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GOOD PRACTICE EXAMPLES OF MOBILITY AS A SERVICE IN GERMAN CITIES

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Abstract

Mobility as a service (MaaS) is a new way of offering sustainable mobility in cities centered on the person, i.e. the user, who chooses the way to travel to the destination according to individual preferences via a mobile application. All the necessary actions such as: planning, choosing the mobility method and paying for the trip, as well as providing all the relevant information about the trip in real time, are in the user's hands, using the application on their smartphone. By purchasing a mobility service as needed or as a monthly tariff, buying, owning and caring for your own car becomes unnecessary, which has a positive effect on city traffic and urbanism. This could become an effective way of sustainable urban mobility, which does not create traffic, but is aimed at achieving mobility through public transport and ride-sharing services or vehicles, mainly electric, which has a positive impact on the climate. Powerful and available information and communication technology and access to MaaS business models are essential prerequisites for general acceptance and increased use of the service. Objective of the research in this paper is to show the services, application and advantages of

different MaaS mobile applications in 5 German cities and highlight their special features. The purpose of the paper is to show the increase in the use of sustainable modes of mobility in cities through examples of the use of MaaS mobile applications. Finally, the paper presents conclusions and suggestions for further development and improvement of mobile applications to strengthen the MaaS service.

1. INTRODUCTION

At the core of the Mobility as a Service (MaaS) concept lies the user and their mobility needs, aiming to provide optimal mobility services without the necessity of car ownership or other means of transportation, in a sustainable manner. Rather than purchasing a car, users can access suitable mobility services through a mobile application (alternatively via computer) tailored to their individual preferences, facilitated by digitalization. Private cars are typically used for only one hour per day on average, remaining idle for 23 hours, incurring associated costs, and simultaneously occupying already limited public spaces, which is not sustainable. The "Mobility as a Service" (MaaS) concept is made available to users through a digital platform (mobile application) that offers easy access to existing mobility options such as public transport and sharing services.

The second variant of "Mobility as a Service" includes subscription-based models, where users can choose from different mobility packages, similar to mobile phone plans. For pre-booked routes, credits are deducted from the respective package based on the transportation mode used. An example of this offering is the multimodal mobility service provided by UbiGo in Stockholm. The service includes unlimited usage of public transport and packages for carsharing, rent-a-car, taxi, and bike sharing. Ordering and payment are facilitated through a smartphone application, and the bill can be shared within a household. During the test phase in Gothenburg, participants' car usage was reduced by half. At the same time, satisfaction with their mobility increased from 19% to 51%.

Passenger transportation accounts for almost two-thirds of emissions. Mobility as a Service can help change mobility-related behaviors. An important prerequisite for the successful acceptance of "Mobility as a Service" by the population is a dense public transport network with frequent connections, sharing services, and the availability of on-demand options through the mobility-as-a-service platform. Rural regions require more flexible mobility solutions, such as on-call shared taxis. These demand-responsive offerings must be integrated into the offerings of transportation associations [1].

2. GERMAN MARKET

A significant step towards Mobility as a Service has been achieved in Germany with the introduction of e-scooters. Today, brands like Voi, Bird, or Lime are a common sight in the urban landscape of many European cities. It is estimated that there are

around 50,000 shared e-scooters in Germany, with approximately 15,000 of them in Berlin alone. The total sales of the shared e-scooter segment in Germany amounted to 72 million euros in 2019, and by 2022, it has more than doubled, reaching 176 million euros. The number of users has also increased from 4.4 million in 2019 to nearly 10 million currently. However, according to projections, the trend is expected to stabilize soon and reach around 200 million euros by 2025. Uber already has concrete plans in the area of self-driving cars, while other providers like Bolt are making their way into the German market, catering to the low-cost segment.

3. AUTONOMOUS MOBILITY AS A SERVICE – FUTURE OF URBAN TRANSPORT

Promising further development in MaaS technology involves the integration of autonomous transportation. Numerous attempts are already being made worldwide in this direction. In Germany, the first autonomous bus was put into operation in 2017 and continues to operate smoothly on its routes in several cities. Companies like Amazon and Postmates are also investing in this field and aiming to provide autonomous delivery services. Postmates even received conditional approval to test its delivery robot called Serve, allowing them to conduct tests in San Francisco for 180 days. Amazon announced that its delivery robots called Scout are now operating in Irvine, California. MaaS is less widespread in the United States compared to Europe, likely because Europe has more international cities in a smaller area. However, being ahead of the American market in this emerging sector is a rather unusual phenomenon [2].

4. EXAMPLES OF MAAS IN GERMAN CITIES

4.1. Stuttgart

Mobility Stuttgart is a multimodal mobility platform that integrates public and private mobility services from the city of Stuttgart and surrounding areas into a single mobile application. Currently, 13 cities and municipalities participate in the Mobility Hub, which offers a base for mobility services, providing services like Park&Ride spots and rental of shared vehicles (carsharing, e-scooters). From public transportation to ridesharing and vehicle-sharing services, the application offers door-to-door trip planning, reservation, and payment for services, as well as Park&Ride services with a display of available parking spaces. The ultimate goal is to reduce or eliminate the use of private cars. The application helps users choose the fastest routes and considers personal travel preferences, such as mode of transportation. Real-time travel information, including disruptions, delays, and alternative routes, is provided, along with push notifications for transfers and audio navigation. The app also offers ticket purchase suggestions based on the selected travel route. [3]

On-Demand-Service Stuttgart

Stuttgarter Straßenbahnen (SSB) offers on-demand mobility service through their SSB-Flex app, utilizing mini-buses that are more efficient compared to traditional

taxis. This service allows for ridesharing, which means transporting multiple passengers within the same time frame or on similar routes, making it a cost-effective and environmentally friendly option. SSB-Flex complements public transportation where it may not be extensively developed, especially in the outskirts of the city [4].

4.2. Hamburg

The easiest way to meet mobility needs sustainably in the city of Hamburg is by using the unique mobile platform through the "switch" application, which consolidates all relevant mobility services. Currently, Hamburg boasts over 1,500 sharing vehicles. Through ride-pooling, where passengers with similar routes are grouped together, service providers aim to reduce costs and offer prices up to 40 % lower than local taxis, depending on the time and route. On-demand mobility is achieved by ordering taxis through the app and sharing the ride with other passengers, thus reducing costs for all travelers. Citizens and visitors can currently rent one of 2,600 bicycles from 220 stations. The service is being expanded to 350 stations and 4,500 bicycles. What makes this offer particularly attractive is that the first half-hour of bicycle use is free of charge [6].

In order to shorten commutes, reduce traffic, and save time, Hamburg has set the ambitious goal of creating a "15-minute city," where all essential needs of the population can be met within a maximum of 15 minutes of travel time. The aim is to design a city where residents can easily access amenities such as schools, workplaces, shops, parks, and other services within a short distance from their homes, promoting convenience, sustainability, and a higher quality of life [7].

4.3. Mobil-flat, Augsburg 2018 – today

The municipal utility company, Stadtwerke Augsburg, manages the public transportation system in the city of Augsburg, Germany. In addition to trams and buses, Stadtwerke Augsburg also operates the city's only carsharing system (both free-floating and station-based) and a bike-sharing system. This multimodal service portfolio allows Stadtwerke Augsburg to position itself as both a public transportation operator and a mobility service intermediary [8].

Following its long-term multimodal mobility strategy, Stadtwerke Augsburg launched a MaaS project called "Mobil-Flat" in October 2017. Around 50 residents of Augsburg were invited to subscribe to a mobility package for a one-year trial. While the overall goal of MaaS journeys for Stadtwerke Augsburg is customer retention, the objective of this initial trial was to learn about travel behaviour under the influence of the package [9].

The tested package included a monthly budget of 30 hours for carsharing (any vehicle, unlimited distance), an unlimited number of 30-minute bike-sharing trips, and a citywide public transportation pass. The price of the package was 75 euros, which, in comparison to the minimum price of 110.5 euros for individual services (52.5 euros for public transportation ticket, 48 euros for carsharing without additional charge per kilometre, and 10 euros for bike-sharing), offered cost savings.

Participants were asked to keep a simple mobility diary throughout the program to enable research and package development. Leveraging the analysis of trial reservation data, Stadtwerke Augsburg improved its subscription packages and launched the first two commercial multimodal subscription packages in Germany on November 1st, 2019. The first package ('swa Mobil-Flat S') was a slightly smaller version of the trial package, offering 15 hours of carsharing (half of the trial version) and the same budgets for public transportation and bike-sharing, at a price of 79 euros per month. The second package ('swa Mobil-Flat M') essentially continued the trial package at a price of 109 euros per month (after an initial discounted price of 79 euros per month for the first 6 months). The initial acceptance of these packages was promising, with around 150 applications received in the first 2 weeks [10].

4.4. Berlin

The mobile application "Jelbi" offers all mobility services in Berlin in one single app, with over 40,000 vehicles from all partners and the Berlin Public Transportation Company (JGP), so to speak, "all in one place." No need to install other additional apps to access mobility throughout Berlin and its suburban areas. After selecting the desired location, multiple transportation options are provided, with a focus on sustainability and healthy mobility choices. All types of tickets are available in digital form after purchase. The majority of sharing vehicles are electric, contributing to eco-friendly transportation. Increasingly, ride-sharing services are being offered, where passengers benefit from shared routes with multiple travellers, resulting in lower costs per ride. The app clearly compares different offers based on duration and price, allowing each user to easily book the most suitable option depending on the occasion, weather conditions, cost, or availability. Mobility hubs are strategically located near major JGP transit hubs, train stations, or areas with high foot traffic, both in the city centre and the outskirts. These hubs facilitate seamless transfers between public transportation and sharing options, as they provide a comprehensive range of urban mobility services in one place. Jelbi stations also offer additional amenities, such as internet access, package stations, and electric vehicle charging points, enhancing the overall user experience [11].

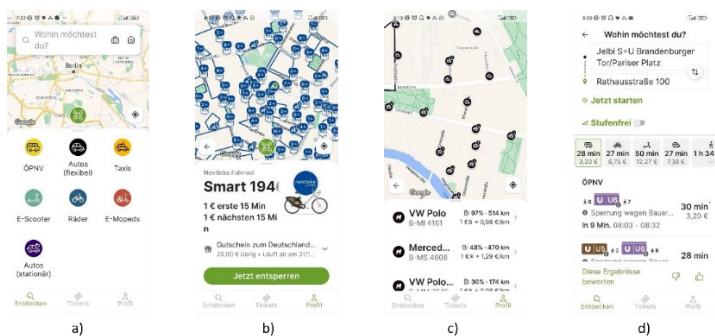


Figure 1 a) Choices for modes of transport b) Price display for individual modes of mobility c) Displaying the location of bicycles for rent and prices near your location d) Locations and prices for carsharing vehicles

Figure 1 a) is the home screen of the Berlin mobile app Jelbi, where the destination is entered while simultaneously selecting the preferred mode of sustainable mobility. Figure 1 b) shows the point of departure, the destination with the highlighted price of the modes of transport offered and the duration of the trip. Figure 1 c) shows the location of rental bikes near your current location, the number of bikes available and the rental price. Figure 1 d) shows the location of electric car rentals near your current location, along with the type and registration number of the vehicle for faster finding, the battery condition, the maximum number of kilometres that can be travelled with the current battery condition, and the rental price, i.e., per kilometre travelled.

The micro-mobility sharing sector, including e-scooters, bicycles, and e-mopeds, has nearly 65,000 vehicles available, with e-scooters being the most prevalent, totaling 48,000 vehicles. Additionally, there are around 7,300 carsharing vehicles, consisting of 7,000 free-floating vehicles and 300 vehicles available at rental stations. Currently, Berlin has 1.98 carsharing vehicles per 1,000 residents, making it the third-largest city in Germany in terms of carsharing availability [12].

5. CONCLUSION

Mobility as a Service is really about users and mobility, as the mobility platform is available through a free app to the vast majority of the population via their own smartphones. It is the availability, the practicality of handling and the application adapted to the individual needs of the user that guarantee an increase in interest and the realization of a sustainable way of multimodal mobility through the MaaS service. The most widespread vehicle in the carsharing service is the e-scooter, with around 50,000 vehicles in Germany, of which 15,000 vehicles are in Berlin. Common to all applications in the mentioned cities are basic functions such as: planning, reservation, payment for driving services, travel information in real time, as well as the offer of public and private transportation services.

A very important service, which not all cities have, but Berlin, Hamburg and Stuttgart, is on-demand mobility, which strengthens mobility in the outskirts of cities with weaker coverage by public transport and sharing services. Berlin has a large number of Jelbi mobility hubs near the station and larger passenger transfer points, where sharing vehicles (bicycle, e-scooter, e-moped, e-car) can be booked in advance and continue the journey in a sustainable way. Jelbi offers a monthly ticket through the application and a €25 start package for mobility services with the aim of attracting new users.

Only the city of Augsburg currently offers in Germany through its application "swa Mobil-Flat" the possibility of monthly or annual subscription of a certain package for the use of MaaS services. This offer is practical, because the costs of all multimodal mobility services are calculated automatically in the form of deducting the monthly amount of the selected tariff option. The user should only choose the mode of mobility, i.e., the means of transport, with which he wants to make trips and should not deal with paying for each trip.

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