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Mobility-as-a-Service – Are current
players delivering value?
A qualitative consumer analysis

Carl Rudolf Max Crayen

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Abstract

Title: Mobility-as-a-Service – Are current players delivering value? A qualitative consumer analysis
Author: Carl Rudolf Max Crayen

Urbanization, technological developments, along with the trend towards access-based mobility, fosters the rise of shared mobility services. This in return caused the birth of a new mobility service concept, namely Mobility-as-a-Service, which anticipates the change of mobility consumption by the aggregation and redistribution of mobility services through a single mobile application. Due to the lack of existing consumer studies related to Mobility-as-a-Service, this master thesis explores the emerging phenomenon from the consumer perspective, with special attention towards the consumer-perceived value existing Mobility-as-a-Service providers add. The researcher obtained data in a qualitative manner through semi-structured (in-depth) interviews with young Mobility-as-a-Service consumers in urban areas in Germany, in order to explore their post-consumption experiences. The analysis was of inductive nature, following the qualitative content-analysis approach. Research findings indicate that consumer-perceived value is at hand, in form of the opportunity to search for and book tickets for public transport within the single application, addressing the consumer needs for *time savings*, *convenience*, *information* and *ease of use*. However, the value addition is of limited nature due to performance issues, limited service beyond local boundaries and partial irrelevance of integrated transport modes. These results provide new insights for existing providers and enrich the explorative research field of Mobility-as-a-Service. Due to the sole focus on young Mobility-as-a-Service consumers, and their relationship with a specific provider, findings are of limited nature and can not be generalized across target segments and geographic boundaries.

Keywords: Mobility-as-a-Service | consumer-perceived value | product attributes | mobility needs | urban areas | Germany | mobility concept | young consumers

Resumo

Título: Mobilidade-como-Serviço - Estarão as actuais empresas a gerar valor?
Uma análise qualitativa de consumo

Autor: Carl Rudolf Max Crayen

Urbanização e desenvolvimento tecnológico, juntamente com a tendência para a mobilidade baseada na fácil disponibilidade de acesso, promove o aumento dos serviços partilhados de mobilidade. Estes acontecimentos causam o nascimento de um novo conceito de serviço de mobilidade: a Mobilidade como Serviço, que antecipa a mudança do consumo de mobilidade pela agregação e redistribuição de serviços de mobilidade através de um serviço aplicativo móvel. Devido à falta de estudos de consumo relacionados à Mobilidade como Serviço, esta tese de mestrado explora o fenómeno emergente do ponto de vista do consumidor, com especial foco no valor para o consumidor como consumidor de um serviço de mobilidade. O realizador da tese obteve dados de maneira qualitativa por meio de entrevistas semi-estruturadas (em profundidade) com jovens consumidores de mobilidade como serviço em áreas urbanas na Alemanha, a fim de explorar as suas experiências pós-consumo. A análise foi de natureza indutiva, seguindo a abordagem qualitativa de análise de conteúdo. Os resultados da pesquisa indicam que os resultados recolhidos pelo consumidor estão facilmente disponíveis, sendo facilmente pesquisar e reservar ingressos para transportes públicos dentro um só aplicativo móvel. No entanto, a adição de valor é de natureza limitada devido aos problemas de desempenho, ao fornecimento limitado de serviços além dos limites locais e a irrelevância parcial dos modos de transporte integrados. Devido ao foco exclusivo em jovens consumidores de mobilidade como serviço e ao seu relacionamento com um provedor específico, os achados são de natureza limitada e não podem ser generalizados aos segmentos-alvo e fronteiras geográficas.

Palavras-chave: mobilidade-como-serviço | valor para o consumidor | atributos do produto | necessidades de mobilidade | área urbanas | Alemanha | conceito de mobilidade | consumidores jovens

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IV List of Abbreviations

Abbreviation	Abbreviated word or term
MaaS	Mobility-as-a-Service
Apps	Applications
e.g.	Exempli gratia / for example
ICT	Information and communication technology
min.	Minimum
etc.	Et cetera

1. Introduction

“Urban mobility is undergoing a deep and fundamental change, with far-reaching consequences for car makers” (Stricker, Kalmbach, & Zayer, 2018, no page).

Whereas the global mobility market has a volume of \$7 trillion with growing forecasts, the usage of private cars among urban areas is on a downtrend while shared mobility services are on an upswing (Burgstaller, Flowers, Tamberrino, Terry, & Yang, 2017). “In China - Europe and the United States - the shared-mobility market was nearly \$54 billion in 2016, and it should continue to experience impressive annual growth rates in the future“ (Grosse-Ophoff, Hausler, Heineke, & Möller, 2017, no page).

Fueled by the rise of Information and Communication Technology (ICT) and the global hyper-urbanization, which will amount to 66% by 2050 (UNDESA, 2014), several data-driven shared-mobility business models entered the mobility market in urban areas and changed the traditional value chain (Kamargianni & Matyas, 2017; Digital-Gipfel, 2017); away from ownership-based towards access-based mobility, particularly among young generations, the followers of the shared economy (Belk, 2014). Car sharing providers managed to attract 5.8 million members on a global scale in 2016 (Warwick, Tiffany, Justine, Brett, & Traci, 2017) and bike sharing schemes increased by 9-fold around the globe between 2004 and 2016 (Hutt, 2016), underlining their relevance for consumers’ daily mobility journey.

The novel concept *Mobility-as-a-Service* (from now referred to as MaaS) as “a newly emerging phenomenon in transportation” (Kamargianni & Matyas, 2017, p. 12), anticipates the changing mobility consumption patterns in urban areas and envisions to offer its “users a tailored hyper-convenient mobility solution” (Jittrapirom et al., 2017, p. 13). The concept of MaaS aims to aggregate and redistribute the variety of existing mobility services through a single smartphone application and thus striving for the provision of seamless door-to-door mobility (Jittrapirom et al., 2017; Kamargianni & Matyas, 2017; Motta, Ferrara, Sacco, You, & Cugola, 2013; Preston, 2012). Due to the integration of existing access-based mobility services, MaaS scholars expect that the concept is particularly appealing to younger generations (Eryilmaz, Kagerbauer, Schuster & Wolf, 2014; Holmberg, Collado, Sarasini & Williander, 2015; Li & Voegelé, 2017).

While “preliminary estimations indicate that MaaS is a trillion dollar market” (Kamargianni & Matyas, 2017, p.11), a high level of vagueness environs the concept with varying

definitions that either contradict or set different focal points regarding what constitutes MaaS (Jittrapirom et al., 2017).

The first MaaS provider launched operations in 2012, with 12 providers currently operating, of which the majority functions on a local level with a highly diverging degree of services offered (Jittrapirom et al., 2017; Kamargianni, Li, Matyas, & Schäfer, 2016).

MaaS as an user-centric concept “seeks to offer a transport solution that is best from customer’s perspective” (Jittrapirom et al., 2017, p. 16). At the same time, “the users’ perspectives toward MaaS have not been well studied and understood” (Li & Voege, 2017, p.102). In 2016, the *European Commission* highlighted the necessity for demand-sided MaaS studies, whereas Li and Voege (2017) clearly indicate the need for consumer behavior studies. Sochor, Strömberg and Karlsson (2014) on the other hand stress the necessity for examination of the consumer value current MaaS providers add.

Consumer-perceived value is closely linked to the satisfaction of needs since the “purpose of value is to meet consumer needs” (Wagner, as cited in Holbrook, 1999, p. 134). Furthermore, the assessment of consumer value depends on the consumer-perceived attributes, as they set the foundation for individual product evaluation (Holbrook, 1999; Peter & Olson, 2009; Woodruff, 1997). Considering additionally the expected adoption of MaaS services among young consumers in urban areas (Eryilmaz et al., 2014; Finger, Bert & Kupfer, 2015; Li & Voege, 2017), this thesis will explore the post-perceived consumer value arising from existing MaaS providers, by finding answers for the question:

How is the relationship between Mobility-as-a-Service perceived core attributes and the mobility-service related needs of young MaaS consumers in urban areas?

The investigation related to the problem statement of this thesis was informed by the following research questions:

Research Question 1: Which are the mobility-service related needs of young Mobility-as-a-Service consumers in urban areas?

Post-consumption product evaluation and value perception are linked to the satisfaction of needs, in which needs serve as central criteria for value perception (Anderson, Fornell, & Lehmann, 1994; Cronin, Brady, & Hult, 2000; Holbrook, 1999; Peter & Olson, 2009; Woodall, 2003). In addition, MaaS aims to be a user-centric mobility service concept, in

which the flexible addressing of needs is at its center (Jittrapirom et al., 2017; Kamargianni & Matyas, 2017), emphasizing the necessity to explore the mobility-service related demands of its target segment.

Research Question 2: Which are the consumer-perceived core attributes of Mobility-as-a-Service products?

Integral criterion for the judgment of a product are its attributes (e.g. functions) (Holbrook, 1999; Peter & Olson, 2009; Woodruff, 1997) since the interaction with perceived product attributes provide the consumer with outcomes which are related to the consumer's individual needs (Gardial, Clemons, Woodruff, Schumann, & Burns, 1994; Zeithaml, 1988). In regard to MaaS, little is known about the "right" mix of MaaS products due to its developmental phase (Jittrapirom et al., 2017; Kamargianni et al., 2016), accentuating its need for exploration.

Academic and Managerial Relevance

Insights into consumer demands in regard to product attributes can assist in specifying the conceptual pillars of MaaS and thereby further develop this new concept from an academic perspective. From a managerial point of view, research studies and market predictions state that MaaS schemes will impact the future of mobility in urban areas and gain significant market capitalization (Kamargianni & Matyas, 2017). At the same time, existing MaaS players still act on a small scale, of which the majority is classified as pilot projects (Jittrapirom et al., 2017; Kamargianni et al., 2016). Consumer insights regarding the value creation of MaaS providers could benefit existing operators to understand the mobility-service related needs of MaaS consumers and their current satisfaction. Those results will help existing actors to strategically position their product for the future.

Short overview of thesis structure

In this chapter, the topic is introduced, the problem statement presented, and the objectives of this dissertation clarified. Chapter 2 reviews literature related to MaaS, the construct of value and existing consumer studies related to MaaS respectively mobility needs of urban consumers. Chapter 3 covers the methodology by explaining the research design that was applied for the empirical research. Chapter 4 presents results from the undertaken research, interprets and discusses them. Chapter 5 incorporates conclusions, discusses limitations and provides future research recommendations.

2. Literature Review

2.1 Mobility-as-a-Service: The Concept

2.1.1 Mobility-as-a-Service: Definitions

The concept of MaaS is still in its infancy and surrounded by a high degree of ambiguity (Holmberg et al., 2015; Jittrapirom et al., 2017; Kamargianni & Matyas, 2017). According to Jittrapirom and colleagues (2017), MaaS can be seen “as a concept (a new idea for conceiving mobility), a phenomenon (occurring with the emergence of new behaviors and technologies) or as a new transport solution (which merges the different available transport modes and services)” (p.14).

Hietanen (2014) defines MaaS as a model that aggregates existing transport services and distributes them to the consumer, based on their needs, through a single digital interface. Giesecke, Surakka, and Hakonen (2016) describe MaaS as a social occurrence, which focuses on sustainability by fostering the substitution of the private car with alternative transport solutions. Chowdhury (2016) along with Luk and Olszewski (2003), go in a similar direction, just as Jittrapirom et al. (2017) who point out that MaaS “presents a shift away from existing ownership-based transport system towards an access-based one” (p. 13).

Kamargianni and Matyas (2017), on the other hand, conceptualize MaaS as follows:

“Mobility as a Service is a user-centric, intelligent mobility distribution model in which all mobility service providers’ offerings are aggregated by a sole mobility provider, the MaaS provider, and supplied to users through a single digital platform” (p.4).

In addition, Kamargianni and Matyas (2017) emphasize that MaaS providers – in distinction to single-mode service operators (e.g. *Uber* for ride-hailing services), who run their service operations entirely by themselves - function as business ecosystem facilitator, without self-ownership of transport services.

In regard to the target segment, young consumers in urban areas are considered as most likely to adopt the concept, even though concrete age specifications for “young” consumers are missing (Eryilmaz et al., 2014; Li & Voegelé, 2017; Finger et al., 2015). Eryilmaz and colleagues (2014) argue that young consumers expose a strong affinity for emerging mobility services triggered by their preference for access-based ownership and adaptation of technological developments within daily consumption. The aspect of desired shared

consumption among young consumers finds also appearance in further publications (Bardhi & Eckhardt, 2012; Belk, 2014) and therefore underlining its relevance.

The application of MaaS towards urban areas, on the other hand, is caused by the extensive distribution of mobility service offerings, arising by congestion issues and hyper-urbanization (Ghanbari, Álvarez San-Jaime, Casey, & Markendahl, 2015; Heikkilä, 2014) .

2.1.2 Mobility-as-a-Service: Key elements of the concept

Despite a variety of definitions, certain key themes emerge consistently across conceptualizations and will therefore be examined in detail in the following. This includes: User-centricity, a single digital app (usually a smartphone app), incorporation of trip management functionalities, along with the integration of existing transport modes.

2.1.2.1 User-centricity

The term user-centricity is related to the term customer-centricity, meaning that the creation of a product or service is depended on customers' needs and resources (Shah, Rust, Parasuraman, Staelin & Day, 2006; Wagner & Majchrzak, 2007). Within the context of MaaS, user-centricity serves as an conceptual pillar (Ghanbari et al., 2015; Jittrapirom et al., 2017; Kamargianni et al., 2016; Rantasila, 2015), which “frames the mobility service provision” (Jittrapirom et al., 2017, p. 14). Following this, the MaaS concept is supposed to align closely with the needs of mobility consumers by offering smooth door-to-door mobility services through a variety of integrated transport options (Hietanen, 2014; Holmberg et al., 2015).

The conceptual vision of user-centricity links to the single digital app which is the central access for the consumer (Hietanen, 2014; Kamargianni et al., 2016; Kamargianni & Matyas, 2017).

2.1.2.2 Single digital app

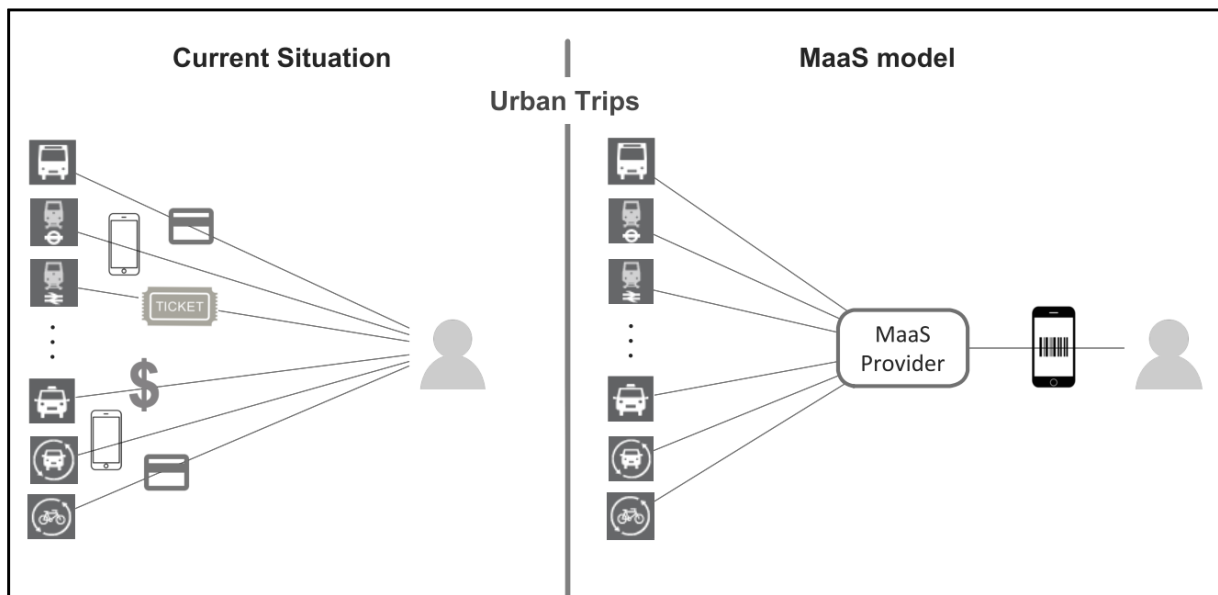


Figure 1: Conceptual visualization of the single digital app (Kamargianni & Matyas, 2017)

According to Kamargianni and Matyas (2017), the goal of MaaS is “to envisage the integration of the currently fragmented tools and services a traveler needs” (p.3). As a result, the consumer has to use just one single platform, resulting in a paradigm shift to the current process, visualized in the figure above (figure 1) (Kamargianni & Matyas, 2017). The mentioning of a single digital app in other MaaS publications highlights its significance to the concept (Hietanen, 2014; Holmberg et al., 2015; Jittrapirom et al., 2017; Kamargianni et al., 2016). Other authors refer to the term “one-stop-shop” or “one-stop access”, indicating similar meaning (Li & Voegelé, 2017; Sochor, Strömberg & Karlsson, 2014). In contrast to single-mode service providers who operate isolated and being characterized as access points for a single service (Kamargianni & Matyas, 2017; König, Eckhardt, Aapaoja, Sochor, & Karlsson, 2016), the aggregating approach of MaaS “offers its users one-stop access to a wide range of services through a single app” (Li and Voegelé 2017, p.96).

For the operational enablement of service aggregation, Finger et al. (2015) as well as Ghanbari et al. (2015) indicate the integration of consumer-relevant transport modes as necessary, while Jittrapirom et al. (2017) suggest the requirement of “giving the user the possibility to plan his/her journey, in terms of booking and paying” (p. 14).

2.1.2.3 Integration of existing transport modes

While there is consensus in respect to the bundling of transport modes as a constitutive element of MaaS (Finger et al., 2015; Ghanbari et al., 2015; Hietanen, 2014), existing literature serves a fragmented picture regarding the applicable type of consumer-relevant transport modes for the concept of MaaS. Up until now, scholars either miss out specifications (Y. Li & Voegelé, 2017), or provide a varying range of suggestions: Ghanbari and colleagues (2015) mention public and private transportation modes in general as applicable, supported by further studies (Finger et al., 2015; Holmberg et al., 2015; Kamargianni & Matyas, 2017; König et al., 2016; Rantasila, 2015). Jittrapirom et al. (2017) add a wide spectrum of additional integrable modes, including taxi, car sharing, ride-hailing, bike sharing, car rental, and on-demand bus services. These suggestions link to the argumentation of Kamargianni and Matyas (2017), who accentuate that the sole integration of public transport is not sufficient enough to differ from single-mode service providers and instead recommend focusing on the integration of multiple private transport services. An aspect that is also shared by König and colleagues (2016) who suggest private services as car sharing, bike sharing and taxi services as integrable means, owing to their increasing adaptation in urban areas.

Because of the outlined ambiguity concerning the necessary transport modes for MaaS, it is required to incorporate the voice of the consumer given that the product development of a user-centric concept like MaaS is dependent on the needs of its consumers (Shah et al., 2006; Wagner & Majchrzak, 2007).

This issue becomes more apparent when considering the operational difficulty of transport mode integration: Without self-ownership of transport services, the MaaS provider acts as a mobility service broker between transport providers and consumers (Kamargianni & Matyas, 2017) and is therefore dependent on cooperation agreements with public and private transport operators (Li & Voegelé, 2017). Based on the definition of Moore (1993), the MaaS provider needs to establish a cooperation in which he delivers value to the transport operator to achieve their participation in the MaaS ecosystem, for example by providing a wider market access (Kamargianni & Matyas, 2017). According to Li and Voegelé (2017), this remains challenging since the MaaS provider relies on the willingness of transport providers to open their data sets for the technical enablement of cooperation. In detail, public transport providers need to undertake significant technical effort for the embedding of data streams, due to their variety of transport categories (bus, train, metro etc.). In regard to private single-mode transport providers, Li and Voegelé (2017) mention conflicting business interests as an possible obstacle:

Private operators would lose their digital touch point with their customer base if their operations were to be distributed by MaaS providers, triggering a possible decrease of customer base.

Regarding both scenarios, transport operators might display little willingness for cooperation, impeding business expansion of MaaS providers beyond local boundaries (König et al., 2016). In this context, the market reach of the MaaS provider seems to be of importance for the chance of collaboration (Li & Voegelé, 2017).

2.1.2.4 Integration of trip management functionalities

For the enabling of a one-stop-shop for mobility services, the integration of trip management functionalities seems to be central to the concept of MaaS (Ghanbari et al., 2015; Holmberg et al., 2015; Kamargianni et al., 2016). According to Jittrapirom et al. (2017), the “integration of information is of vital importance and a pillar in MaaS: it is what the end user receives and upon which the whole supply network builds” (p.21) and thus supporting the consumer to plan their trip. Other research attempts specify the aforementioned by considering the integration of real-time information as relevant to the MaaS concept (Atasoy, Ikeda, Song & Ben-Akiva, 2015; Ghanbari et al., 2015; Heikkilä, 2014; Motta et al., 2013).

Another stream of scholars focuses instead on the aspect of booking: Holmberg and colleagues (2015) propose that the MaaS concept needs to assist the consumer with the opportunity to book and pay all aggregated mobility services within the MaaS app in order to strive for the position as the one-stop-shop for mobility. Doing so, the MaaS concept can distinguish itself from the model of journey planning providers (e.g. *Google Maps*), who likewise aggregate information linked to multiple mobility services but exclude the facilitation of booking and payment procedures (Kamargianni & Matyas, 2017). Moreover, Holmberg et al. (2015) emphasize the requirement for an easy booking and payment procedure to enable a seamless journey for the consumer. Jittrapirom et al. (2017) on the other hand, conceptualize trip management functionalities in a wider context by suggesting the incorporation of travel history report, weather forecast and invoicing, to name just a few.

Generally speaking, the integration of trip management functionalities is considered to be essential to the MaaS concept. In particular, enabling the consumer to plan their trip along with the opportunity to book transport modes is mentioned frequently, even though a clear definition is not at hand, underlining the exploratory stage of the MaaS concept.

2.1.3 Mobility-as-a-Service: Existing landscape

Jittrapirom et al. (2017), as well as Kamargianni et al. (2016), reviewed existing MaaS schemes and concluded that the current landscape is at a preliminary stage in which the majority of providers operate as pilot projects on a local level. The only exception is the German provider *moovel*, who carries out his service on a national and international level (Kamargianni et al., 2016). Moreover, they identified 12 MaaS schemes worldwide, of which 11 operate in Europe (Kamargianni et al., 2016)

On the subject of integrated trip management functionalities, it can be summarized that the providing of information was given among 82% of the schemes, while booking and payment of all integrated transport modes was offered by less than 50% of operators (Jittrapirom et al., 2017). Concerning the integrated information, Jittrapirom et al. (2017) do not further classify the information type. In terms of transport modes, existing providers do not have a finite ground in regard to integrated transport options (Kamargianni et al., 2016). Nonetheless, public transport, bike sharing and, car sharing are commonly integrated across schemes, while other single-mode services as ride sharing, ride-hailing and taxi services find appearance on a solitary basis (Jittrapirom et al., 2017; Kamargianni et al., 2016).

2.2 The Concept of Consumer Value

The concept of consumer value has become essential in marketing activities and is in particular applied in the field of consumer research (Holbrook, 1999). Creating value for consumers “must be the reason for the firm’s existence and certainly for its success” (Slater, 1997, p. 166).

A variety of consumer-focused value concepts exists, ranging from *customer value concepts*, *consumer-perceived value concepts* to *customer-desired value concepts*, to name just a few (Graf & Maas, 2008). The usefulness of this variety is in doubt, though, owing to the complexity of the concepts accompanied by the missing convergence regarding their operationalization (Woodall, 2003, Sánchez-Fernández & Iniesta-Bonillo 2007).

In general, consumer value is defined as the outcome of a consumption experience with a product (Babin, Darden, & Griffin, 1994). Since the consumer consumes a product with the aim to fulfill their needs, the “purpose of value is to meet consumer needs” (Wagner, as cited in Holbrook, 1999, p. 134).

Consumer value can be assessed from different perspectives, including the company- and consumer perspective (Smith & Colgate, 2007). The latter links to the category of *consumer-perceived value* that gained interest in the field of marketing and strategy management in the recent past (Sánchez-Fernández & Iniesta-Bonillo, 2007). The concept of consumer-perceived value strongly focuses on the perspective of the consumer and their needs within the stage of value assessment, thereby providing an interesting fit to the concept of MaaS, which is characterized by its consumer centrality (Jittrapirom et al., 2017).

The category of consumer-perceived value is divided into uni- and multi-dimensional value constructs (Sánchez-Fernández & Iniesta-Bonillo, 2007). Advocates of the uni-dimensional category focus on the ratio between benefits and sacrifices as determinants for perceived value (Butz & Goodstein, 1996; Gale & Wood, 1994; Lai, 1995; McDougall & Levesque, 2000; Zeithaml, 1988). Other researchers share the point of view that uni-dimensional value constructs are too simplistic and suggest instead multi-dimensional value constructs for the identification of consumer-perceived value (Bolton & Drew, 1991; Sweeney & Soutar, 2001). Woodall (2003) and Holbrook (1999) are named as prominent advocates of the multi-dimensional consumer-perceived value research stream (Sánchez-Fernández & Iniesta-Bonillo, 2007). Since the “goal of consumption is to satisfy consumer’s needs” (Wagner, as cited in Holbrook, 1999, p.136), they argue that the value a consumer perceives is related to the matching of their needs, which, in turn, can only be assessed in the post-consumption stage (Holbrook, 1999; Peter & Olson, 2009; Woodall, 2003). A notion that appears in other definitions as well (Anderson et al., 1994; Cronin et al., 2000; Gardial et al., 1994).

Besides the importance of need satisfaction, Holbrook adds further components in his conceptualization. As an elementary condition for value perception, Holbrook (1999) argues that an interaction between the subject (consumer) and the object (product) has to be given. Additionally, he declares that the individual product attributes are the basis for product evaluation, aligned with findings of Woodruff (1977) and Peter and Olson (2009). On top, Holbrook contends that perceived value is comparative and situational, meaning that situational context factors affect the perception of value, as also mentioned by other scholars (Peter & Olson, 2009; Sheth, Newman, & Gross, 1991). Peter and Olson (2009) add external factors, as marketing efforts, as influential for the value perception.

Even though the concept of consumer-perceived value remains confusing, certain patterns of relevance can be carved out:

Firstly, it seems that consumer-perceived value is in a relationship with the satisfaction of needs which can be only assessed in the post-consumption stage (Anderson et al., 1994; Cronin et al., 2000; Holbrook, 1999; Peter & Olson, 2009; Woodall, 2003).

Moreover, product attributes as the basis for product evaluation and consumer-perceived value, appear across various definitions (Holbrook, 1999; Peter & Olson, 2009; Woodruff, 1997). Regarding the dimensions of value types, several definitions incorporated functional value as elementary (Sheth et al., 1991; Smith & Colgate, 2007), which refers to the usefulness of a product to fulfill its means and is “presumed to be the primary driver for consumer choice” (Sheth et al., 1991, p.160)

Lastly, it seems that consumer-perceived value is conditional, in which situational context factors influence the value perception (Holbrook, 1999; Peter & Olson, 2009; Sheth et al., 1991).

2.3 Consumer Value and Mobility needs in the field of MaaS: Current state of research

2.3.1 Consumer value research in the field of MaaS

Consumer value studies related to MaaS are of limited existence (Li & Voege, 2017). To the researcher's best knowledge, the only undertaken attempt to integrate the consumer perspective regarding the young concept of MaaS was conducted by a field project of Sochor and colleagues in 2014. A six-month lasting field operational test in Göteborg (Sweden), called *UbiGo*, was analyzed regarding motivation and deterrent factors for the adoption of the MaaS concept by using a mixed-method approach. In terms of motivation for participation, convenience/flexibility, curiosity and economy served as the most dominant factors. On the contrary, price, mismatch between travel pattern and service offer as well as lacking infrastructure of aggregated services were the most common reasons for deterrent (Sochor et al., 2014).

Concerning the perceived value from a consumer's perspective, Sochor et al. (2014) concluded that the integration of different transport modes was most value-adding without further specifying the type of transport mode.

Even though the research of Sochor et al. (2014) is classified as the first explorative consumer research in regard to MaaS (Kamargianni & Matyas, 2017), the age of selected participants contradicts with the described target segment of MaaS by Eryilmaz et al. (2014), Finger et al. (2015) and Li and Voege (2017). While the average age of participants within the *UbiGo* project was 38 years respectively 44 years for non-participants (Sochor et al., 2014), the aforementioned claim that MaaS is most appealing to young consumers.

2.3.2 Mobility-service related needs

The concept of MaaS foresees to link its service proposition close to the needs of the consumer (Hietanen, 2014; Holmberg et al., 2015; Jittrapirom et al., 2017; Kamargianni et al., 2016). On top, the concept of consumer-perceived value is as well narrowly linked to the matching of individual needs (Anderson et al., 1994; Cronin et al., 2000; Gardial et al., 1994; Holbrook, 1999; Peter & Olson, 2009; Woodall, 2003).

Findings from the aforementioned field project *UbiGo*, point out that a sufficient infrastructure of aggregated transport modes in relation to convenience, priceworthy

individual options, as well as the facilitation of daily travel patterns is demanded by MaaS consumers (Sochor et al., 2014). Also, their results imply that the reliability of service providing along with an easy usage of mobility apps¹, is of vital importance.

Broadening the scope towards the needs of young mobility consumers in general, a conducted study of Grotenhuis, Wiegman, and Rietveld (2007) implies that time savings, in terms of travel time and search time are of importance for this demographic group in urban areas. In detail, Grotenhuis and colleagues (2007) claim that young mobility consumers in urban areas desire extensive information to reduce search- and travel time. Specifically, real-time information is required to compare available transport options and react flexibly towards occurring transport interruptions or traffic congestion. The aspect of information, as well as the demand for flexibility, is indicated in further publications (Eryilmaz et al., 2014; Heikkilä, 2014; Li & Voegelé, 2017), underpinning its relevance.

Besides, present research discusses that convenience is as well of relevance for young mobility consumers, linked to sufficient infrastructure of transport means (Eryilmaz et al., 2014; Stopka, 2014). Those results are consistent with the aforementioned findings from the field project of *UbiGo* (Sochor et al., 2014).

¹ Mobility apps are defined by the author as apps that facilitate the mobility consumption. The category mobility apps contains *journey planning apps, single-mode service apps and MaaS apps*.

3. Methodology

Based upon the conducted literature review regarding MaaS and the construct of consumer-perceived value, this thesis focused to understand the consumer-perceived value of MaaS providers by exploring the individual relationship between a selected instance of a MaaS provider (*moovel*) and its consumer base. The explorative approach intended to find answers for the following question:

How is the relationship between Mobility-as-a-Service perceived core attributes and the mobility-service related needs of young MaaS consumers in urban areas?

3.1 Research Approach

With the research purpose of exploring the MaaS consumer-perceived value, a *qualitative* and *inductive* research approach was chosen.

An inductive research approach is applicable when existing theories are inadequate for answering the research questions at hand (Flint & Woodruff, 2001; Saunders, Lewis, & Thornhill, 2008), as in the case of this study due to preliminary knowledge of consumer-perceived value studies in the field of MaaS (Li & Voege, 2017; Sochor et al., 2014). Inductive research, also known as inductive reasoning, “is often referred to as a ‘bottom-up’ approach to knowing, in which the researcher uses observations to build an abstraction or to describe a picture of the phenomenon that is being studied” (Lodico, Spaulding, & Voegtle, 2010, p. 10). In difference to *deductive* research, inductive research is not affiliated with the testing of existing theories (Saunders et al., 2008). Instead, the researcher “begins with an area of study and allows the theory to emerge from data” (Strauss & Corbin, 1994, p. 12). Nevertheless, the complete exclusion of prior theory is not advised (Saunders et al., 2008) and at the same time “it is impossible to achieve this ideal of a clean theoretical slate” (Eisenhardt, 1989, p. 536).

Regarding the research method, a *qualitative* method, commonly affiliated with inductive research (Saunders et al., 2008), was chosen. Qualitative research helps producing new theories, while quantitative methods, associated with deductive research, concerns with testing of existing theories (Atteslander, 2010; Gläser & Laudel, 2010; Mayring, 2000; Saunders et al., 2008).

In respect to the field of mobility and travel consumer research, qualitative research practices gained popularity in the recent past, enabling the researcher to concentrate on the personal experiences of mobility consumers (Mars, Arroyo, & Ruiz, 2016).

3.2 Data Collection and Sampling

This study relied on nine conducted *non-standardized, one-to-one, semi-structured (in-depth) interviews* with MaaS consumers as primary qualitative data collection tool.

3.2.1 In-depth interviews

Non-standardized, semi-structured (in-depth) interviews are typical and useful research methods within qualitative studies - following an inductive approach (Saunders et al., 2008) - and therefore chosen. Semi-structured (in-depth) interviews use open, impartial and indirect question to allow the researcher “to explore the contextual boundaries of that experience or perception, to uncover what is usually hidden from ordinary view or reflection” (Gubrium, Holstein, Marvasti, & McKinney, 2012, p. 102). Since consumer-perceived value is built on the experience arising from product interaction (Holbrook, 1999), in-depth interviews enabled the researcher to examine experiences of consumers when interacting with the MaaS app.

As usual for semi-structured (in-depth) interviews, the researcher developed an interview protocol, covering a preset list of themes relevant for answering the research questions at hand (Saunders et al., 2008). Within the phase of interview protocol development, the researcher focused to use mainly open-ended “why”, “what” and “how” questions which helps to animate interview participants to relief their subjective experiences (Saunders et al., 2008). The developed interview protocol can be found in the Appendix 2.

3.2.2 Sampling

Regarding the sampling method, a *non-probability* sampling method was chosen which is applicable for exploratory studies (Saunders et al., 2008). Within the range of non-probability sampling methods, the researcher decided to rely on purposive sampling, meaning that sampling criteria are subjectively defined based on the research objectives (Miles & Huberman, 1994; Saunders et al., 2008). Due to the limited frame of a master thesis, the early stage of MaaS consumer research and the low degree of existing MaaS apps, a purposive

sampling method, suitable for small sample studies (Saunders et al., 2008), sustained a methodological fit with the research intention.

Moreover, this research focused on a homogenous sample group in order to “study the group in great depth” (Saunders et al., 2008, p. 240).

Following purposive-homogenous sampling strategy, following criteria served as a basis for interview participant selection:

1. [**MaaS provider**] – For the research interest at hand, this study selected an exemplary MaaS provider and its consumer base. In this way, the researcher had the opportunity to increase the homogeneity of subgroups, in order to achieve an approximate comparison across interview participants (Zott & Huy, 2007) and control for external noise factors (e.g. marketing efforts), influencing the value perception (Peter & Olson, 2009). For this purpose, the German MaaS provider moovel, identified as an instance of the concept phenomenon MaaS (Finger et al., 2015; Jittrapirom et al., 2017; Kamargianni et al., 2016), was selected. A further description of moovel, a subsidiary firm of the German car manufacturer *Daimler AG*, can be found in the Appendix 7.
2. [**Familiarity**] - In order to gain in-depth information, the researcher controlled for product familiarity since “the ability to memorize product information improves as familiarity increases” (Nacif, 2012, p. 138). Familiarity was ensured by selecting interview participants, who use the moovel app on average min. two days/week and/or use the moovel app since min. four months. Both criteria guarantee product knowledge and product involvement, correlated to product familiarity (Nguyen, Dang, Do, & Mai, 2015).
3. [**Geographic living area**] - The transport concept of MaaS is expected to specifically impact urban areas in the first instance (Ghanbari et al., 2015; Heikkilä, 2014). As a result, only participants living in cities with a population of min. 500.000 inhabitants or in urban areas (within 25 km distance to cities) were considered.
4. [**Age**] – MaaS researcher claim that young adults are the target segment of the MaaS concept (Eryilmaz et al., 2014; Finger et al., 2015; Li & Voegelé, 2017), which lead to the decision to control for the age. Due to missing age specifications of “young adults” among MaaS publications, this research defined “young adults” according to the definition of Newman and Newman (2017), who define the “early adulthood” from 24-34 years.

3.2.3 Data collection procedure

To reach suitable participants, the researcher contacted moovel app consumers in Germany and especially focused on the geographic areas of Hamburg and Stuttgart. The main used contact channels were *Facebook*, *LinkedIn*, *Apple App Store/Google Play Store*. In case of a positive first feedback, the researcher sent additional information in form of a document explaining the research purpose and interview procedure (see Appendix 1).

Overall, the researcher approached 53 moovel consumers and received 21 valid replies of which 9 resulted in actual interviews due to the highest fit with the sampling criteria. The interviews, which lasted between 23-65 minutes, were conducted via *Skype* video call and audio-recorded. The audio records were accompanied by hand-written notes during the interviews and summary protocols after each interview. All audio records were self-transcribed by the usage of the transcription software *F5 Transcription Pro*, following the guidelines of Kuckartz (2014). In addition to the interviews, the researcher developed a questionnaire for each interview participant in order to collect demographic- and socio-demographic data regarding general mobility patterns. The results are summarized in the following table (additional information can be found in Appendix 5).

Table 1: Overview of Interview participants and demographic & socio-demographic description

Interviewee	Age	Living Place	Occupation	Mobility Apps Usage	Preference of Mobility Apps	Moovel Usage	Total moovel usage
1	25	Stuttgart	Trainee	Often	1. Google Maps 2. moovel 3. VVS App	3-5 days/week	4-6 months
2	24	Stuttgart	Sales Manager	Often	1. Google Maps 2. moovel 3. VVS App	3-5 days/week	<7 months
3	33	Hamburg	Operations Manager	Often	1. MyTaxi 2. Google Maps 3. Car2Go	1-2 days/week	<7 months
4	29	Stuttgart	Strategy Manager	Often	1. moovel 2. VVS App 3. -	3-5 days/week	Missing data
5	26	Ehningen	Student	Often	1. Google Maps 2. DB App 3. moovel	3-5 days/week	4-6 months
6	26	Stuttgart	Student	Often	1. Google Maps 2. DB App 3. moovel	1-2 days/week	<7 months
7	31	Stuttgart	Consultant	Often	1. moovel 2. Google Maps 3. DB App	3-5 days/week	<7 months

8	28	Stuttgart	Workshop Manager	Oftentimes	1. Google Maps 2. VVS App 3. moovel	1-2 days/week	4-6 months
9	30	Hamburg	Marketing Assistant	Oftentimes	1. Google Maps 2. VVS App 3. DB App	3-5 days/week	4-6 months

3.3 Data Analysis

To sustain consistency with the overall inductive research approach, an inductive qualitative analytic procedure was chosen. Within the family of inductive analytic procedures and in distinction to other methods, the guidelines of the *Qualitative Content Analysis* of Gläser and Laudel (2010) were followed. Qualitative Content Analysis, commonly used for exploratory and inductive studies, is suitable for the extraction of complex information out of the data and is open for unpredictable and new information during the whole analysis (Gläser & Laudel, 2010). The open method also focuses on the development of core concepts from textual data by using a systematic procedure of data reduction and analysis (Gläser & Laudel, 2010).

The analytical concept facilitates a high degree of inductivity within the phase of extraction by using solely pre-developed research questions as a search grid for the initial extraction procedure and by this facilitating a balance between structural analysis and maximal openness for emerging themes and concepts (Gläser & Laudel, 2010), reasoning its choice.

Moreover, Content Analysis has been already used successfully in various consumer research studies (Kassarjian, 1977), strengthening its appropriateness for this study.

The systematic approach of the Qualitative Content Analysis approach of Gläser and Laudel (2010) includes four steps, which were followed within the phase of data analysis:

1. Preparation of Extraction

- a. Initial development of category system based on the research questions
- b. Development of definitions for each category
- c. Definition of unit of analysis (in this case sentence and abstract)

2. Extraction:

- a. Extraction of transcribed interviews and allocation of data chunks to initial developed category system
- b. Inductive development of new categories and sub-categories for situations when emerging themes didn't match with criteria of existing categories; for each inductive developed category, new definition criteria were set

3. Processing of extracted material:

- a. Merge of overlapping (sub-) categories, Refinement of (sub-) categories and clearance of redundant (sub-) categories
- b. Summary protocol for main categories

4. Analysis:

- a. Identification of patterns, emerging concepts, and causal mechanisms as well as comparing analysis of causal mechanisms within and across interviews
- b. Goal: Answering of research questions and back reference to existing theories
- c. Analysis, which is strongly connected to the extraction and processing of extracted material, is presented in thematic results. Subsequently, the interview material is interpreted in regard to the research intention

For the extraction and processing of extracted material, this research used the computer-assisted qualitative-and mixed-method software *MAXQDA* within the Qualitative Content Analysis procedure. The developed category system can be found in Appendix 4.

4. Results and Discussion

4.1 Results

4.1.1 The mobility-service related needs of young MaaS consumers

The upcoming subchapter addresses the consumer needs linked to the consumption of mobility (mobility needs) along with needs linked to the consumption of mobility apps (mobility app needs) that were considered the most important by the interviewed MaaS consumers. A hierarchical order has been developed based on pattern coding and will be presented subsequently according to its hierarchical position in the section of needs. The results are summarized in the following table 2.

Mobility Needs	Mobility App Needs
1. Time Savings a. Travel time b. Search time	1. Information a. Real-time information b. Location information
2. Costs Savings	2. Reliability
3. Convenience	3. Global Usage
4. Flexibility	4. Ease of use

Table 2: Summary of needs

Mobility Needs

1. Time Savings

The need for time savings was mentioned among all interview partners and ranked as the highest priority when consuming mobility:

“For me it is clear, my first priority is to get as fast as possible from A to B”
(Interview 5).

However, interview participants expressed that the need for reduced travel time differs among situations and is particularly high for users who are currently employed. 89% of all interview

partners are employed and therefore free time is sparse, resulting in a strong demand for efficiency (see Interview 5, 7²).

The desire for time savings was not only expressed in form of minimal travel time, which, in turn, informs the choice of transport mode. The interviewed sample also desires a low amount of search time within the pre-decision stage of trip planning. Both in combination drive the use of mobility apps (see Interview 4).

2. Costs savings

The need for costs savings was also mentioned by all interview partners. Moreover, 78 % of interviewees mentioned costs savings as the 2nd most important need:

“and secondly it is also a question of the costs” (Interview 5).

The desire for costs savings is related to the perception that mobility is purely functional and thus not worth spending money on (see also Interview 7, 9):

“In my opinion, I don’t want to spend a lot for mobility services. I don’t get anything from it, you sit in there and you get from A to B, but it is not such a super cool adventure” (Interview 8).

Similar to the aspect of time savings, MaaS consumers weigh costs savings as more important in work related situations, while in private mobility consumption situations a higher level of cost flexibility, in exchange for convenience and time savings, seems apparent (see Interview 3).

As in the case of desired time savings, interviewees stated that the need for costs savings is linked to the usage of mobility apps since the majority of mobility apps, in particular journey planning apps, enable the user to acquire information regarding costs of transport modes within the pre-decision³ stage of transport choice (see Interview 7).

3. Convenience

A demand for convenience when consuming mobility was expressed by 78% of all interviewees and reasoned as follows:

“Especially in our generation, it is all about convenience” (Interview 4).

² Additional citations can be found in the Appendix 3.

³ The pre-decision stage is defined by the author as the stage in which the transport mode decision has not been taken.

The need for convenience was commonly declared in relation to the transport mode selection. In detail, interview partners articulated the importance of sufficient infrastructure of transport modes in relation to convenience (see Interview 2, 8). In specific, door-to-door mobility with short walking distance to the transport mode and a low amount of transfers were listed as important in order to travel convenient (see Interview 6). Interviewee 3 covers the point of desired convenience linked to the infrastructure by stating:

“Keyword is again Convenience. That is for me an important criterion. Going with the bus to the metro station, from the metro station to the train station, I am not sure. Then I would rather prefer a taxi or something that brings me straight to the train station” (Interview 3).

The desire for convenience was also frequently mentioned in connection to the usage of mobility apps owing to the opportunity to receive support within the mobility journey, causing in return a convenient travel experience (see Interview 4).

4. Flexibility

The desire for flexibility in mobility consumption originated in 66% of all interviews. The need for flexibility was frequently mentioned in the context when work and private life overlap (see Interview 5), influencing the choice of transport mode. Interviewee 8 justifies her preference for the bike by stating:

“and then I am also more flexible when I for e.g. spontaneously consider meeting friends after work” (Interview 8).

Interview participants explained the need for flexibility concerning transport selection by arguing that transport modes that allow the user to react on unpredictable changes, provide certain flexibility:

“and if I want to drink a beer or something spontaneously, then you have the freedom to do so” (Interview 5).

Additionally, the interviewed sample stated that the need for flexibility is also related to the usage of mobility apps, in particular to journey planning apps, given that the providing of real-time information enables interviewees to adapt to traffic interruptions (see Interview 5).

Mobility App Needs

1. Information

According to the interview participants, mobility apps are perceived as functional support tools that facilitate the consumption of mobility. Related to their perceived purpose, the need for information was emphasized consistently among all interviews, linked to the pre- and post-decision stage⁴ of transport mode selection.

Information, related to the pre-decision stage, are demanded to take transport mode decisions based on situational mobility needs (time, costs, convenience, flexibility):

“I like to know the different options because I want to know what brings me home fast” (Interview 4).

The need for information in the post-decision stage is vital to react to unpredictable interferences such as public transport interruptions or traffic congestion:

“Especially when you are going to work, if the trains are down and I need to take a taxi, ok fine. But at least, I would like to know that, so the App should inform me about that” (Interview 4).

The need for information in the post-decision stage is mainly affiliated with the specific need for real-time information and location information. The demand for real-time information is linked to the situational context of public transport and car usage, which are used by most interviewees for work purposes on a daily basis (see Appendix 5). Moreover, the wish for real-time information was in the majority of the cases associated with the desire for *time savings, convenience and flexibility*.

The need for location information found common appearance in the situational context of low geographic familiarity:

“I have no idea where the bus stop is when I am in a new city or somewhere, where I am unfamiliar with” (Interview 7).

2. Reliability

The need for reliability, which emerged repeatedly in the interview phase, is expressed by demanding consistent functionality without the experience of errors and unfulfillment of expectations (see also Interview 8):

⁴ The post-decision stage is defined by the author as the stage in which the transport mode decision has been taken.

“It is important for me that I can trust the application. For example, If I would have the feeling after booking with this application that it was more expensive than somewhere else, then I wouldn’t use it again” (Interview 5).

In addition, the need for reliability is particularly high developed when using new mobility apps, due to a low level of loyalty and trust caused by little product experience (see Interview 8).

Furthermore, interviewees stated the need for reliability corresponds with the mobility needs for *time savings* and *convenience* as a lack of reliability causes time loss and inconvenience, as a result of misleading information.

3. Global Usage

The expectation to use mobility apps with the same set of services on a local, national and international level was conveyed by 78% of interviewees. Explanations were of different nature, but the trend towards a global lifestyle in connection with travelling in unfamiliar areas triggers the desire to use well-known mobility apps in those situations (see Interview 3). In particular the regional unfamiliarity, linked to a strong need for information, seems to originate the wish for mobility apps in order to receive functional support:

“Today we are at a workshop in a different city, where I have never been. Here I just don't know where the next metro station is and how I should handle all of this. In these situations, I really like Google Maps, because it can especially help me in places where I have never been” (Interview 8).

In addition, the examined sample stated that the need for global usage is linked to the needs for *flexibility*, *convenience* and *time savings* since the functional support of mobility apps has the potential to address those needs in situations of travelling.

4. Ease of use

The need for easy and simple handling, including simple registration procedures when interfering with mobility apps was a further commonly declared aspect (see Interview 6, 8). The sample revealed that a simple handling addresses the needs for *convenience* and *time savings*:

“The advantage of an ease of use is that it saves me some time because I don’t need to spend hours with this app. But it is also just comfortable when the whole app handling is easy and simple” (Interview 3).

4.1.2 The consumer-perceived product attributes

The upcoming sub-chapter presents results regarding the consumer-perceived core attributes that inductively emerged from the interviews. These include integrated transport modes, integrated functions and the usage situations of the examined MaaS app.

Integrated transport modes

Regarding the usage of integrated transport modes within the examined MaaS app, all interviewees specified to use public transport regularly, while taxi services (*MyTaxi*) are used by 22% and car sharing (*Car2Go*) by 11% of investigated MaaS consumers. Long-distance train (German national train provider *Deutsche Bahn*), as well as bike sharing do not find application. The reasons for the exposed results are summarized by table 3:

Public Transport	Car sharing (Car2Go)	Bike sharing	Long-distance train	Taxi (MyTaxi)
a. Sufficient Infrastructure (see Interview 1, 2, 4) b. Low costs (see Interview 2, 5)	a. High costs (see Interview 5, 8) b. Lacking infrastructure (see Interview 5, 9) c. No personal need (see Interview 1, 5, 6, 8, 9)	a. Lacking infrastructure (see Interview 1, 2, 5, 9) b. No personal need (see Interview 1, 3, 6, 8, 9)	a. Limited functionality (see Interview 5, 7)	a. High costs (see Interview 1, 5, 7, 8)

Table 3: Reasons for acceptance & deterrence of integrated transport modes

89% of participants use public transport in general either “daily” or “often” (see Appendix 5), and therefore fell back on the examined MaaS app within those situations. The low usage of car- and bike sharing services is related to the insufficient infrastructure of the individual offers, in particular the limited amount of car sharing and bike sharing stations, combined with the non-given need due to the self-possession of cars and bikes. Also, car sharing services, along with taxi services, are perceived as too costly, thus not being viable. Long-distance train tickets are not purchased within the examined MaaS app, because of the non-existent registration option for the German railway subscription program “BahnCard”, that enables price discounts.

Integrated Functions

In terms of used functions, all interviewed MaaS consumers stated to use the search function as well as the ticket function⁵.

Search function

The search function of the examined MaaS app is mainly used for public transportation. In detail, the search function is commonly applied in the situational context of information need regarding departure- and total travel time of different public transport options (bus, metro, etc.) within local areas in the pre-decision stage. In addition, MaaS consumers reported that the search function serves as the pre-step for ticket purchase of public transport:

“Normally I already know my stop, that is nothing unfamiliar to me, so I just use it to check when the next metro is coming and then purchase” (Interview 8).

The general existence of a search function as a pre-step for ticket purchase is perceived as convenient and time saving, since just one app is needed to compare different transport modes and subsequently book them:

“because I can save some time and it is convenient because I don’t need to open another app to do both steps separately” (Interview 1).

However, examinees revealed that the provided search function of the examined MaaS app lacks in terms of reliability (see also Interview 2), as well as in terms of missing real-time- and location information, resulting in disadvantages:

“It costs time and is super complicated because I can’t find the bus stop since this app always lists a station in a different city” (Interview 8).

As a consequence, MaaS consumers stated to rely on journey planning apps (e.g. Google Maps) in the situational context of high information need:

“I don’t know but in those situations Google Maps and others are better with the quality and real-information and all of that. That’s the reason why I use them to get information” (Interview 3).

Ticket function

The opportunity to purchase public transport tickets within the examined MaaS app, in combination with the information acquisition, serves as the main motivation for its usage,

⁵ Ticket function: The author aggregates under the term ticket function the opportunity to book and pay integrated transport modes.

according to 89% of the interview partners and exemplarily summarized by interviewee 1 (see also Interview 5):

“I would use moovel, to purchase my ticket, especially when I plan to use the metro” (Interview 1).

The opportunity to search for public transport connections related with the direct ticket purchase option within the app, sets the examined MaaS app apart from journey planning apps, as reported by MaaS consumers:

“and of course, the ticket purchase opportunity, this I can’t do in Google Maps” (Interview 6).

The ticket function of the examined MaaS app results in time savings and increased convenience as the necessity of offline ticket purchase becomes obsolete (see also Interview 5):

“Now I just do it via moovel. It is more convenient, and I can get my tickets faster because I don’t need to get them [tickets] at the vendor” (Interview 7).

On top, results uncovered that the handling of the purchase process is perceived as simple, leading to less app time spend and a more convenient user experience, displaying a difference to local transport apps (see Interview 5, 6, 9).

Usage situations

The examined MaaS app is used in private- as well as in work-related situations. While a fragmented picture is given regarding the trip purpose, consensus was displayed concerning the regional familiarity. All interview participants stated that the examined MaaS app is exclusively used in local areas, where a high geographic familiarity is at hand (see also Interview 7):

“Until now, I have just used moovel in regional areas” (Interview 3).

On the one hand, this might be linked to the fact that the examined MaaS app provides limited service proposition in terms of public transport ticket purchase across local boundaries:

“As I said, besides in the cities of Hamburg and Stuttgart, I can’t purchase any public transport tickets within the app. For example, when I am in Berlin, I can’t purchase BVG Tickets in moovel. So what’s the sense? When I am already in the moovel app, I want to purchase a ticket. Otherwise I could also use straight away the BVG App” (Interview 2).

On the other hand, MaaS consumers declared to rely on global journey planning apps in the situational context of high information need in geographic unfamiliar areas due to positive past experiences in terms of reliability and quality of information provision (see Interview 9).

4.2 Discussion and Interpretation of Results

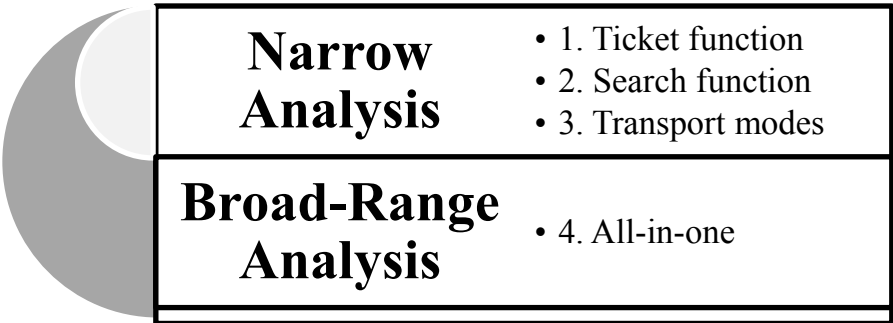
Based on the undertaken qualitative content analysis and the reflexive process of category building and analysis, the section 4.1 Results presented the explored mobility-related needs as well as the mobility app needs of young MaaS consumers in urban areas. Besides, results discovered how MaaS consumers interact with the examined MaaS app by untapping the used integrated transport modes and functions, as well as the situations of usage. Those findings set the ground for answering the problem statement of this thesis, namely:

How is the relationship between Mobility-as-a-Service perceived core attributes and the mobility-service related needs of young MaaS consumers in urban areas?

Relationship analysis

The relationship between the presented consumer needs with the examined MaaS app will be analyzed in the following: As a first step, the following analysis focuses on the specific functions and integrated transport modes individually, due to their consistent inductive emergence within the interviews. On top, MaaS scholars state the necessity to analyze “how each component of MaaS system [...] impacts the demand for this service” (Kamargianni et al., 2016, p. 3303). In the subsequent stage, the analysis zooms out towards the integration of multiple functions related to the incorporation of multiple transport modes, as visualized in figure 2.

Figure 2: Guideline for Relationship analysis



1. Ticket function [Narrow Analysis]

The integration of a ticket function is perceived as valuable by the interviewed MaaS consumers, specifically for public transport, as it addresses their mobility needs for *convenience* and *time savings* owing to the bypassing of offline ticket purchases (see 4.1.2 Results). Furthermore, the simple process to purchase tickets within the examined MaaS app complies with the need for *ease of use* in the category of mobility app needs, resulting in perceived convenience and reduced (app) time (see 4.1.2 Results). Fulfilling its means and meeting the consumer needs, it can be concluded that the ticket function provides a significant value addition for the consumer in terms of functional value (Sheth et al., 1991). Moreover, in the eyes of the interviewed consumers it equips the examined MaaS app with a competitive advantage towards journey planning apps and public transport apps, resulting in the sole usage of the examined MaaS app in the situational context of public transport ticket need (see 4.1.2 Results).

Nonetheless, certain consumer needs are not addressed sufficiently, providing input for the refinement of the examined MaaS app and the overall MaaS concept:

In this study, MaaS consumers reported to not have the opportunity to purchase public transport tickets in other national cities as they would wish and prefer, resulting in the usage of the examined MaaS app solely on a local level. This limitation runs contrary to the situational need for *global usage* in the category of mobility app needs, causing a negative relationship between product attribute and needs.

The wish for a ticket function on a national and global level was clearly expressed in each interview. MaaS consumers stated that especially the opportunity of public transport ticket purchase along with the general booking opportunity of mobility services in geographic unfamiliar areas would unleash a value addition superior to the value addition in familiar areas, since knowledge regarding ticket purchase procedures on a trans-regional level are of limited nature:

“If it would be possible to purchase a ticket directly in the app in other cities, in which I have no idea about local transport opportunities, then I would say this would be the big plus for moovel. But since it is just possible for my hometown, okay nice but in case moovel would not exist, I would also manage it with some other apps” (Interview 2).

Therefore, it needs to be emphasized, from a managerial perspective, that the providing of consistent service level across local boundaries, in particular the enablement of booking

procedures for all integrated transport modes, seems to be of cruciality in order to increase its relevance among young MaaS consumers.

2. Search function [Narrow Analysis]

Results of this study indicate that the providing of a search function benefits MaaS consumers in the pre-decision stage by addressing their situational needs for *information* in the category of mobility app needs and the need for *time savings (search time)* and *convenience* in the category of mobility needs, stating a positive relationship (see *4.1.1 Results*). Moreover, the perceived value can be classified as conditional value, since conditional value depends on the fulfillment of situational needs (Holbrook, 1999; Peter & Olson, 2009; Sheth et al., 1991).

However, in the post-decision stage of mobility consumption *real-time information* seem to be essential for young MaaS consumers in order to react flexibly towards unpredictable changes (see *4.1.1 Results*). Besides MaaS consumers have situational needs in terms of *location information and reliability* related to the usage of mobility apps (see *4.1.1 Results*). Due to a high error rate and the absence of real-time- and location information within the search function, the examined MaaS app does not address those consumer needs. On the contrary, consumers reported to perceive an increase in search time and a decrease in convenience and flexibility (see *4.1.2 Results*), indicating a negative relationship. As a consequence, the interviewed MaaS consumers rely on the usage of journey planning apps in the situational context of high information need, which might serve as an explanation for the exposed results of preferred mobility apps (see Appendix 6). By this, the declared goal of the MaaS concept, to provide a one-stop-shop for mobility is not sustained.

3. Integrated transport modes [Narrow Analysis]

The concept of MaaS foresees the opportunity to use a combination of different trip management functions for “different operators by using just one platform” (Kamargianni et al., 2016, p. 3295). The results of this study imply, though, that MaaS consumers do not use the examined MaaS app as an aggregator for multiple transport modes, but as a single-mode service provider for public transport (see *4.1.2 Results*).

By now, the integration of car sharing, bike sharing, long distance train and taxi services is in most cases not appealing due to insufficient infrastructure (causing a mismatch with the needs for *time savings, convenience and flexibility*), high costs (conflicting with the need for *costs*

savings) or the non-given need for the integrated type of transport mode (caused by self-ownership of cars and bikes) (see 4.1.2 Results). Therefore, the value of the integrated transport mix is limited.

This raises the question of relevant integrable transport modes within the MaaS concept. Earlier MaaS related consumer studies revealed that the “service must appeal to the users on a practical level and facilitate their daily travel” (Sochor et al., 2014, p. 11). The findings of this study imply similar suggestions, since the integration of public transport, in contrast to the remaining, facilitates the daily travel of examined MaaS consumers and consequently being relevant within the examined MaaS app. Besides public transport modes, interview participants demand further options as for e.g. global ride-hailing services (e.g. *Uber*), long-distance bus services (e.g. *Flixbus*) and car-pooling options (e.g. *BlaBla Car*). All of the aforementioned options are perceived as low-costs providers, emphasizing that priceworthy transport options might be of relevance for young MaaS consumers in urban areas.

Another perceived selection criterion for integrable transport options, is the infrastructure of transport means, addressing the needs for *time savings, convenience and flexibility*.

The expressed wish for further transport mode integration links to the issue of cooperation between MaaS provider and existing public and private transport operators (Kamargianni & Matyas, 2017). The achievement of a cooperation is of a complicated nature due to technical challenges along with conflicting business interests (Li & Voegelé, 2017). Owing to this, it is of great importance to incorporate the voice of the consumer regarding the relevant transport modes.

4. All-in-one: Search & Book of multiple transport options [Broad Range Analysis]

The combination of a search and ticket function, in particular in relation to public transport modes, within the examined MaaS app is noted as valuable given that just one app is required to conduct two steps, namely the information acquisition and the purchase of tickets (see 4.1.2 Results). As an outcome, interviewees reported to perceive benefits in terms of convenience and time savings, stating a positive relationship between those consumer mobility needs and the MaaS attributes at hand. In light of the fact, that functional value is “presumed to be the primary driver for consumer choice” (Sheth et al. p.160) and that the combined search- and ticket function is the main motivation for using the examined MaaS app (see 4.1.2 Results), it

can be concluded that MaaS consumers perceive significant functional value related to this feature.

However, as of now this value seems to be limited for the use of public transportation in local areas (see 4.1.2 Results). Considering the aforementioned deficits in respect to the search function and the integrated transport modes, the examined MaaS provider functions neither as an aggregator for multiple transport modes, nor as a one-stop-shop for mobility. Thus, it can be stated, that the aspirations of the MaaS concept are not yet fulfilled.

Nonetheless, MaaS consumers recognize its potential value for the local urban area, but see its promise rather for the future, when their mobility patterns will presumably change, and more individual mobility services have a greater relevance for their daily routine:

“I believe the concept is the future because there will be more and more different individual mobility concepts, because of urbanization, the cities get more and more crowded and so on. And because of this, people will rely more and more on individual mobility services and then something like moovel which comprises the different ones, will be the future” (Interview 6).

While the value for local usage is limited as of today, the potential value for the trans-regional level is already at hand: According to the interviewed consumers, the concept of MaaS is especially beneficial in situations of regional unfamiliarity, in which a need for information acquisition (search function) and booking opportunities (ticket function) regarding multiple transport modes, is particularly strong developed owing to limited knowledge:

“If I go to China you know: I don’t have cash, I don’t know which app to use, I don’t know how to get a Didi car. It would be helpful to just have one app that I am familiar with, that is not on Chinese or something, that I can use for information and paying of different modes of transportation” (Interview 4).

In correspondence to their needs for *global usage, convenience* and *time savings*, a familiar one-stop-shop for mobility would facilitate the opportunity to search and book different transport options and thus provide a unique value proposition towards journey planning apps, which are currently mainly used in situations of regional unfamiliarity.

An expansion of the MaaS model towards the trans-regional level does not only promise advantages for the examined target segment, but also a new target segment could be possibly addressed:

“Because they could start targeting business people that are travelling frequently. And you want them to use your app in the US, in China or in all over Europe” (Interview 4).

5. Conclusions and Limitations

While MaaS is a newly emerging concept phenomenon in urban mobility with strong future forecasts, research into the field of MaaS is in an investigative phase with surrounding vagueness regarding its essential pillars for the implementation. Due to limited consumer studies related to the MaaS concept, this study took action and explored the consumer-perceived value of an existing MaaS provider to fill this gap. In the following section, the major findings of each research question are summarized and interrelated. Following this, the theoretical and practical implications of the results are described to critically reflect on the study and narrow down a scope for future research.

5.1 Main Findings and Conclusions

Research Question 1: Which are the mobility-service related needs of young Mobility-as-a-Service consumers in urban areas?

By the usage of semi-structured (in-depth interviews), the inductive analysis uncovered mobility needs (linked to the usage of transport means) along with mobility app needs (linked to the usage of mobility apps) of young MaaS consumers in urban areas. The usage of transport modes and mobility apps were of a functional nature to the interviewed MaaS consumer. Their related needs appeared to be strongly affected by situational context factors. The obtained mobility needs of *time savings*, *costs savings*, *convenience* and *flexibility* confirm previous findings concerning mobility needs of young mobility consumer in urban areas (Eryilmaz et al., 2014; Grotenhuis, Wiegman, & Rietveld, 2007a; Li & Voegelé, 2017; Stopka, 2014). Overall, it can be concluded that MaaS providers need to focus on these needs in terms of product development and positioning, when addressing young consumers in urban areas, who are considered to be the main target segment of MaaS (Eryilmaz et al., 2014; Finger, Bert & Kupfer, 2015; Li & Voegelé, 2017).

In regard to the examined mobility app needs, the interviewed MaaS consumer expressed their desire for *information (real-time)*, *reliability* as well as *ease of use* within the pre- and post-decision stage of transport choice. These findings are in alignment with prior research (Grotenhuis et al., 2007, Sochor et al. 2014, Eryilmaz et al., 2014; Kamargianni et al., 2016) and suggest, from a managerial perspective, that the MaaS performance- and interface design is of essential importance in addressing the aforementioned needs. Moreover, findings imply

that MaaS consumer demand *location information* for orientation purposes and want to rely on the same consistent level of service provision across local boundaries, indicating the here discovered need for *global usage* of mobility apps.

Research Question 2: **Which are the consumer-perceived core attributes of Mobility-as-a-Service products?**

Existing MaaS literature proves to be inconsistent in regard to suggestions about consumer-relevant integrable transport modes. Nonetheless, instead of a sole focus on the integration of public transport it is predominantly recommended to focus on the integration of private providers (Kamargianni & Matyas, 2017; König et al., 2016; Li & Voegelé, 2017). Findings from this study draw a different picture, raising the question for consumer-relevant transport modes. Within the examined MaaS app, public transport remains the almost exclusively used option. Its sufficient infrastructure in combination with affiliated low costs presents the main motivation factors for its general usage and the associated usage within the examined MaaS app. The remaining integrated transport modes (car sharing, bike sharing, taxi services, long-distance train) are hardly considered by the interviewee for its usage within the examined MaaS app. Additionally, as a result of the limited services provision across local boundaries, the examined MaaS app is merely used in local areas.

In terms of functionalities, the combination of a search- and ticket function enables MaaS consumers to search and book (public) transport modes within one app and is therefore perceived as a novelty to previous processes, presenting the main motivation for the usage of the examined MaaS app.

Research Intention: ***How is the relationship between Mobility-as-a-Service perceived core attributes and the mobility-service related needs of young MaaS consumers in urban areas?***

The perceived core attributes of the examined MaaS app, individually as well as combined, are in **limited positive relationship** with the extracted mobility-service related needs of young MaaS consumers in urban areas. The unique combination of a search- and ticket function within one app (in connection to public transport) is perceived as a functional value addition in comparison to former practices. This functionality addresses in particular the consumer needs for *time savings* and *convenience* (mobility needs) as well as for *information* respectively for *ease of use* (mobility app needs). Limitations of the perceived value on the other hand occur owing to deficits in the search function, the irrelevance of further integrated

transport modes as well as the limited usage across local boundaries. In detail, the lacking reliability of the information provided accompanied by the missing incorporation of real-time and location information result in time loss, inconvenience and reduced flexibility, causing a mismatch with corresponding mobility needs. Consequently, MaaS consumers rely, in the situational context of high information need, on the usage of journey planning apps (e.g. Google Maps) due to positive experiences.

By cause of its sufficient infrastructure and its comparably low costs, the integration of public transportation addresses the consumer needs for *time savings, costs savings, convenience and flexibility*. The integration of car sharing, bike sharing, taxi services and long-distance train remain irrelevant to examined MaaS consumers, mainly due to high costs, the non-given need or insufficient infrastructure, conflicting with consumer's needs. Respectively, the examined MaaS app is used as a single-mode service provider for public transport and not as multiple-mode service provider, as intended within undertaken conceptualizations (Kamargianni et al., 2016). Furthermore, results from this study suggest that the prevalence of cars and bikes remain a deterrent factor for the MaaS concept. This implies that the assumed shift away from an ownership-based towards an access-based transport system is not yet completed.

Overall, it has to be noted that the vision of MaaS, to be the one-stop-shop for mobility for its consumers, is not sustained under the current implementation, within the examined app.

Nonetheless, the potential of the concept for strong value addition is recognized by consumers, in particular for the trans-regional level. Due to increasing travelling activities, MaaS consumers face often unfamiliarity with mobility procedures in geographic unknown areas. As a result, they expose a strong desire for functional support from (familiar) mobility apps. The opportunity to **search and book** within one app in geographic unknown areas would provide a significant advancement to current procedures in which the aforementioned steps can be only executed by using a fragmented landscape of unfamiliar local apps. Therefore, one-stop-shops for mobility (MaaS apps) would provide superior value addition in unfamiliar areas compared to its local usage, as of now.

5.2 Contributions and Limitations

The thesis at hand fills an identified gap in the field of MaaS consumer research. It provides first indications for existing MaaS providers in terms of strategic product development and positioning, when addressing young consumers in urban areas. Furthermore, the obtained insights into mobility-service related needs of MaaS consumers can help to specify the up until now vaguely explored concept of MaaS from an academic perspective, in accordance with its envisioned user-centricity.

Existing conceptualizations of MaaS differ concerning integrable trip management functionalities and transport modes. Results from this study point out that, from a consumer perspective, a sufficient infrastructure in conjunction with low-costs are essential criteria for the integration of consumer-relevant transport modes. Additionally, it can be stated that, besides the combination of a search- and ticket function, the opportunity to acquire information along the mobility journey is of vital importance for MaaS consumers and should therefore be included to the conceptual pillars of MaaS. In this context, not only the integration of real-time information is of relevance, as already suggested by Motta and colleagues (2013), but also the integration of location information.

Moreover, the presented findings support the argumentation of Holmberg and colleagues (2015), who declared the importance of an easy app handling for the addressing of consumer needs.

As stated above, results of this study reveal that young MaaS consumers perceive a potential value addition from the MaaS concept in particular for the trans-regional level. This is partially explained by the fact that the unique properties of MaaS serve consumer needs especially in situations of geographic unfamiliarity. Additionally, it can be stated that the surveyed consumers still use mobility services in established ways, as they have not yet fully transitioned to an access-based transport system or make regular use of a variety of service providers. Under these conditions, offering a distinct and value-adding service limited to a local area might prove to be difficult for MaaS providers.

Due to the expected further increase of urbanization (United Nations, 2014), the rise of ICT technology and the trend towards a shared economy (Belk, 2014), it can be assumed that the patterns of mobility consumption will eventually change, which in return might present the point at which the MaaS concept can unfold its full potential. In order to grow their user base

until then, findings imply that MaaS provider should consider a trans-regional business strategy as they already meet the needs of travelling consumers.

In relation to that, *business travelers* might present another promising target segment for MaaS operators. Business people travel constantly and therefore are often confronted with geographic unfamiliarity. In addition, they might display a stronger interest for access-based transport modes as they are not in possession of self-owned bikes and cars during business trips. On top, possible job-related time constraints might cause a decreased relevance for costs, which currently present a deterrent factor for taxi and car sharing services. These implications might present a promising start and need further investigation.

In connection to the trans-regional expansion, MaaS providers should foster cooperations with global private single-mode service providers (e.g. Uber). The advantage of integrating global providers is due to the case that a one-time integration remains valid for multiple trans-regional locations, increasing the market reach of the MaaS provider significantly, an aspect that was already developed by Li and Voegelé (2017). However, due to opposing business interests, MaaS provider need to focus on developing an attractive compensation model for private operators, in order to achieve a cooperation agreement and in this way grow their own consumer base to be well equipped for the increasing relevance of MaaS, since

“people will rely more and more on individual mobility services and then something like moovel which comprises the different ones, will be the future”
(Interview 6).

As it is true for all empirical studies, the findings need to be understood and reflected in the light of the research limitations:

Firstly, respectively his research it has to be mentioned that only a small sample was observed. The small sample size implies that more participants could have brought up additional insights and therefore richer results. Nonetheless, the researcher tried to encounter this issue by selecting a preferably homogenous sample to ensure a certain level of comparability.

Secondly, although MaaS researchers indicate that young consumers are the first adoption segment of the MaaS concept, reasoning its choice for this study, the need for further qualitative as well as quantitative MaaS consumer studies, in respect to additional age groups, is present.

Thirdly, this research examined only the relationship of a single MaaS provider and their consumer base. As a result, the findings cannot be generalized across other operators and by this accentuating the need for further and larger consumer-perceived value research through the lens of other existing MaaS providers.

Fourthly, this research focused on urban areas in Germany, which can be characterized by a strong infrastructural public transport system. Hence, those results cannot be necessarily transferred towards other geographical areas, in particular urban areas with weak infrastructure (e.g. *USA*), stating the need for further examination.

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Appendix 1: Contact Proposal

Contact:

Max Crayen

Email: max.crayen@gmx.de

Phone number: +49 1786170928

LinkedIn: <https://www.linkedin.com/in/max-crayen-90125411a/>



Research project: „Consumer value creation of Mobility-as-a-Service provider“

Dear XXX,

my name is Max Crayen and I am currently a master's degree student at Católica Lisbon School of Business and Economics. Within my master thesis, I am conducting an empirical study related to the topic “Consumer value creation of Mobility-as-a-Service provider”

Based on a semi-structured interview (duration approx. 40 min, via *Skype*, audio recorded), I want to gain insights how Mobility-as-a-Service provider create value for consumers. Within my study, I am focusing on the provider *moovel*. Therefore, I am looking for consumers, who have already made experiences with the *moovel* app.

The interview purpose is to understand your mobility needs and experiences with the *moovel* app.

Your personal data will be kept confidential in order to avoid any setbacks.

I would highly appreciate, if you are interested to participate in one of the interviews. You will not only contribute to my master thesis, you will also help to further develop the young research field of Mobility-as-a-Service. Moreover, I would be happy to share my gained insights after the submission of my thesis.

The interviews are planned for the time frame between the 16.04.2017-30.04.2018, but I can also flexibly adapt to your free time slots.

I would appreciate a positive feedback. For the case that you might have any open questions, you can contact me the whole time under the provided contact data.

Best regards,

Max Crayen

Appendix 2: Interview protocol

Interview protocol “consumer-perceived value creation of Mobility-as-a-Service provider”

Introduction

1. Introduction of interviewee
2. Short presentation of topic “new Mobility-as-a-Service apps”
 - a. **Goal:** to explore value creation of *moovel* app (young research field)
 - i. Usage of *moovel* app
 - ii. Evaluation of *moovel* app from a consumer perspective
3. Interview topics:
 - a. Mobility needs (transport services + mobility apps used for transport services)
 - b. Made experiences with the app *moovel*
4. Interview Style:
 - a. Explorative interview: no yes or no, free talking, no interview protocol with yes/no questions
5. Interview structure: 3 areas
 - a. Mobility behavior, mobility needs, apps for mobility service usage
 - b. Usage of *moovel*
 - c. Evaluation of *moovel*
6. Interview audio taped, question for permission
7. Data confidentially, no personal setbacks possible
8. Open questions?

Part 1: Consumption patterns and consumer needs:

Let's start to talk about your daily travel behavior and the apps that you use on your daily travel...

<u>Leading question 1: You mentioned in the pre-questionnaire that X,Y,Z are your most used transport services. Why in particular do you use them?</u>		
<u>Content Aspects</u>	<u>Trigger Questions</u>	<u>Follow-up questions</u>
Needs Transport services	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? 	<ul style="list-style-type: none"> · Why is this important to you? · Why are you using <i>XX</i> never?

<u>Leading question 2: You mentioned in the pre-questionnaire that X,Y,Z are your most used mobility apps. Why in particular do you use them?</u>		
<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Needs (Mobility Management apps)	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? 	<ul style="list-style-type: none"> · Why is this important to you?

Part 2: The moovel app: usage

After we talked about mobility services and related mobility management apps in general, let's talk more about the moovel app (a new form of mobility management apps).

<u>Leading question 3: What motivated you to install the moovel app?</u>		
<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Needs (unsatisfied before)	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? · Can you provide me with an example?? 	

<u>Leading question 4: When and in which situations do you use the <i>moovel</i> app?</u>		
<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Neutral description (MaaS)	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? · 	<ul style="list-style-type: none"> · Why in those particular situations?

<u>Leading question 5: Which functions of the <i>moovel</i> app do you use?</u>		
<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Perceived attributes (Attribute) Relevant attributes	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? · Can you provide me with an example? 	<ul style="list-style-type: none"> · Why? · Why is this in particular important to you? · Which functions do you use rather less often? · Why?

<u>Leading question 6: Which transport modes do you use in the <i>moovel</i> app? → Bridge: If you want to go from A to B, different transport modes are available. How do you decide which to choose?</u>		
<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Needs Criteria Relevant transport modes	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? 	<ul style="list-style-type: none"> · Why? · How do you apply those named criteria in the <i>moovel</i> app?

Part 3: The *moovel* app: Evaluation

Leading question 7: What do you like about the *moovel* app?

<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Perceived value (positive)	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? · Can you provide me with an example? 	<ul style="list-style-type: none"> ○ How does <i>moovel</i> make your life easier? ○ Which functions of the <i>moovel</i> app do you like?

Leading question 8: What do you not like about the *moovel* app?

<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Perceived value (negative)	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? · Can you provide me with an example? 	<ul style="list-style-type: none"> ○ Why do you not look this? ○ Which functions of the <i>moovel</i> app do you not like?

Leading question 9: How do you like the *moovel* concept to integrate different transport modes within one app?

<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Probing (integration)	<ul style="list-style-type: none"> · Could you describe this in more detail? · What do you mean by this? · Can you provide me with an example? 	<ul style="list-style-type: none"> ○ All-in-one <ul style="list-style-type: none"> ▪ Transport modes ▪ Search-Book-Pay ○ Why?

Part 4: The *moovel* app: Wish list

Leading question 10: What do you miss in the *moovel* App? What would you like to have?

<u>Content aspects</u>	<u>Trigger questions</u>	<u>Follow-up questions</u>
Desires (uncovered needs)	<ul style="list-style-type: none">· Could you describe this in more detail?· What do you mean by this?· Can you provide me with an example?	<ul style="list-style-type: none">○ Functions? (e.g. Search, Filter)<ul style="list-style-type: none">▪ In comparison to other apps○ Transport modes

Leading question 11: Is there anything else about the *moovel app* that hasn't been mentioned yet?

Open Exit question

Interviewee can decide whether important topics need to be mentioned

Ending

- Thanks and explanation of further procedure
 - Interviews will be transcribed and qualitatively analyzed
 - Findings of thesis can be sent.

Appendix 3: Interview Citations

Interviewee 1:

1. *“I mean, that you can always use the same app and that you don’t have to think about which app is now relevant in this city”.*
2. *“because our office is now in the middle of the city and you can get there very well with the metro”.*
3. *“I don’t know but I have my own car, so I don’t any car sharing. I can just take my car whenever I want to”.*
4. *“and bike sharing, I don’t go that often with a bike because it is too far to work and there are not enough bicycle tracks. And I am also not the bike person, that’s the reason why no bike sharing”.*
5. *“The problem with the taxi is that is just too expensive. When I am with some friends, then I might think about it but for myself it is just way too expensive”.*
6. *“That is really cool, because it just saves me time because first I don’t need to open another app and I also don’t need to buy my ticket at the vendor”.*
7. *“Yes true, I get the information in Google Maps as well and actually they are better there, I mean how they present them and all of this. But the thing is, I can’t pay in Google Maps, in moovel I can”.*
8. *“When I use moovel, I just have this 4-digit pin that I need to enter and that makes it really fast when I just want to buy quickly a public transport ticket on the way”.*
9. *“I use Google maps because I always made good experiences with it and the information are always correct. So, it became a habit, always when I need to get somewhere, I use Google Maps”.*
10. *“If I take the car, I am much more flexible. For example, on Fridays, I normally take the car because in the morning I don’t know whether I will go after work straight to my parents who live a bit further away or whether I will stay in Stuttgart. So, the car is then better for me”.*

Interviewee 2:

1. *“In my opinion this bike sharing thing just makes sense when I can get from door to door with it”.*
2. *“The metro connection in Stuttgart is just very good, it keeps me flexible. When I take the car, it is horrible because parking in Stuttgart is the worst. And the public transport is also cheaper than the car because of the parking”.*

3. *“I don’t live directly in the city center and those bike sharing stations are just within the inner circle of the city and not in my district. In my opinion, bike sharing makes just sense when I can get from door to door with it. But in this case, I can’t do it”.*
4. *“I use Google Maps because I want to know how I can get the fastest from A to B”.*
5. *“So, when I know that I will meet some friends after work, then it might be that we grab some beers. And then I prefer to take the metro to work and afterwards because I mean you never know how the night ends up”.*
6. *“It is nicely designed and so on. But that's not the reason why I use such an app, it needs to be functional and help me, that's it”.*
7. *“I believe it has a huge advantage, when you are travelling a lot and you are often in new cities, in which you have no knowledge and ask yourself: What mobility options do I have over here?”*
8. *“I know that I can get fast and convenient public transport tickets with moovel”.*
9. *“The information within the moovel app are often wrong and it is not that accurate. The VVS app is better in that”.*

Interviewee 3:

1. *“In the evening I use sometimes the Taxi because it is more convenient. [...] True, I said that the price is an important criterion for me, but when I take the taxi in the evening to meet friends, it is just much more convenient. Then it is okay to spend a few Euros more”.*
2. *“As I said, I have my own bike, so I just don’t need any bike sharing thing”.*
3. *“Maybe in a different city or somewhere where I have no idea how to get around. If I already use an app, then I want to use it everywhere and don’t start again to think about what app I can use here. Imagine, when I am in a new city then I really need those apps because I don’t know what brings me from A to B. Especially then I want to use an app that I am familiar with and that I can use everywhere”.*
4. *“The benefit is that I can save time and it is more convenient, the whole handling”.*
5. *“Because we humans, don’t live at the same place anymore, instead we travel more and more and because of this we want to use to the same app or service everywhere, at least it is in my case like that”.*

Interviewee 4:

1. *“But most often, I am using S-Bahn because it is the closest to my house, the stop and it runs most frequently”.*

2. *“So, if I have to change two trains and a bus to get there, then I usually won’t do it. I rather just have one train to get me to there”.*
3. *“I just want to have one app also in other areas that makes it much easier. And you know, in our generation it is all about convenience”.*
4. *“You don’t want to waste your time looking at things”.*
5. *“It is helpful for me to be like, especially when I go to the office, if I can know is the U-Bahn or the S-Bahn coming next and what are my options and what is my time frame? This is important to me”.*
6. *“Because they could start targeting business people that are travelling frequently. And you want them to use your app in the US, in China or in all over Europe”.*

Interviewee 5:

1. *“I don’t have much time, especially not when you are working. Time becomes then really important. Because of this, I am not so keen to spend 3h on my way if I want to go somewhere”.*
2. *“In my opinion, no one likes to spend 200€ for a train trip. You don’t have much from it. You just sit in there, you get from A to B and that’s it. It is not such a super cool adventure”.*
3. *“That is something different, if I am in my holidays. Then I have more time and then it is okay to spend a few hours in a bus or something like that. But when you just want to go quickly into the city on your way to work, then it is just annoying if it takes you 2 hours”.*
4. *“When I think about costs, then I would say the public transport. The S-Bahn and U-Bahn are not very expensive”.*
5. *“It is nice that Car2Go and Taxi are included in moovel, but they are just too expensive for me. And why would I need them? I have an own car and Car2Go cars are not very often in my area, that is not very convenient”.*
6. *“That’s a good question why I never use it [Bike sharing]. I live currently a little bit out of Stuttgart and here they don’t exist. I could just use them directly in the city and to register for that is too much effort”.*
7. *“Yes, I tried to buy train tickets in moovel but there I can’t register my BahnCard. I don’t know why it is not possible but in the DB App I can do it, so I buy my train tickets directly in there”.*
8. *“Then I am scrolling a little bit through the available options, but actually normally I already know before which option I want to use to get there, for e.g. the metro”.*
9. *“I use moovel almost entirely just for the booking because it is convenient for me. I have the app on my smartphone, my payment details are saved in the background and I can just book easily without the need to go to the vendor”.*

10. *“Actually, I just go in there to directly purchase my ticket”.*
11. *“[...] for instance, I already know my way to work but I still use Google Maps to see whether there is any traffic jam on my way”.*

Interviewee 6:

1. *“But when I know that I would need to take a train connection abroad, then I would always first use Google Maps, because I know them already and they are available everywhere and they are so good”.*
2. *“To do often transfers with public transport is related with delays or waiting time or I could also miss my connection train, and this would be annoying because then I would arrive too late to my business appointments”.*
3. *“To have a direct connection is always better because it is just much more relaxed, and you know I am already stressed the whole day, so at least when I take public transport, I want to relax a few minutes”.*
4. *“That's extremely important for me [when using mobility apps], that it doesn't take long and that is simple to use”.*
5. *“I don't use car sharing because I have currently my own car. We have really often a Car2Go in front of our house, but it is not relevant for me because I can use my car”.*
6. *“That is the same with bike sharing. Cool idea, but I have my own bike”.*
7. *“Actually, that is really cool because it increases my convenience and it is quick. I can purchase public transport tickets through moovel”.*
8. *“I can purchase easily and fast tickets for public transport with moovel, that's cool”.*
9. *“If moovel would have real-time information, it would make the DB maybe obsolete. I mean not directly obsolete. At least I would consider using it more often when I need information and not just a ticket”.*

Interviewee 7:

1. *“I don't have that much free time and I don't want to spend this rare free time with sitting in some transport modes”.*
2. *“Time is for me very important. I am a person who always has a lot of things to do, also because of my work. Because of this, I don't have much free time and that's the reason why I want to use my time effectively”.*
3. *“In summary, mobility is just something functional for me, I want to get fast and cheap from A to B, nothing more”.*
4. *“I tried to book a train in moovel but there I couldn't register my BahnCard. If I could do it in moovel as I can do it in the DB App, then I would directly do it”.*

5. *“Taxi would be the best, but I pay much more than using the metro”.*
6. *“I use moovel for everything in my local area”.*
7. *“Before I always had to buy tickets for the metro at the vendor. But that was super inconvenient. I always had to have some coins at hand and stand there to get tickets. Nowadays, I just do it through moovel and it is much more convenient”.*
8. *“moovel directly shows me how much it costs”.*

Interviewee 8:

1. *“Time, because I don’t have much free time and my spare time is always limited. If I then spend much time to get around, then it is just annoying”.*
2. *“And then I think, I am not in the mood to spend a lot of time with that because then my vacation time is gone. Because of this, I just buy it and in this moment the price is less important for me somehow”.*
3. *“If I would have installed this app just recently and it produces the whole time problems, then I would be rather into the mood of deleting it again”.*
4. *“Except there is such a huge advantage, which I want to use so bad, then I would still use the app, as in the case of moovel”.*
5. *“When I already use such an app, I expect that it works fine and doesn’t produce errors the whole time”.*
6. *“Car sharing, I have my own car and when I need a car, then I use my one”.*
7. *“It shows me that I could take the Car2Go to go home. That is nice, but it would cost me 4€ more and this doesn’t fit into my price range. That is the same with Taxi. That’s even more expensive. No one can pay that”.*
8. *“Bike sharing, I don’t because I have my own bike, which I really like and therefore I don’t need to rent one”.*
9. *“It is a catastrophe and that happens the whole time. They show me some stops which have the same name, but they are somewhere in Spain or something. Those errors happen the whole time. This thing is not intelligent and reliable at all”.*
10. *“To go with the bike takes less time and is more comfortable than going with public transport because I don’t need to take any transfers”.*
11. *“So, when I use the VVS App, I have to enter a long and complicated password and when I use moovel then I just need to enter a Pin. That is faster because the Pin is just 4-digits or actually I can also just do it with my fingerprint sensor”.*

Interviewee 9:

1. *“Costs are an important thing. I don’t see any sense to spend much money to get around”.*

2. *“Yes, normally I would directly delete the app, but they have this feature that no one else has”.*
3. *“I used car sharing in the past but right now there are normally not many cars around my home and I don’t walk for 20 min to find a Car2Go”.*
4. *“since I have my own car now, I don’t consider Car2Go that much anymore. At least not in my routine”.*
5. *“That is the same with bike sharing. Not enough stations and at least here in my city, I have my own bike which is actually very nice”.*
6. *“The benefits? Well, I can get my ticket faster through moovel and it is also much more relaxed because I can directly buy it in the app”.*
7. *“But when I don’t know the way as for example in another city, then I would always take Google Maps because the information is better displayed. And the information and time predictions are always super accurate. But maybe I also just use it because I am used to it”.*

Appendix 4: Inductively Developed Category System

1 Citations	14
2 Other All-in-one services	3
3 Mobility Needs	0
3.1 Flexibility	9
3.2 Saving costs	20
3.3 Convenience	18
3.4 Saving time	9
3.4.1 Work	10
3.5 Other	4
4 Mobility consumption	0
4.1 Used transport modes	0
4.1.1 Consequences	0
4.1.1.1 Time	9
4.1.1.2 Convenience	8
4.1.1.3 Costs	6
4.1.1.4 Flexibility	5
4.1.2 Car sharing	8
4.1.3 Taxi	4
4.1.4 Public Transport	15
4.1.5 Car	17
4.1.6 Bike sharing / Bike	13
4.2 Mobility Apps	0
4.2.1 Usage	0
4.2.1.1 Geographic familiarity	9
4.2.1.2 Habit	6
4.2.1.3 Transport mode	3
4.2.1.4 Function	1
4.2.2 Google Maps	15

4.2.3 Consequences	0
4.2.3.1 Time	10
4.2.3.2 Costs	3
4.2.3.3 Convenience	8
4.3 Criteria Transport choice	0
4.3.1 Infrastructure	15
4.3.2 Travel time	8
4.3.3 Habit	6
4.3.4 Parking	3
4.3.5 Costs	2
4.4 Purpose of Mobility	5
5 Mobility App needs	0
5.1 Information	10
5.1.1 Orientation	8
5.1.2 Real Time Information	13
5.2 More than one function	3
5.3 Performance	8
5.4 Global Usage	13
5.5 Cashless Payment	4
5.6 Ease of use	8
6 Moovel	0
6.1 Description of Moovel	0
6.1.1 Integration of Transport modes	6
6.1.2 Information	3
6.1.3 Ticket Function	6
6.2 Consumption Behavior	0
6.2.1 Functions	0
6.2.1.1 Ticket Function	13
6.2.1.2 Information/Comparison Function	10
6.2.2 Situations	0
6.2.2.2 Geographic Usage	7

6.2.2.3 Work	7
6.2.2.4 Private	3
6.2.3 Used Transport modes	18
7 Evaluation of Moovel	0
7.1 Negative	0
7.1.1 Regional - Limited Value	19
7.1.2 Information/Comparison Function	17
7.2 Positive	0
7.2.1 Easy-to-use	10
7.2.2 Information function	20
7.2.3 Ticket function	26
7.2.4 All-in-one	10
7.2.5 Integration of Transport mode	12
8 Consequences of Moovel Usage	0
8.1 Added Value	0
8.1.1 Saving Costs	3
8.2.2 Flexibility	1
8.3.3 Overview	5
8.3.4 Environment	2
8.3.5 Convenience	21
8.3.6 Time Savings	19
9 Future Desires	0
9.1 Navigation	9
9.2 Information Function	0
9.2.1 Frequency	1
9.2.2 Real-Time Information	8
9.2.3 Comparison	4
9.3 Ticketing for all	7
9.4 Further Transport modes	4
9.4.1 Long-distance	6
9.5 Worldwide Usage	19

1 Citations

Definition:

All relevant citations for results section

2 Other All-in-one services

Definition:

Description of All-in-one services that are used in daily life

-Online/offline

3 Mobility Needs

Definition:

Base Level Mobility Needs, in relation to consumption of mobility (car+transport modes)

1. Flexibility
2. Costs savings
3. Time
4. Convenience
5. Resulting needs related to base level needs (e.g. Infrastructure)

4 Mobility Consumption

Definition:

Consumption behavior of mobility in daily routine: Transport modes/used apps/why?

-Apps

-Transport modes

-Others

5 Mobility App Needs

Definition:

Needs in connection to the usage of mobility apps

-What is important when using mobility apps?

-Mobility Apps: Journey Planning, Single-mode service, MaaS

6 Moovel

Definition:

Neutral description of moovel and the interaction with the app (neutral voice, without rating)

-Description of App

-Motivation for usage

-Usage behavior in relation to app

7 Evaluation of Moovel

Definition:

Evaluation of moovel (evaluating voice, with rating)

-Functions

-Transport modes

-Marketing campaign

8 Consequences of Moovel Usage

Definition:

Consequences from moovel interaction (evaluating voice, with rating)

-positive and negative results

9 Future Desires

Definition:

Explicit wishes in regard to moovel:

-What is missing (Functions, Transport modes)

-What should be improved (Functions, Transport modes, business model)

-Others

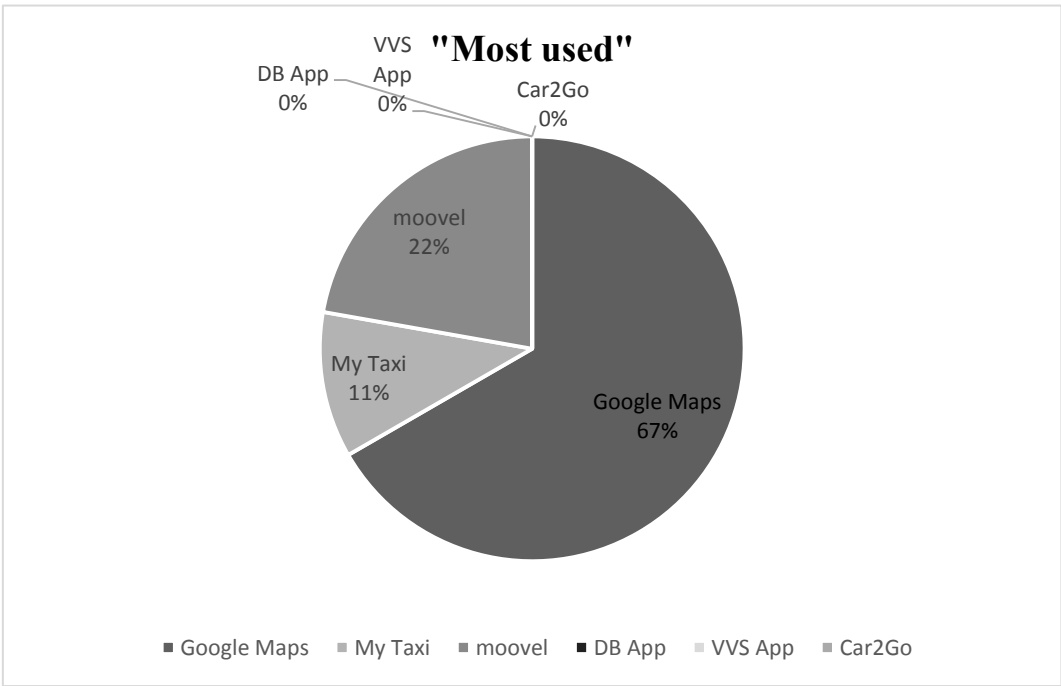
Appendix 5: General travel patterns of sample

Note: The interviewed sample were asked to categorize following transport modes based on their usage into “Daily”/”Often”/”Rarely”/”Never”. The left column of each category presents the number of interviewees, while the right column presents the related percentage value.

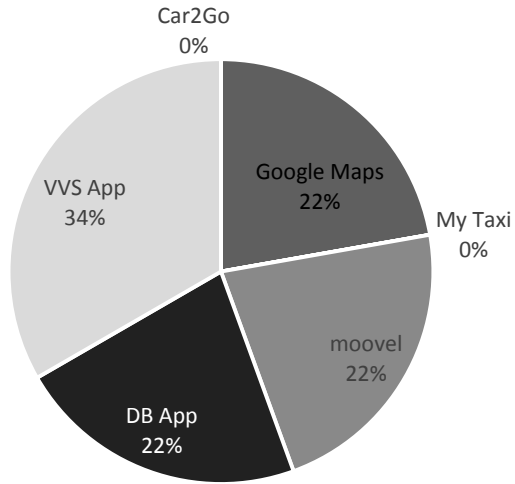
Modes / Usage	“Daily“		“Often“		“Rarely“		“Never“	
Public Transport	2	22%	6	67%	1	11%	0	0%
Car	5	56%	2	22%	2	22%	0	0%
Bike Sharing	0	0%	0	0%	1	11%	8	89%
Bike	1	11%	2	22%	3	33%	3	33%
Car Sharing	0	0%	2	22%	3	33%	4	44%
Taxi	0	0%	1	11%	7	78%	1	11%
Ride Hailing (e.g. Uber)	0	0%	0	0%	5	56%	4	44%

Appendix 6: Mobility App usage of sample

Note: The interviewed sample were asked to name their Top-3 mobility apps that are most used. *VVS* App presents the local public transport app of Stuttgart (Germany).

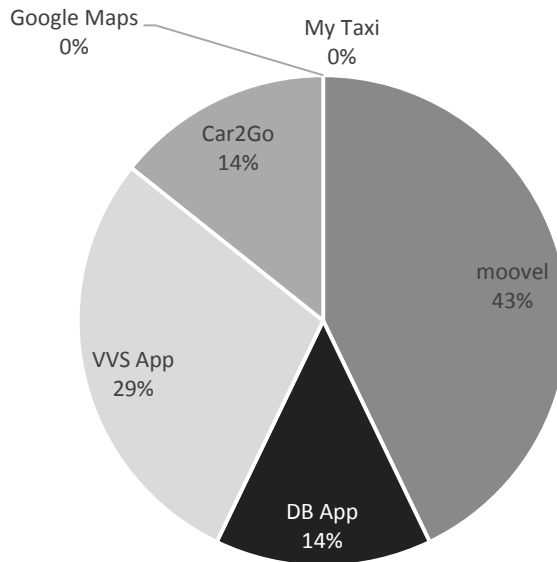


"Second most used"



■ Google Maps ■ My Taxi ■ moovel ■ DB App ■ VVS App ■ Car2Go

"Third most used"



■ Google Maps ■ My Taxi ■ moovel ■ DB App ■ VVS App ■ Car2Go

Appendix 7: Description of moovel



Company name: moovel

Operation start: 2016

Employees: 250

Location: Stuttgart (HQ), Hamburg, Berlin, Portland (USA)

Geographic operations: Germany, Austria, Italy, Netherlands, UK, USA, Canada

Integrated functionalities: Search function (Planning), Booking, Payment

Integrated transport modes: Local public transport (Booking only available in Hamburg and Stuttgart), bike sharing, car sharing (Car2Go), taxi services (MyTaxi), long distance train (only in Germany)

Interesting facts:

- In terms of car sharing and taxi services, *moovel* aggregates services of two other major *Daimler AG* subsidiary firms, carsharing provider *Car2Go* and taxi service provider *MyTaxi* (Burrows & Bradburn, 2015). *Car2Go* is the biggest carsharing provider worldwide with operations in 26 countries, a fleet of 14.000 cars and 2.5 million registered members (Car2Go, 2018). Also *MyTaxi* operates in multiple countries (11 countries) and compasses a taxi driver network of 120.000 drivers (Daimler Financial Services, 2018).
- *BMW Group* and *Daimler AG* announced recently (28.03.2018) to merge their existing mobility service units, including *moovel*. The merge plans to create a joint venture between *moovel* (*Daimler AG*) and *ReachNow* (*BMW Group*) and by this planning to “create significant added value for users” (Moovel, 2018). “Combining our mobility services as planned will create a unique digital ecosystem. This alliance will make it easier for our customers to discover the emission-free mobility of the future“ (Harald Krüger, Chairman of the Board of Management of BMW AG)

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