Moving on a Whim

Customer Value Creation in MaaS

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Abstract

Mobility as a Service (MaaS) is a concept that brings together public and private transportation operators, creating a seamless service experience on a single platform. The aim of this study is to improve the understanding of customer value in MaaS. This is achieved by studying how customers of a commercial MaaS provider perceive the value in the service. In particular, the study focuses on discovering 1) the main types of customer value and 2) the main sources of customer value in MaaS. Lastly, the study also addresses how MaaS providers can positively exceed the expectations and desires of their customers.

The study consists of literature review on MaaS and customer value creation, and analysis of customer survey results. The quantitative survey answers from 257 respondents are analyzed utilizing methods including Mann-Whitney U and Kruskall-Wallis H tests, and these results are further complemented with findings from open-ended questions.

Based on the literature review and empirical findings, the results of the study, and therefore the key issues to consider in service development in MaaS, are the following:

1) The key aspects of customer value in MaaS relate to functionality, costs, reduced effort and risks in using mobility services
2) MaaS can also create value by allowing customers to express their personal values and personality, and by providing services that are customized to personal preferences and situational factors
3) The key sources of customer value in MaaS are the products, yet the usability and features of the platform itself also contribute to value creation
4) To create value for different customer segments, MaaS should include both pay-as-you-go options and service bundles that combine public and private transportation modes

Keywords MaaS, Mobility as a Service, mobility services, value creation, customer value

![Aalto-yliopisto Kauppakorkeakoulu]

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Tiivistelmä

Mobility as a Service (MaaS) tuo yhteen julkiset ja yksityiset liikkumispalvelujen tuottajat samalle alustalle, jonka kautta asiakkaat saavat saumattomia liikkumisen palveluja. Tämä tutkimus keskittyy erityisesti asiakkaan kokemaan palvelun arvoon. Tutkimus keskittyy kaupallisen MaaS-toimijan asiakkaiden näkemyksiin palvelun arvosta. Erityisesti tavoitteina on selvittää 1) minkä tyyppistä arvoa MaaS tuottaa ja 2) mistä lähteistä arvo syntyy. Lisäksi tavoitteina on tarkentaa, mitä asiakkaat palvelulta odottavat, mitä he toivovat, ja toisaalta miten palveluntuottaja voi ylittää asiakkaan odotukset ja toiveet.

Tutkimus koostuu MaaS:iin ja asiakkaan arvonmuodostukseen keskittyvästä kirjallisuuskatsauksesta sekä asiakaskyselystä saaduista tuloksista. Kvantitatiiviset osat 257 vastausta keränneestä kyselystä on analysoitu hyödyntäen muun muassa Mann-Whitney U ja Kruskall-Wallis H -testejä. Lopullisia tuloksia on täydennetty avointen kysymysten analyysilla.

Kirjallisuuskatsauksen ja empiiristen tulosten pohjalta tehdyt lopulliset tulokset, ja siten keskeiset kysymykset MaaS:in palvelukehityksessä, ovat seuraavat:

1) Keskeisin arvo, jota asiakkaat MaaS:ilta odottavat, liittyy palvelujen toimivuuteen, hintaan sekä koetun vaivan ja riskien vähentämiseen
2) MaaS voi tuottaa asiakkaille arvoa myös mahdollistamalla henkilökohtaisten arvojen ja oman persoonan ilmaisun sekä tarjoamalla räätälöityjä palveluita, jotka huomioivat kuluttajan omat preferenssit sekä tilanteen, jossa palvelua käytetään
3) Tärkein arvon lähde MaaS:issa ovat tuotteet, mutta myös alustan käytettävyys ja ominaisuudet ovat osa arvonluontia.
4) Luodakseen arvoa eri asiakassegmenteille MaaS-valikoiman tulisi sisältää sekä yksittäisiä matkoja että palvelupaketteja, jotka sisältävät useita eri liikkumisvälineitä.

Avainsanat MaaS, asiakkaan kokema arvo, arvonluonti, liikkumisen palvelut

Acknowledgements

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1. Introduction

In the era of digitalization, industries face profound changes in their structure. Within the past fifteen years, we've seen how smartphones have completely changes the way we communicate, while Netflix has introduced us a new way of consuming entertainment services. Similar, profound change is also expected to revolutionize the mobility industry.

From the day one of humankind, there has been a need for moving from one place to another as conveniently as possible. For hundreds of thousands of years, humans lumbered through forests by foot, carrying heavy stowage. Then, the horse carriages were invented to relieve their burden. In the 19th century, the transportation changed drastically and with the invention of trains, trams and steamboats, the public transport as we know it today was born.

Yet, these modes of transport may have provided an efficient and fast way to move the growing population from point A to point B but there was one thing they were not able to provide: flexibility for the individuals. In 1886, the first patent for a modern car was filed. Soon after, in the beginning of the 20th century when Henri Ford's first Model T left the factory, it seemed that with the mass production of cars, the humankind had finally mastered flexible mobility with reasonable costs.

In 2020, the mobility industry is again on the verge of change. With global warming and growing urban population, the private car is no longer meeting the needs of the society. Even though the car manufacturers are pushing environmentally friendlier cars to the markets, the share of cars utilizing alternative fuels is still rather small, and therefore the environmental impact is delayed. At the same time, cities are struggling to accommodate to the needs of private cars. In the city centers, parking spaces are taking up more and more of the street. This, combined with traffic congestion, make the urban environment less attractive. With successful city planning, cities can solve these issues to some extent, but if the growing urban population continues to desire the individual freedom provided

by cars, they may be on a hiding to nothing. In addition to these challenges, there is also increased need for mobility as differences between living costs and salaries are increasing in many areas (Giesecke et al., 2016).

One can also question, whether private cars actually offer the desired freedom and flexibility to their owners. Does one really feel themselves free when spending valuable time looking for that one available parking spot? Or when stuck in a traffic jam after a long day of work? Yet, any other mode of transport alone hardly accommodates the need of flexibility better than a car. With public transportation, there is almost always the "last mile issue", as customers rarely arrive right to the doorstep of their destination. On the other hand, using more flexible options such as taxis or shared cars can be expensive if they alone are used to meet the daily mobility needs.

But what about a combination of all these? This is where MaaS (Mobility-as-a-Service) steps in. MaaS is defined as "a user-centric, intelligent mobility distribution model in which all mobility service providers' offerings are aggregated by a sole mobility provider, the MaaS provider, and supplied to users through a single digital platform" (Kamargianni & Matyas, 2017). In other words, through MaaS platform, consumer can plan and pay trips for a variety of public and private transportation modes.

A combination of all possible modes of transport would solve the issues presented above. But why would the customer choose a MaaS provider instead of purchasing each trip individually? The research on MaaS has so far not been able to give a comprehensive answer to this question. The aim of this thesis is therefore to shed light to consumer perspective on MaaS. This is accomplished by studying how Finland-based MaaS operator MaaS Global's customers perceive the value created by their mobile application Whim.

The study focuses on value types and sources as well as specific service attributes contributing to customer value in MaaS. The understanding of this value creation process is gained through analysis of survey responses from Whim users. The framework used for analyzing customer value is based on Smith & Colgate's (2007) model, which helps companies and researchers identify five potential sources of value and four main types of

value customers perceive in services and products. The final framework also includes the three levels of value presented by Butz & Goodstein (1996), as they also contribute to the construct of customer value by separating customer's expected, desired and unanticipated value.

1.1.   Introduction to Mobility as a Service (MaaS)

There are many possibilities to reduce private car usage. According to Karlsson et al. (2016), possible solutions include economic disincentives such as increasing car-related taxes and introducing congestion charges, economic incentives to use public transport as well as campaigns to increase awareness of the negative effects of private cars, to name a few. In addition, transportation innovations such as car sharing can potentially reduce the need for private cars. (Karlsson et al., 2016) In 2014, another alternative solution, Mobility as a Service (MaaS) started to gain footing in the academic world. Before getting into more detail about the concept, a brief history of the concept is needed.

The conceptualization of MaaS happened over time. The first vision of a common platform for transportation providers and customers was presented at the ENTER conference in Insbruck already in 1996 by Nico Tschanz and Hans-Dieter Zimmermann (MaaS Global, 2019a). Another "unripe" version of the concept was presented by Meurer in 2001 (Caiati et al., 2020). The paper mentions the term "Mobility as a Service" but does not go into much detail on the matter. However, the modern version of MaaS had its early development taking place in Finland. The current MaaS Global CEO Sampo Hietanen, then CEO of ITS Finland, a network for public and private collaboration in intelligent transport systems and services, introduced his idea of mobility service packages in a conference in 2006. A few of years later, the term "Mobility as a Service" was first used in Finland by The Club for New Transport Policy based on the suggestion from Director General of the Ministry of Transport and Communications, Minna Kivimäki (MaaS Global, 2019a). Finally, the concept of MaaS as we know it today was thoroughly defined in the academic context by Heikkilä (2014) in her Master's thesis, which Hietanen instructed alongside with Director of Helsinki City Traffic Planning, Ville Lehmuskoski. Soon after, the first MaaS business plan

was created. Based on that business plan, the case company of this thesis, MaaS Global, was founded (MaaS Global., 2019a).

The now-settled version of MaaS is a concept that brings together different modes of transport to a "seamless" service experience (Heikkilä, 2014). Like a transport broker, MaaS operator combines trips from both public and private transport service providers and packages them for the end customers (Karlsson et al., 2016) and functions as "a digital platform that creates and manages trips which users can pay for via a single account." (Matyas & Kamargianni, 2018). Another key proposition of MaaS is that, with the right combination of public transportation and private options such as taxis, rental cars and car sharing, it aims to provide the freedom of a private car without the responsibilities and risks of owning one (e.g. Utriainen & Pöllänen, 2018). This sets it apart from the previously presented approaches to reduce private car usage: it does not aim to motivate people to just drive less. Instead, an ideal MaaS would serve customer's travel needs perfectly, making private cars redundant.

The components of MaaS are not entirely new. There exists already many route planning apps such as Google Maps and Moovit that integrate different modes of transport into one journey. Cities like Helsinki, London and Tokyo have for years provided rechargeable public travel cards and mobile ticket options that cover all or most of the public transportation systems, meanwhile Uber and car sharing have made sharing economy a constituent part of mobility industry. However, until MaaS emerged in 2014, there had not been attempts to combine all of these: to bridge the gap between private and public mobility services, to bring together both traditional and innovative mobility services and to allow route planning, payment and access all in one platform.

Although the roots of modern MaaS are in Finland and in the Finnish transport policy, which seeked new possibilities to respond to the transportation challenges presented by climate change and urbanization (Heikkilä, 2016), the need for new transportation solutions was global. Cities around the world were facing similar issues as Helsinki – and many in a much larger scale –, which lead to MaaS soon having sparked global interest. Heikkilä's (2014) work was featured in publications around the world, including Boomberg and Guardian

(MaaS Global, 2019a). Although not always under the name "MaaS", during the past few years, cities of Paris, Hanover, Las Vegas and Singapore have piloted flexible transportation schemes that combine public and private mobility services (Goodall et al., 2017). There is also fast-growing interest in MaaS in the academia, particularly in Europe (Utriainen & Pöllänen, 2018).

In the Spring of 2020, at the time of writing this thesis, companies like Ubigo in Sweden and the case company of this thesis, MaaS Global, are providing MaaS that fits the description presented earlier: they provide a possibility to plan trips, pay and access public transport, taxis, city bikes and cars on a single digital platform, with a possibility for monthly subscription, i.e. "mobility bundles". In addition to private MaaS companies, public entities and international corporations in the field of technology and manufacturing share a common interest in MaaS. Members of the MaaS Alliance, a "public-private partnership creating foundations for a common approach to MaaS" include public entities such as Ministry of Transportation and Communications in Finland and Capital Region of Denmark, transportation operators like East Japan Railway Company and Emirates Transport, technology companies like Siemens and ride sharing companies like Moia, newest addition to Volkswagen Group, and ViaVan, who are aiming to solve the last-mile issue (Maas-alliance.eu, 2020). According to Zuzana Púčiková, Head of EU Public Policy at Uber, the well-known ride sharing company and mobility industry pioneer has also developed its MaaS capabilities by offering electric bikes and public transportation tickets to its users and is also looking for new MaaS partnerships (Witzel, 2020).

1.2. Case company: MaaS Global

Founded in 2015, Helsinki-based MaaS Global is among the first commercial MaaS operators and its mobile application Whim has established a firm ground in its home city of Helsinki and is also operating in other European cities. Via Whim, users get access to variety of transportation modes and they can plan, pay and access all of their regional trips using the app. According to CEO Sampo Hietanen, the company has a clear target: "We want to prove that we can beat the service level of a car. Or at least be comparable to it. We want to show that people want it, not just that we can do it." (Goodall et al., 2017).

In December 2014, Sampo Hietanen, the then CEO of ITS Finland, a network for public and private collaboration in intelligent transport systems and services, held a presentation with a title "A Starting Event for the World's First Mobility as a Service Operator" in a podium at the Finnish Science Center Heureka. In the presentation Hietanen had prepared with his colleague Jonna Pöllänen, Hietanen also presented a project for creating a first MaaS business plan, which eventually convinced 24 organization representatives present to took up on the idea and join the project funding. In collaboration with a consulting company, a business plan for MaaS was created in the spring of 2015. (MaaS Global, 2019a) With an idea of "the Spotify of transportation" in mind (Rauma, 2016), the business plan was completed and based on that plan, MaaS Finland Oy was founded (MaaS Global, 2019a). The name MaaS Global was then adopted in the summer of 2016, followed by the public introduction of the Whim application, which was fully launched later in 2016.

MaaS Global has reached for global markets from the very beginning: the initial funding came from companies like French traffic operator Transdev and Turkish vehicle company Karsan, and in less than a year after the Helsinki launch Whim was operating in the city of Antwerp in Belgium (MaaS Global, 2019a). In the Spring of 2020, at the time of writing this thesis, Whim has extended its reach to Birmingham and Vienna and Asian metropolises like Singapore and Tokyo are also on its radar (MaaS Global, 2020a). The ultimate goal of the company is still far beyond their current scope. According to Sampo Hietanen (2018), the aim would be that Whim would work like mobile connectivity; once you have the app on your phone, it would meet all of your transportation needs wherever you are. In addition to cars, bikes and public transport, the selection of transportation modes would be expanded to include long-distance trains, ships and airplanes.

1.2.1   Whim

A typical MaaS offering consists of two alternative payment options: a monthly subscription and pay-as-you-go option (Goodall et al., 2017). This structure is also applied in MaaS Global's mobile application Whim. Whim is currently, in the spring of 2020,

available in Helsinki, Vienna, Antwerp and Birmingham and the selection of plans and transportation modes available vary depending on the city.

This thesis focuses on Whim's users in Helsinki region. Currently, they can choose from 4 alternative Whim plans. The selection of possible transportation modes includes Helsinki region's public transport (HSL) tickets, taxi rides, car rental, e-scooters and public city bikes (MaaS Global, 2020b).

Whim to Go is the pay as you go option, which requires no pre-payment: users can choose their mode of transport and pay individually for each trip. Whim to Go can also be combined with a Helsinki region's city bike season subscription, which covers all city bike trips less than 30-minutes long.

Whim Urban 30 includes a 30-day HSL ticket, unlimited number of city bike trips under 30-minutes, 4 short taxi trips for 10 € and the possibility to rent a car for a discounted price.

Whim Weekend also includes a 30-day HSL ticket and unlimited number of city bike trips but in addition, the customer is entitled to a rental car for the weekends and unlimited number of taxi rides with 15% discount per ride.

Whim Unlimited offers unlimited number of public transport tickets, car rentals and city bike trips. Whim Unlimited customers also get 80 free taxi rides per month, provided that they are less than 5 km long.

1.3. Introduction to objectives and methodology

MaaS is described to "move us toward a more user-centered mobility paradigm" (Goodall et al., 2017), yet the research approach taken on the topic has so far not put the user in the center. This research provides an excellent opportunity to bring customer perspective to MaaS research. As the research is made in collaboration with a commercial MaaS provider, MaaS Global, it opens a possibility to study the behavior of existing MaaS customers.

Previous studies on MaaS with the focus in consumer perspective (e.g. Caiati et al., 2020; Matyas & Kamargianni, 2018) have conducted research on potential MaaS customers, rather than current ones. In addition, the focus of these has mainly been on the ideal combination of transportation modes in the subscription packages, in other words, in the so called "mobility bundles". Understanding the construct of ideal bundles is a necessary topic as bundles are identified to have an important role in MaaS in a similar way as they have in e.g. telecommunications (Caiati et al., 2020) yet, the earlier research does not shed light to value creating factors that go beyond the modes of transport. So far, only the studies based on the Ubigo trial in Sweden by Sochor et al. (2016) and Karlsson et al. (2016) have contributed to the understanding of the behavior of MaaS users that goes beyond their preferred choice of transportation mode. Yet, the temporal nature of the trial created limitations to applying the findings in other MaaS schemes.

Based on Rogers (1962), Caiati et al. (2020) state that "— history demonstrates that many innovations fail to achieve a widespread diffusion due to their inadequacy to address real user needs and preferences or because of their incompatibility with user values and past experience". Only by understanding customer needs, as well as the way in which personal factors and context impacts them, in other words, by understanding *customer value creation*, innovations as well as individual companies succeed (Butz & Goodstein, 1996). Due to its comprehensive nature, customer value was therefore chosen as the theoretical starting point for understanding the customer perspective in MaaS, and the following research questions were formatted:

Research question: How can MaaS create customer value?
1. Supporting question: What types of customer value can MaaS create?
2. Supporting question: What are the main sources of customer value in MaaS?

To answer these questions, firstly, a thorough literature review on existing research on MaaS and customer value was conducted. In Chapter 2, the findings from literature review are presented and based on the findings from literature review, the framework and hypothesis for empirical research are built. In the second part of the study, value creation in the context of MaaS is analyzed through survey responses from Whim's

current customers, making the focus of the study quantitative. The content of the survey, which was sent to two main user groups of Whim in Helsinki in the beginning of May 2020, is based on value creation framework by Smith & Colgate (2016), which was complemented by the three levels of value presented by Butz & Goodstein (1996). The individual questions and statements were further modified to fit Whim's service selection and the key characteristics of mobility services (e.g. Koppelman & Pas, 1980) and mobile apps (e.g. Mallat et al., 2008, Kleijnen et al., 2007) and MaaS (e.g. Sochor et al., 2016; Matyas & Kamargianni, 2018; Caiati et al., 2020). This process is presented in Chapter 3. Based on the analysis of survey data (Chapter 4) as well as literature review, a depiction of customer value creation process in MaaS is presented in Chapter 5. The conclusion of findings, practical implications as well as limitations and suggestions for further research are provided in Chapter 6.

2. Literature review

This chapter provides a holistic overview of the literature on two of the main aspects of this study. Although Chapter 1 already provided a short introduction to the history of MaaS, in the first part of this chapter, the concept and its academic development are further discussed. The second part of the literature review focuses on customer value creation, presenting its development in the literature and building to the framework used in the study. Lastly, the two aspects are combined and the customer value creation in traditional mobility services and in MaaS are discussed.

2.1. MaaS

According to Kamargianni & Matyas (2017) concepts such as "integration, interconnectivity and optimization of the transport services, smart and seamless mobility, and sustainability" have been hot topics in transportation research over the last few decades. In 2014, MaaS brought all these topics together into one concept, with additional characteristics also from two current topics in other industries, IoT and sharing economy. This section first discusses the development of MaaS since Heikkilä's (2014) thesis work, which was the first academic contribution to the topic. After providing an overview of the literature, the focus is on shedding light to current understanding of MaaS and its ecosystem as well as researchers' view on how MaaS will impact mobility services and the society in the future.

2.1.1. Development of MaaS in the literature

Before the term "MaaS" was officially introduced to the public in 2014, there had already been some trials that could be described as MaaS. In the end of November 2013, a 6-month travel broker service trial under the name "Ubigo" started in Gothenburg, Sweden. The idea was to bring together private and public transport; participating households were asked to customize a monthly subscription for themselves, which included public transport, taxis and even car and bike sharing (Karlsson et al., 2016). The price of the final packages was based on the chosen combination of the transport options (Karlsson et al., 2016).

The results of Ubigo trial were analyzed and discussed in the context of MaaS by Sochor et al. (2016) as well as Karlsson et al. (2016) and were among the first contributions to the field after Heikkilä's (2014) thesis. The two studies provided insights on critical service attributes that could impact customer adoption of MaaS and also confirmed that the trial was successful: 97% of the participants would have liked to continue using the service (Karlsson et al., 2016). It still took 5 years before the commercial launch of the Ubigo took place in Stockholm in April 2019 (Ubigo.me, 2019), yet the trial signaled already in 2014 that there exists demand for MaaS.

After 2016, the number of scientific publications with a focus on MaaS started to increase (Utriainen & Pöllänen, 2018; Caiati et al. 2020). Utriainen & Pöllänen (2018) have summarized that the main topics in MaaS research include the roles of different transport modes and services in MaaS, the findings of MaaS pilots and trials, and the expected societal effects of Maas. After Utriainen & Pöllänen (2018) conducted their research, studies with more practical approach to establishing a successful MaaS have emerged. Already in 2016, Giesecke et al. presented a four-step model for MaaS, which aims to help MaaS operators to develop their services in a sustainable manner while meeting the needs of customers. This was followed by Jittapirom et al. (2017), who identified key characteristics in MaaS schemes. Later, for example Kamargianni & Matyas (2017) and Lyons et al. (2019) have both describe the ecosystem in which MaaS providers operate and Sarasini et al. (2017) have developed a model that supports the creation of a sustainable MaaS model that provides value to customers but also to the society as a whole. Their findings are discussed in more detail in section 2.4.

However, one area is clearly lacking in the research: customer needs and requirements relating to MaaS. Although there exists studies on MaaS that have attempted to create better understanding of what MaaS has to offer for customers, according to Kamargianni & Matyas (2017), more research would be needed particularly on demand for MaaS, the service design, willingness to pay and the impact of MaaS on individual mobility behavior. Caiati et al. (2020) state that in particular, there is a need for quantitative studies aiming to forecast the demand for MaaS. They themselves attempt to fill this gap by studying

potential MaaS adoption, yet the preferences of existing customers have remained unstudied to this day.

The lack of customer perspective in MaaS may be due to the limited number of MaaS operators that provide both public and private options on a single platform. As Utriainen & Pöllänen (2018) have stated, knowhow of large scale MaaS schemes is missing from the research. The topic of the thesis answers therefore to the needs rising not only from MaaS Global as a company, but from the academic research in the field of MaaS.

To conclude, Table 1 presents the most relevant studies in the field of MaaS regarding this thesis work. It's not an all-encompassing view yet depicts the key developments of MaaS in academia. In addition to findings from field studies (Sochor et al., 2016; Kalrsson et al., 2016) and survey-based studies on potential adoption of MaaS (Matyas & Kamargianni, 2018; Caiati et al., 2020), studies that describe the environment in which MaaS providers operate and studies that contribute to the conceptualization of MaaS also provide insights that help in understanding the customer perspective and customer value in MaaS. These findings are further discussed in section 2.4. Next, we'll go further into the current state of MaaS.

Table 1: Selected literature on MaaS

Authors	Year	Title	Topic
Lyons et al.	2019	The importance of user perspective in the evolution of MaaS	Development of the concept
Caiati et al.	2020	Bundling, pricing schemes and extra features preferences for mobility as a service: Sequential portfolio choice experiment	The roles of different transport modes and services in MaaS
Smith et al.	2018	Mobility as a Service- Development scenarios and implications for public transport	Ecosystem of MaaS
Matyas & Kamargianni	2018	The potential of mobility as a service bundles as a mobility management tool	The roles of different transport modes and services in MaaS
Utriainen & Pöllänen	2018	Review on mobility as a service in scientific publications	MaaS in scientific publications
Kamargianni & Matyas	2017	The Business Ecosystem of Mobility as a Service	Ecosystem of MaaS
Sarasini et al.	2017	What characterises a sustainable MaaS business model?	Development of the concept
Jittrapirom et al.	2017	Mobility as a Service- A Critical Review of Definitions, Assessments of Schemes, and Key Challenges	Development of the concept
Sochor et al.	2016	Trying Out Mobility as a Service- Experiences from a Field Trial and Implications for Understanding Demand	Findings of a MaaS trial
Karlsson et al.	2016	Developing the 'Service' in Mobility as a Service- experiences from a field trial of an innovative travel brokerage	Findings of a MaaS trial
Giesecke et al.	2016	Conceptualizing Mobility as a Service	Development of the concept
Heikkilä	2014	Mobility as a Service – A Proposal for Action for the Public Administration	Development of the concept

2.1.2. MaaS ecosystem

A well-functioning MaaS requires an ecosystem of private and public operators. The following section depicts the construct of this ecosystem, which is also important from the value creation perspective: the network of firms, public entities and consumers influence how MaaS providers can create and capture value (Kamargianni & Matyas, 2017).

According to Kamargianni & Matyas (2017), MaaS ecosystem surrounding the MaaS provider has three layers: core business, extended enterprise and business ecosystem (Figure 1). Data providers, transport operators and customers are in the core business layer. Extended enterprise layer includes technical solution providers who handle payments, ticketing and overall ICT infrastructure. Insurance companies are also included in this layer. Lastly, business ecosystem layer includes the remaining stakeholders: investors, policy makers, media and other societal operators such as universities and unions.
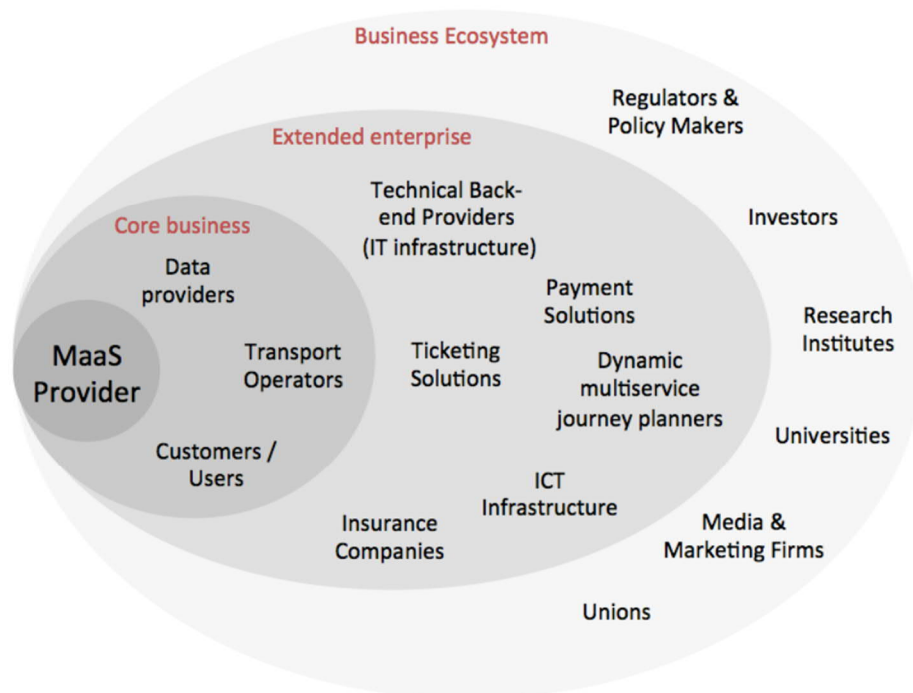

Figure 1: The Mobility-as-a-Service Ecosystem by Kamargianni & Matyas (2017)

Lyons et al. (2019) offer an alternative, pyramid-shaped depiction for MaaS system. Their approach is more focused in the user as the order of the layers from the bottom-up is the following: infrastructure and vehicles, mobility services, information services, transaction, mobility intermediary (in other words, MaaS provider) and users. However, unlike Kamargianni & Matyas (2017) depiction of the ecosystem, the user-oriented pyramid approach does not include external operators such as public authorities, which are often considered to have a key role in MaaS (Goodall et al.,2017; Caiati et al., 2020). Hence, MaaS ecosystem depiction by Kamargianni & Matyas (2017) provides more comprehensive view of the entire ecosystem. This section now proceeds to demonstrating the operators in the ecosystem presented by Kamargianni & Matyas (2017), as well as their needs and role in the development of MaaS.

MaaS provider

In the very core of MaaS is the MaaS provider, which Lyons et al. (2019) also refer to as "mobility intermediary". MaaS provider such as Whim operate the platform by gathering data from transport operators and aggregates the data to find best travel options for the user. What sets MaaS provider apart from route planning systems such as Google Maps is that it also handles the payment and ticket for the user, either by allowing the user to purchase each trip individual (pay-as-you-go) or by providing weekly or monthly subscriptions that include a combination of different transportation modes, i.e. "mobility bundles" (Kamargianni & Matyas, 2017; Lyons et al., 2019). In the future, MaaS has the potential to customize the mobility experience for each user based on e.g. weather and availability of transportation modes, but also their individual transportation mode preferences, past travel behavior and personality (Transport Systems Catapult, 2016). According to Kamargianni & Matyas (2017), MaaS provider can be either public transport authority or a private company.

Core business layer: Customers

In the core business layer of MaaS ecosystem are its customers/users. MaaS is often described as a user-centric model (e.g. Kamargianni & Matyas, 2017; Goodall et al., 2017; Giesecke et al., 2016), but who, in fact, is a MaaS customer? Customer value research

provides a variety of answers to the question. The most common one is presented, among others, by Priem (2007): customers are consumers or companies who purchase the service. However, a broader definition of a customer also exists. Butz & Goodstein (1996), for example, have suggested that anyone having some influence on the purchasing decision can be seen as a customer.

MaaS literature has focused on consumer markets. Due to this, customers are defined as passengers who use the service directly (Kamargianni & Matyas, 2017). Yet, in addition to consumers, MaaS literature also acknowledges that the model can serve Business-to-business (B2B) customers (Kamargianni & Matyas, 2017). For example, Finnish MaaS operator Kyyti has specialized in B2B customers; in addition to supporting municipalities and public entities in implementing MaaS-driven solutions, Kyyti has created commuting shuttle for Finnish car manufacturer Valmet Automotive's employees who commute from their homes in Turku to Valmet's factory in Uusikaupunki (Kyyti Group, 2020). Kamargianni & Matyas (2017) also see that in the future, MaaS could be extended to include freight services.

The focus of this thesis is in customer value. From the customer value creation perspective, which is discusse in more detail in section 2.1., even though the B2B-customers before the end users can contribute to the final value experience by the consumer, the value of the service can only be perceived by the end user (Priem, 2007). Hence, for the sake of clarity, in this thesis, the word "customer" is used for the consumers who use MaaS. As MaaS Global's mobile application Whim mainly serves consumers and as the empirical research of this study is solely focusing on B2C-customers, this approach is more appropriate than including the B2B-customers to the definition.

Core business layer: Transportation & Data providers

In the model of Kamargianni & Matyas (2017), in addition to customers, the core business layer of MaaS ecosystem includes transportation providers and data providers. One could say that transportation providers are the gatekeepers to MaaS, as the core idea of MaaS is

based on multi-modality. Therefore, finding partners from both public and private mobility providers is essential.

In particular, motivating the public transportation authorities to collaborate can be crucial. Findings from both Matyas & Kamargianni's (2018) in London and Caiati et al.'s (2020) study in the Netherlands on potential MaaS usage show that alongside with private transportation options, MaaS plans should include a selection of public transportation options that create the "backbone" of the services. The user study of Whim (Ramboll, 2019) displayed similar results. Although Whim users were three times likely to use taxis compared to average citizen of Helsinki, they were also more likely to use public transport. In fact, 95 per cent of the Whim-trips were still made using public transport. (Ramboll, 2019) Particularly public transportation authority's lack of willingness to co-operate with the MaaS platform can be an obstacle in the development of MaaS. In the case of Ubigo in Sweden, attempts were made to commercialize the service after the trial, but allegedly the resistance from the public transportation authority lead to postponing the project (Smith et al., 2018).

In addition to public transportation and traditional private sector operators such as taxis, innovative and demand-responsive solutions that aim to solve the last-mile issue are needed. These demand-responsive innovations could be shared cars or bikes, or even vans or minibuses that operate on flexible schedule and routes. In any case, solving the last mile issue is critical for MaaS. Caiati et al. (2020) even suggest that without this aspect, what is left of MaaS is nothing but a single platform for planning and purchasing travels, which is already in place in many cities.

According to Kamargianni & Matyas (2017), transportation providers could benefit from MaaS providers' ability to redirect customer flows to meet the capacities of the transportation providers. In addition, MaaS could help them tap into new customer segments. It seems that mobility providers, both private and public, already see the potential in MaaS. In the spring of 2020, citizens of Helsinki can purchase variety of Helsinki region's public transport options through Whim, as well as use city bikes, rent e-scooters and cars and choose from multiple taxi operators.

Lastly, MaaS operators also need to partner with data providers (Kamargianni & Matyas, 2017). According to Kamargianni & Matyas (2017), minimum data required for MaaS includes contract data, real-time vehicle data, route data and data on booking and payments. Without this, the system would not be able to provide the key benefits MaaS provider can produce to its stakeholders, as many of them are based on MaaS provider's ability to aggregate data to balance supply and demand of transportation services.

Extended Enterprise layer

In the extended enterprise layer, Kamargianni & Matyas (2017) have included technical actors of the ecosystem: payment solutions, ticketing solutions, dynamic multiservice journey planners, ICT & IT infrastructure and lastly, insurance companies. These are all attributes that should be included in successful MaaS yet can be operated either by external partners or by the MaaS provider itself (Kamargianni & Matyas, 2017).

Business Ecosystem layer

The outermost layer of the MaaS ecosystem is the business ecosystem. According to Kamargianni & Matyas (2017), academic input from research institutes and universities could provide enabling frameworks for the development of MaaS, and unions and lobby groups also have to be taken into account in order to not set them against the progress. Yet, perhaps the most important stakeholders are public authorities, in particular regulators and policy makers (Kamargianni & Matyas, 2017). MaaS has its roots in meeting the needs of cities and governments (Heikkilä, 2014), and their role is likely to shape the future of MaaS likewise. They can first and foremost enable the development, but they also have a role in ensuring that the public interest is protected (Goodall et al., 2017).

According to Goodall et al. (2017), governments can support MaaS by supporting needs related to data, financing and networking. Organization such as MaaS Alliance, a European public-private partnership for establishing common approach to MaaS (Ertico, 2015), can bring potential MaaS players together, facilitate discussion and hence help with the market

development. This is also supported by Smith et al. (2018), who state that inter-organizational innovation management is needed for successful MaaS implementation. Governments can also provide financial support for early MaaS schemes as well as allow access to public APIs (Goodall et al. 2017).

On the other hand, governments have a role in protecting the public interest by ensuring that MaaS doesn't create inequality between different geographic areas (Goodall et al., 2017) and that, for example, people with disabilities are served equally (Giesecke et al., 2016; Utriainen & Pöllänen, 2018). Lyons et al. (2019) have also expressed their concern on the responsible innovation in MaaS; in addition to guaranteeing equality, governments may find themselves with a role of ensuring that MaaS providers do not use their influence on mobility supply and demand to raise prices without actually increasing the efficiency in the system.

Governments and in particular cities can still, above all, benefit from MaaS. Ideally, MaaS operators could optimize the supply and the demand, making the mobility systems of the cities function better (Transport Systems Catapult, 2016; Kamargianni & Matyas, 2017). Kamargianni & Matyas (2017) also add that MaaS could improve distribution of government's mobility subsidies. All in all, MaaS has the potential to make cities more livable and functioning. If public and private mobility options would work seamlessly together, citizens would have to spend less time travelling and ideally, there would be no need for private car ownership, or at least the households would limit their purchase to one car instead of multiple ones (Lyons et al., 2019). This would result in less traffic congestion and reduced need for parking space for cars. Thinking creatively, in a city where most of the trips would be made using alternatives to private cars, some of the roads could even be transformed to city boulevards where urbanites could enjoy their evening walks without having to give way to cars.

MaaS industry is forecasted to be worth 500 billion dollars by 2030 (MaaS Global, 2019b) and therefore it would also be justified to argue that investors hold another key role in the MaaS ecosystem. Kamargianni & Matyas (2017) suggest that particularly the role of public funding is essential in MaaS. In addition to public investments, private sector investors have

already showed interest in MaaS. For example, by November 2019, MaaS Global had received 53,7M euros of funding (MaaS Global, 2019b). Companies who have invested in MaaS Global include venture capitals but also large players in the transportation industry such as Mitsubishi and Toyota, as well as technology companies like DENSO from Japan (MaaS Global, 2017).

2.1.3. Changing the way we move

A key promise of MaaS for the decision-makers is that it can make our transportation system more sustainable (Sarasini et al., 2018). With the potential to reduce private car usage (e.g. Sochor et al., 2016; Utriainen & Pöllänen, 2018; Lyons et al., 2019), MaaS driven approach to transportation would mean less emissions, leading to cleaner air in cities as well as potentially slowing down the climate change. In addition, the potential to make cities more livable is another key driver for the public interest of MaaS (Heikkilä, 2014).

According to United Nations (2014), urban mobility impacted everyday life of 54% of the world population in 2014. In 2050, this percentage of population living in urban areas is estimated to rise up to 66% (United Nations, 2014). If the seamless travel experience proposed by MaaS materialized and people shifted to public transport driven travel behavior, we could see a reduction of traffic congestion in cities. However, there would naturally still be cars in the streets as taxis and car sharing, which are among the cornerstones of MaaS, would still continue to serve customers (Utriainen & Pöllänen, 2018). In any case, cars would be used in a more efficient manner. If most of the cars would be shared, the total number of cars needed would be smaller and the use rate per car would be higher. This, in turn, would create less need for parking space. Today, average car is parked for 96% of its lifetime (Hietanen & Tinnilä, 2017), which means that there is a room for significant improvement in the utilization rate of a single car.

Another urban issue MaaS aims to solve is the inflexibility of the current transportation system. This would be made by creating customized, on-demand services (Goodall et al., 2017). Reducing overall travel time and solving the "last-mile issue" is important both from the societal and individual aspect: the time we spend on travelling and planning our travels

is time taken away either from economic activities or individual's well-being. Current MaaS schemes that include city bikes, taxis and car sharing alongside with public transport can already make an impact on this. Yet, the need for on-demand service could be met even better in the future with driverless technology (Goodall et al., 2017).

The potential impacts of MaaS are not limited to urban areas. Eckard et al. (2018) also make a case that rural areas could benefit from more flexible mobility options. Even though the public transport driven MaaS is not a viable option in sparsely populated areas, components of MaaS such as car sharing, collaboration between different regions and private and public mobility services as well as last-mile deliveries of goods could be greatly beneficial outside the urban areas. For example, one of the early MaaS pilots was conducted in the Ylläs ski resort area in Northern Finland, aiming to better connect the resort with Kittilä airport and Kolari railway station (Aapaoja et al., 2017).

Lastly, looking at the big picture, MaaS can also make an impact worldwide if emissions from private cars would decrease while the use of public transportation and shared rides increases. Sarasini et al. (2017) suggest that the share of transportation that utilize renewable energy could also be increased with the help of MaaS. Alongside with the reduction of overall car usage, the focus on renewably energy in MaaS schmes would therefore strengthen the role of MaaS in fighting the climate change.

2.2.   Customer value creation

Value is a concept that can be perceived by the company or external stakeholders such as investors. From the perspective of these operators, value is often a financial concept. However, this thesis has a focus on customer value. Alongside with price and quality, customer value is among the most central concepts in consumer behavior research as these three concepts hold the key roles in the customer's purchasing decision (Zeithaml, 1988). In this section, the concept of customer value, its sources, main types and different levels are presented and the foundation for the framework used in this study is built.

2.2.1. Definition of customer value

In order for a service to attract customers, the service has to create some value for them. In the literature, the importance of customer value – sometimes also referred to as "consumer value"– is strongly acknowledged (Sánchez-Fernández, 2009). By understanding customer's perception of value, the company can position themselves in the markets (Zeithaml, 1988) and with the focus in customer value, they will also gain competitive edge, which is essential for the survival of the company (Butz & Goodstein, 1996). In the 1990s, when the economies started to become increasingly driven by services instead of manufacturing of products, the interest in customer value and value creation increased; instead of designing well-functioning and aesthetic products, the focus shifted to understanding the reasoning behind customer's purchase (Gustafsson et al., 2015). Yet, even though the interest in customer value has remained an important focus in the research ever since, defining the concept of value creation or the value itself has proven to be challenging and to this day, there exists is no coherent definition for customer value (e.g. Grönroos & Voima, 2013; Smith & Colgate, 2007).

To start with, customers themselves can have very different ideas about the meaning of value. In the consumer study conducted by Zeithaml (1988), the respondents were asked questions related to quality, price and value of soft drink products. Price is a rather tangible concept and its interpretations among the respondents were naturally rather coherent. Quality and value, on the other hand, have more complex nature, which leaves more room for individual interpretation. In the study, when comparing consumers' perceptions of quality to those of companies, they differed notably. However, among the consumers, the cues that signaled quality were commonly accepted. This was not the case with value. In fact, four main consumer interpretations of value were identified from the results.

For some respondents, value was simply another expression for low costs, i.e. cheap price. For others, value was whatever they personally wanted from the product, i.e. the benefits. This definition is closest to what is known in the field of economics as 'utility'. For the third group, value was the trade-off between price and quality. The last group defined value as

the trade-off between what they give, both monetary and non-monetary, and what they get.

As a conclusion, Zeithaml (1988) define perceived value as "consumer's overall perception of the utility of a product based on perceptions of what is received and what is given". Similar approach to value as the one presented by Zeithaml (1988), but with more emphasis on the costs, is the value-price-cost (VPC) framework by Hoopes, Madsen & Walker (2003) (in Priem, 2007), where V stands for the consumption benefits perceived by the customer, P for the monetary price paid by the customer and C for the production cost by the seller.

However, Zeithaml (1988) already noted that the value assessment process may be very different in products that are more expensive or more complex than beverages, and even in the case of soft drink products, respondents implied that they did not actively weight costs and benefits. Most of them, in fact, chose the brands they trusted or made the decision based on "extrinsic value cues" such as signs of quality (Zeithaml, 1988). This is not to say that the cost were not taken into account, but simply that the 'get' part of the process was the more conscious factor in the decision-making process. In any case, the complexity of the concept of value was apparent in the results.

Butz & Goodstein (1996) offer alternative definition to customer value. What Zeithaml (1988) has referred to as customer value, Butz & Goodstein (1996) define as net customer value. According to Butz & Goodstein (1996), customer value itself is purely the emotional bond between the customer and the provider, which is established when the customer uses a product or a service and recognizes it as useful. As Zeithaml (1988) already noted, the cost-benefit analysis is not always made consciously and positive value cues often have a bigger role. With the approach to customer value presented by Butz & Goodstein (1996), the focus shifts to the "get" part.

Particularly in the service setting, which applies to MaaS, the trade-off approach can be too simplified and may fail to capture multidimensionality, such as the impact of emotions and buying habits (Sánchez-Fernández, 2009). Also, in services, the non-monetary costs often have more significant role in the value creation as they do in the case of products (Kleijnen

et al., 2007). Therefore, a benefit-driven approach similar to Butz & Goodstein's (1996) is often used in the more recent literature (e.g. Grönroos & Voima, 2013; Kleijnen et al. 2007). This approach also takes the costs into account but instead of looking at the trade-off between costs and benefits, having low costs or required sacrifice – either monetary, time-related, physical or psychological – is, in fact, considered a benefit itself. This is also the approach chosen for assessing value creation in this thesis.

In addition to aiming to define value itself, the literature on value also studies the relationship between customer value and business, the roles of different operators in value creation process, potential types of value and potential sources of value. By clarifying these aspects, the research supports companies to take practical steps in improving the value perceived by their customers. These aspects of value are presented in the following sections of this chapter and are used in developing theoretical framework of the research.

2.2.2. Customer value and companies

Why should companies focus in understanding customer value? Firstly, value is a crucial tool in analyzing consumer behavior (Zeithaml, 1988; Sánchez-Fernández, 2009) and should be in the core of a business model of a company (Smith & Colgate, 2007). Consumers buy products or services only if they are perceived to create some value. Thus, the understanding of customer value helps in understanding customer's choices.

The role of value is particularly relevant for new companies. Those innovations that are most rapidly adopted have something in common: they offer relative benefits compared to other solutions, i.e. "additional value" (Rogers, 1983; in Sochor et al., 2016). According to Kleijnen et al. (2007), particularly in technology-mediated services, which MaaS is also an example of, perceived value is also among the best predictors of the customer behavior.

Constant evaluation and improvement of customer value is needed also after the customer base is established. Sánchez-Fernández et al. (2009) suggest that customers are increasingly well-informed and are more actively comparing alternatives, which requires constant assessment of potential sources of value by the company, if they wish to maintain

their competitive advantage. Further, value is also linked with the price customers are willing to pay, making it also a crucial question in defining future company revenues. According to Priem (2007), "consumers are arbiters of value". Consumers make the purchase as long as the price they have to pay matches their perception of value of the service or the products. By increasing customer value, or in other words, by value creation, the companies can set the price higher while still keeping the existing customers.

Equally important to attracting customers and revenue is the impact of customer value on costs, both monetary and non-monetary. If the company develops their services with a focus in right types and sources of customer value, they are not wasting resources for issues that are irrelevant to customers (e.g. Smith & Colgate, 2007; Sánchez-Fernández, 2009). Therefore, defining the service attributes that contribute to customer value should be in the core of service design, as it results in more efficient operations and improved cost structure, which can further be seen in profits.

2.2.3. Customer as the value creator

In the past, traditional strategic management has viewed value to be created by providers rather than the customers. In this approach, value is understood to flow "downstream" towards the consumer. (Priem, 2007). For example, in Porter's (1985; in Priem, 2007) famous value system, all members of the supply chain add contribution to the final value of the service or the product. In other words, they create value added. Similar approach with a focus in value chain is presented also in modern research by, for example, Sainio et al. (2011) in their study of internationalization of firms. In their view, inter-organizational relationships are among the most important sources of value. In the words of Priem (2007), the finished product is "laden with value" by the supply chain.

Yet, customer focus in marketing has raised its head already in the 1950's and the role of customer in the value creation process has been a central topic since the 1990s (Gustafsson et al., 2015). Today, few would argue that value is solely created by the producers (Butz & Goodstein, 1996). In most of the recent literature, the main operant in the value creation is, in fact, the customer (e.g. Priem, 2007; Smith & Colgate, 2007; Butz & Goodstein, 1996;

Grönroos & Voima, 2013). This customer perspective on value and value creation gives more emphasis for the collaboration of the company and the customer in the process: value will only actualize when the consumer perceives the value, yet the company and its supply chain aid the value creation process. In addition, the modern approach to customer value creation seems to give more emphasis to customer needs in service development.

According to Butz & Goodstein (1996), for both services and products, value creation happens through emotional bonding between the customer and the service provider; the stronger the bond the more customer value there is. With services, this bonding is particularly relevant. Grönroos & Voima (2013) complement this view by suggesting that customer value creation process takes place in three spheres. Companies produce and deliver their resources and processes in the *provider sphere* yet the value is only created when the customer starts to use the service and interacts with the resources provided by the company. Therefore, value creation only actualizes in the *customer sphere*, where customer creates value either individually or collectively through social interactions with other people. Lastly, in the intersection of the provider and customer spheres is the *joint sphere*. In the joint sphere, the interaction between customers and company creates value to the customer, allowing the company to operate as a co-creator. If the company is able to access this sphere, they can take more active role in the value creation process.

2.2.4. Sources of customer value

Although Grönroos & Voima (2013) emphasize that customer is the value creator, the role of the company in value creation is also relevant. During the production process that included design, development, manufacturing and delivery, companies create resources that customers can utilize for the value creation. Adding to this, the company can also impact the perceived value in the joint sphere through interactions with the customer. Smith & Colgate (2007) have identified the sources of value in more detail. In addition to interaction, four other key sources of value are information, products (services or goods), interaction, environment and ownership/possession transfer.

Information as a source of value consists of materials and communication provided by the company. In more detail, all advertising and marketing, public relations activities and even service instruction help customers to assess the service and see the potential outcomes of using it. With the right kind of information, consumers can make most out of the service and products. Information also helps consumers make value creating associations and interpretations as well as evaluate alternative options. (Smith & Colgate, 2007)

Product, which can be either goods or services, is another key source of value. In addition to functionality, attributes such as safety and affordable price as well as the enjoyment of using a service or products can create value to customers (Smith & Colgate, 2007). According to Smith & Colgate (2007), the "value-chain" activities associated with the products include product development, market research, research and development activities and production.

Interaction between the customer and the organizational systems and employees, which Grönroos & Voima (2013) also emphasize as a key to accessing joint sphere of value creation, is also one of the five main sources of value identified by Smith & Colgate (2007). The distinction between interaction and the product in service context can sometimes be difficult to make but Smith & Colgate (2007) have included attributes such as service timeliness and relational bond as part of this value source in services. The value-chain activities related to interaction include recruitment and training, service quality and operations (Vadenbosch and Dawar, 2002 in Smith & Colgate, 2007).

Lastly, according to Smith & Colgate (2007), the purchase or consumption *environment* provides value through interior design and facility management, and the last of the five sources, *ownership/possession transfer,* through payment and billing processes, contracts and the delivery of the product.

However, it should be noted that the framework by Smith & Colgate (2007) was created before mobile apps penetrated the markets: Apple opened its App Store in 2008 alongside with the release of iPhone 3G (The Verge.com, 2018), hence the unique characteristics related to the sources of value in mobile services were not included in the framework. In a

modern mobile service, in other words, in a mobile app, particularly the three value sources, and in some cases also the other two, merge and the distinction between the five can be difficult to make. Edelman & Singer (2015), for example, suggest that the value in modern mobile apps would be in the overall customer journey, from which new individual sources of value would emerge through innovation. Yet, Smith & Colgate's (2007) five sources still serve as a good basis for studying sources of value as hey help to identify the way in which each service attribute contributes to value creation. However, it would not be purposeful to attempt to make rigid distinctions between the sources. Rather, they should be use as tools for identifying the underlying value.

2.2.5. Levels of customer value

To help in understanding customers' needs and hopes regarding services and products, Butz & Goodstein (1996) have defined three levels of customer value: expected value, desired value and unanticipated value. Firstly, *expected value* is formed when the company is able to meet customer's basic needs (Butz & Goodstein, 1996).. Defining this level of value is the starting point for value creation, as it explains the core functions required of the service. For example, if customer enters a taxi, they expect the taxi to take them to their destination.

The *desired value* is the value customers hope to get but do not expect (Butz & Goodstein, 1996). For example, customers do not necessarily expect that the cafe where they grab their coffee in the morning has relaxing atmosphere, yet companies such as Starbucks have differentiated by turning cozy interior design to desired value for coffee shop customers. However, in the competitive markets, desired value can still be the "baseline required to survive" and even become expected value if customers get used to it (Butz & Goodstein, 1996). Therefore, understanding customer desires can be equally as important as assessing their expectations.

The last of the three levels of value is the *unanticipated value*. This level of value is reached when the company is able to provide customers with something valuable they did not expect or desire (Butz & Goodstein, 1996). Discovering these latent needs is particularly

relevant when developing technology innovations. Many of the successful innovation, such as the iPhone or Facebook, were not something customers consciously needed or wanted before they were published. Hence, creating this level of value can help in developing new business, but also in developing existing service further and gaining competitive advantage.

2.2.6. Types of customer value

According to Klejinen et al (2007), the literature on value often identifies at least two main types of value, hedonic and utilitarian. This means that products and services contribute to customer value by either creating positive feelings and enjoyment or by providing efficient and good quality functions and results, or both. More detailed approaches also exist and have gained popularity over the past decades (Sánchez-Fernández, 2009). One of the most commonly used frameworks for analyzing customer value is that of Holbrook's (1999), who has divided customer value to four main types: economic, social, hedonic and altruistic. Holbrook's approach has been praised for taking into account the multidimensional nature of value and including key sources of value such as ethics and spirituality, which are often overlooked in the other models (Sánchez-Fernández, 2009).

Another similar and commonly used approach is by Smith & Colgate (2007). Holbrook's (1999) model has been criticized for its complexity as well as its main focus on benefits as it does not explicitly take into account costs and sacrifices (Sánchez-Fernández, 2009). The approach of Smith & Colgate (2007) focuses on practicality as they, above all, have aimed to create a framework for companies. Their framework also clearly takes into account the aspect of personal costs and risks in value creation and is easily applicable to both goods and services. Due to its practicality and clearness, the four main types of value by Smith & Colgate (2007) were also chosen as the basis of the theoretical framework for this research.

According to Smith & Colgate (2007), companies can create four main types of value to customers: Functional/Instrumental, Experimental/Hedonic, Symbolic/Expressive and Cost/Sacrifice. *Functional/instrumental value* is created when the service has the correct features or provides a desired outcome. The concept of "quality" is also included in the functional/instrumental value. For example, for a transportation service, getting customer

from point A to point B in a reasonable time without any inconvenience on the way would create functional/instrumental value to the customer.

Experimental/hedonic value is related to enjoyment and curiosity. According to Smith & Colgate (2007) in entertainment and hospitality industries, this is most often the main type of value companies create. In addition to experimental services, luxury products can also appeal to the hedonic sense in customers (Tynan et al., 2014). In creating experimental/hedonic value, aesthetics or ambience of the surroundings is important, and people also seek emotional value such as enjoyment or excitement. Experimental/Hedonic value can also be created when the use of the service enhances social relationships. (Smith & Colgate, 2007)

Sometimes value is created based on psychological meaning of the service. This type of value is defined by Smith & Colgate (2007) as *symbolic/expressive value*. Customer may, for example, use a service because it makes them feel good about themselves or allows them to express their personality, values or status. By creating a brand that people associated with status, or by emphasizing sustainability, companies can also contribute to symbolic/expressive value. (Smith & Colgate, 2007)

Last of the four types is the *cost/sacrifice value*. This type of value is created when customers perceive the service to reduce their personal costs or risks. The cost and risk factors can be economic or psychological, or related to the effort and time the customer spends for the service. Physical safety can also be a cost/sacrifice value. (Smith & Colgate, 2007) In a nutshell, customers receive cost/sacrifice value when a service helps them to spend less money and time or creates feeling of physical and psychological safety.

2.2.7. Measuring customer value

According to Butz & Goodstein (1996), "only customers themselves can give us clear and direct data on their needs, both manifest and latent, and the degree to which we have met those needs, especially as compared to our competitors." . Therefore, measuring customer value always requires dialogue with the customers themselves.

One could also argue that the best results are achieved when the value is defined by actual customers of the service rather than potential customers. Previous studies indicate that the attitude towards a new technology does not reliably predict the adoption of the technology (Jackson et al. 1997; Taylor and Todd 1995 in Kleijnen et al., 2007). This is supported by Grönroos & Voima (2013): "Before value is determined or assessed by the customer or by any other beneficiary, it must be perceived or experienced; otherwise, there is nothing to assess."

In particular when studying a recent phenomenon like MaaS, a challenge is that if the customer has not actually used the service, their understanding of the service may not be accurate and hence the answers given may be misleading (Caiati et al., 2020). This is also in accordance with Butz & Goodstein's (1996) view that customer bonding, which they identified as customer value, is about the actual behavior of the customers rather than their opinion about the company. This behavior includes their purchasing behavior but also whether they would recommend the provider to others; in a nutshell, purchase or recommendations by the customer can be much more valuable to the company than, for example, high satisfaction rate.

One of the main challenges in studying value creation is that consumers are not likely to share a common meaning for value. Hence, Zeithaml (1988) have suggested that measuring customer value should start with gaining understanding of the respondents' expressions of value. Another challenge is that perceived customer value is impacted by the surrounding world. Service value in particular can be context dependent (Mallat et al, 2008; Kleijnen et al., 2007). Butz & Goodstein (1996), also note that when looking at customer value, everyone who has some impact on customer purchase decision, for example friend and family, contribute to it. In addition to social relationships and context, other companies that the customer is in interaction with are also part of the value creation process, because services from different service providers can complement each other and make one another more, or less, valuable (Grönroos & Voima,2013).

Last important issue to note when measuring customer value is that, although customer satisfaction and value can be linked (Sánchez-Fernández et al., 2009), value can't be

increased by solely increasing the customer satisfaction (Butz & Goodstein, 1996). Some decades ago the common understanding in the literature was that, by focusing on excellent service or product quality and thus improving the customer satisfaction, the company would excel (Gustafsson et al., 2015). This Total Quality Management (TQM) approach to service and product development was given well-justified criticism by Butz & Goodstein (1996), who emphasized that companies should shift their focus from customer satisfaction to customer value, since focusing on customer satisfaction alone may cause companies to misunderstand their customer's true needs. For example, a same customer may be very satisfied with the quality of the service yet does not find it to fit their personal needs and therefore doesn't use it. If the difference between customer satisfaction and customer needs is not understood, the resources may be allocated to parts of the service that are not, in fact, significant sources of customer value.

2.3. The framework

The concept of customer value is multi-dimensional and its complexity can be particularly highlighted in services (Sánchez-Fernández, 2009; Kleijnen et al. 2007). As presented by Grönroos & Voima (2013), the value of the service perceived by a customer is dependent not only on the service provider and its processes and products but on the context, social relations and personal factors such as values, goals and personality of the customer. However, there are certain structures presented in this chapter that help in understanding the customer value and offer practical basis for studying customer value in companies. These structures are used to build the framework (Figure 2) that used in this thesis for analyzing customer value in the context of MaaS.

Customer value can be seen as an entity that comprises of four main types of value: functional/instrumental, experimental/hedonic, symbolic/expressive and cost/sacrifice value (Smith & Colgate, 2007). These value types are depicted in Figure 2 as the four slices in the customer value creation circle.
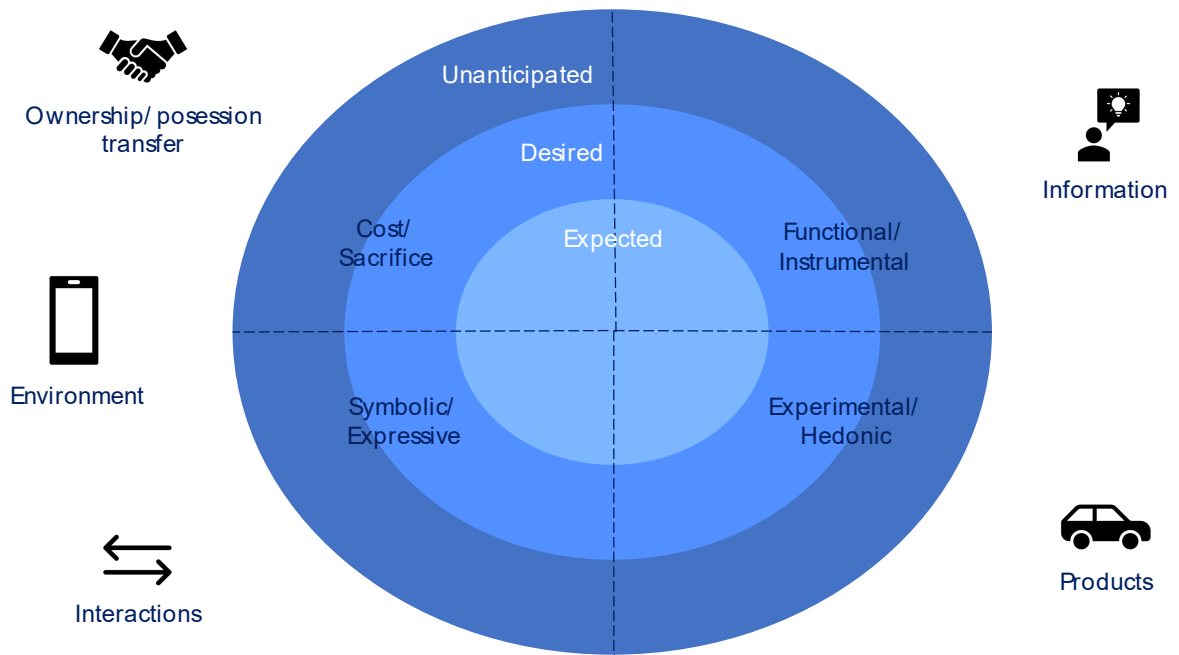
Figure 2: Value creation framework

Firstly, functional/instrumental value is created through utility and functionality of the services. Secondly, experimental/hedonic value is created when the service is enjoyable to use or otherwise creates positive emotions, facilitates social relationships or appeals to the senses. The third value type, symbolic/expressive value, is something customers can perceive if the service allows them to express their personality or values, if the service enhances their identity or status, or if the brand itself has personal meaning to the customer. Lastly, cost/sacrifice value is created when customer perceives that their monetary costs, time, effort or risks of are decreased by using the service.

Although some services can be focused in creating one type of value, in most cases, one service contributes to multiple value types, and most often, to all of them. Including these four main types in the framework is therefore essential. By making all of the four value types present, the value creation process is observed holistically and in addition to the core elements of the service, the less obvious service attributes are taken into consideration. Without the division to the four main types, the company may, consciously or unconsciously, focus only on the service attributes that they already consider relevant, rather than seeing the potential in the latent aspects.

In addition to the four main types of value, this customer value framework is complemented with Butz & Goodstein's (1996) levels of value. In Figure 2, the four value types are further divided into three levels, which are expected, desired and unanticipated. These levels define whether the customer was expecting the service to provide them with certain type of value, or whether they hoped for it, or whether they received value they did not even anticipate.

The levels of value are not included in the original framework by Smith & Colgate (2007), yet are highly relevant in understanding which types of customer value should be in the core focus in developing and marketing services. Understanding simply the types of value the customers perceive in the service does not support the development of the service and marketing, if the company fails to understand how to prioritize them. This is where the levels come to the picture: if the company fails to deliver what customers expect, the desired and unanticipated value will most likely not compensate for that.

In addition, the levels also contribute to ensuring that the latent values, which can create competitive advantage (Butz & Goodstein, 1996) are detected. When the unanticipated value is also present in the framework, company is forced to think creatively to take the service beyond what customers already require or hope from the service. This is particularly relevant in MaaS, as it's a relatively new concept that combines aspects of traditional mobility services and modern mobile-based services, and therefore offers great possibilities for unanticipated value. Some value aspects of MaaS may be aligned with customer expectations and desires from mobility services, some may be derived from the key characteristics of mobile services while the combination of the two can create value that surprises the customer positively.

Lastly, the suggested customer value framework for studying MaaS also acknowledges the sources of value in services. They are included because they help in understanding where the main types of customer value originate and therefore contribute to the final construct of the value creation process. A comprehensive view of the five sources is proposed by Smith & Colgate (2007), who define them as information, products, interactions with

employees and systems, environment and ownership/possession transfer. Marketing, communications and for example the use instruction contribute to information as a source of value. The second source, the products, in the case of MaaS comprises of individual trips purchased on the platform as well as the offered mobility bundles. The last three of the sources are environment, ownership/possession transfer and interaction, which in modern digital services often merge in the mobile app. Yet, assessing them individually helps in creating a better picture of the construct of the app.

In the thesis, the framework is used firstly, to support the formation of empirical research, which is based on the customer survey for Whim users. The survey content is created in alignment with the framework to ensure that all potential aspect and dimensions in the customer value creation process are taken into account. Secondly, the framework supports the analysis of the results. Lastly, the framework is used in representing the final findings from literature review and the survey results. The final product, which can be used to analyze the value creation process in MaaS, is a graph that includes individual service attributes in relation to the main value types and levels they represent.

2.4. Customer value in mobility services

First, this section applies customer value theory to traditional mobility services, shedding light to the types of expected, desired and unanticipated value often associated with them. Following this, an overview of the current understanding of customer value in MaaS is presented. The last part of this section focuses on formatting the research hypotheses based on the literature review.

2.4.1. Value creation in traditional mobility services

In mobility services, most customers do not seek for excitement or wish to express their personality during their commute or travel to grocery store, but rather expect to get from point A to point B as conveniently as possible. Although using different terminology, Koppelman & Pas' (1980) study on travel behavior confirms that issues relating to functional/instrumental value and cost/sacrifice value are key elements in travel behavior.

In their study, they compared consumer preferences and perceptions of three modes of transport: bus, car and walking. They found that the most important factors that impact the travel choice preference are related to overall service level and safety, followed by convenience and accessibility. Their results also confirm that although people prefer cars in general, the level of commitment to existing travel choices was not very high when situational and availability constraints were taken into account. Aside from commute, 24% of the respondents had used some other mode of transport than their most preferred alternative for their latest trip.

Yet, this doesn't mean that mobility services couldn't create any other type of customer value. Firstly, not all of our mobility behavior is driven by the need to get from point A to point B, which already leaves room for creating experimental/hedonic value. A decision to book a cruise ship or go for a run is rarely made with the focus on the destination, but rather because of the process itself: for improving the health or enjoying oneself (Giesecke et al., 2016).

Even when customer's main focus would be on the outcome, the process itself can also create experimental/hedonic value. For example, people can choose a scenic route instead of the fastest option, just to enjoy the views. Airlines have for a long time focused on the travel experience instead of just making sure they leave and arrive on time. Already in the 1990's, in order to provide a more pleasant experience, the low-cost alternative Southwest Airlines encourages their flight attendants to have informal conversations with their customers, and they also changed their pre and in-flight announcements to be more engaging (Butz & Goodstein, 1996). In 2020, this has become a common practice and most pre-flight announcements encourage customer to what Southwest Airlines did already decades ago: to "have a pleasant journey".

The American long-distance bus service Greyhound has also already decades ago appealed to the consumer's need for psychological comfort with their slogan "leave the driving to us" (Koppelman & Pas, 1980). Both Southwest Airlines and Greyhound have discovered that even though the expected value for their customers may be functional/instrumental,

desired – or even unanticipated – value can be created by tapping into the sources for hedonic/experimental value.

McKinsey & Company (2016) have forecasted an even greater shift from functional to experience-driven mobility services. In their vision, autonomous cars could free people to other activities during the drive, such as shopping in-car and consuming entertainment services. Although their report focused on autonomous cars, similar solutions could be implemented in carpooling, taxis and even public transportation already with the technology currently at hand.

Lastly, mobility services can also create symbolic/expressive value, of which luxury car market is an excellent example. Tynan et al.'s (2014) study on types of value perceived by luxury car customers found that although functional/instrumental value, which they refer to as "utilitarian value", is an important determinant of customer value also in luxury cars, perceived symbolic/expressive value and experimental/hedonic value set the individual brands apart from each other. In other words, customers expect any car, luxurious or not, to function as intended while the other types of value contribute to the overall experience and create competitive advantage to brands.

In addition to the feel of luxury and the possibility to express personal style, symbolic/expressive value also includes the expression of personal values and customers' needs for social meaning. Climate change has made sustainability a key issue in mobility, and this will likely shape the development of future solutions in the industry (Sarasini et al., 2017). In addition to mobility services having to meet the sustainability requirements set by governments and regulatory authorities, consumers are increasingly environmentally conscious. Consumers, for example, choose city bikes when they want to reflect their personal values (Yin et al. 2018) or follow their friend's example in purchasing an electric car to gain social meaning such as status (Daziano & Chiew, 2012). In practice, these phenomena can be seen in the increasing popularity of bike and car sharing as well as electric and hybrid cars, and it's possible that providing symbolic/expressive value by offering sustainable mobility services could become an industry standard in the future.

2.4.2. Value creation in MaaS

MaaS is a relatively new field and the focus has not been on customer value. Yet, earlier research has presented a number of potential benefits that MaaS can create for customers, which create a basis for studying customer value creation. Some studies on MaaS have also discussed the role of value, although it hasn't been the main focus earlier. This section brings together these insights presented in the MaaS literature.

The promise of "seamless" service experience that includes planning, payment and access to transportation modes is in the core of MaaS value proposition (Sochor et al., 2016; Heikkilä, 2016). Other words often used to describe the benefits of MaaS to consumers include "easy", "flexible", "reliable", "price-worthy" and "sustainable" (Giesecke et al., 2016). The first practical study to address suggested value in MaaS was by Sochor et al. (2016), who studied the results from Swedish Ubigo trial and were able to confirm that the presented value propositions hold true to some extent. In addition, they identified other potential benefits. Similar findings from the same field trial were also presented by Karlsson et al. (2016).

"Value added" in UbiGo trial in Sweden

The UbiGo trial in Gothenburg, Sweden, started in 2013, already before the concept of MaaS was defined. During the trial, participants' travel behavior was analyzed and in addition, their perceptions and experiences where further examined through surveys during different stages of the trial. From the results, Sochor et al. (2016) analyzed the behavioral changes but also assessed what they defined as "added value or relative benefit" of the service. Their findings suggest that MaaS platform such as UbiGo should, above all, serve the practical needs of the customers, which is aligned with Koppelman & Pas (1980) findings on traditional mobility services. More specifically, MaaS could provide added value in four aspects: economy, flexibility, improved access and simplicity (Sochor et al. 2016).

Regarding economy, Sochor et al. (2016), state that unless significant value would be added by some other aspect of the service, successful MaaS should not increase individual's travel costs. Surveys sent for participants revealed that even though money was not seen as the main driver for joining the trial, participants expected that the adoption of Ubigo would not at least increase their current travel costs. Many of the participants also hoped that the service would help to reduce them.

Another aspect perceived to be important by the UbiGo trial participants was flexibility. One of the core ideas of MaaS is that the individual's travel needs can't be fulfilled by one single mode of transport. Participants also implied that without Ubigo, for example buying a monthly subscription to public transport makes them more likely to be "locked" to public transport modes, even in the situation where the travel would be more convenient with another mode of transport, such as city bike. (Sochor et al., 2016)

Thus, MaaS provides increased flexibility by allowing the customer to seamlessly change from one mode of transport to another. The UbiGo trial was limited to the city of Gothenburg, but an ideal MaaS service would fulfil all possible travel needs of an individual by also providing the travel options between the cities and even between countries (Sochor et al., 2016; Hietanen, 2018). This is also linked with the third proposed benefit, improved access. MaaS provides those who don't own a car an access to one when needed. Sochor et al. (2016) also suggest that because choosing a MaaS plan made them assess all existing transportation options, the travel alternatives became more "mentally accessible".

Lastly, the simplicity of MaaS was perceived as a value adding factor. Since all travel bookings of the household were available in one place and the payment and access of transport only required carrying a smartphone, the service made payments and tracking of the use easier. The participants also suggested that future applications of MaaS could provide them with additional support for decision-making between different modes of transport. (Sochor et al., 2016)

Sochor et al. (2016) study provides useful insights and sheds light to customer perspective in MaaS, yet the limitation of the study is that it was based on a trial, which was organized by public authorities and lasted for only 6 months. A study of this length is not likely to simulate how a real-life, commercial MaaS operator would be able to create value to customers. For example, the user interface of the mobile application and the customer service were not included in the study; the focus was on the mobility packages rather than the platform. In addition, the participants mentioned that one of the main motives for participating in the trial was the joy of trying new things, which implies that the users' perception of value in MaaS may differ after they have used the service for some time (Sochor et al., 2016).

Other value creating factors in MaaS

Sarasini et al (2017) have also contributed to the understanding of the potential customer value in MaaS, or as they call it, "private value". In their research, they take a sustainability-driven approach to MaaS and describe the potential sustainable value MaaS can create to customers, the environment and the society as a whole. According to them, customer value in MaaS comes from two sources: mobility services and data-based services. Mobility services can create value by offering affordability, flexibility and convenience whereas data-based services improve the process of trip planning, booking and payment, optimization of mobility services and can also save travel time and money.

Two other studies touch upon the topic of customer needs in MaaS, although not directly focusing on customer value. Matyas & Kamargianni have studied the interest for MaaS among the citizens of London and Caiati et al. (2020) among the Dutch. Matyas & Kamargianni (2018) analyzed consumers' potential willingness to pay for different MaaS bundles based on survey data. First, they asked the respondents to answer to socio-demographic questions and questions about their attitude towards mobility and mobile applications. In the second part of the survey, respondents were asked to choose their preferred travel bundle and indicate their likelihood of subscribing to the chosen bundle. To simplify the survey, pay-as-you-go option was excluded. Based on the results, a bundle

choice model was built to display the ideal bundles, i.e. the combination of modes of transport for a certain price.

Their model showcased that although respondents were interested in innovative mobility solutions such as car sharing and bike sharing, public transport should be "the backbone of MaaS". Although the results of Matyas & Kamargianni's (2018) study do not specify the types of value created by MaaS, they indicated that MaaS bundles can create value. The respondents showcased willingness to pay for bundles: around 40% of the respondents would have either purchased their ideal bundle or considered doing so.

Caiati et al. (2020) conducted a portfolio choice experiment in the Netherland. The key characteristic that sets their study apart from that of Matyas & Kamargianni (2018) is that instead of presenting the respondents with ready-made bundle options, respondents were asked to tailor the bundles themselves by choosing service attributes from a given portfolio. In addition to this, in the second part of the survey the respondents were asked to select additional attributes to complement the basic service, such as parking payment, real time alerts and notification and CO_2 tracker. These complementing service attributes would have provided a more comprehensive view of the potential value in MaaS that goes beyond the modes of transportation, however, the results of the second part have not been published at the time of writing this thesis.

Caiati et al. (2020) confirmed Matyas & Kamargianni's (2018) finding that public transportation has a central role in MaaS. Interestingly, respondents also preferred longer-term subscription plans. Also, instead of being worried about the data gathered by the provider, MaaS providers access to GPS was perceived to increase the utility of the service, which, according to them, implies that customers can even consider the utilization of their location data as an advantage in MaaS. According to Caiati et al. (2020), the finding regarding data were aligned with the findings from Transport Systems Catapult study (2016) where more than half of the consumers are happy to share their personal data if it leads to better transportation services.

Another main finding of Caiati et al. (2020) relates to pricing: depending on the transportation mode, people prefer either flat rate plans with unlimited access or two-part tariffs where the customers get a set discount per ride. This is also aligned with what Matyas & Kamargianni's (2018) finding that the bundles are a key opportunity in MaaS. Sochor et al. (2016) and Karlsson et al. (2016) also found that people embraced the idea of monthly subscription in MaaS, and it is therefore possible that the pay-as-you-go option may not maximize customer value in MaaS. However, comparing the difference between the two has not been explicitly conducted in any of the previous studies.

Transport Systems Catapult's (2016) study on MaaS stakeholders has also addressed potential benefits of MaaS. According to their study, the current transportation system pain points for the users include costs, congestion, parking, delays, unreliability and lack of flexibility, all of which MaaS has the potential to address.

Customer value in mobile apps

The studies on customer needs in MaaS have focused on the transportation mode selection and the impact of the MaaS platform and its user interface has remained a less studied area. However, Transport Systems Catapult (2016) study revealed some interesting insights on utilizing smartphone capabilities in MaaS. Their findings emphasize that customization and tailored services have significant potential. In addition to finding the fastest route and helping to avoid congestion, mobility services utilizing GPS and smartphone data could help in choosing the most environmental-friendly or most child-friendly alternatives and in choosing accessible alternatives for people with disabilities. The latter is something that Giesecke et al. (2016) and Utriainen & Pöllänen (2018) have also addressed. According to Transport Systems Catapult (2016), particularly millennials expect to get mobility services based on their personal, immediate needs and 38 % of them would be interested in getting lifestyle information relating to weather, social media but also to travel, through one platform.

Early studies on mobile services by Kleijnen et al. (2007) Anckar & D'Incau (2002) and Mallat et al. (2008) also support the insights from that study and help in understanding potential

of the platform itself. When the mobile services emerged, the academic interest in the potential value creation of these services sparked. The main value creating aspects of mobile applications relate to cost/sacrifice value: they increase accessibility, can potentially increase timeliness and are often place and time independent. (Kleijnen et al., 2007). Therefore, key characteristics of mobile apps help in fulfilling the promise of flexible and seamless service in MaaS.

Anckar & D'Incau (2002) also found that purchasing mobile travel tickets can create value by serving main needs of mobile service users: time-critical needs, spontaneous needs/decisions and efficiency needs/ambitions. In other words, mobile tickets can be purchased quickly, right before entering the vehicle hence allowing both time-critical behavior and spontaneity. This also increases efficiency as there is, for example, no need for queuing for tickets. Mallat et al. (2008) who studied the mobile ticket adoption in Helsinki region also came to similar conclusions, implying that the combination of mobility and mobile services could help in providing more spontaneous and efficient travelling.

2.5. Conclusions & hypotheses formation

The earlier literature on mobility services suggest that service aspects relating to functional/instrumental value and cost/sacrifice value are in the centre of mobility value creation, and this is likely to hold in MaaS, as well. People seek for adequate service level with reasonable costs, as well as safety, convenience and accessibility in any mobility service they use (Koppelman & Pas, 1980). In other words, they expect to get safely, comfortably and quickly to their destination, and these expectations determine their chosen transportation mode. However, MaaS has also the potential to improve flexibility and accessibility (Sochor et al., 2016; Transport Systems Catapult, 2016) , to simplify the mobility offering particularly through mobility bundles (Sochor et al, 2016; Karlsson et al. 2016; Matyas & Kamargianni, 2018; Caiati et al., 2020), and to improve customization of mobility services (Sochor et al., 2016; Transport Systems Catapult, 2016). Lastly, MaaS can reduce mobility costs (Sochor et al., 2016).

In addition to these more practical aspects of customer value, which are likely to also lead to expected value, MaaS can also contribute to creating experimental/hedonic and symbolic/expressive value. In these cases, the focus is on desired or unanticipated value, even though in the future the experiences during the travel may even become something customers expect. Regarding symbolic/expressive value, MaaS could help in expressing environmental values. In addition, the chosen transportation mode can express personality or status, as Tynan et al. (2014) found to be the case with luxury cars. Regarding experimental/hedonic value, as the examples from Greyhound and Southwest airlines and luxury car markets show, the customer experience itself has the potential to create value in MaaS.

Based on these findings, five hypotheses for studying value creation in MaaS were formatted. Firstly, the basic needs regarding MaaS are likely to be practical and relate to core functions of travelling, as is the case for any mobility service. In addition, switching traditional mobility services to MaaS should not increase the costs, either monetary or psychological, perceived by the customer. Therefore, the following hypotheses was formatted:

H_1: Functional/instrumental and cost/sacrifice value have key roles in customer value creation in MaaS

The earlier research on mobility services suggest that in addition to more practical value types, mobility services can offer enjoyable experiences and support self-expression. Therefore, the second hypothesis is:

H_2: Hedonic/experimental value and symbolic/expressive value also contribute to positive customer experience in MaaS

The third hypothesis is based on earlier research on MaaS. Caiati et al. (2020), Matyas & Kamargianni (2018) and Karlsson et al. (2016) came to the same conclusion that mobility bundles, the so called "transportation smorgasbord' concept is a positive driver for the adoption of MaaS. To studyi this, the third hypothesis was formatted:

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H_3: Mobility bundles increase the perceived value in MaaS

In addition to the providing variety of transportation modes in one package, the concept of MaaS includes a digital platform. The platform itself can therefore also contribute to creating seamless service experience. The fourth hypothesis is:

H_4: Alongside with the optimal selection of transportation alternatives, MaaS platform can create value to customers

MaaS is also expected to reduce private car usage. To succeed in this goal, MaaS provider should be able to create value that exceeds that of a car and therefore helps in giving up the car. The fifth hypothesis is the following:

H_5: Customers who do not have access to a car perceive higher value in MaaS than the customers who have access to a car

3. Methodology

3.1. Choosing the method

One of the common methods for analyzing customer value creation is a user survey. The method is particularly useful in research and development issues: according to Bozeman & Kingsley (1997), user surveys have high technical needs and require resources and time slightly more than some alternatives, yet are high in validity and reliability and serve as both summative and formative when assessing research & development (R&D) issues. User surveys have been used in particular in the studies on mobile service adoption (e.g. Mallat et al., 2008; Kleijnen et al., 2007) but also in previous studies of MaaS (Matyas & Kamargianni, 2018; Caiati et al. 2020). Hence, this method was also chosen for assessing value creation among Whim's customers.

One of the possible survey methods for analyzing consumer preferences are bundle choice models where the respondent is presented with alternative service/product bundles and is asked to select their preferred bundle. The results can then be analyzed using, for example, multinomial logit models (MLN). These models can be particularly efficient when the research aims to discover subconscious preferences. A bundle choice model was used, for example, by Matyas & Kamargianni (2018) when they analyzed potential MaaS bundles in the Greater London area.

However, the respondents of the MaaS survey conducted in Greater London area were not customers of any MaaS as the aim was to measure the potential of MaaS in general. One challenging factor when interviewing customers or conducting a customer survey is the impact the interview or survey may have on the expected value among customers. Just by asking about customers' opinions and satisfaction, company may raise customer expectations (Butz & Goodstein, 1996). Due to the unnecessary risk of raising customer expectations, the decision was made to not use a bundle choice model in this thesis.

One alternative survey-based method for analyzing value creation is TAM (Technology Acceptance Model), which has been used in the past for modelling how emerging

technologies are accepted and used by the consumers (Mallat et al., 2008). In the TAM model, perceived usefulness and perceived ease-of-use are considered to be the most important determinants of individual's technology adoption. However, despite being applicable in defining customer value, using TAM is more purposeful when modelling the adoption of technology rather than value. In addition, Mallat et al. (2008) attempted to utilize TAM in their study of mobile tickets in the Helsinki region public transport and discovered that the ease of use and usefulness were not, in fact, statistically significant factors. Thus, TAM method may also not be the best choice for the analysis of value creation in Whim as one of the key features in MaaS is the online platform where customers can pay their travels.

Finally, the chosen method was a survey measuring customer value perception, which contains some aspects of TAM yet is mainly based on the questions from Smith & Colgate (2007) suggestions for measuring customer value in companies. Due to its practical approach, it can be easily adapted for different industries and purposes. For example, Tynan et al. (2014), who studied customer value in the luxury car market, have used Smith & Colgate's (2007) framework as a theoretical basis for their survey.

The construct of the survey is further discussed in the section 3.2. After completing the first version, the survey was tested and adjusted based on the results. First, the initial survey structure was tested with three people. The first idea was to conduct a test survey among Whim customers, yet due to the practical reasons relating to rapidly developed coronavirus situation, the test respondents ended up being people who had no previous experience on Whim. Therefore, the aim was simply to ensure that the questions and statements were formatted in a clear way and were correctly interpreted by the respondents. The test respondents were asked to give feedback after they had responded, and based on this feedback, some of the statements as well as one of the open-ended questions were reformatted. The first test round also confirmed that the response time estimate of 5 minutes was credible.

After the first test round, the survey was modified and additional statements were added. Then, the survey was sent internally at MaaS Global to ensure that the question and

statement formats had remained clear after the modifications, and that all potential value creating factors were included in the survey. After the final edits based on suggestions from MaaS Global, an invitation to respond to the online survey was sent via email to a group of Whim to Go customers in Helsinki region on May 4th 2020. The second target group of Whim Urban 30 customers received their survey invitation on May 7th 2020.

The email included a brief motivation text for the respondents and a link to the survey. According to Butz & Goodstein (1996), one of the main issues in planning a survey is the motivation of the respondents. They suggest that the motivation should focus in customer's benefits in responding to the survey. Hence, an introduction to the survey was written with the emphasis on Whim's aim to develop their services based on their customers' needs and values. In the hope for better motivation as well as to meet the European General Data Protection Regulation (GDPR) requirements, it was also clearly stated both in the invitation e-mail and in the beginning of the survey that in addition to service development, the answers will also be used in a Master's thesis work by an Aalto University student.

3.2. Online survey

In addition to a short intro text (Figure 3), the survey consisted of three parts: background information, value statements and open-ended questions. This section explains the construct of the survey as well as justification for each question or statement included in the survey.
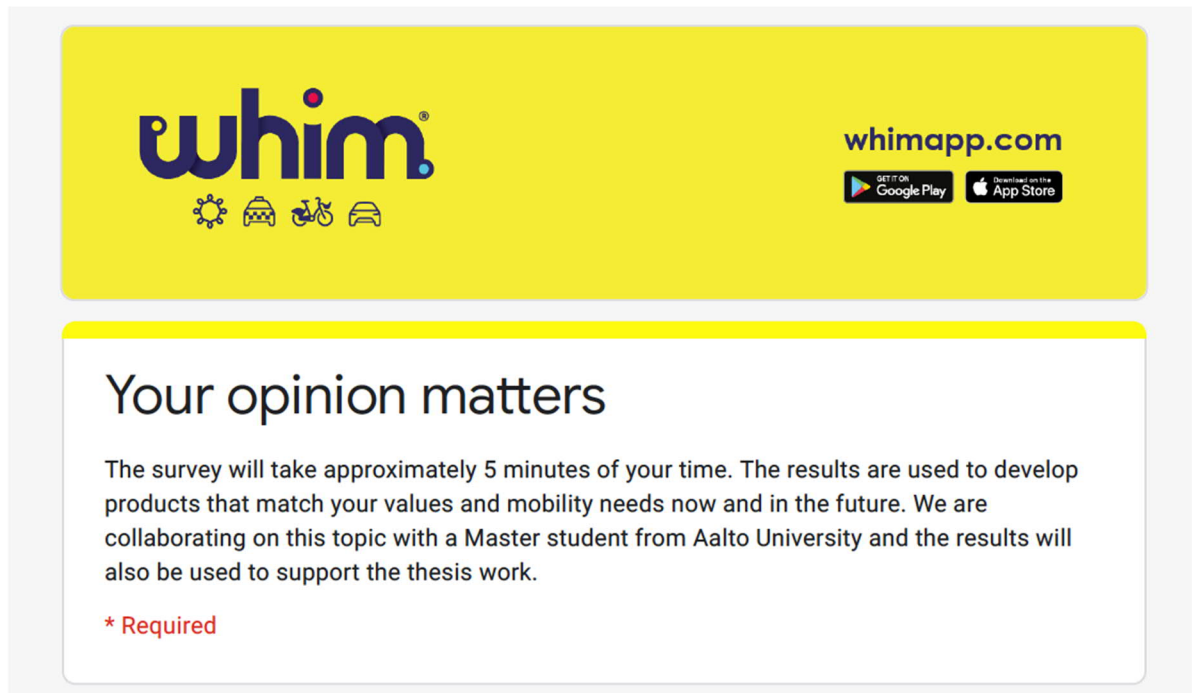
Figure 3: Screenshot from the survey intro

3.2.1. Background questions

To understand the demographic distribution of the respondents, age and gender of the respondent were asked. To ensure adequate response rate as well as to follow the GDPR requirements for minimization of personal data (see Office of the Data Protection Ombudsman, 2020b), the survey was kept as compact as possible and background questions were limited to the bare minimum. In addition to age and gender, the respondents were asked about current ownership or access to a car in the household, their main use purpose of Whim, the length of their customer relationship with Whim and their satisfaction to Whim in general.

To understand the relationship of cars and MaaS and to study the fifth hypotheses: "H$_5$: Customers who do not have access to a car perceive higher value in MaaS than the customers who have access to a car", including a question about car ownership in the household was important. The questions about the length of the customer relationship as well as the overall satisfaction to Whim were added to understand customer value creation process better. As, according to Zeithaml (1988), customers only make a purchase when they perceive there to be value, we can assume that all customer perceive some value in Whim's service. However, the length of the relationship and the satisfaction to the service, although not exact measures, may indicate the amount of value.

With services, but in particular with mobile applications, consumer decision-making process is often impacted by the use context. According to Mallat et al. (2008), the situational factors impact customer's decision of the service or product, but it can also have an impact on the purchasing channel. Koppelman & Pas (1980) presented similar findings regarding travel choice behavior: travel mode choice is, in many cases, impacted more by situational factors than personal preference. Based on this, the question regarding the use purposes of Whim was considered relevant.

3.2.2. Statements

The statements are based on Smith & Colgate (2007) value framework and their market research statement suggestions in Appendix C. In the survey, respondents were asked to evaluate the statement on a 5-point Likert scale, based on their experiences on using Whim. The five points in the scale were the following: (1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree. In the process of formatting the survey, some of the original statements by Smith & Colgate (2007) were included as such, yet most of them were modified to better suit Whim as a company. In addition, the special features of mobility services, mobile apps and MaaS were taken into account.

The formatting of the statements was also contemplated. When researching value creation, the aim is to look for features or service attributes that offer customers something superior, or something they would not otherwise get. For the same reason as Smith &

Colgate (2007) use the word "compete", the questions were carefully formatted so that they include either a comparison to alternatives or to respondent's life when they were not using Whim. The word "compete" was replaced after the questions were presented to test respondents, as the word was found to be confusing. The chosen alternative to the wording was "I like to use Whim because", or whenever it was possible, the comparison was included in the statement by using comparative adjectives or expressions such as "outstanding", "right" or "valuable".

Even though the four main value types were used both in the formatting of the survey and in the analysis, these were not used in the survey design. Instead, for the sake of clarity, the statements in the survey were divided under three main headlines: "Whim's Service Offer", "Whim and my lifestyle" and "Whim as a company". These headlines were considered to be easy to understand to all respondents and they also made the list of statements easier to follow. The order of the statements under each headline was based on the formatting of the statements to make the layout as clear as possible and reduce the required cognitive effort. For example, statements under "Whim service offer" were ordered so that all statements starting with "Whim offers…" were first, followed by all statements starting with "By using Whim…". For the survey layout, see Appendix 1. Next, explanations for individual statements are provided.

Functional/instrumental value

In Smith & Colgate (2007), the suggestions for questions under functional/instrumental value are related to selection of right features and attributes, performance and outcomes, general usefulness and quality as well as technology innovation. Based on these, the following statements were formatted:

- Whim offers the right combination of transportation modes
- Whim offers a valuable mobile app for planning routes
- By using Whim, I get faster to my destination
- Whim offers mobility services that are customized to my needs

All of the statements are modified from the framework to fit the context of MaaS, yet they seek for answers to same issues as the questions in the original framework: Do the services compete by having the right features or superior outcomes? Is the service useful? Does the service work well?

Previous research suggests that the optimal selection of transportation modes is a key factor in adoption of MaaS (Matyas & Kamargianni, 2018; Caiati et al., 2020), therefore justifying the question about transportation modes. The second statement was added to measure whether the mobile app itself can create value to customer. Even though the digital platform is considered to be a crucial part – and an enabling factor – in MaaS (e.g. Jittapriom et al., 2017; Sochor et al., 2016; Kamargianni & Matyas, 2017), one could argue that the role of the platform itself has been overlooked in the existing research. The focus of this statement was on route planning, as in addition to apps like HSL app provided by Helsinki Regional Transport Authority where customers can both plan and pay their travels, MaaS provider competes with general route planning apps such as Google Maps. The aspect of payment was not included in the statement as it would have potentially lead customers to only compare Whim to services that have both features, planning and payment.

The third statement, "By using Whim, I get faster to my destination", could have also been included in the cost/sacrifice value as time can be seen as a non-monetary cost. However, travel time is a key factor in any transportation service (Koppelman & Pas, 1980). In addition to having central role in mobility services, efficiency and saved time are also important for mobile services. According to Kleijnen et al. (2007), time consciousness "is an important psychographic characteristic that should be considered when studying mobile value creation from a consumer perspective." This is particularly interesting in understanding the behavior of MaaS customers, as time-conscious consumers can be more open to new services and can even spend additional effort and most importantly, money, to save time in the future (Kleijnen et al., 2007). For these people, time truly is money. To make the survey as compact as possible, instead of asking separately about the time spent on travelling and time spent on planning and purchasing the ticket, a decision was made to include both aspects to one statement.

Customizability is not included in the original framework by Smith & Colgate (2007). However, based on the research by Sochor et al. (2016) and Transport Systems Catapult (2013), customizability and personalization are among the key benefits of MaaS. This is aligned with Kleijnen et al. (2007) view that in particular in mobile services, user control of the timing and content of the service can create value. Therefore, a statement about customizability of the service was added under the functional/instrumental value.

Experimental/hedonic value

Experimental/hedonic value can be an important source of customer value in services (Smith & Colgate, 2007). The statements relating to experimental/hedonic value in the survey are the following:

- Whim offers outstanding customer experience
- Whim is fun, interesting or exciting to use
- I like to use Whim because it's an innovative company
- I like to use Whim because my friends or family are also using it

The first two statements are directly adapted from Smith & Colgate (2007) suggestions as they are both relevant for any service offering. The second statement is also supported by previous research on MaaS. Some of the respondents of the Ubigo study explained that they joined simply because it was a fun opportunity to test emerging transport innovations such as car sharing (Sochor et al., 2016).

For the same reason, the statement about Whim being an innovative company was included in this section. In the original framework, Smith & Colgate (2007) have actually included technology innovation under functional/instrumental value, most likely because it can reflect how well the technology of the company functions. However, as Sochor et al. (2016) results show, trying new innovations can contribute to the enjoyable user experience.

Lastly, experimental/hedonic value includes social aspect of the service. The question at hand is: does the service enhance social relationships? Whim is not a social platform like Facebook or Instagram and does not facilitate interaction with the other users. However, according to Caiati et al. (2020), social factors can also influence the adoption of MaaS: people are more likely to subscribe to the service if their relatives or friends have already subscribed. Like the statement regarding innovation, this, too, is slightly controversial, as social networks can also create symbolic/expressive value if the use of MaaS would create social status. However, this statement aims to study whether the value in MaaS increases when friends and family use the same purchasing channel for their mobility services. The social meaning is further studied through statements relating to symbolic/expressive value presented next.

Symbolic/expressive value

Creating symbolic/expressive value means that the company can enhance one's self-identity, create personal meaning or facilitate self-expression. In the survey, the statements under this value type are the following:

- By using Whim, I can express my personal values
- By using Whim, I can reduce my carbon footprint
- I like to use Whim because it's a socially and environmentally responsible company
- I like to use Whim because Whim partners with some premium brands
- I like to use Whim because Whim's brand has a strong personal meaning to me
- By using Whim, I can live a healthier lifestyle

The first statement relates to self-expression. According to Smith & Colgate (2007) companies can create value to customer by allowing them to express their personal values. As sustainability is one of the spearheads of MaaS (Karlsson et al., 2016; Sarasini et al., 2017; Utriainen & Pöllänen, 2018), this aspect was also measured separately through additional statements about carbon footprint and responsibility of Whim as a company.

By choosing "premium" or "luxury" cars, people can express their personality or status (Tynan et al., 2014). Alongside with more affordable options, Whim's car rental selection includes cars from brands like Mercedes-Bentz and Lexus. Therefore, a statement was added to measure the role of status and self-expression in MaaS. Another brand-related statement adapted from Smith & Colgate (2007) was also included to measure the meaning of Whim's brand. This statement reflects the value customer can experience if they identify themselves with Whim and find personal meaning in the company or its services.

Lastly, a question about healthier lifestyle was added. Giesecke et al. (2016) have pointed out that the choice of transportation mode, such as city bikes, can reflect a wish for a healthier lifestyle. This again, is a statement that could have been considered to relate to more than one value type. Healthy lifestyle can reduce medical costs and personal risks therefore leading to cost/sacrifice value, and it can also create experimental/hedonic value for those who enjoy the feeling they get from a good workout. However, in the context of this survey, the respondent is most likely reflecting the wording "healthy lifestyle" to their personal values rather than considering the matter more deeply.

Cost/sacrifice value

The price of the service is important factor in the purchasing decision (e.g. Zeithaml, 1988). In addition, customers also consider non-financial aspects such as perceived risk and effort. Based on this, the following statements relating to cost/sacrifice value were added to the survey:

- By using Whim, I can spend less money on mobility
- By using Whim, I can keep better track of track my mobility costs and behavior
- By using Whim, I get more reliable transportation services
- By using Whim, I get safer transportation services
- I like to use Whim because Whim values my privacy
- Whim is very easy to use compared to other mobility apps
- By using Whim, I can be more flexible in my mobility behavior

As Sochor et al. (2016) stated, MaaS should not increase individual's mobility costs unless the other service attributes provide significant improvement for the currently used mobility services. Giesecke et al. (2016) also see potential in MaaS in creating "price-worthy" mobility, which is supported by Hietanen & Tinnilä's (2017) observation that in Finland, owning and using a private car costs on average around 5000 euros, which is almost four times as much as the yearly spend on public transport. This implies that giving up the private car and changing to public transport driven MaaS can create significant savings for the user. Whim is currently providing competitive pricing, and the statement also helps to understand whether the customers have marked this. Whim's Urban 30 packages, which includes public transport in Helsinki region, have the pricing aligned with HSL (Helsinki Regional Transport Authority), which means that the monthly costs are between 59,7€ and 139,7 euros, depending on the selected travel zone. (MaaS Global, 2020c) In addition to the public transport ticket, city bikes are included in the package, therefore making the combined cost of both services lower than when customer purchases them individually.

The next statement about tracking costs and mobility behavior is based on Sochor et al. (2016) findings from the Ubigo trial. According to some participants, the trial allowed them to assess their own travel behavior and Ubigo helped them to better follow their overall spend on travel (Sochor et al., 2016).

Reducing psychological and physical risks are important aspects of cost/sacrifice value. The statements regarding safety and reliability were added as they both have a strong impact on travel preferences (Koppelman & Pas, 1980). According to Mallat et al. (2008), trust and risk are also important factors in electronic and mobile services as mobile services handle personal data such as credit card and phone numbers. Today, use and sharing of other types of personal data, like GPS location, view history and search history, has significantly increased and consumers are becoming even more concerned about disclosure and misuse of their personal information (Andreassen et al. 2015). With the introduction of Europe's General Data Protection Regulation (GDPR), consumers nowadays are also likelier to be aware of their rights regarding their data. Hence, if company is vocal about consumer privacy, it could potentially create value for the customer by providing the feeling of

psychological safety as well as feeling of justice. Therefore, the statement about privacy was added.

The second last statement in this value type was about ease of use, which Smith & Colgate (2007) have also included in their framework. The cognitive effort is also highlighted by Kleijnen et al. (2007), who see it as a relevant factor for the adoption of mobile services. By reducing cognitive effort, the company can speed up the adoption of their service. Lastly, a statement about flexibility was added as it's another key factor in MaaS (e.g. Goodall et al. 2017). This was confirmed in the Ubigo trial. The participants felt that Ubigo helped them to find the best fit for their travel needs depending on the situation and made them feel less "locked" to one or two transportation modes. Also, the trial provided a low-risk opportunity to try a short-term car leasing, which was of high interest in those households who didn't own a car. (Sochor et al., 2016)

3.2.3. Open-ended questions

In the end of the survey were two open-ended questions with a focus in value creation. In addition, the last question allowed customer to give open feedback. The open feedback answers are not used in this research.

- What is your main motivation to use Whim?
- Services in general create value for me when…
- Do you have any additional thoughts about Whim that you would like to share with us?

The first open-ended question about customer's main motivation to use Whim was added to shed light to customers' priorities. As an alternative option for identifying this, a question that asked customers to rank statements based on their preference was considered. However, asking this through one open-end question was considered to be more time-efficient. In addition, it allowed room for customer's own interpretation and provided a chance to identify additional sources of value that the statements hadn't covered.

The second open-ended question about customer's interpretation of value in general was added to understand the value perceptions of Whim's customer better. According to Zeithaml (1988), value can be interpreted in four main ways: as low cost, a cost-benefit trade-off, a price-quality trade-off or simply as the benefits of the service. Hence, the question can potentially help to identify price-sensitive customers and, on the other hand, those to whom price is not a key issue in decision-making.

3.3. Research ethics

Traditional research ethic principles include consent, risk, privacy, anonymity, confidentiality and autonomy (Buchanan & Hvizdak, 2009). According to Buchanan & Hvizdak (2009), with online surveys, these issues are present as ever, yet in addition, there are emerging concerns related to data storage and security that should also be addressed. In addition to following these ethical principles, the survey design and handling of survey data were conducted following European Union's General Data Protection Regulation (GDPR).

Firstly, GDPR requires that gathering of personal data is based on a specific, legal purpose and that the respondents should be made aware of this purpose (Office of the Data Protection Ombudsman, 2020a). To meet the GDPR requirements set for both academic research and the requirements for private companies, the use purpose of the survey data was clearly stated both in the invitation email and the survey intro (Figure 3). Also following GDPR, the data is not stored after the use purposes stated in the survey intro have been fulfilled. This simultaneously ensured that the ethical principle of consent was met.

Also according to GDPR, data gathering for academic research purposes should always aim for minimization of personal data (Office of the Data Protection Ombudsman, 2020b), which is aligned with the ethical questions relating to risk, privacy, anonymity and confidentiality highlighted by Buchanan and Hvidzak (2009). Minimization of personal

data was therefore kept in mind throughout the process of designing the survey. The demographic questions were minimized to only include gender and age and the overall design aimed to ensure anonymity as no further questions were asked that could have together been considered as personal data.

The survey settings were also defined so that the answers were not linked to any names or email addresses. This was done to make sure that the pseudonymization, which ensures that the data can't be linked to an individual without additional complementing information, was made as early as possible. This is also a GDPR requirement (Office of the Data Protection Ombudsman, 2020a). The survey was constructed so that the even full anonymity would have been possible. However, the survey included open-ended questions where the respondents could have potentially revealed information that could have been considered personal. Therefore, as often is the case with academic research, the results are considered to be pseudonymized rather than anonymized (Office of the Data Protection Ombudsman, 2020b).

Lastly, the ethical principle of autonomy was also taken into account. Although most of the survey questions were set as mandatory hence reducing the level of autonomy for respondents, the survey was completely voluntary and the respondent was able to exit the survey without sending the results. Also, there were no financial incentives or other factors that could have potentially made the respondent feel obliged to answer the survey.

3.4.   Limitations regarding the sample

The survey was sent to approximately 2000 Whim to Go customers and 2000 Urban 30 customers and received 257 responses in total. Whim to Go customers gave significantly less responses: only 24% of the respondents were Whim to Go customers, who are using the pay-as-you-go option of the service. From 61 Whim to Go answers, 3 were in English and 58 in Finnish. The remaining 76% the respondents were Urban 30 customers, who are subscribed to monthly public transportation and city bikes as well as get discounted price

for car rental and four taxi trips. From the 196 Urban 30 responses, 19 were in English and 177 in Finnish.

The survey therefore allows comparison of the two different user groups: pay-as-you-go and mobility bundle customers. However, it should be noted that the two groups may be somewhat overlapping. Due to the social distancing recommendations given by the Finnish government to prevent the spread of coronavirus, the use of public transport has significantly decreased when the survey took place in May 2020. In April 2020, Helsinki Regional Transport Authority (HSL) had reduced bus services by 20%, while the total number of public transportation journeys faced a drastic, over 70% decrease from February 2020, when the virus hadn't yet started to spread in Helsinki region (HSL, 2020). The situation may have impacted Whim's customers as well, leading some of them to change their plan to better fit their current travel needs.

As the survey was only sent to Whim to Go and Urban 30 customers, the results do not include views of customers of other Whim packages, such as Whim Weekend or Unlimited. This poses a limitation for generalizing the results to all Whim's customers. In addition, all online surveys are prone to self-selection bias as some individuals are more likely to respond to surveys than others (Wright, 2005). According to Wright (2005), some people are in general more likely to respond to any survey. In addition, surveys send by companies can also attract users from both extremes: those who are very satisfied with the survey and those who are very unsatisfied. Due to this, any generalization of survey findings should be made with caution.

4. Data analysis and results

The analysis of the survey responses was conducted using IBM SPSS Statistics 26. The following section consists of the analysis of the data, with the aim of answering the following research questions presented in Chapter 1:

Research question: How can MaaS create customer value?

1. Supporting question: What types of customer value can MaaS create?
2. Supporting question: What are the main sources of customer value in MaaS?

Before proceeding to the analysis, tests were run to detect normality in data. Saphiro-Wilk tests confirmed that the data was not normally distributed in any of the variables. This information was later used for choosing the appropriate methods for testing for statistical differences between different customer groups, such as Whim to Go and Urban 30 customers and customers in different age groups. In addition, Harman's single factor test was also run to confirm that there is no common method bias, which could, for example, imply respondents' lack of cognitive effort in answering. The data passed the test with highest variance explained by one variable being 44%, therefore slightly under the recommended threshold of 50%. This confirmed that there is no significant common method bias.

The chosen method for analyzing differences between two samples was Mann-Whitney U test, which is commonly used for Likert scale data and allows the comparison of two statistically independent samples where the population is not normally distributed. As an alternative option, *t* test was also considered, however, differences between the two in measuring 5-point Likert scale data are minor and Mann-Whitney U can be a safer choice when the data is relatively skewed (de Winter & Dodou, 2010), as was the case for the data in question. For the comparison of more than two groups, the chosen test was Kruskall-Wallis H -test, which is also suitable for non-normally distributed data with relatively small sample size.

The rest of the chapter focus on the analysis and findings from the data, starting with describing the use of Whim among the respondents. From there, the chapter proceed to discuss the analysis of the statements, both individually and by value type. Next, the results from Mann-Whitney U & Kruskall-Wallis tests, which were run to detect differences between perceived value in different customer groups, are discussed in more detail. To conclude the analysis, findings from the open-ended questions are explained.

To recap, the analysis aims to test for the following hypotheses presented earlier:

H_1: Functional/instrumental and cost/sacrifice value have key roles in customer value creation in MaaS

H_2: Hedonic/experimental value and symbolic/expressive value also contribute to positive customer experience in MaaS

H_3: Mobility bundles increase the perceived value in MaaS

H_4: Alongside with the optimal selection of transportation alternatives, MaaS platform can create value to customers

H_5: Customers who do not have access to a car perceive higher value in MaaS than the customers who have access to a car

4.1.   Demographics

The sample consisted of 257 responses, of which 24% came from Whim to Go customers and 76% from Urban 30 customers. Regarding demographics, there were slightly more men in the respondents: 61,5% of the respondents were male, 37% were female and 1,5% other or preferred not to say. The respondents represented a variety of different ages from 19 to 84. Running Saphiro-Wilk test for normality confirmed that the age, rather expectedly, was not normally distributed. The average age of the respondents was under 40, with majority of the respondents aged between 20 and 50. The sample slightly differs from the Finnish population distribution: both women and people over 50 are underrepresented in the sample (Statistics Finland, 2019).

Those who did not have a car in their household were majority: only 28 per cent of the respondents owned or otherwise had access to a car in their household. As, according to Traficom (2020), there are on average 425 cars per 1000 people in the Uusimaa region where the survey was conducted, the respondents were less likely to own a car than an average citizen in the region. A relatively high share of users who don't have access to a car was expected, as earlier research suggests that early adopters of MaaS are likely to be public transport users rather than car owners (Caiati et al., 2020).

4.2.   Use of Whim

This section aims to create a picture of overall use of Whim by utilizing basic descriptive statistics in SPSS. The questions following the demographic questions focused on the use purposes of Whim, respondent's overall satisfaction and the length of customer relationship.

The results imply, firstly, that the respondents use the app flexibly to their needs: less than 1/5 of the respondents stated that they only use Whim for one type of travel, such as commuting. Over half of the respondents stated that they used Whim for all their travel needs. However, small number of respondents who use Whim only for one type of travel also means that the initial idea of comparing different use purposes would not be meaningful.

Secondly, the respondents in general are satisfied with Whim's services. More than 80% considered the services either satisfactory or very satisfactory and less than 6% of the respondents were unsatisfied. Thirdly, the results also show that majority, more than 75% of the respondents, have been Whim's customers for more than a year. As Whim has only been operating for a couple of years, the sample therefore mainly consists of those who can be considered as long-term customers.

The implications of the distributions of responses regarding satisfaction and length of customer relationship are two-fold. Based on the distributions, we can expect that the majority of the respondents do perceive value in Whim as they have been customers for a

while and consider the service to be satisfactory or very satisfactory. Therefore, their responses to the statements and open-ended questions are likely to reflect value in Whim and potentially value in MaaS in general. With a sample consisting of mainly unsatisfied customers of those with limited experience on using the service, this wouldn't necessarily be the case. However, the uneven distribution of the two questions also poses a risk that the results do not, for example, reflect the value the newer customers see in Whim. However, this should not be considered as a significant issue as the focus is on identifying potential sources of value rather than in exact quantification of the findings.

4.3. Statements by value type

This chapter discussed the comparison of value statements. Before proceeding to the analysis of individual statements, Kruskall-Wallis H test was run to discover whether the respondents' responses to statement differed given their overall satisfaction and length of customer relationship. This was made to ensure that that the chosen statements succeeded in reflecting customer value. The null hypothesis for Kruskall-Wallis H was that the distribution of the tested statement is the same across all categories. Although the test didn't find the length of customer relationship to impact the results, for overall satisfaction, the test confirmed that the null hypothesis can be rejected for all statements (p-value less than 0,001), thus the statements varied depending on the given overall satisfaction score.

To study whether the statements succeeded in representing the four main value types, a factor analysis was conducted (See Appendix 2). The analysis was able to find common factors that, when combined, explain 63% of the variance. Both first and third factor consisted mainly of statements relating to symbolic/expressive value but also some to experimental/hedonic value and cost/sacrifice value whereas second and fourth factor included statements mainly relating to functional/instrumental value and to cost/sacrifice value.

The factor analysis supports the assumption that the statements reflect the value types, although some value types may also overlap. This was expected, as some service

attributes, such as flexibility, time and costs, can be considered as either cost/sacrifice value or functional/instrumental value, depending on the approach. Similar issues apply to some statements under symbolic/expressive and experimental/hedonic value, such as innovativeness and healthy lifestyle. This is explained in more detail in section 3.2.2.

To better understand the types of value and the service attributes through which Whim can create value to its customers, means, standard deviation and distribution of answers for the statements were compared. These findings are discussed in in the next part of this section. All 257 respondents have answered the statements with the exception of the statement "By using Whim, I spend less money on mobility", for which the number of respondents was 196 as the statement was only included in the Urban 30 customer survey. In addition to looking at individual value statements, the statements were also grouped by the four main value types to allow comparison between them.

Functional/Instrumental value

- Whim offers the right combination of transportation modes
- Whim offers a valuable mobile app for planning routes
- By using Whim, I get faster to my destination
- Whim offers mobility services that are customized to my needs

Functional/instrumental value had the highest mean when comparing the four main value types, which strongly implies that, as expected, getting from point A to point B is key issue also in MaaS. When looking at the individual statements, "Whim offers the right combination of transportation modes" received the highest mean. This statement was also the one where respondents were the most unanimous, as it had the lowest standard deviation of all variables and nearly 90 per cent of the respondents agreed or strongly agreed with the statement. Statements "Whim offers mobility services that are customized to my needs" and "By using Whim, I get faster to my destination" also received above average means with more than half of the respondents agreeing with the statement and only few respondents either disagreeing or strongly disagreeing.

The last of the four statements under functional/instrumental value was about the value of Whim's mobile app in planning routes. This statement had one of the lowest means of all the statements, and around 1/3 of the respondents either disagreed or strongly disagreed with the statement. This may be due to the fact that Whim's route planning capabilities fail to meet customer's expectations or desires. However, alternative explanation would be that people travel familiar routes and do not need route planning.

Experimental/Hedonic value

- Whim offers outstanding customer experience
- Whim is fun, interesting or exciting to use
- I like to use Whim because it's an innovative company
- I like to use Whim because my friends or family are also using it

The overall mean of experimental/hedonic value was slightly lower. This value type was also the most controversial among the respondents. The statement "I like to use Whim because it's an innovative company" was, rather surprisingly, the statement with the second highest mean when comparing all statements. The statement "Whim offers outstanding customer experience" also ranked high when comparing means of all statements.

On the other hand, the statement " I like to use Whim because my friends and family are also using it", which aimed to explain the potential social aspect respondents may associate with Whim, ranked the lowest of all statements and more than half of the respondents disagreed or strongly disagreed with the statement. However, it should be noted that this statement also had the highest standard deviation of all the statements and more than 20% still agreed with the statement. Rather than strongly implying that the social aspect would be irrelevant to value creation in MaaS, the results could also be explained by the low adoption rate of Whim among respondents' friends and family.

Symbolic/Expressive value

- By using Whim, I can express my personal values

- By using Whim, I can reduce my carbon footprint

- I like to use Whim because it's a socially and environmentally responsible company

- I like to use Whim because Whim partners with some premium brands

- I like to use Whim because Whim's brand has a strong personal meaning to me

- By using Whim, I can live a healthier lifestyle

Symbolic/expressive value had the lowest mean of the four main value types, yet the statements relating to environment and responsibility ranked relatively high. The statement "By using Whim, I can reduce my carbon footprint" had the highest mean in this value type. Around half of the respondents agreed or strongly agreed with the statement and less than 20% disagreed. In the statement "I like to use Whim because it's a socially and environmentally responsible company", around half of the respondents were neutral and around 30% either agreed or strongly agreed.

The statements "I like to use Whim because Whim partners with some premium brands" and "I like to use Whim because Whim's brand has a strong personal meaning to me" were in the bottom three of all statements when ranked by means. However, it should be noted that these statements also had above average standard deviation, and more than 20% of the respondents agreed with the statement regarding Whim's brand and almost 30% with the statement regarding premium partners.

Cost/Sacrifice value

- By using Whim, I can spend less money on mobility

- By using Whim, I can keep better track of track my mobility costs and behavior

- By using Whim, I get more reliable transportation services

- By using Whim, I get safer transportation services

- I like to use Whim because Whim values my privacy

- Whim is very easy to use compared to other mobility apps

- By using Whim, I can be more flexible in my mobility behavior

Closely following functional/instrumental value, cost/sacrifice value was perceived to be the second important value type when comparing the means. The statement "By using Whim, I spend less money on mobility" was excluded from the comparison as it was only asked from the Urban 30 customers. However, that particular statement alone had the highest mean of the cost/sacrifice value statements and third highest mean of all statements.

All of the statements under this value type received rather similar frequencies and the means ranged between 3 and 4. The statement with the second highest mean in this value type was "By using Whim, I can be more flexible in my mobility behavior" and the lowest "By using Whim, I can keep better track of track my mobility costs and behavior". The standard deviations were also quite similar and generally lower than in other value types.

4.4. Perceived value impacted by gender and age

To better understand the value perceived by the respondents, the impact of gender and age on the statements was also tested. First, the differences on perceived value by male and female respondents was tested using Mann-Whitney U, which is suitable for skewed data. The results showed that responses from men and women statistically differed from each other in the statements "Whim offers the right combination of transportation modes" and "I like to use Whim because Whim partners with some premium brands" (p-value < 0,05). In general, women were more satisfied with the modes of transport. Although more than 80% of both men and women agreed with the statement, the share of strongly agreeing was around 20 percentage points higher among women. Men, on the other hand, seemed to value premium partners more. More than 1/3 of the male respondents but only around 10% of the female respondents agreed or strongly agreed with the statement regarding premium brands. The differences were only tested between men and women because the number of respondents who stated their gender as other or did not want to specify was too small to allow meaningful comparison.

Kruskal-Wallis H –test revealed that age also impacted the value perceived by customers. For the analysis, the respondents were divided into 5 age groups (19-29,30-39,40-49,50-59,60+). The test found statistically significant differences particularly when comparing the two older age groups to the others.

Older respondents generally gave higher scores in value statements, particularly in those relating to experimental/hedonic value and symbolic/expressive value. For example, in the statement "Whim is fun, interesting or exciting to use" among the age groups 50-59 and 60+, the share of those agreeing or strongly agreeing was around 15 percentage points greater than in all age groups. The impact of age on symbolic/expressive value and experimental/hedonic value was also tested with Kruskal-Wallis H for the grouped statements, and this test confirmed that the distribution of both of the two value types differed in the older age groups. Yet, people over 50 also found Whim to be practical. In the statement "Whim is very easy to use compared to other mobility apps", almost the entire 60+ age group agreed or strongly agreed with the statement, and the age group 50-59 also agreed or strongly agreed with the statement clearly more than the younger respondents.

In the statement "I like to use Whim because Whim's brand has a strong personal meaning to me", older respondents also agreed significantly more. The share of those agreeing or strongly agreeing was twice as high among the people over 50 than in the total sample. In the statement "I like to use Whim because Whim is a socially and environmentally responsible company", people over 50 also agreed significantly more than the average respondent.

The findings regarding age are supported by Andreassen et al. (2015). In their study on service trends, they identified three key customers segments. One of them was adults between 50-70 years old who have significant disposable income and who are driven by search for quality of life. They seek for pleasurable experiences and active lifestyle but are also interested in saving time and prioritizing and eliminating tasks. It is possible that the early adopters of Whim in this age group belong to this this segment.

Transport Systems Catapult (2016) suggest that MaaS is most likely to attract millennials first. There were no clear trends among the younger respondents, which, to speculate, may be due to the fact that younger generations are more comfortable with trying different mobile apps and the younger users may represent variety of customer segments. This is also supported by the survey results as the respondents from the youngest age group, 19-29, had generally higher variance in the responses for each statement. Identifying their more diverse needs may therefore be more challenging.

4.5.   Main motivation to use Whim

Results from open-ended question regarding main motivation to use Whim revealed interesting insights on the preferences and value types. The quality of answers was good: less than 3% provided no answer, and many of the respondents answered with a full sentence. The analysis was conducted by categorizing each response to one or multiple categories based on key themes in the answer. Qualitative analysis showed that the key motivations to use Whim for both Urban 30 and Whim to Go customers included price, ease of use and convenience, flexibility and the selection of different transportation modes.

Affordability seemed to be slightly more important for Whim to Go customers. Words relating to money were explicitly mentioned by around 1/3 of the Whim to Go respondents, and only 1/4 respondents referred to ease of use. Urban 30 customers seem to put slightly more emphasis on ease of use and convenience as the numbers were the other way around: around 1/4 mentioned price whereas more than 1/3 referred to the ease of use and convenience of the service in general. In addition to costs and ease of use, the two groups did not significantly differ.

Selection of transportation modes was important for both customer groups. This was expected as the statement regarding the right combination of transportation modes also received the highest mean. Around 20% of the respondents were motivated by getting access to all transportation modes they need. From the remaining answers, 40% explicitly

named one transportation mode or combination of two or three among the main motivations. Most responses that named a specific transportation mode, such as taxis, city bikes or public transport, reasoned it with a good pricing, but some also emphasized reliability and ease of use in purchasing tickets to that specific mode.

Although city bikes and public transportation tickets also received number of mentions, taxis had a notably high number of mentions. One reason for this may be the recent change in the number of free or discounted taxi trips included in the plans. Yet, even with the potential bias, the findings imply that alongside with public transportation, customers expect access to flexible and individualistic transportation modes.

Some of the respondents mentioned that Whim is easier to use than Helsinki Regional Transport Authority's own HSL-app and some gave positive feedback for Whim's customer service. Lastly, a small group of respondents, chose to emphasize that they want to support a new, innovative service. One respondent defined their main motivation to use Whim as follows: "Whim represents the kind of future I want to support".

Perhaps rather surprisingly, environment was not mentioned once as the main motivation to use Whim even though sustainability is considered to be a very important aspect in MaaS (Sarasini et al., 2017) and the respondents generally agreed with survey statements relating to environment. Topics relating to symbolic/expressive value in general were missing from the responses, with one exception: innovativeness. Although originally included under experimental/hedonic value, open-ended responses relating to innovativeness actually suggested that respondents want to support innovative company because its aligned with their personal values. This would mean that innovativeness of the company may, in fact, leads to symbolic/expressive value.

Overall, the main motivations to use Whim are practical and the customers seem to be looking for solutions that make their lives easier and help spend less money and time on mobility. This implies that the functional/instrumental and cost/sacrifice value are very important in developing MaaS. However, some customers also expected or hoped aspects relating to symbolic/expressive value and experimental/hedonic value.

4.6.   Perceptions of value in services

The second open-ended question, "Services in general create value for me when…" was added in order to measure the key aspects respondents consider when they choose services. It also aimed to measure price sensitivity. However, the responses to this question showed that the question left room for interpretation, leading to inconsistent results. Although some respondents had interpreted the question as intended and described their overall perception of service value, many clearly responded with only Whim or mobility services in mind. Others simply stated that they do not understand the question.

The results indicate that the respondents expect ease of use, reliability and functionality from services, particularly from those relating to mobility. Expressions such as "easy" and "ease of use" were mentioned more often than others. Interestingly, issues relating to economy were mentioned less often than in the question regarding main motivation to use Whim. However, further analysis of the responses would not be meaningful, as the interpretations and contexts of individual answers were not clear.

4.7.   Bundles vs. pay-as-you-go

Both Caiati et al. (2020) and Matyas & Kamargianni (2018) have suggested that mobility bundles would offer more for customers than the pay-as-you-go MaaS. The study on Whim's customers allowed the comparison of the value perceived in these two groups, and therefore the following hypothesis, "H_3: Mobility bundles increase the perceived value in MaaS", was formatted.

Mann-Whitney U test showed that Whim to Go and Urban 30 groups differed from each other in some statements and overall satisfaction. Firstly, Urban 30 customers were more satisfied with Whim's service in general. Regarding individual statements, Urban 30 customers agreed more with the statements "Whim offers the right combination of transportation modes", "Whim offers mobility services that are customized to my needs", "By using Whim, I get more reliable transportation services", "By using Whim, I get safer

transportation services", "By using Whim, I get faster to my destination" and " I like to use Whim because it's socially and environmentally responsible company". Except for the last, all of the statements relate to functional/instrumental and cost/sacrifice value. Mann-Whitney U test for statements grouped by value type confirmed that the distribution of functional/Instrumental value differed statistically significantly (p-value < 0,01) between the two customer groups.

The first explanation for the results would be that the value in MaaS would increase through mobility bundles, which would support H_3. However, it's possible that customers who purchase mobility bundles already see more value in MaaS and therefore are more willing to commit to monthly subscription. This, on the other hand, would contribute to H_1: "Functional/instrumental and cost/sacrifice value have key roles in customer value creation in MaaS", as there were significant differences between the perceived functional/instrumental between Whim to Go and Urban 30 customers.

Lastly, the coronavirus situation may have affected the travel habits of the respondents making them switch from their usual plan to a plan that better fits their travel needs. This further weakens the reliability of the results. Therefore, the findings do not provide adequate support for H_3.

4.8. MaaS and car ownership

This section focuses on the hypothesis "H_5: Customers who do not have access to a car perceive higher value in MaaS than the customers who have access to a car". In the sample, 28% either owned a car or had one in their household. With Mann-Whitney U, this group was compared to respondents who didn't have access to a car.

Those who didn't have access to a car agreed slightly more with the statement regarding overall satisfaction to Whim. The share of those strongly agreeing was more than 10 percentage points higher among those who did not have access to a car than among those who did. Other statements revealed by Mann-Whitney U test to differ significantly in the distribution of the responses were "By using Whim, I get more reliable transportation

services" and "By using Whim, I spend less money on mobility", both of which were more often agreed by those not having access to a car.

According to Lyons et al. (2019), even if people would not be willing to give up private cars altogether, MaaS could help households to give up their second cars. To test the difference between owning a car and having access to one in a household, Kruskall-Wallis H test was also run for three groups: own car, household car and no car. The distribution of overall satisfaction did not statistically differ between the three groups, yet the distribution of the statements "By using Whim, I spend less money on mobility" and "By using Whim, I can express my personal values" did. Regarding money, those without any access to a car agreed most with the statement, yet the share of agreeing or strongly agreeing respondents was also almost 30 percentage points higher among those who personally owned a car, than among those who had access to a car but didn't own one. These results provide an interesting insight that using Whim alongside private car ownership could help save on overall mobility spending. Also, regarding personal values, those who owned a car agreed the least with the statement, whereas the share of strongly agreeing with this statement was, in fact, the highest among those who had access to a car but didn't own one. To speculate, this could mean that some of the respondents want to use more environmental-friendly or innovative mobility services, even if the people they live with choose to own a car.

To conclude, the results suggest that those who don't have access to a car can perceive more value in MaaS as they are slightly more satisfied with the service and are likelier to also perceive the service to help them save money and get more reliable mobility services. Also, those who have a car in their household but do not personally own one may use Whim to express their personal values. However, the data doesn't strongly support that MaaS could make people give up their cars. There were no statistically significant differences between the groups in the distributions of the four main value types, and the differences in the individual statements were rather small. In addition, those who owned a car felt that they save money by using Whim, and around 20% of them considered Whim's overall service very satisfactory. This may imply that some

people want to use Whim as a complement for car ownership rather than a substitute.

Therefore, the findings do not provide adequate support for H$_5$.

5. Discussion

Mobility services have traditionally been perceived to create functional/instrumental value and cost/sacrifice value with the focus in getting the customer from point A to point B as quickly, safely and affordably as possible. However, MaaS can challenge this thinking, as, in addition to providing the right selection of transportation modes, it can potentially create value through the digital platform that improves the customer experience. This chapter discusses the value creation process in MaaS, as well as the final findings relating to unanswered hypothesis H_1, H_2 and H_4.

5.1. Types of customer value in MaaS

Customer value can be divided into four main types: functional/instrumental, experimental/hedonic, symbolic/expressive and cost/sacrifice. This section ties the findings relating to the types of value in MaaS and answers the first two hypothesis presented in section 2.5.

The results from the survey support the first hypothesis "H_1: Functional/instrumental and cost/sacrifice value have key roles in customer value creation in MaaS", which is based on earlier studies on MaaS and mobility services. Based on the Ubigo trial, Sochor et al. (2016) identified four practical aspects that create "added value" in MaaS: economy, flexibility, improved access and simplicity. In the survey among Whim users, followed by the right selection of transportation modes, the statements relating to costs of using the service, flexibility, customization and ease of use all received above average scores from the respondents. These were also most mentioned among the main motivations to use the service. As Kopperman & Pas (1980) found, issues relating to functionality, costs and risks are also critical in customer decision-making between traditional transportation modes such as cars, public transport and even walking. Therefore, many of the mobility service providers focus their resources in excelling their operational capabilities. If the companies are not able to meet the customer's expectations of travel time and safety, no desired or unanticipated value is likely to compensate that. Same can be expected from Maas.

The second hypothesis, "H$_2$: Hedonic/experimental value and symbolic/expressive value also contribute to positive customer experience in MaaS", was also supported. The statements relating to innovativeness and customer experience were among the five statements with highest mean, clearly implying that the experience of using Whim has significance to the customers and can therefore create value. Although not having been raised among the main motivations, statement relating to carbon footprint was also scored relatively high, and environmental and socially responsibility was perceived to be important in certain age groups. This implies that perceived sustainability of the service can also contribute to the creation of symbolic/expressive value. Similarly, men and older respondents more often strongly agreed with the statement "I like to use Whim because Whim partners with some premium brands" and older respondents with "Whim is fun, interesting or exciting to use". These findings support what Tynan et al. (2014) discovered when studying luxury car markets. According to them, customers' expectations regarding functional/instrumental value should be met, yet mobility services can also create symbolic/expressive value and experimental/hedonic value through experiences and expression of personality and status.

5.2. Sources of customer value in MaaS

In the suggested framework, the five sources of customer value presented by Smith & Colgate (2007) include products, information, interactions, environment and ownership/possession transfer. To assess the fourth hypothesis: "H$_4$: Alongside with the optimal selection of transportation alternatives, MaaS platform can create value to customers", presenting the value sources in the context of MaaS is needed. However, as already mentioned in Chapter 2, particularly in mobile services, the sources can overlap and should therefore be used as a support for understanding the value creation process rather than as a strict frame.

Firstly, *information* as a source of value is usually common for all services, and MaaS is not an exception. This source of value consists of marketing, communications and instructions for using the service. All advertising and work on public relations and brand management can contribute to this value source.

According to Smith & Colgate (2007), the second value source, *products,* can be either physical or intangible. For Whim, defining the products can be difficult. On the one hand, entire app can be seen as a product. Yet, based on responses from open-ended questions in this study, as well as earlier research on the role of transportation modes and bundles in MaaS (e.g. Caiati et al., 2020; Matyas & Kamargianni, 2018; Sochor et al., 2016), what people are first and foremost paying for in MaaS are the subscriptions packages and individual trips. Therefore, this study assesses them as the products in MaaS.

In mobile services where the app plays a key role, the three remaining sources of value are likely to overlap. The third value source, *Interactions* consists of customer service and interactions with the systems (Smith & Colgate, 2007). Interactions in Whim therefore include active processes the customer engages in when using the app: planning the journey, making the purchase and using the app to access the chosen mode of transport. Although Whim's partners provide a variety of different environments for travelling, Whim app can still be considered as the main *environment*. It's impacted by the design of the app and its user interface, which makes it linked with the value source of interactions. Lastly, *ownership/possession transfer* can be considered to include the payment of an individual trip or monthly subscription and the ticket the customer receives for the trip. Ownership/possession transfer also takes place in-app and is therefore impacted both by environment and interactions.

The sources of value in Whim are likely to reflect those of any MaaS provider. Earlier literature emphasizes that MaaS takes place on a digital platform (e.g. Jittapriom et al., 2017; Sochor et al., 2016; Kamargianni & Matyas, 2017), which in practice is likely to be a mobile app like Whim. Thus, any MaaS consists of the same core elements as Whim regarding environment, interactions and ownership/possession transfer: route planning, payment and ticket system that allows access to transportation modes. The products are also likely to be similar across different MaaS schemes. Caiati et al. (2020) Matyas & Kamargianni (2018) suggest that bundles will play a key role in MaaS. Yet, pay-as-you-go option can still co-exists as some customers may prefer that option for example when renting a car on rare occasions.

5.3.   Customer value in MaaS

In this section, the knowledge gained from assessing both sources of value and types of value are combined. Based on the framework presented in section 2.3, Figure 4 finally presents the construct of value creation process in MaaS.
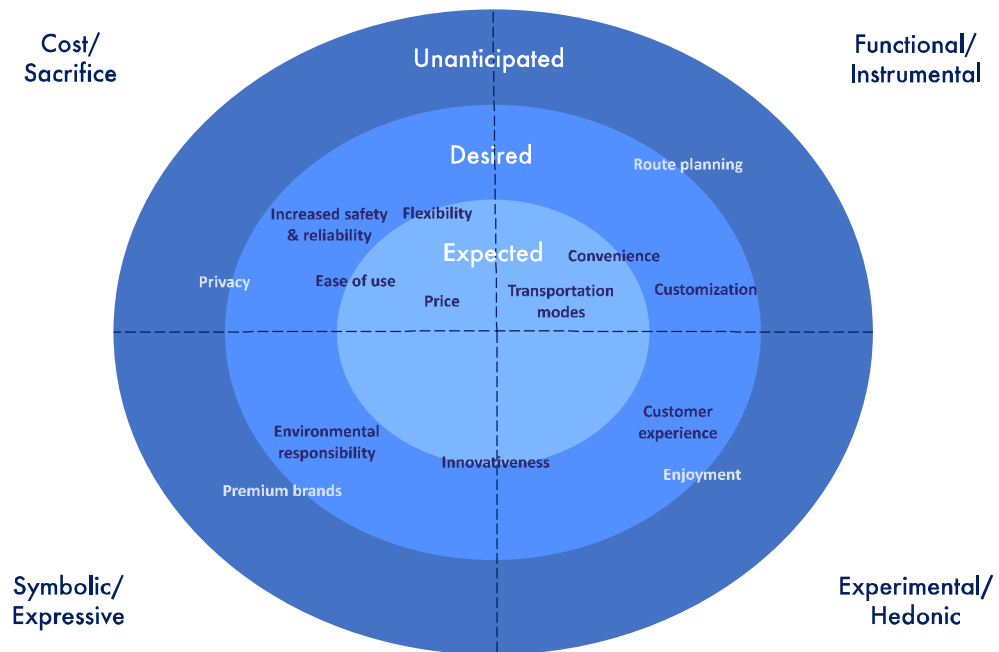

Figure 4: Value creation in MaaS

The layers portray the three levels of value presented by Butz & Goodstein (1996), whereas the four lines divide the value to four main types by Smith & Colgate (2007). The words within the graph describe different service attributes, and their locations depends on customer's expectations and hopes as well as the main type of value they represent. It should also be noted that although the original framework included also the sources of value to support the analysis, these have been excluded from the Figure 4, as explicitly stating source of each service attribute would not always be possible, neither would it create an accurate depiction of the process.

In the core layer of the graph are the service attributes that contribute to expected value. Both transportation modes and price were highlighted both in the statements and open-

ended questions. As discussed earlier, these attributes relate to functional/instrumental and cost/sacrifice value and are derived mainly from the products.

Flexibility, convenience, ease of use and innovativeness are located in the intersection of the expected and desired value. The first three attributes are highlighted in the earlier literature on MaaS, and also received mentions when the respondents described their main motivations to use Whim. People in general also agreed with the statements regarding these attributes, yet not as strongly as with those relating to price and transportation modes.

The fourth attribute in the intersection of expected and desired value is innovativeness, which is also located in the intersection of symbolic/expressive value and experimental/hedonic value as it can potentially reflect both (see section 4.5). This attribute had an unexpectedly important role in value creation among the respondents. It had the second highest mean of all the statements and a small group of respondents even mentioned it as one of the main motivations to use Whim. Although innovativeness was not explicitly mentioned, Sochor et al. (2016) found the enjoyment of trying new things as a possible motivation to try MaaS. Responses from Whim users further indicate that the customer's needs and hopes relating to innovativeness of the company are not just the motivation to join MaaS in the first place but the reason to continue to use the service. Most of the respondents (around 80%) had been using Whim for more than a year and still continued to value the innovativeness of the company.

Desired value in MaaS includes customization, customer experience, environmental responsibility and increased safety and reliability. The first three have been mentioned in earlier research on MaaS and the statements relating to them also stood out from the others. However, customers do not see them as their main motivations to start using the service. Therefore, they are located on the desired level. In addition to their specific role in MaaS, the role of customization and customer experience are also highlighted in any mobile service today as they create a customer journey that can become equally as valuable as the final products (Edelman & Singer, 2015).

Increased reliability was mentioned couple of times as one of the main motivations to use Whim, yet most of the respondents did not seem to find it as important. However, the earlier literature on mobility services suggest that safety and reliability impact the choice of transportation mode (Koppelman & Pas, 1980) and although the findings from the survey do not support this claim strongly, it's impact can't be ruled out either. Therefore, the increased safety and reliability are located in the layer depicting desired value: it may not be critical factor, but the lack of it may still cause people to consider other alternatives.

The remaining service attributes are located in the intersection of the desired and unanticipated levels, as finding purely unanticipated value is often difficult. However, the survey results suggest that there are some service attributes that are desired by some of the respondents as their role was highlighted in some customer groups, yet could potentially create unanticipated value for others. These attributes include route planning, enjoyment, premium brands and privacy.

From the four statements relating to functional/instrumental value, statement "Whim offers a valuable mobile app for planning routes" had the highest variance in the responses. Roughly 30% agreed with the statement, 30% disagreed and 30% were neutral. It is possible that some people are using alternative apps for route planning, either because using them has become a habit or because they prefer them, and therefore do not use Whim for that purpose. On the other hand, it is also possible that the route planning feature of Whim could be improved, either technically or content-wise. Lastly, some people may use Whim only for travelling familiar routes and therefore do not see value in route planning.

Next, among the users of Whim, enjoyment was not very central. However, respondents over 50 years old made an exception, perhaps since they are likelier to seek for improved quality in life when choosing services (Andreassen et al., 2015). Thus, enjoyment is located in between desired and unanticipated value as it can be more important to some than to others.

Lastly, premium brands and privacy divided respondents. When comparing men and women, men agreed more with the statement "I like to use Whim because Whim partners

with some premium brands". On the other hand, they were less likely to agree with the statement about right transportation modes. Therefore, it is possible that men would hope for even more premium alternatives.

Premium partners were also valued more by respondents older than 50 years old. For them, the role of privacy was also more important. The earlier research provides controversial results regarding customer's expectations on privacy. Andreassen et al. (2015) stated that customers are increasingly worried about the use of personal data, whereas Transport Systems Catapult (2016) study found that 57% of consumers would be willing to share personal data to get better transportation services. However, it's safe to say that at least some customers may value higher privacy. Also, MaaS provider could create more value by clearly express how personal data is handled and how the use of personal data could benefit customers.

To conclude, the presented depiction of customer value creation process includes all the service attributes of MaaS that received support during this study. Service attributes such as healthy lifestyle and the role of social relationships in MaaS were excluded as they did not receive adequate support. Therefore, this figure can be complemented when further research on the topic is conducted. It can also be modified to fit the needs of an individual MaaS provider. This section also assesses the fourth hypothesis, "H_4: Alongside with the optimal selection of transportation alternatives, MaaS platform can create value to customers". Although price and transportation are perceived to be important and therefore the products in MaaS can be considered as the main source of expected value in Maas, service attributes relating to the platform itself also have central roles in customer value creation. Therefore, H_4 is also supported.

6. Conclusions

This chapter concludes the findings from the literature review and the survey, both of which contribute to the main research question: "How can MaaS create customer value?". In addition, limitations of the study and suggestions for further research are presented.

6.1. Research summary

The study begun with a literature review, which provides an overview of both the existing literature on MaaS and the current state of customer value creation research. Based on the literature review, the framework for studying value creation in the context of MaaS was built. The study framework is a combination of two main contributions to value creation, Smith & Colgate's (2007) four main types and five main sources of customer value, and Butz & Goodstein's (1996) three levels of value. The combination was seen to be a good fit for studying customer value in MaaS. In addition to supporting the identification of service attributes that contribute to customer value, the levels of value showcase customer priorities of these attributes. Following the introduction of the framework, the last part of the review then combined the findings from literature on MaaS and customer value, creating a basis for studying value creation in the context of MaaS. After this section, the literature review was completed and the research hypotheses were formatted. Based on the findings and to study the hypotheses, an empirical research in a form of a customer survey was conducted.

The survey findings, firstly, supported H_1: "Functional/instrumental and cost/sacrifice value have key roles in customer value creation in MaaS". Similar to traditional mobility services, customers expected functionality and reduced costs and risks also from MaaS. As Caiati et al. (2020), Matyas & Kamargianni (2018) and Sochor et al. (2016) have discovered in their studies, the pricing and right combination of transportation modes are important. In addition, flexibility, customization and ease of use are also practical aspects that contribute to value in MaaS. The findings also supported H_2: "Hedonic/experimental value and symbolic/expressive value also contribute to positive customer experience in MaaS", as

service attributes such as customer experience and the possibility to reflect personal values relating to environment and innovation are valued in MaaS.

In addition to creating understanding of the types of customer value MaaS can create, potential sources of value were also detected. The findings suggest that products, which in the case of MaaS are the mobility bundles and individual trips, are a key source of value. Yet, the platform itself, which combines the value sources of interactions, environment and ownership/possession transfer, creates value to the customer by being easy to use and contributes to seamless and customized travel experiences. Therefore, H_4: "Alongside with the optimal selection of transportation alternatives, MaaS platform can create value to customers" was supported. In addition to the three sources relating to the platform itself, the findings suggest that information as a source of value also has a role in customer value creation in MaaS, as the emphasis on environment and innovativeness can help customers reflect their personal values thus creating symbolic/expressive value. However, the differences in value perceived in different product types was not clear and H_3: "Mobility bundles increase the perceived value in MaaS" was therefore not supported.

Lastly, the fifth hypothesis "Customers who do not have access to a car perceive higher value in MaaS than the customers who have access to a car" attempted to explain the relationship between car ownership and MaaS and whether MaaS could ultimately replace private cars. However, the results did not provide adequate support for this hypothesis. Those who did not have access to a car in their household were slightly more satisfied with Whim and agreed more with some statements, yet at the same time, around 20% of those who had a car still considered Whim's services very satisfactory and found Whim to decrease their mobility costs. These results imply that some customers may prefer to use MaaS as a complement for a car rather than a substitute.

The research succeeded in shedding light to the types and sources of value central to MaaS. To conclude, functional/instrumental and cost/sacrifice are something that customers expect, yet symbolic/expressive and experimental/hedonic value can also contribute to the perceived customer value. Regarding the sources of value, products, which include the mobility bundles and the individual trips, are central, yet the platform itself as well as

marketing, communications and other issues relating to information customers receive, also create value.

6.2. Practical implications

In the words of Butz & Goodstein (1996): "Once the customer understanding process is complete, at least for the time being, then the organization's strategic planning team needs to be convened to receive, digest, and apply the findings of this analysis. Without such an implementation step there is no reason to even begin the customer understanding process". Therefore, the relevance, and the value, of this study only materializes when the findings are taken into practice in developing MaaS.

To begin with, the findings of this study strongly imply that the core elements in MaaS are its service selection and their functionality. If MaaS provider fails to offer a selection of transportation modes that fulfils customers' core expectations regarding travelling, other service attributes are not able to compensate for that. Therefore, choosing the right selection of transportation partners that are reliable and affordable is crucial in MaaS.

Further, the selection should include both public and private partners. Public transportation is cost-efficient and environmental-friendly, and therefore has a central role in MaaS. Yet, customers also appreciate the possibility for car rental and taxi rides, which also ensure the societal equality. Taxis, for example, are sometimes a necessary mode of transport for elderly and people with disabilities (Kampf et al., 2010). With the right amount of different transportation alternatives, the customer can choose a mode that best fits their current need and provides the desired flexibility.

In addition to having the right selection of transportation modes, operational capabilities of the transportation partners are important. Although MaaS providers can only actively impact the in-app customer experience, the journeys purchased from the app also impact the overall customer experience. If transportation partners are not reliable or convenient, customers may seek for alternatives that better meet their mobility needs. Also, in order

to establish an economically sustainable business, the pricing of the chosen partners should reflect customer's willingness to pay.

After selecting the right partners, MaaS operator can impact customer value creation by ensuring that the platform itself allows smooth user experience and contains the desired features. The survey findings suggest that ease of use is appreciated by customers and they may even expect it. For any MaaS provider, the usability of the platform should be one of its core focuses. The survey also revealed that customers appreciate customization. According to Edelman & Singer (2015), in order to improve customer journey, which they emphasize as a key source of value alongside with products, companies should provide personalized service that takes into account previous actions of customers as well as anticipates their needs in the future. Transport Systems Catapult (2016) study suggests that MaaS providers can create customization particularly through support in route planning. Support in selecting the right transportation mode was already desired by Ubigo trial participants (Sochor et al., 2016), and route planning was also an area where Whim had room for improvement. MaaS provides an excellent opportunity to create unanticipated value with journeys that recommend a transportation mode based on individual preferences and needs, and also take into account issues like real-time weather conditions and traffic congestion.

By improving their products and the platform, MaaS providers create value. Finally, MaaS providers can also contribute to the value creation through their marketing and communications. Innovativeness and "newness" in MaaS appeal to customers. Therefore, emphasizing how MaaS provider differs from traditional transportation providers can attract customers. The image of an innovative company can also be sustained by ensuring that the customers are aware of all the latest developments of the platform and product selection. Finally, although not identified as key motivations for using the service, clear privacy policy, environmental and social responsibility and the potential to reduce CO_2 emission by using the service are also appreciated by specific customer groups. By highlighting these attributes, MaaS providers can make customers feel more comfortable with using the service, help them express their personal values and empower them by create a feeling that they are making a positive impact by using the service.

6.3.   Limitations

Although this study contributes to the overall understanding of customer value, the chosen methods, the sample and the complexity of customer value create limitations that impact the significance of the study and the possibility to generalize the results.

The study is conducted in a relatively new research area as the concept of MaaS became to wider knowledge less than a decade ago. Particularly the lack of case studies focusing on MaaS platforms means that the results can't be validated by comparing them to those from similar studies. This is the first limitations of the study. Also, as the focus is on one case company, certain additional limitations apply. MaaS Global's Whim is the only consumer-oriented MaaS platform in Finland. Due to this, when respondents think of Whim, they most likely compare their experiences to traditional transportation providers rather than to other MaaS providers. Hence, the results can reflect overall value creation in MaaS rather than value created only by one MaaS company. However, at the same time, results also reflect Whim's individual capabilities. For example, Whim only includes regional travel options, and therefore the value of MaaS for tourism and leisure travelling remains unstudied. In addition, when talking about, for example, ease of use or convenience, it is difficult to say whether the overall convenience of the concept of MaaS or simply Whim's technical capabilities contribute to customer value.

Surveys with a Likert-scale measures are common in measuring customer value (e.g. in Tynan et al., 2014; Prebensen et al. 2013; Tai, 2011; Wu & Liang, 2009) and are a good tool for comparing value types. They also provide a more comprehensive view of customer value in different customer groups than individual interviews would. Yet, they are not without a flaw, either. Due to the lack of previous research on customer value in MaaS and with limited amount of research in the field of transportation, the chosen service attributes may fail to reflect the entire customer value MaaS could create. The time frame and the static nature of surveys did not offer the possibility to review whether additional value creating service attributes would have emerged, either.

The limitations of surveys in general and the chosen structure should also be acknowledged. Although the survey was designed to be as compact as possible and effort was put in to formatting the questions in an user-friendly way, and the data also passed Harman's single factor test for common method bias, it is still possible that some respondents found the survey too long and did not put as much cognitive effort to their answers. Also, some of the statements or questions may have been too complicated or may have held multiple alternative meanings, which can cause inconsistency in the answers. Also, in the factor analysis, the four factors only roughly reflected the four main value types, which suggest that the statements represented the value types correctly to some extent, yet may fail to do so in some cases or, alternatively, the respondents may have interpreted individual statements differently.

Although the sample size was adequate for the chosen statistical methods, its structure also leads to limitations in generalizing the results. As Wright (2005) points out, online survey samples rarely represent a true random sample of customers. Some people are more likely to answer to surveys in general, and particularly those who have strong opinions may participate more actively. Both the gender and age distribution of the respondents differed from the Finnish population as women and older age groups were significantly less represented (Statistics Finland, 2019). It is not known whether the distributions reflect Whim's customer base, either. Also, the coronavirus situation during the spring may have caused some people to switch their plan recently, and therefore the results do not necessarily reflect the perceptions of pay-as-you-go and mobility bundle customers accurately.

Lastly, the most critical limitations relate to the complexity of customer value. As customer value is dependent on the context, personal factors and social relationships (Grönroos & Voima, 2013) and can be considered as a "high-level abstraction rather than a directly measurable attribute" (Zeithaml, 1988 in Sánchez-Fernández, 2009), quantifying customer value poses a challenge. The perceived value depends on the individual and the situation the service is used in. Therefore, it is not possible to measure the amount of overall customer value in Whim or MaaS in general. The overall satisfaction, which was included in the survey, can reflect value yet fails to take into account customer's needs

(Butz & Goodstein, 1996) and the measuring the role of price, which often can be seen as an indicator of value (Priem, 2007), through a survey is also not sensible. Further, it is practically impossible to capture how much value each service attribute creates, or how much does one value type contribute to the perceived value. The customer is hardly able to identify this themselves, nor can we generalize that the value would remain the same in different situations. Therefore, the study focuses on only identifying potential sources and types of value and comparing their relationships with one another, rather than providing an all-encompassing structure of the customer value and the proportions of each value type in MaaS.

6.4.   Suggestions for further research

This study creates a practical framework for understanding customer value creation in MaaS. However, research on MaaS customers and value creation in MaaS still offers a variety of interesting and relevant topics for further research. Firstly, to create a better understanding of potential service attributes contributing to customer value in MaaS, a future researcher could address the limitations of this study. In particular, similar studies focusing on current MaaS operators would broaden this understanding. For example, service attributes that did not receive strong results for one way or another, such as the role of healthy lifestyle and the social aspect of MaaS, could be further studied. Also, the comparison of multiple operators would help in setting the distinction between the impact of MaaS in general and the impact of an individual MaaS provider. If the operators would be located in different regions, the role of culture and other local characteristics in mobility could be better taken into account, and with a larger sample, the differences between customer segments could be studied in more detail.

An empirical study with a more qualitative approach could further reveal latent sources of value as well as strengthen the understanding of how MaaS succeeds in meeting customer's expectations. Whether MaaS could provide a credible alternative to private cars as suggested by earlier research (e.g. Utriainen & Pöllänen, 2018; Hietanen & Tinnilä, 2017) would also require further assessment.

The focus of this study is on consumers. However, alongside with the consumers, MaaS can also serve B2B-customers (Kamargianni & Matyas, 2017). The potential for MaaS in creating value for B2B-customers could therefore be another interesting research area in the future. In addition to contributing to the academic understanding, the research on B2B-customers would help current and future MaaS operators to either expand their selection or further develop their current B2B-offering. Similarly, interest for MaaS that crosses regional boarders was already expressed by the Ubigo trial participants in 2014 (Sochor et al. 2016). Therefore, a further research on customer value in the context of tourism and inter-city travelling would help MaaS to gain its full potential.

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Appendices

Appendix 1: Survey layout

Please rate the following statements based on your experience using Whim.

1 = Strongly Disagree
2 = Disagree
3 = Neither disagree nor agree
4 = Agree
5 = Strongly Agree

Whim service offer

Whim offers the right combination of transportation modes *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Whim offers mobility services that are customized to my needs *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Whim offers a valuable mobile app for planning routes *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Whim offers outstanding customer experience *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

By using Whim, I get more reliable transportation services *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

By using Whim, I get safer transportation services *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

By using Whim, I get faster to my destination *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Whim is very easy to use compared to other mobility apps *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Whim and my lifestyle

By using Whim, I can keep better track of track my mobility costs and behavior *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

By using Whim, I can live a healthier lifestyle *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

By using Whim, I can reduce my carbon footprint *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

By using Whim, I can be more flexible in my mobility behavior *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

By using Whim, I can express my personal values *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Whim is fun, interesting or exciting to use *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Whim as a company

I like to use Whim because it's a socially and environmentally responsible
company *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I like to use Whim because it's an innovative company *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I like to use Whim because Whim values my privacy *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I like to use Whim because Whim partners with some premium brands *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I like to use Whim because Whim's brand has a strong personal meaning to me *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I like to use Whim because my friends and family are also using it *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

What is your main motivation to use Whim? *

Your answer

Services in general create value for me when... *

Your answer

Do you have any additional thoughts about Whim you would like to share with
us?

Your answer

100

Appendix 2: Results from the factor analysis

Rotated Component Matrix^a

		Component			
		1	2	3	4
By using Whim, I can live a healthier lifestyle	Symb/Expr	.783			
By using Whim, I can express my personal values	Symb/Expr	.718			
By using Whim, I can reduce my carbon footprint	Symb/Expr	.710			
Whim is fun, interesting or exciting to use	Exp/Hed	.669			
By using Whim, I can be more flexible in my mobility behavior	Cost/Sacr	.666			
By using Whim, I can keep better track of track my mobility costs and behavior	Cost/Sacr	.635			
I like to use Whim because my friends and family are also using it	Exp/Hed				
Whim is very easy to use compared to other mobility apps	Cost/Sacr		.707		
By using Whim, I get more reliable transportation services	Cost/Sacr		.685		
By using Whim, I get safer transportation services	Cost/Sacr		.667		
Whim offers a valuable mobile app for planning routes	Func/Inst		.649		
Whim offers outstanding customer experience	Exp/Hed		.619		
I like to use Whim because it's a socially and environmentally responsible company	Symb/Expr			.773	
I like to use Whim because Whim partners with some premium brands	Symb/Expr			.734	
I like to use Whim because it's an innovative company	Exp/Hed			.689	
I like to use Whim because Whim values my privacy	Cost/Sacr			.673	
I like to use Whim because Whim's brand has a strong personal meaning to me	Symb/Expr	.566		.568	
Whim offers the right combination of transportation modes	Func/Inst				.834
Whim offers mobility services that are customized to my needs	Func/Inst				.811
By using Whim, I spend less money on mobility	Cost/Sacr				.528
By using Whim, I get faster to my destination	Func/Inst				.500

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.269	44.140	44.140	9.269	44.140	44.140	4.041	19.241	19.241
2	1.702	8.106	52.246	1.702	8.106	52.246	3.405	16.215	35.456
3	1.275	6.072	58.318	1.275	6.072	58.318	3.242	15.437	50.893
4	1.030	4.904	63.222	1.030	4.904	63.222	2.589	12.329	63.222
5	.882	4.201	67.422						

KMO and Bartlett's Test

Kaiser–Meyer–Olkin Measure of Sampling Adequacy.		.915
Bartlett's Test of Sphericity	Approx. Chi–Square	2286.246
	df	210
	Sig.	.000