3, 4, and 5, we can see that all the survey questions exceed the correlation benchmark of 0.3. Consequently, *Environmentalism*, *Product*, and *Attitude* consist of all survey questions after finalizing the factor analysis. Finally, in the factor of *Economic flexibility*, we can see that *EcFlex_4* does not exceed the correlation benchmark of 0.3 and is therefore rejected. In conclusion, *Economic flexibility* consists of *EcFlex_1*, *EcFlex_2*, *EcFlex_3*, and *Avail_3* after finalizing the factor analysis.

The final pattern matrix with the six factors and its final and respective survey questions are exhibited in *Table 11*.

Factor Analysis - Final Pattern Matrix						
	Factor					
	1	2	3	4	5	6
Innov_2	0.99					
Innov_1	0.44					
Env_2		0.81				
Env_4		-0.68				
Env_1		0.63				
Env_6		0.58				-0.19
Env_5		0.53				
Env_3		0.36				
Qual_1			0.79			
Qual_2			0.72			
Cust_1			0.43			
Att_2				0.69		
Att_1				0.58		
Innov_6				0.45		
Att_3				0.39		
EcFlex_3					0.70	
EcFlex_2					0.52	
EcFlex_1					0.44	
Avail_3					0.36	
Avail_1			0.25			0.64
Att_5						0.46

Extraction Method: Maximum Likelihood.

Rotation Method: Oblimin with Kaiser Normalization

Table 11 - Final Pattern Matrix

5.3 Reliability - Cronbach's Alpha

The reliability of this survey has been assessed by finding to what extent the scales are consistent and thus able to produce the same solution if repeated (Malhotra, 2006). A common measure of internal consistency is to assess the Cronbach's Alpha, determining how much the items of a scale is measuring the same underlying dimension (Bland & Altman, 1997). This research examines six different factors, where two of them are based on well-established scales, anchored in previous research. The two established scales are *Environmentalism* and *Innovativeness*. To be able to determine the reliability of the different factors, we have performed one Cronbach's Alpha test for each factor.

The Cronbach's Alpha defines how much of the variance of the phenomenon the factor is explaining (Field, 2018). If the Cronbach's Alpha test results in a reasonable percentage of variance explained, we will take the average of the respondent values from all survey questions belonging to the same factor and use it for the following analysis in the regression model.

For the interpretation of Cronbach's Alpha values, scholars argue quite differently. Kline (1999) suggest that the general cut-off point for cognitive tests, such as intelligence- and ability tests is 0.7. However, when dealing with psychological constructs, values below 0.7 can realistically be assessed as legitimate due to the diversity of the phenomena being measured. Further, some scholars even suggest that values as low as 0.6 (Hennigs et al., 2012; Malhotra, 2006) and 0.5 (Nunnally, 1967) will suffice and that it is not unusual in psychological constructs. Cortina (1993) and Pedhazur and Schmelkin (2013) argue that the value of alpha depends on the number of items squared. As a result, including more items in the factor will increase the alpha value. Therefore, it is possible to compute large alphas due to many items included in the factor, and not necessarily due to the reliability (Field, 2018). As several of our factors include few items, even as low as two items, we will take this criticism of Cronbach's Alpha into account when interpreting the values.

Reliability Statistics						
	Innovativeness	Environmentalism	Attitude	Economic Flexibility	Availability	Product
Cronbach's Alpha	0.62	0.75	0.60	0.56	0.43	0.66
N of Items	2	6	4	4	2	3

Table 12: Reliability analysis with Cronbach's Alphas on all independent variables

From *Table 12* with reliability statistics for each construct, we can see that the factor of *Innovativeness* explains 62% of the variance of the phenomenon. We interpret this as a quite good inter-item reliability. Further, we can see that the factor of *Environmentalism* explains 75% of the variance in the phenomenon. We interpret this as a very good inter-item reliability. For *Attitude*, we can see that the factor explains 60% of the variance in the phenomenon. We interpret this as quite good inter-item reliability.

Moreover, the factor of *Economic flexibility* explains 56% of the variance in the phenomenon. We interpret this as a middling inter-item reliability. For *Availability*, we can see that the factor explains 43% of the variance in the phenomenon. We interpret this as a mediocre inter-item reliability. As *Availability* only consists of two items, we also believe that it can be a part of the reason why it is not scoring higher. In addition, we believe that the phenomenon of *Availability* is highly important for the subject in the thesis and by explaining 43% of the variance, it will be sufficient to use it in the further analysis. Finally, we can see that the factor of *Product* explains 66% of the variance in the phenomenon. We interpret this as quite good inter-item reliability.

However, *Table 13* showcases that by deleting the survey question *Cust_1*, we could have increased the alpha to explaining 73% of the variance, which we interpret as very good. However, with the critique of the method top of mind, we choose to continue including *Cust_1* in the analysis. A factor explaining 66% of the variance is also quite good, and we want to keep as many aspects of the phenomenon as possible, to be able to explain more of it.

Cronbach's Alpha if Item Deleted

	Cust_1	Qual_1	Qual_2
Cronbach's Alpha	0.73	0.49	0.48

Table 13: Cronbach's Alpha for Product if item deleted

5.4 Multiple Regression

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.437	0.191	0.178	0.910

Predictors: (Constant), Prod, EcFlex, Env, Att, Avail, Innov
 Dependent Variable: WillMob

Table 14 - Model Summary of Multiple Regression

Table 14 shows an R square for the overall model of 0.191 with an adjusted R square of 0.178. This indicates that the independent variables explain 19.1% of the variability in the dependent variable *Willingness*. We expect that a customer’s willingness to adopt a new product or service is a complex variable that cannot be solely explained by the independent variables we have chosen to study. Thus, explaining 19.1% of the variation in the dependent variable is satisfactory.

Anova

	Sum of Squares	df	Mean Square	F	Sig.
Regression	69.768	6	11.628	14.033	.000
Residual	294.982	356	0.829		
Total	364.749	362			

Dependent Variable: WillMob
 Predictors: (Constant), Prod, EcFlex, Env, Att, Avail, Innov

Table 15 - Anova of the Multiple Regression Model

Table 15 shows that the multiple regression model statistically predicted *Willingness*, with a $p < .001$.

Multiple Regression - Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
<i>(Constant)</i>	2.480	0.523		4.738	0.000
Innov	-0.013	0.071	-0.009	-0.182	0.428
Att	0.466***	0.066	0.347	7.014	0.000
Env	0.170**	0.077	0.107	2.197	0.014
EcFlex	0.201***	0.065	0.152	3.093	0.001
Avail	-0.097**	0.059	-0.082	-1.658	0.049
Prod	-0.089	0.056	-0.080	-1.603	0.055

Dependent Variable: WillMob. N = 363

p < 0.05 *p < 0.01

Table 16 - Multiple Regression, Coefficients

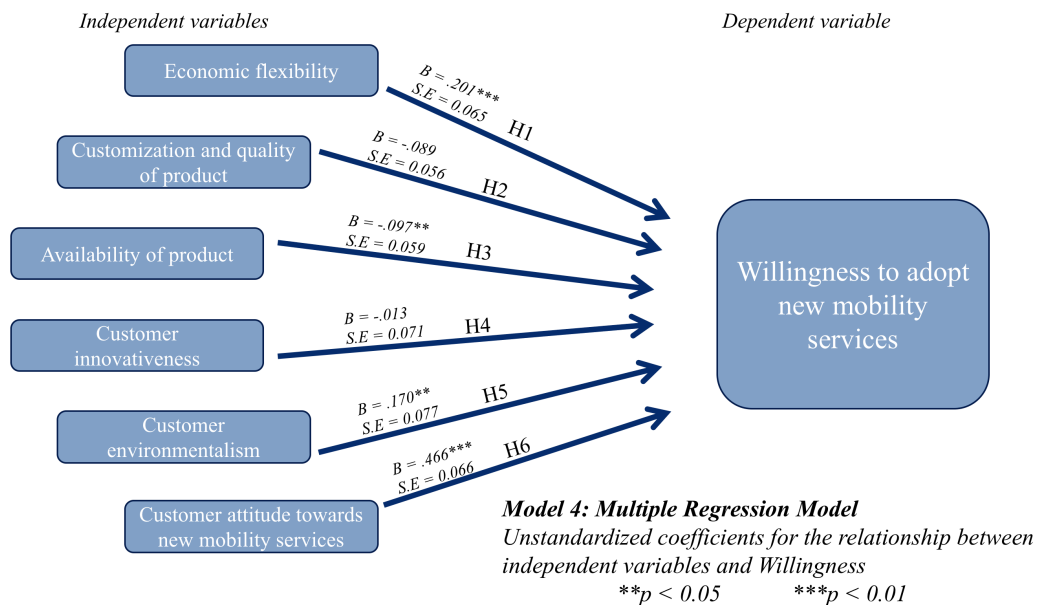
From Table 16, we can see that *Economic flexibility*, *Availability*, *Attitude*, and *Environmentalism* statistically significantly predicted *Willingness* ($p < .05$), while *Product* and *Innovativeness* did not. This results in the following equation.

Regression equation:

$$\text{Willingness} = 2.48 + (0.201 \times \text{Economic Flexibility}) - (0.097 \times \text{Availability}) + (0.466 \times \text{Attitude}) + (0.170 \times \text{Environmentalism})$$

Attitude has the strongest beta amongst the independent variables, with a coefficient of 0.466. Consequently, this is the strongest predictor of *Willingness*. Secondly, *Economic flexibility* is positively correlated with *Willingness*, with a coefficient of 0.201. In other words, this means that the more economic flexibility the consumers prefer, the more willing they are to adopt new mobility services. The same accounts for *Environmentalism*, which is also positively correlated with *Willingness*, with a coefficient at 0.170. Finally, the consumers’ preferences around *Availability* suggests that a higher need for availability negatively correlates with the willingness to adopt new mobility services, with a coefficient of -0.097.

5.5 Hypothesis Testing - Multiple Regression



5.5.1 Hypotheses for customer preferences

(H1): There is a positive relationship between customer preferences related to economic flexibility and the willingness to adopt new mobility services.

For H1, we assessed the relationship between the dependent variable, *Willingness*, and the independent variable *Economic flexibility*. *Economic flexibility* statistically significantly predicts *Willingness* with a $p < .001$ and an unstandardized beta = 0.201. As a result, we can reject the null-hypothesis, and say that there is a positive relationship between *Economic flexibility* and *Willingness*.

(H2): There is a negative relationship between customer preferences related to customization & quality of the product, and the willingness to adopt new mobility services.

For H2, we assessed the relationship between the dependent variable, *Willingness*, and the independent variable *Product*. *Product* does not statistically significantly predict *Willingness* with a $p > .05$. As a result, we cannot reject the null-hypothesis, and we cannot state that there is a negative relationship between *Product* and *Willingness*.

(H3): There is a negative relationship between customer preferences related to the availability of the product, and the willingness to adopt new mobility services.

For H3, we assessed the relationship between the dependent variable, *Willingness*, and the independent variable *Availability*. *Availability* statistically significantly predicts *Willingness* with a $p < .05$ and an unstandardized beta = -0.097. As a result, we can reject the null-hypothesis, and state that, there is a negative relationship between *Availability* and *Willingness*.

5.5.2 Hypotheses for customer characteristics

(H4): There is a positive relationship between the customer characteristic of innovativeness and the willingness to adopt new mobility services.

For H4, we assessed the relationship between the dependent variable, *Willingness*, and the independent variable *Innovativeness*. *Innovativeness* does not statistically significantly predict *Willingness* with a $p > .05$. As a result, we cannot reject the null-hypothesis, and we can therefore not state that there is a positive relationship between *Innovativeness* and *Willingness*.

(H5): There is a positive relationship between the customer characteristic of environmentalism and the willingness to adopt new mobility services.

For H5, we assessed the relationship between the dependent variable, *Willingness*, and the independent variable *Environmentalism*. *Environmentalism* statistically significantly predicts *Willingness* with a $p < .05$ and an unstandardized beta = 0.170. As a result, we can reject the null-hypothesis, and state that, there is a positive relationship between *Environmentalism* and *Willingness*.

(H6): There is a positive relationship between the customer characteristic of attitude and the willingness to adopt new mobility services.

For H6, we assessed the relationship between the dependent variable, *Willingness*, and the independent variable *Attitude*. *Attitude* statistically significantly predicts *Willingness* with a $p < .001$ and an unstandardized beta = 0.466. As a result, we can reject the null-hypothesis, and say that there is a positive relationship between *Attitude* and *Willingness*.

5.6 Summary of Main Findings

Independent variable	Main findings
Economic flexibility	Economic flexibility has a statistically significantly positive effect on Willingness with a B of 0.201, explaining 4.6% of the variance
Product	We can not say that Product has statistically significantly negative effect on Willingness
Availability	Availability has a statistically significantly negative effect on Willingness with a B of -0.097, explaining 1.5% of the variance
Innovativeness	We can not say that Innovativeness has a statistically significantly positive effect on Willingness
Environmentalism	Environmentalism has a statistically significantly positive effect on Willingness with a B of 0.170, explaining 2.4% of the variance
Attitude	Attitude has a statistically significantly positive effect on Willingness with a B of 0.466, explaining 13.6% of the variance

Table 17: Summary of Main Findings

6.0 Discussion

The goal of this study has been to gain an understanding of how three independent variables related to customer preferences and three independent variables related to customer characteristics affect the customer's willingness to adopt new mobility services (*see Model 2*). The importance of using the customer as a co-innovator when developing any new product or service has been stressed throughout the literature review. Therefore, it was valuable for us to capture the customer's preferences and characteristics in order to draw conclusions as to what distributors of new mobility services should focus on when developing these services in the future. In this chapter, we will discuss the theoretical and managerial implications of the results for each significant independent variable, as well as discuss some limitations and suggestions for further research.

6.1 Theoretical Implications

Our findings are in line with the literature in the area of mobility services and servicizing business models. Particularly, our findings indicate that preferences around *Economic flexibility* and *Availability* are significant for predicting how willing the customer is to adopt the mobility service. In addition, the customer characteristics of *Environmentalism* and *Attitude* are found to be significant predictors, with *Attitude* being the strongest predictor (beta = 0.466).

The results revealed that customers that prefer high *Economic flexibility* are more inclined to adopt new mobility services, as it was significantly positively correlated with *Willingness*. Further, the descriptive statistics show that customers want moderately high economic flexibility related to car use (mean = 3.66). This finding is supported by McKinsey, who stated in their report about the automobile industry that customers may demand more flexibility in the future (Gao et al., 2016). Our study demonstrates that this desire is driven by the trends mentioned in our introduction about changing preferences around ownership, technological innovation, environmental policies and regulatory control (Bert et al., 2016; Gao et al., 2016). In our literature review, the aspect of operating costs being built into the service price is one of the greatest differences between how customers pay for a mobility service versus how they would pay for traditional ownership of a car

(Plepys et al., 2015; Toffel, 2008). In a mobility service, the customer no longer bears the cost of repairs, maintenance or replacements, and only pays for the functionality. Thus, it may be viewed as a form of outsourcing where the customer outsources this responsibility to the provider. This aspect is related to how economically flexible the customer ends up being in terms of how the costs related to car use accrues. With a mobility service, the costs are much more predictable since they usually occur when the car is in use. In order to provide a high level of economic flexibility in mobility services, we find support in the literature for a pay-per-use pricing structure (Agrawal & Bellos, 2016; Orsdemir et al., 2015; Plepys et al., 2015). This is unlike the situation of owning a car, where the costs are characterized by a mix of fixed and variable costs that occur at different points in time. The variable costs are usually unpredictable as they are often related to service and maintenance. This situation makes the customer bound to the economic responsibility of owning a car, where costs accrue even though the car is not in use. Our study demonstrates that the significant relationship between *Economic flexibility* and *Willingness* is related to this, as the customer might see a mobility service as a trade-off for ownership. A mobility service may offer the same function and value as owning, but with the opportunity to stop costs from accruing when it is not in use. In other words, the customer might see the costs of owning compared to using a mobility service as similar when both are in use, with the additional advantage of forgoing economic responsibility when the car is not in use with mobility services. In a mobility service, the market value of the cars will depreciate more rapidly compared to cars owned by private people, since the car is shared and utilized more (Fraiberger & Sundararajan, 2015). However, the customer will no longer bear the economic responsibility of the value loss when using a mobility service. In addition, the risk related to lack of knowledge when reselling a car will be mitigated. Lack of knowledge can harm both the seller and the buyer in the selling process, as cars are advanced products where ordinary people might lack the necessary technological expertise. Moreover, frequent technological advancements might make it difficult to sell certain vehicles in secondary markets. Furthermore, we find additional support for these findings in the literature, as Abhishek et al. (2016) state that 43% of consumers feel that owning is a burden. As a result, our findings showing a positive relationship between *Economic flexibility* and *Willingness* is supported by the literature.

The literature review also addressed the aspect of *Availability* of the product in a mobility service, and how this is a challenge for distributors of mobility services (Bellos et al., 2017; Benjaafar et al., 2015; De Lorimier & El-Geneidy, 2013; Toffel, 2008). In general, it is difficult to ensure that the car has the same level of availability as it would have for a customer that owns a car and has it parked outside their residence at all times. Our findings show that customers highly value the aspect of availability when considering car use (mean = 3.80). This finding is supported by Toffel (2008), who stated that transaction costs related to searching and finding need to be mitigated in order to attract customers. The results show a significantly negative relationship between *Availability* and *Willingness*, which further emphasizes the importance of solving the challenges around availability for providers. This finding can be explained by the fact that ownership offers the highest level of availability since the car is always parked outside the owner's door (*or very close*). Thus, the customers might perceive the cars to be less available in a mobility service compared with owning. This is not surprising, as most of the current mobility services require the user to search for a vehicle that is available and travel to where it is parked in order to use it (ex: Hyre, Hertz CarPool, etc.). Furthermore, we can explain the reason why customers highly value the aspect of availability due to some customers' more impulsive and sporadic nature of car use. Customers might feel more flexible to run errands when owning a car and might feel a higher level of independence when having the opportunity to use a car whenever the need arises. The customers might feel anxiety about potentially not finding a vehicle available when needed and the need to budget extra commute time in order to walk to where the car is parked (Bellos et al., 2017). This is different from the nature of ownership where consumers can access it costlessly and instantly over its lifetime (Fraiberger & Sundararajan, 2015). On that note, the literature supports our findings by emphasizing that shortening lead times for distribution of mobility services is an important aspect for providers to improve (Gadde & Hulthén, 2009; Yang et al., 2005).

Our findings also show that the strongest predictor of *Willingness* is *Attitude*, with a significant positive relationship. Logically, a positive attitude toward a new product or service should result in a higher willingness to adopt that product or service. In addition, our findings show that customers have a quite positive attitude toward mobility services (*mean* = 3.56). To some extent, this positive attitude is

likely driven by the heavy media attention around disruptive technologies and the sharing economy, as mentioned by BCG (Bert et al., 2016). This relationship can be explained by a possible perception among car users that mobility services are the future of the automobile industry. Moreover, the customers might be enthusiastic about technological development, which explains the positive attitude. Technological innovations in other industries might affect their attitude, as several other industries have made their product offerings highly available, flexible, and modern through online applications and the internet. Examples of such technological innovations can be found in other successful sharing economy business models, such as Airbnb, Uber, and eBay. Thus, the positive attitude toward new mobility services could stem from its nature of sharing, which matures with their positive experiences from similar industries. As a result of their positive experiences from other industries based on sharing economy principles, customers might be optimistic about the automobile industry becoming a more technologically advanced, accessible, and exciting industry.

In terms of accessibility, Benjaafar et al. (2015) stated that car sharing platforms can provide greater access for customers who previously could not afford to buy a car, which could explain the finding of a positive attitude toward new mobility services. Scholars discuss almost solely around the practical advantages of product offerings making customers more willing to purchase them. Unlike the typical practical advantages discussed by scholars, a part of the positive attitude toward new mobility services could be explained by pure joy, interest, and excitement among customers around modernized product offerings in the automobile industry. The theory around diffusion of innovations by Rogers (2010) shows that, in general, 2.5% of the population tend to be “innovators”, while 13.5% tend to be “early adopters” (*see Figure 2, p. 20*). However, our findings show that 37.5% (*see Table 18, Appendix 8.2.1*) respond that they try new products and services before their acquaintances and that 87.1% (*see Table 20, Appendix 8.2.3*) are generally positive toward new developments in the automobile market. We believe this higher number, compared to the “innovators” and the “early adopters” by Rogers (2010), also stems from the population’s particular interest in automobile solutions.

Moreover, the positive attitude could be linked with the customer characteristics of environmentalism. Our findings show that customers perceive environmental issues

as very important (mean = 4.10). Furthermore, our findings show that the customer's *Environmentalism* has a significant positive effect on *Willingness*. This finding is not surprising, as customers should be more willing to adopt a new service that is perceived as environmentally friendly if they care about environmental issues. Previous research by Roberts and Bacon (1997) supports this finding, stating that there is a positive relationship between environmental attitudes and behavior. On the contrary, other researchers have highlighted that, in practice, there is a gap between environmental attitudes and behavior (often referred to as the the "intention-action gap") because the product or service also needs to be cost effective in order to trigger environmental behavior (Padel & Foster, 2005; Samuelsen & Støyle, 2016). The concept of mobility services has been getting heavy media attention and has been branded as environmentally friendly. This has also been studied in the literature, and several authors support the idea that mobility services, or other servicizing business models, can have a positive effect on the environment (Fischer et al., 2012; Fishbein et al., 2000; Goedkoop et al., 1999; Rothenberg, 2007; U.S. Environmental Protection Agency, 2009; White et al., 1999). Thus, it is reasonable to believe that since the customers perceive environmental issues as very important, then they naturally have a positive attitude toward new mobility services. A wind of environmental consciousness might blow over the population, making them realize the necessity of adopting new ways to meet their transportation needs that are less harmful to the environment.

6.2 Managerial Implications

The sample is supposed to represent the larger population portion of car users in the greater Oslo region. The results indicate that this is a population who are relatively positive to the development of new mobility services. In addition, the dependent variable *Willingness* has a mean value of 3.85, where 75.7% of the respondents were willing to adopt new mobility services to a great- or a very great extent. These results not only further indicate how positive the population is toward the concept, but also that the population is highly willing to adopt new mobility services if it includes the factors they perceive as important. Our findings show that the variables *Economic flexibility*, *Availability*, *Environmentalism*, and *Attitude* were all statistically significant predictors of willingness. Thus, all these factors should be taken into account by any distributor of vehicles that seeks to develop a new mobility service.

Firstly, the more economically flexible the customers have a desire to be, the more willing they are to adopt the mobility service. A managerial implication of this is that the distributor should consider having a pricing scheme that provides the highest level of flexibility for the customer, in terms of when and how costs related to car use accrue. This can be achieved by having some kind of pay-per-use pricing scheme, such that the costs of car use only occur when the customer actually uses the car (Agrawal & Bellos, 2016; Orsdemir et al., 2015; Plepys et al., 2015). In fact, 55.9% (see Table 21, Appendix 8.2.4) of the respondents prefer to pay-per-km, while 63.9% (see Table 21, Appendix 8.2.4) prefer to pay for the time driven. The alternative could be to offer several different mobility packages with different prices such that the customer can choose the mobility package that best fits with their needs as suggested by Kamargianni et al. (2016). Offering different mobility packages is one way to implement service modularization in practice (Böttcher & Klingner, 2011; Brun & Zorzini, 2009; Sundbo, 1994). There could also be an opportunity to switch between these packages whenever the customer's needs change as a way to offer increased flexibility and customer value (Rahikka et al., 2011). The results showcased that 70.6% (see Table 25, Appendix 8.2.8) of the respondents wanted a car scheme on the market that is designed this way.

Secondly, another managerial implication is that the distributor of vehicles will need to ensure a high level of availability for the cars in the mobility service. In practice, this means that the customers cannot be forced to wait a long time before they can use a car if the need for one arises (Gadde & Hulthén, 2009; Yang et al., 2005). As mentioned by Toffel (2008), these transaction costs need to be mitigated in order to attract customers. This was also confirmed by De Lorimier and El-Geneidy (2013), who showed that if consumers have to travel to get a car in a car sharing service, their usage of the service will decline. Offering a mobility service requires providers to create a foundation for high flexibility and responsiveness in their supply chains and distribution networks to cope with the complexity of demand and the demand for short lead-times (Ray & Jewkes, 2004). According to Hagel and Brown (2008), customers will require resources to be made available on their terms, when they want them, rather than when and where it is convenient for the provider to deliver them. The provider should, therefore, adopt more responsive and thereby flexible delivery systems for their customers. More efficient logistics

and technological developments can contribute to providers being able to offer shortened lead-times (Gadde & Hulthén, 2009; Yang et al., 2005). An example of flexible delivery systems and short lead times in practice are the concepts called “Voi” and “Green Mobility by Vy” who provide electric scooters and cars, respectively. These products can be picked up anywhere and abandoned somewhere else. In these business models, the provider has the responsibility of ensuring efficient logistics by collecting them for repair and recovery, and later distribute them strategically around the city.

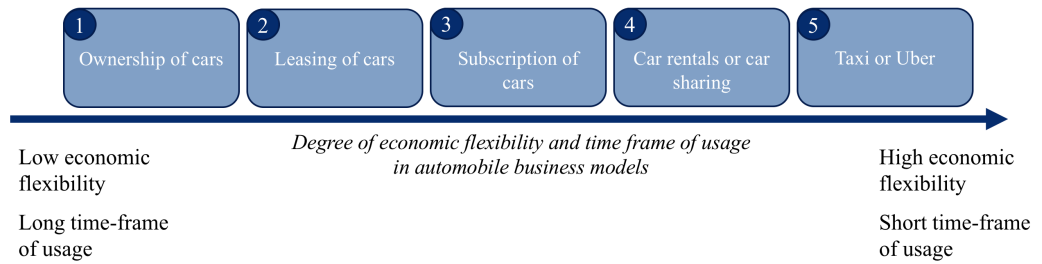
A way for the provider to achieve high flexibility in the supply chain might be to do an analysis of warehouse sizing and location, in order to supply the customer base with short lead times. Croxton and Zinn (2005) argue that a distribution network is focused on the locating of warehouses and determining which customers to be supplied from each warehouse. The information flow required for this flexibility might be resolved by launching online mobile applications, making a seamless communication line between provider and customer. Harland (1996) emphasizes the importance of this interdependence between provider and customer. In addition, determining the size of the carpool will be of high importance to serve the customers with the right car at the right time. When providing a mobility service, Bellos et al. (2017) argue that customers’ mobility needs can be satisfied through a smaller pool of vehicles than the number of customers.

Ensuring high availability is probably the biggest challenge that the distributor faces when providing a mobility service. In addition, it might also be one of the most important challenges for the distributor to solve, as a higher desire for *Availability*, meaning to have the car outside at all times like with ownership, had a significant negative impact on *Willingness*. In fact, 46.3% of the respondents wanted to have a car outside their door at all times (*see Table 23, Appendix 8.2.6*). Consequently, customers who prefer high availability are less willing to adopt new mobility services. Therefore, if the distributor can solve this challenge, by making mobility services more available, they have a chance of targeting a larger part of the population with their offering.

One way to solve this challenge could be to offer what we have called a car subscription. We asked the respondents in our survey to what extent they were

willing to adopt a specific mobility service offering, which we described to them and referred to as a car subscription. The results show that 70.6% of the respondents stated that they would adopt such a mobility service, to a great- or a very great extent. We have developed a model to illustrate five different business models that we have identified in the automobile industry. These are ranged on an axis from low to high economic flexibility and long to short time-frame of usage.

Model 5: Identified business models in the automobile industry



In the middle, we find the business model that describes the subscription of cars. By offering a *car subscription*, the customer can use a car in the same way as if they owned it. This is how we described a car subscription to the respondents of the survey:

“A car subscription is an offering with a fixed monthly cost that covers all expenses throughout the year. It will include different packages with several cars for different purposes, with the opportunity to switch between cars when you want. The car is always outside your door.”

As *Model 5* illustrates, subscription of cars offers a moderate level of economic flexibility for the customer. To back up *car subscription* as a high-potential business model, the descriptive statistics show that customers want moderately high economic flexibility related to car use (*mean* = 3.66). Regarding the challenge of availability – the car can always be outside the customer’s door because the concept of a car subscription is very similar to the concept of leasing. However, all operating costs of the vehicle are built into the monthly price, and the customer is not locked to the same car for 3-5 years as with leasing. Rather than paying for only one car, they can pay for a mobility package that fits with their needs and with the opportunity to switch cars whenever they want, as advocated by Kamargianni et al.

(2016). A similar concept has been discussed in the literature by Böttcher and Klingner (2011) as the concept of service modules. This gives the customer more flexibility, and at the same time, the costs are more predictable since they only pay one fixed fee per month. The *car subscription* business model can be compared to how mobile phone subscriptions have evolved in Norway. Now, customers can pay a fixed monthly fee for a phone with the opportunity to switch after 12 months (Telenor, 2019). For the provider, a car subscription business model would require a carpool size that can offer all customers an available car at all times, as well as a diversified assortment to supply the customers when they want to switch car for a different purpose. The provider's high costs of maintaining a large pool size could be decreased by doing an analysis of the optimal timing for reselling the cars in secondary markets, as well as an optimization analysis of the distribution model to find the minimum inventory level.

Thirdly, the consumers who care more about environmental issues are more likely to adopt new mobility services. This means that the distributor should consider marketing the service as environmentally friendly in order to target these customers. In addition, environmental branding could contribute to changing the perception of the automobile industry from an industry with high emissions and little care for the environment, to a more responsible industry. This could in turn increase revenues.

Fourth, the general attitude is that the population is positive to the development of new mobility services in the market. In fact, 87.1% stated that they were positive to some- or a great degree. This indicates that perhaps such business models are reaching the growth stages of the product life cycle (Anderson & Zeithaml, 1984). Therefore, the distributor should aim to target the customers more precisely in order to gain market shares in the growth stages. There will exist substantial network effects from mobility services as a sharing economy concept in the future. Consequently, there could be great first-mover advantages for the distributors that are entering this market early on. Firstly, there is obviously a barrier for customers to download mobile applications for daily use, and secondly, there will only be significant upsides from the network effects if they can achieve economies of scale from a large customer base. As soon as one distributor is supplying the market with a sustainable service offering, the customers will probably hesitate with trying out new solutions, creating the potential first-mover advantage. We would argue that

providers who are not reshaping their automobile business models and targeting the customers more precisely with new mobility services will be laggards in this industry in the future. As a result, the laggards may become losers in competition, and fail to maintain market shares.

6.3 Limitations

There are some limitations regarding this research that should be taken into account when interpreting the results. These limitations are mainly related to the nature of some of our survey questions, and the necessity of excluding a few of them in the factor analysis.

Firstly, the willingness to adopt new mobility services is a relatively new research area, and we could not find literature that has studied the concept of adoption in the context of mobility services (Barnett et al., 2013). When doing the review of literature, we might have ended up including variables that were not necessarily the most appropriate to assess the phenomenon. Consequently, there might exist variables that were not identified which explain the willingness even more precise. However, we included the aspects that were most frequently discussed in existing literature regarding the topic of mobility services.

Secondly, as the research area is relatively new, we could not find established scales for all the variables we wanted to test for. Consequently, only two independent variables were found to have established scales, namely *Environmentalism*, and *Innovativeness*. As the remaining variables were tested through self-made scales, their explanatory power might have been inadequate. However, we achieved relatively good factor loadings and Cronbach's Alphas on most of the scales, which could argue otherwise. Another related issue is the possibility of our scales being of a formative measurement nature, as these types of questions have been argued to not necessarily perform as a unitary entity (Wilcox, Howell, & Breivik, 2008).

Thirdly, after the factor analysis, the construct of *Availability* ended up having only two survey questions. This might have reduced the explanatory power of the construct, as it had a narrower explanatory field. However, we prioritized to achieve a more narrow and precise measure of the construct, rather than a broader and more imprecise one.

6.4 Further Research

Firstly, a suggestion for further research could be to add other variables to the model that might explain the variations of the phenomenon even more and extend the understanding of willingness to adopt new mobility services. In response to the limitation on the variable *Availability*, a broader and better definition of the construct could be developed to measure its connection to *Willingness* to a greater extent.

Secondly, we chose to study the subject at hand in the context of the Norwegian market. For further research, it could be interesting to see whether the results turn out different when applied in foreign markets. This could be interesting due to political, cultural and international differences.

Thirdly, it could be interesting for further research to do a cluster analysis to discover which segments that prefer the different business models presented in *Model 4*. In this way, providers could target different customer groups more precisely. This would also support existing literature suggesting that future distributors should perform as a dual firm, with multiple product offerings, to target different customer groups (Abhishek et al., 2016).

Fourth, an optimization analysis could be of high interest, focusing on how the distribution network would preferably look like when designing a *car subscription* scheme. Such a study would focus on how to shape and design the specific operations around a *car subscription* business model.

Lastly, there were two independent variables that did not show a significant relationship with the dependent variable of *Willingness*, namely the customer preferences around *Product* and the customer characteristic of *Innovativeness*. For further research, it could be interesting to do a more qualitative study through focus groups on these variables to determine their importance for distributors when shaping a mobility service.

7.0 Conclusion

This research provides an understanding of the changing market trends in the automobile industry, and how these changes will shape future mobility services. These changes will have important implications for automobile distributors in future business development. The results are consistent with indications found in the literature and with four out of the six hypotheses. With regards to the research questions, our findings show the effect of the significant predictors on the willingness to adopt new mobility services. The significant predictors are customer preferences related to price (*Economic flexibility*) and distribution (*Availability*), and the customer characteristics of *Environmentalism* and *Attitude*. Thus, this research has expanded the understanding of the phenomenon of mobility services and what factors affect the customers' decision to adopt such a business model.

Firstly, our findings stress the importance of offering a high degree of economic flexibility when providing new mobility services. This means that the distributor should consider having a pricing scheme that provides the highest level of flexibility for the customer, in terms of when and how costs related to car use accrue. This can be achieved by having some kind of pay-per-use pricing scheme, such that the costs of car use only occur when the customer actually uses the car.

Secondly, the results are consistent with the literature's proposed challenges with availability of the product, which was confirmed as a significant factor. Ensuring high availability is probably the biggest challenge that the distributor faces when providing a mobility service. The results suggest that the customers are less willing to adopt the service when the availability decreases. Thus, it is also one of the most important challenges for the distributor to solve. In order to solve this challenge, we propose that distributors provide a business model defined as a *car subscription*. Here, the customer is offered different mobility packages for different purposes with the opportunity to switch car whenever they want, with predictable costs and the car outside the home at all times.

Thirdly, our findings showcased that customers that are more environmentally conscious are more likely to adopt new mobility services. Thus, the distributor

should brand the service as environmentally friendly in order to target these customers. This could contribute to changing the perception of the automobile industry from an industry with high emissions and little care for the environment, to a more responsible industry.

Lastly, the findings advocate for automobile distributors to target their customers more precisely when tailoring future business models in order to develop and maintain a competitive advantage. To sum up, they should pay attention to brand their offering in a way that seduces the environmentally conscious customer groups and focus on high economic flexibility and availability when tailoring the business model. The findings also stress the importance for providers to reshape their business models and take action now in order to capture economies of scale as a result of first-mover advantages. This is amplified by our findings of a positive attitude toward the industry development and a high willingness to adopt new mobility services. By taking action now, the distributors will take precautions to not lose out in competition and to avoid becoming industry laggards.

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8.0 Appendices

8.1 Appendix 1: Survey Development

Survey – Automobile Industry

Start of Block: Demographics

Information box: This is a survey for our master thesis related to new products and services in the automobile industry. The purpose of this survey is to reveal your current and future needs and preferences around the ownership and the use of a car. This is done with the goal of mapping whether there is a need for today's car distributors to change their offering towards their customers. The survey is completely anonymous and is in accordance with GDPR rules. The data collection has been approved by NSD (Norwegian Centre for Research Data). The data will be used for research purposes only and will be deleted after the analysis.

Q2 Gender

- Male (1)
- Female (2)

Q3 What is your age? Answer in numbers (f.ex: 24)

Q4 What is your yearly income before tax? Answer in numbers, without comma or dot (f.ex: 350000)

Q5 Where in the greater Oslo region do you live?

- Outside the Oslo city border (1)
- Outside Ring 3, but inside the Oslo city border (2)
- Inside Ring 3 (3)
- Inside Ring 2 (4)
- Inside Ring 1 (5)

Q6 If you are working, how far is your workplace from your home? Answer with a number in km (f.ex: 5). If you are not working, answer only with the letter n.

Q7 How many people live in your home, including yourself?

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- Over 7 (8)

Q8 Do you own a car today?

- Yes, I own a car (1)
- No, I lease a car (2)
- No, I neither own or lease a car, but I regularly have access to a car, or will have a need for a car in the future (3)

Q9 To what extent do you agree with the following statements regarding new products and services on the market in general? (In other words, not necessarily related to car use)

	Strongly disagree (1)	Somewhat disagree (2)	Neutral (3)	Somewhat agree (4)	Strongly agree (5)
I usually perceive new products and services on the market as better than the existing offering (Innov_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I usually think that new products and services on the market are in accordance with my values and needs (Innov_2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I rarely perceive new products and services on the market as hard to understand and use (Innov_3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<p>I am more willing to use new products and services if it is possible to test them beforehand (Innov_4)</p>	0	0	0	0	0
<p>I am more willing to use new products and services if I clearly see other's advantages of using them (Innov_5)</p>	0	0	0	0	0
<p>I usually try new products and services early compared to my acquaintances (Innov_6)</p>	0	0	0	0	0

Q10 To what extent do you agree with the following statements regarding the nature and environment?

	Strongly disagree (1)	Somewhat disagree (2)	Neutral (3)	Somewhat agree (4)	Strongly agree (5)
Humans need to live in harmony with nature to survive (Env_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humanity is severely abusing the environment (Env_2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are approaching the limit of people that the planet can withstand (Env_3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Humans do not need to adapt to nature since they can change it to fit with their needs (Env_4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When humans manipulate nature, the consequences can be catastrophic (Env_5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am more willing to use new products and services if I know that they are environmentally friendly (Env_6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Demographics

Start of Block: Future mobility solutions

Information box - Future mobility services: The last few years, several new solutions for access to cars have emerged. Among these are car sharing groups, deployed electric cars that can be used at a price per minute, self-driving means of transport, and Uber for taxi services. The market trends show that additional solutions of transport and mobility will emerge in the future. An important decision for consumers is the choice between owning and only having access to a car. This part of the survey will identify your preferences around such future mobility services.

Q12 To what extent do you agree with the following statements regarding car use and mobility services?

	Strongly agree (1)	Somewhat agree (2)	Neutral (3)	Somewhat agree (4)	Strongly agree (5)
I have knowledge about new mobility services (Att_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I usually try new mobility services that appear on the market (ex. Uber, Voi, Tier, Green Mobility) (Att_2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am generally positive towards the development of new solutions in the automobile industry (Att_3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the actual ownership that I value the most when owning a car (Att_4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the immediate access to a car that I value the most when owning a car (Att_5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Information box: Imagine a situation where you do not own a car, but you have access to a car whenever you need it. Answer the following statements from the perspective of such a situation.

Q14 To what extent do you agree with the following statements regarding the payment for car use?

	Strongly disagree (1)	Somewhat disagree (2)	Neutral (3)	Somewhat agree (4)	Strongly agree (5)
I only want to pay per km that I drive (EcFlex_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I only want to pay for the time period that I use the car (EcFlex_2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to be relieved of the economic responsibility of service and maintenance of the car (EcFlex_3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer flexibility when it comes to due dates and size of costs related to a car (EcFlex_4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15 To what extent to you agree with the following statements regarding the product?

	Strongly disagree (1)	Somewhat disagree (2)	Neutral (3)	Somewhat agree (4)	Strongly agree (5)
It is important that I can choose between a large variety of car brands, car types (SUV, sedan, etc.), and/or specifications (gearbox, seat lining, color, etc.) (Cust_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important that I can choose cars that are environmentally friendly (Cust_2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important that I have access to electric cars (Cust_3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important that I can always use cars that are relatively new (Qual_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

It is important that I can use high-quality cars (Qual_2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Q16 To what extent do you agree with the following statements regarding the availability and time frame of usage related to car use?

	Strongly disagree (1)	Somewhat disagree (2)	Neutral (3)	Somewhat agree (4)	Strongly agree (5)
The car has to be outside my door at all times (Avail_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to travel up to 5 km to pick up the car if I can get a lower price (Avail_2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I need to have the opportunity to switch between different cars for different use whenever I want (Avail_3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish to use the same car for a longer period of time (Time_1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17 To what extent are you willing to adopt new mobility services, given that the factors you consider important are included in the offer?

- To a small extent (1)
- To some extent (3)
- Neutral (4)
- To a great extent (5)
- To a very great extent (6)

Q18 Imagine a car subscription with a fixed monthly cost that covers all expenses throughout the year. It will include different packages with several cars for different purposes, with the opportunity to switch between cars when you want. The car is always outside your door. To what extent is this an offer you wish was available?

- To a small extent (1)
- To some extent (2)
- Neutral (3)
- To a great extent (4)
- To a very great extent (5)

End of Survey

8.2 Appendix 2: Descriptive Statistics of Scale Statements

The first two constructs are based on established scales and meant to capture the innovativeness and environmental consciousness of the sample in general. Not necessarily in the context of mobility services and car use. On the other hand, the scaled statements within the rest of the constructs are based on the specific context of mobility services and car use.

8.2.1 Innovativeness

Examining the frequencies for the construct of innovativeness, one can see that the sample is quite innovative. Their level of innovativeness was measured through 5 established scales suggested by Rogers (2010) that can be used to measure the rate of adoption of an innovation. The scales were used to develop statements related to 1. relative advantage, 2. compatibility, 3. complexity, 4. trialability, and 5. observability of an innovation. We also added a final statement within the construct of innovativeness in order to capture if respondents tend to adopt new products and services before others. This statement is not based on any established scales to measure innovativeness.

Scale Statement Descriptives - Innovativeness							
		Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	Total
Innov_1	Frequency	5	27	96	198	37	363
	Percent	1.4	7.4	26.4	54.5	10.2	100
Innov_2	Frequency	7	29	134	164	29	363
	Percent	1.9	8.0	36.9	45.2	8.0	100
Innov_3	Frequency	5	50	57	146	105	363
	Percent	1.4	13.8	15.7	40.2	28.9	100
Innov_4	Frequency	3	15	51	146	148	363
	Percent	0.8	4.1	14.0	40.2	40.8	100
Innov_5	Frequency	3	16	35	138	171	363
	Percent	0.8	4.4	9.6	38.0	47.1	100
Innov_6	Frequency	32	96	99	103	33	363
	Percent	8.8	26.4	27.3	28.4	9.1	100

Table 18 - Scale Statement Descriptives for Innovativeness

Relative advantage: The sample seems to mostly agree with the statement “I usually perceive new products and services on the market as better than the existing offering” (**Innov_1**). We see that 54.5% stated that they somewhat agree, and 10.2% said that they strongly. Overall, this scale has a mean value of 3.65.

Compatibility: Only 8% of the sample strongly agree with the statement “I usually think that new products and services on the market are in accordance with my values and needs” (**Innov_2**), while 36.9% are neutral and 45.2% somewhat agreed with this statement. Overall, this scale has a mean value of 3.49.

Complexity: Only 30.9 % of the sample strongly disagree, somewhat disagree, or are neutral with the statement “I rarely perceive new products and services on the market as hard to understand and use” (**Innov_3**), while 40.2% somewhat agreed, and 28.9% strongly agreed with this statement. This resulted in a mean value of 3.82 for the scale.

Trialability: 81% of the sample somewhat agree or strongly agree with the statement “I am more willing to use new products and services if I clearly see other’s advantages of using them” (**Innov_4**), which means that only 19% are neutral or disagree. This resulted in a high mean value of 4.16 for the scale.

Observability: Similar to the statement about trialability, 85.1% of the sample somewhat agree or strongly disagree with the statement “I am more willing to use new products and services if I clearly see other’s advantages of using them” (**Innov_5**). This means that only 14.9% are neutral or disagree, giving a high mean value for this scale of 4.26.

The responses within the statement “I usually try new products and services early compared to my acquaintances” (**Innov_6**), are more distributed than the responses for the previous scales in the construct of innovativeness. 26.4%, 27.3%, and 28.4% of the sample somewhat disagree, are neutral, or somewhat agree with this statement respectively. Overall, the mean value is 3.02 for this scale.

To conclude, the sample seems to be quite innovative with relatively high mean values for all scales.

8.2.2 Environmentalism

Examining the construct of environmentalism, one can see that the sample seems fairly conscious about environmental issues in general. Their level of environmentalism was measured through 5 established scales that we have extracted from Roberts’ and Bacon’s (1997) work. We added a sixth statement to this construct to capture if people are more willing to use new products and services if they know that they are more environmentally friendly. This scale is called Env_6. The fourth scale had to be reverse scores (Env_4).

		Scale Statement Descriptives - Environmentalism					
		Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	Total
Env_1	Frequency	6	20	49	145	143	363
	Percent	1.7	5.5	13.5	39.9	39.4	100
Env_2	Frequency	5	24	30	141	163	363
	Percent	1.4	6.6	8.3	38.8	44.9	100
Env_3	Frequency	13	43	102	109	96	363
	Percent	3.6	11.8	28.1	30.0	26.4	100
Env_4	Frequency	1	17	25	108	212	363
	Percent	0.3	4.7	6.9	29.8	58.4	100
Env_5	Frequency	5	22	67	169	100	363
	Percent	1.4	6.1	18.5	46.6	27.5	100
Env_6	Frequency	11	11	35	162	144	363
	Percent	3.0	3.0	9.6	44.6	39.7	100

Table 19 - Scale Statement Descriptives for Environmentalism

As we can see from the table, 39.4% of the sample strongly agree that “humans need to live in harmony with nature to survive” (**Env_1**), while 39,9% somewhat agree with this statement. This scale has a mean of 4.10, indicating a high level of environmentalism. 44,9% strongly agree that “humanity is severely abusing the environment” (**Env_2**), while 38,5% somewhat agree with this statement. This scale has a mean of 4.19, which again indicates a high level of environmental consciousness. The responses for the statement of “we are approaching the limit of people that the planet can withstand” (**Env_3**) is more distributed than the previous statements. 26,4% strongly agree with this statement and 30.0% somewhat agreed,

while 28.1% are neutral. This resulted in a mean of 3.64. 58,4% of the sample strongly disagree that “humans do not need to adapt to nature since they can change it to fit with their needs” (**Env_4**), while 29,8% somewhat disagreed. This also indicates a high level of environmental consciousness since this statement had to be reverse scored, which is represented by a mean value of 1.59. 46,6% of the sample somewhat agree that “when humans manipulate nature, the consequences can be catastrophic” (**Env_5**), while 27,5% strongly agree with this statement and 18.5% are neutral. This scale has a mean value of 3.93. Finally, 44.6% of the sample somewhat agree with the statement that “I am more willing to use new products and services if I know that they are environmentally friendly” (**Env_6**), while 39.7% strongly agree with this statement. This also indicates a high level of environmental consciousness in the sample, and we see this through the mean value of 4.15 for this scale.

To conclude, it seems like the sample has a high level of environmentalism.

8.2.3 Attitude toward new mobility services

The construct of attitude toward new mobility services measures how well the sample knows new mobility services, if they tend to use them, and if they are positive toward them in general. In addition, there are two statements, related to what they value the most by owning a car (ownership or access).

		Scale Statement Descriptives - Attitude					
		Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	Total
Att_1	Frequency	15	35	60	165	88	363
	Percent	4.1	9.6	16.5	45.5	24.2	100
Att_2	Frequency	56	73	49	116	69	363
	Percent	15.4	20.1	13.5	32.0	19.0	100
Att_3	Frequency	5	8	34	156	160	363
	Percent	1.4	2.2	9.4	43.0	44.1	100
Att_4	Frequency	63	95	101	76	28	363
	Percent	17.4	26.2	27.8	20.9	7.7	100
Att_5	Frequency	6	8	26	90	233	363
	Percent	1.7	2.2	7.2	24.8	64.2	100

Table 20 - Scale Statement Descriptives for Attitude

As we can see from the table, 69.7% of the sample agree with the statement “I have knowledge about new mobility services” (**Att_1**), whereas 45.5% somewhat agree. The mean value for this statement is 3.76. The responses to the statement “I usually try new mobility services that appear on the market (ex. Uber, Voi, Tier, Green Mobility)” (**Att_2**) are more distributed compared to the previous statement of whether they have knowledge of them. 35.5% disagree with this statement, while

51% agree. Only 13.5% are neutral. The mean value for this statement is 3.19. Indicating that opinions are split on this matter. Most of the respondents (87.1%) agree with the statement “I am generally positive toward the development of new solutions in the automobile industry” (**Att_3**), and this statement has a mean value of 4.26. The statement “it is the actual ownership that I value the most when owning a car” (**Att_4**) is supposed to measure what we call ownership pride. 43.6% of the respondents disagree with this statement, while 28.6% agree, whereas only 7.7% strongly agree. 27.8 are neutral. This indicates a spread in opinions, where more people disagree than agree. We see this from the mean value of 2.75. The statement “It is the immediate access to a car that I value the most when owning a car” (**Att_5**) is the only statement that did not meet the criteria for normal distribution (*see Chapter 5.1.2*). This is further reflected by the fact that 89% agree with this statement, whereas 64.2% strongly agree. This statement has a mean value of 4.48.

To conclude, it seems like the sample has a fairly positive attitude toward new mobility services. Many have knowledge of them, but fewer usually tend to try them. Further, it is clear that most of the sample value the immediate access more than ownership itself when owning.

8.2.4 Economic flexibility

The construct of economic flexibility provides respondents with statement related to how they would prefer to pay for a mobility service. It also attempts to capture desired level of responsibility and flexibility when it comes to the costs related to car usage, such as operating costs.

Scale Statement Descriptives - Economic Flexibility							
		Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	Total
EcFlex_1	Frequency	22	53	85	126	77	363
	Percent	6.1	14.6	23.4	34.7	21.2	100
EcFlex_2	Frequency	18	54	59	152	80	363
	Percent	5.0	14.9	16.3	41.9	22.0	100
EcFlex_3	Frequency	13	20	35	107	188	363
	Percent	3.6	5.5	9.6	29.5	51.8	100
EcFlex_4	Frequency	6	25	98	124	110	363
	Percent	1.7	6.9	27.0	34.2	30.3	100

Table 21 - Scale Statement Descriptives for Economic Flexibility

As we can see from the table, 55,9% of the sample agree with the statement “I only want to pay per km that I drive” (**EcFlex_1**), whereas 21,2% strongly agreed. However, 44.1% are neutral or disagree with this statement. The mean for this statement is 3.50. 63,9% agree with the statement “I only want to pay for the time

period that I use the car” (**EcFlex_2**), where 22,0% strongly agreed. Which means that 36.1% are neutral or disagree with this statement. This statement has a mean value of 3.61. When asked whether they agree with the statement “I want to be relieved of the economic responsibility of service and maintenance of the car” (**EcFlex_3**), 51,8% of the sample strongly agree and 29,2% somewhat agreed. Indicating that the sample wants economic flexibility, because there will be less unforeseen costs related to maintenance and repair. This statement has a high mean value of 4.20. 64.3% of the sample agrees with the statement “I prefer flexibility when it comes to due dates and size of costs related to a car” (**EcFlex_4**), whereas 30.3% strongly agree. 27.0% are neutral.

To conclude, this indicates that the sample wants a moderately high level of economic flexibility.

8.2.5 Customization and quality of product

The construct of customization and quality of product is designed to capture to what extent the sample values a large variety of choices, new cars, and high-quality cars.

		Scale Statement Descriptives - Product					
		Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	Total
Cust_1	Frequency	35	71	62	123	72	363
	Percent	9.6	19.6	17.1	33.9	19.8	100
Cust_2	Frequency	15	24	50	145	129	363
	Percent	4.1	6.6	13.8	39.9	35.5	100
Cust_3	Frequency	34	43	75	112	99	363
	Percent	9.4	11.8	20.7	30.9	27.3	100
Qual_1	Frequency	26	68	68	126	75	363
	Percent	7.2	18.7	18.7	34.7	20.7	100
Qual_2	Frequency	11	31	58	164	99	363
	Percent	3.0	8.5	16.0	45.2	27.3	100

Table 22 - Scale Statement Descriptives for Product

When asked whether they agree with the statement “It is important that I can choose between a large variety of car brands, car types (SUV, sedan, etc.), and/or specifications (gearbox, seat lining, color, etc.)” (**Cust_1**), 54.7% agree, while 29.2% disagree. 17.1% are neutral. This indicates a somewhat spread of opinions on the matter, and the mean for this statement is 3.35. 75.4% of the sample agree with the statement “It is important that I can choose cars that are environmentally friendly” (**Cust_2**), whereas 35.5% strongly agree. Only 10.7% disagree with this statement, which is not surprising since we saw earlier that the sample is quite environmentally conscious, and we expect this statement to be positively correlated with the construct of environmental consciousness. This statement has a mean value

of 3.96. 58.2% of the sample agree with the statement “It is important that I have access to electric cars” (**Cust_3**), whereas 27.3% strongly agree. On the other hand, 21.2% disagree with this statement. Finally, 20.7% are neutral, indicating a high spread of responses. The mean value for this statement is 3.55. 55.4% agree with the statement “It is important that I can always use cars that are relatively new” (**Qual_1**), while 25.9% disagree. The mean value for this statement is 3.43. 73.5% of the sample agree with the statement “It is important that I can use high-quality cars” (**Qual_2**), while only 11.6% disagree. Indicating that high quality cars is quite important for the sample. The mean value for this statement is 3.85.

8.2.6 Availability of product

The construct of availability of product and time frame of usage is designed to capture to what extent the sample values having a car highly available when the need for one arises and to what extent the sample wants to use the same car over a longer period of time.

Scale Statement Descriptives - Availability							
		Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	Total
Avail_1	Frequency	33	103	59	120	48	363
	Percent	9.1	28.4	16.3	33.1	13.2	100
Avail_2	Frequency	110	104	40	75	34	363
	Percent	30.3	28.7	11.0	20.7	9.4	100
Avail_3	Frequency	44	58	60	140	61	363
	Percent	12.1	16.0	16.5	38.6	16.8	100

Table 23 - Scale Statement Descriptives for Availability

As we can see from the table, 46.3% of the sample agree with the statement “the car has to be outside my door at all times” (**Avail_1**), while 37.5% disagree. 16.3% are neutral. The mean value for this statement is 3.13, indicating that having a car outside your door at any moment is somewhat important but not crucial. The statement “I am willing to travel up to 5 km to pick up the car if I can get a lower price” (**Avail_2**) has many responses spread across the scale. However, 59% of the sample disagree with the statement, while only 30% agree in comparison. 11% are neutral. The mean value of this statement is 2.50. 55.4% agree with the statement “I need to have the opportunity to switch between different cars for different use whenever I want” (**Avail_3**). However, 44.6% are neutral or disagree with the statement, indicating that opinions are somewhat split. This statement has a mean value of 3.32.

8.2.7 Willingness to adopt new mobility services

Scale Statement Descriptives - Willingness to adopt new mobility services

	To a small extent	To some extent	Neutral	To a great extent	To a very great extent	Total
Frequency	8	27	57	189	82	363
Percent	2.2	7.4	15.7	52.1	22.6	100

Table 24 - Scale Statement Descriptives for WillMob

An examination of the factor of willingness to adopt new mobility services exhibited a large degree of respondents on the right-hand side of the scale. This factor was called WillMob in our analysis. This shows that a total of 75.7% of the respondents were willing to adopt new mobility services, which we interpret as relatively high. Among these, 22.6% of the respondents were willing to adopt new mobility services to a very great extent. On the other hand, only 9,6% of the respondents had a negative attitude toward willingness of adopting new mobility services. The rest, namely 15.7% of the respondents were neutral to whether they were willing to adopt new mobility services. We rated the responses on a scale from 1-5, where 1 was “to a small extent”, and 5 was “to a very great extent”. The mean value for the responses was 3.85.

8.2.8 Willingness to adopt car subscription

Scale Statement Descriptives - Willingness to adopt car subscription

	To a small extent	To some extent	Neutral	To a great extent	To a very great extent	Total
Frequency	6	34	67	157	99	363
Percent	1.7	9.4	18.5	43.3	27.3	100

Table 25 - Scale Statement Descriptives for WillSub

In the survey, we also tested the willingness to adopt a specific new mobility service that we called a car subscription. This factor was called WillSub in our analysis, and its specifications in terms of payment, time frame, economic flexibility, product, availability and customization was described briefly to the respondents. 70.6% of the respondents were willing to adopt this specific mobility service. Among these, 27.3% of the respondents were willing to adopt this specific mobility service to a very great extent. On the other hand, 11.1% were not willing to adopt the new mobility service, while 18.5% of the respondents were neutral to the concept. This factor was scaled in the same way as WillMob, from 1-5, and had an average response at 3.86.

8.3. Appendix 3: Factor Analysis

8.3.1 Kaiser-Meyer-Olkin (KMO)

KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.73
Bartlett's Test of Sphericity	
Approx. Chi-Square	2290.92
df	406
Sig.	0.00

Table 26 - KMO and Bartlett's Test of Sphericity

8.3.2 Factor analysis execution

Factor Analysis - Initial Pattern Matrix									
	Factor								
	1	2	3	4	5	6	7	8	9
Avail_1	0.98								
Att_5	0.32								
Avail_2	-0.29						0.20		
Qual_1		0.96							
Qual_2		0.58							
Env_2			0.79						
Env_1			0.59						
Env_4			-0.57						
Env_3			0.47					-0.23	
Env_5			0.46						
Innov_2				0.89					
Innov_1				0.50					
Att_4				0.26					0.20
Innov_3				0.21					
Att_2					0.73			0.25	-0.28
Att_1					0.55				
Innov_6					0.47				
Att_3					0.31			0.21	
Cust_3						-0.84			
Cust_2						-0.80			
Env_6			0.35			-0.43		0.19	
EcFlex_3							0.62		
EcFlex_2							0.51		
EcFlex_1							0.49		0.26
Avail_3							0.34		
Innov_4								0.45	
EcFlex_4								0.37	
Innov_5								0.35	
Cust_1		0.21							0.43

Extraction Method: Maximum Likelihood.

Rotation Method: Oblimin with Kaiser Normalization

Table 27 - Initial Pattern Matrix Based on Eigenvalues > 1

8.3.2.1 Innovativeness

In the single factor analysis for Innovativeness, we can see that only Innov_1, Innov_2, and Innov_3 passed the benchmark of exceeding a correlation of 0.3. As

a result, the survey questions Innov_4, Innov_5, and Innov_6 were rejected and not applied further in the analysis.

**Convergent Validity Test
Factor Matrix - Innovativeness**

	Factor
	1
Innov_2	0.81
Innov_1	-0.66
Innov_3	0.65
Innov_6	0.59
Innov_5	0.53
Innov_4	0.35

Extraction Method: Maximum Likelihood.

Table 28 - Convergent Validity - Factor Matrix, Innovativeness

8.3.2.2 Environmentalism

In the single factor analysis for Environmentalism, we can see that all survey questions passed the benchmark of exceeding a correlation of 0.3. As a result, all the survey questions in the factor of Environmentalism are being applied further in the analysis.

**Convergent Validity Test
Factor Matrix - Environmentalism**

	Factor
	1
Env_2	0.81
Env_4	-0.66
Env_1	0.65
Env_6	0.59
Env_5	0.53
Env_3	0.35

Extraction Method: Maximum Likelihood.

Table 29 - Convergent Validity - Factor Matrix, Environmentalism

8.3.2.3 Attitude

In the single factor analysis for Attitude toward new mobility services, we can see that Att_1, Att_2, Att_3, and Innov_6 passed the benchmark of exceeding a correlation above 0.3. As a result, the survey questions Att_4 and Att_5 were rejected and not applied further in the analysis. These results were also slightly

expected, as Att_4 and Att_5 captures the preferences of valuing high access or the ownership itself the highest.

**Convergent Validity Test
Factor Matrix - Attitude**

	Factor
	1
Att_2	0.68
Att_1	0.61
Innov_6	0.46
Att_3	0.35
Att_4	
Att_5	

Extraction Method: Maximum Likelihood.

Table 30 - Convergent Validity - Factor Matrix, Attitude

8.3.2.4 Economic flexibility

In the single factor analysis for Economic Flexibility, we can see that survey questions passed the benchmark of exceeding a correlation above 0.3. As a result, all the survey questions in the factor of Environmentalism are being applied further in the analysis.

**Convergent Validity Test
Factor Matrix - Economic Flexibility**

	Factor
	1
EcFlex_3	0.69
EcFlex_2	0.52
EcFlex_1	0.44
Avail_3	0.36
EcFlex_4	0.31

Extraction Method: Maximum Likelihood.

Table 31 - Convergent Validity - Factor Matrix, Economic Flexibility

8.3.2.5 Availability

In the single factor analysis for Availability, we can see that Avail_3 clearly does not pass the benchmark of exceeding a correlation of 0.3. Therefore, Avail_3 will be rejected and not applied further. In addition, we can see that Att_5 is in the danger zone of being rejected. However, as it is very close to being equal to 0.3, we choose to apply it further in the analysis.

**Convergent Validity Test
Factor Matrix - Availability**

	Factor
	1
Avail_1	0.99
Avail_2	-0.35
Att_5	0.29
Avail_3	

Extraction Method: Maximum Likelihood.

Table 32 - Convergent Validity - Factor Matrix, Availability

8.3.2.6 Product

In the single factor analysis for Quality and Customization of Product, we can see that all survey questions passed the benchmark of exceeding a correlation of 0.3. Consequently, all the survey questions in the factor of Quality and Customization of Product are being applied further in the analysis.

**Convergent Validity Test
Factor Matrix - Product**

	Factor
	1
Qual_2	0.79
Qual_1	0.74
Cust_1	0.42

Extraction Method: Maximum Likelihood.

Table 33 - Convergent Validity - Factor Matrix, Product

Cust_2 and Cust_3 were excluded from the single factor analysis, as these were discovered to become a collection of survey questions that were anticipated to be too vague to fall under their initially assigned factor. These two questions were making a connection between environmentalism and preferences about product and were as a consequence not specific enough to fall within either of the factors.