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Strategic Business Models in the Car Provisioning Industry – Optimizing the Car Sharing Business Model

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ABSTRACT

Car sharing has been the subject of discussion in the context of future mobility. However, many car sharing providers struggle to achieve profitability. This study aims to analyze car sharing and business models in the car provisioning industry to develop concrete recommendations for optimizing the car sharing business model. After conducting a thorough review of all aspects of the car sharing business model, seven recommendations were identified and evaluated. We suggest that implementing dynamic pricing, utilizing vehicles for complementary cases, adding rental/subscription offerings, and preparing for the integration of autonomous vehicles will optimize the business model and ensure future competitiveness.

Keywords: **Car Sharing, Business Models, Business Model Innovation, Sharing Economy**

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AV	Autonomous vehicle
B2B	Business to business
B2C	Business to customer
BM	Business model
BMC	Business Model Canvas
CAGR	Compound annual growth rate
CS	Car sharing
P2P	Peer-to-peer
SAV	Shared autonomous vehicle
SME	Small and medium-sized enterprise

1 INTRODUCTION

The trend of shifting from vehicle ownership to vehicle access has been gaining momentum recently, particularly among younger consumers who place a lower value on ownership. In addition to changing consumer preferences, the high cost of vehicle ownership is also driving this shift (Cox Auto, 2019). To meet the growing demand for alternative forms of transportation, a range of service offerings have emerged in recent decades, including car leasing, car subscriptions, car rentals, and car sharing (CS).

The discussion about the future of transportation and mobility is versatile, but the most significant trends are shared mobility, automation, electrification, and connectivity (Gao et al., 2016; PwC, 2022; BMW Group, n.d.). The CS business model (BM) is a shared mobility concept that uses the advantages of electrification and connectivity and shows strong potential to integrate autonomous driving. However, many CS providers struggle to achieve profitability with their current BMs. Different approaches have been introduced to the market in recent years: free-floating, station-based, and peer-to-peer CS. While the free-floating model holds the most promise for disrupting vehicle ownership, it faces utilization issues directly connected to profitability.

BMs refer to value creation, delivery, and capture, helping to understand why and how a firm operates (Teece, 2010). The way CS providers realize their BM shows promising approaches which can be essential for future success, such as a sustainable value proposition, shared services, and a focus on new technologies. Still, the lack of profitability shows the need to innovate the BM. A new set of value configurations and new service offerings address this challenge.

This work contributes to the literature with a practical-oriented approach to identify the needs of future BMs in this area. This analysis provides recommendations for practical changes and

extensions to the existing CS BM. The theoretical understanding of how the CS BM creates and delivers value is combined with hands-on practical recommendations on how the business should change to ensure future success. As external factors mainly depend on the region, this work's scope is the European market. It follows a resource-based view, considering the resources and capabilities of an organization as the key to a sustainable competitive advantage (Barney, 1991). In a BM context, the resource-based view aims to find a BM which is valuable, rare, imperfectly imitable, and not substitutable by other competing BMs (Wright et al., 1994).

This work is divided into eight sections. In Chapter 2, theoretical concepts of BMs and BM innovation are brought into context with strategy and the sharing economy. Next, Chapter 3 introduces the methodology used in this work and explains how this contributes to the research goal. In Chapter 4 the car provisioning industry is delimited, showing the variations of car leasing, car subscription, car rental, and CS, supplemented by evaluating the strengths, vulnerabilities, and key players. Chapter 5 continues with an in-depth analysis of the CS BM. Within this analysis, different CS models are explained but are ultimately narrowed down to the free-floating offering. It is complemented by an evaluation of the platform offering and processes, the most relevant market players, current market trends, and external challenges. Chapter 6 adds to this with specific recommendations on how the BM should be innovated to ensure future success by increased profitability. A concrete implementation plan and interconnections within the recommended BM are introduced. After the limitations and potential research extensions are discussed in chapter 7, the findings of this work are summarized in Chapter 8.

2 STRATEGIC BUSINESS MODELS

2.1 Business Model

Amit & Zott (2010) understand a company's BM as a system of transactions through which interdependent activities are linked, with the activities transcending the boundaries of the company's core. On the other hand, Osterwalder and Pigneur (2010) describe an organization's BM as the fundamental principle according to which an organization creates, delivers, and captures value. In the context of this thesis, a BM describes the content, structure, and governance of corporate transactions focused on the goal of value generation (Amit & Zott, 2001). Although BMs have always been an integral part of commercial and economic behavior (Teece, 2010), the specific concept gained acceptance and momentum, especially with the advent of the Internet in the mid-1990s (Zott et al., 2011). Through research, Zott et al. (2011) used the EBSCO database to show that interest in the BM concept increased sharply in the literature, especially between 1995 and 2010 (see Figure 1). Ghaziani and Ventresca (2005) confirmed these findings of the significant increase in the importance of BMs in academia.

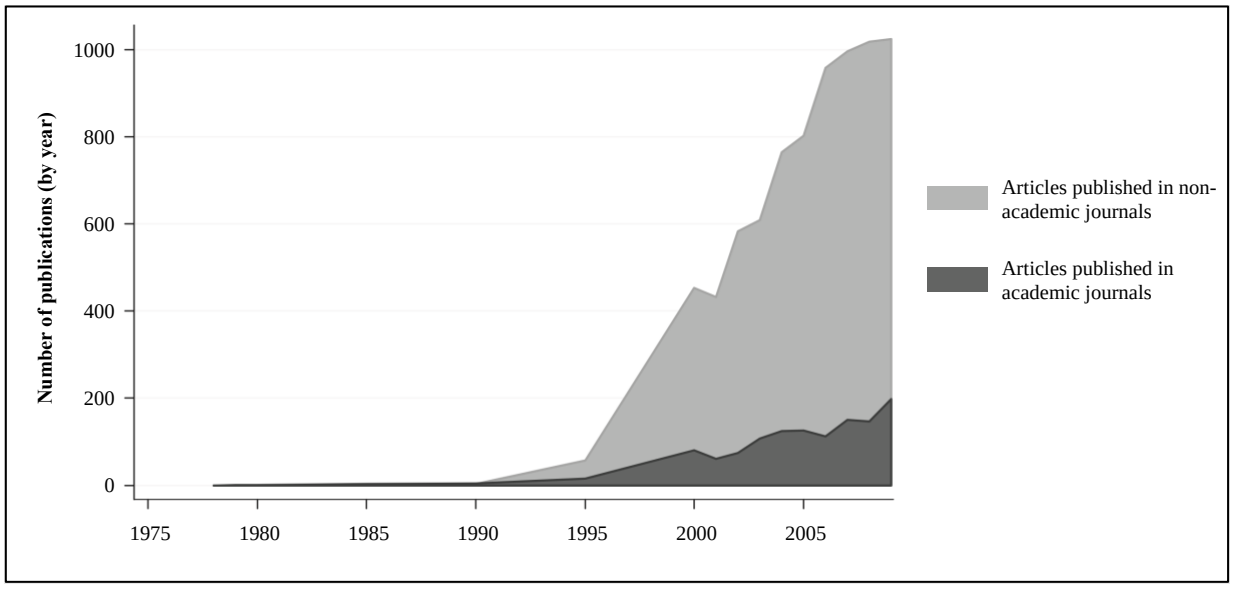

Figure 1: Number of articles on BMs
Source: Own illustration based on, EBSCOhost database, in: Zott et al (2011, p. 1023).

Consideration of the concept of BM also plays a central role in practice. The BM of an organization provides information on how it generates value and what opportunities exist for

differentiation in the market (Saebi & Foss, 2015; Teece, 2010). The consideration of the BM is subject to a holistic approach (Foss & Saebi, 2017). In recent years, the phenomenon of the BM has moved from a complementary reflection of corporate strategy to the center of attention of managers and academics (Spieth et al., 2014). This is mainly because the consideration of the BM has proven to be an essential means for companies to commercialize new ideas and technologies (Chesbrough, 2010).

2.2 Combining Business Models and Strategy

Michael E. Porter defines strategy as "deliberately choosing a different set of activities to deliver a unique mix of values." (Porter, 1996). Looking at the connection between BMs and strategy, BMs refer to the logic of a firm, the way it operates, and how value creation for stakeholders works. Strategy refers to the choice of a specific BM through which a firm competes in the market. It should not be confused with tactics, which refer to the remaining choices available to a company based on its BM (Casadesus-Masanell & Ricart, 2009). Bringing strategy and BMs together answers how BMs in an industry work and why the decision fell on this combination of elements. Strategic thinking always includes a firm's future based on the present business challenges and future business opportunities. Subsequently, this work considers strategic BMs as how a business operates and captures value today and how it must change to successfully operate in the future (Betz, 2016).

2.3 Business Model Innovation

A business model innovation (BMI) can be defined as realizing a fundamentally different BM within an existing business. As a result, businesses compete in their industry differently from their competitors (Markides, 2006). Foss and Saebi (2017) further describe BM innovations as planned, novel, and non-trivial changes to the critical elements of a company's BM or the architecture that connects these elements. BMIs arise from searching for new logic and ways to create value for stakeholders. According to Casadesus-Masanell & Zhu (2013) and Teece

(2010), a BM innovation is defined as finding new ways to generate revenue and define value propositions for customers, suppliers, and partners. Thus, on the one hand, a BM innovation represents a full-fledged form of innovation alongside product/performance innovations, process innovations, market innovations, and social innovations.

On the other hand, a BM innovation can also be complementary to one of these types of innovation in a complementary manner (Amit & Zott, 2012). For example, in the context of product innovation, an adaptation and innovation of the BM are also necessary since an innovative product also places new demands on sales, marketing, and production and requires structural changes. Similarly, increases in efficiency, changes in human resources, organization, legal matters, and opening new markets can also place new demands on the BM. Conversely, a new BM may also require changes in these areas. This relationship is illustrated in Appendix A.

BMIs are divided into reconfigurations of existing BMs and developments of entirely new BMs. To understand the differences between various BMIs, they can be classified in the same way as other types of innovation, distinguishing between the aspects of trigger, degree of change, degree of novelty, and degree of innovation. As triggers, a distinction is made between independent BMI and those dependent on the previous product or process innovations. Regarding the degree of novelty, BMs can be novel within the company, an industry, or the entire world (Stampfl, 2016). BMIs can take place at company level, be applied to individual business areas, or relate only to specific products/services (Wirtz, 2010). An example of a selective application of a BMI to a particular service is the CS service ShareNow of the company PSA, which represents one of many different BMs of the company (Schallmo, 2014). In terms of the degree of innovation, incremental BMIs only affect partial aspects of the BM and do not exhibit any fundamental change in the value creation architecture. Radical BMIs, however, describe the development of a new and previously unknown BM (Schallmo, 2015). For companies, BMIs are becoming increasingly important because product and process

innovation are, on the one hand, very time-consuming and, on the other hand, require considerable upfront investments. In contrast, future returns on these investments are uncertain (Amit & Zott, 2012). While a product or process innovation can often be easily copied, new BMs are difficult for other market players to imitate. On the one hand, this is due to the high effort required to change various elements simultaneously. Still, the BM must fit a company's long-term strategy, corporate culture, and core competencies (Bucherer et al., 2012).

Previous research in BM innovation distinguishes between a company-centric or industry-centric perspective (Zott et al., 2011), and this work will follow the industry-centric view. Bringing the BMI concept in context with this work's research goal, it is necessary to innovate the existing BM to remain competitive. Specific innovations of parts of the existing, industry-leading BMs will lead to a whole new combination of the individual components and should specify the future optimal BM.

2.4 Sharing Economy Business Model

Besides traditional B2B and B2C BMs, the sharing economy emerged as a disruptive approach in recent years (Muñoz & Cohen, 2018). In the literature, the sharing economy term serves as an umbrella term for different consumption activities without ownership, such as swapping, bartering, trading, renting, exchanging, and sharing (Habibi et al., 2017). It comprises all activities related to sharing or granting access to certain goods or services (Hamari et al., 2016). Within this work, a system-level perspective of the sharing economy is applied, defining sharing economy as "a socio-economic system enabling an intermediated set of exchanges of goods and services between individuals and organizations which aim to increase efficiency and optimization of under-utilized resources in society." (Cohen & Muñoz, 2017). Using this perspective, platforms as a fundamental part of the sharing economy evolution are considered (Muñoz & Cohen, 2018). Within platforms, a further differentiation distinguishes between

sharing a privately owned asset, such as peer-to-peer CS, and company-owned assets, such as free-floating or station-based CS (Möhlmann, 2015).

In a BM context, value creation and value capture dimensions differ between sharing-based and traditional BMs (Reuschl et al., 2022). Therefore, the value configuration needs different dimensions for an evaluation. Reuschl et al. (2017) propose the dimensions of standardization vs. individualization and the completeness of property rights. Shared goods can be highly standardized, where the portfolio of offerings is a set of standardized solutions. For instance, CS users show a low emotional involvement, and as they do not aim to own the car, they are not interested in individualizing it. Contrary to that, shared goods with a high degree of individualization allow for a unique emotional experience with the goods. AirBnB, as the most popular example, uses this individualized experience (with specific characteristics of each accommodation and social relations with the provider) as a critical selling argument. The completeness of property rights determines which player in a network can use, change, capture, and guard the value of the goods. Either the focal firm owns the relevant physical goods (e.g., ShareNow owning the cars) or they may also be owned by or shared with individuals of the network (e.g., Turo provides the platform of peer-to-peer CS, ownership is within the individuals). If the focal firm does not own the relevant goods, it can still define and control the characteristics of the goods, as even with peer-to-peer CS the focal firm decides which features a car needs to be suitable for sharing. With incomplete property rights and ownership of goods within users, they are more likely to share goods. Compared to the focal firms, users with property rights do not focus on economic returns but take socio-emotional issues into account as well (Reuschl et al., 2017).

As the definition of the sharing economy is very broad, it appears logical that various BMs with different characteristics exist within this definition. Habibi et al. (2017) developed a sharing/exchange continuum for different BMs to show these differences. Between the two ends

of this continuum, many BMs simultaneously perform sharing and exchange practices with varying degrees. While the sharing end of the continuum is characterized by low expectations for reciprocation, the irrelevancy of money, and social links, the exchange end is reciprocal, monetarized, and impersonal.

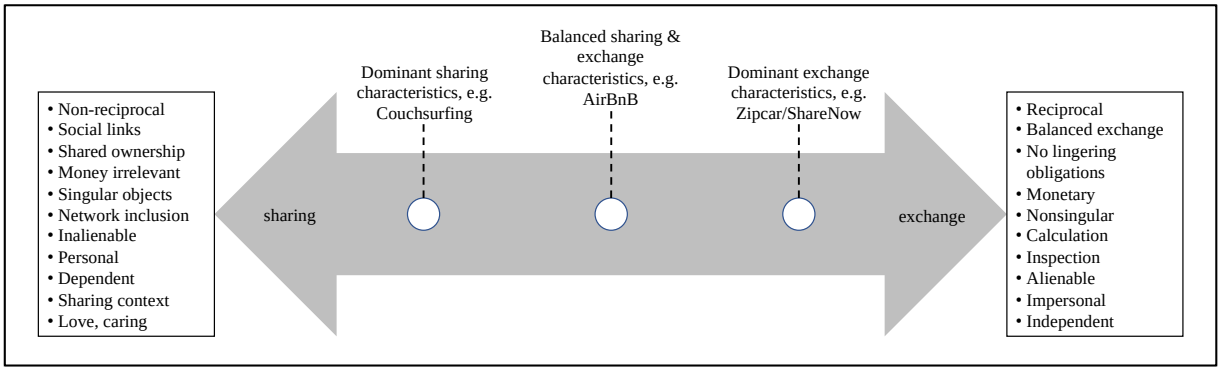

Figure 2: Sharing continuum including free-floating Car Sharing Business Models
Source: Own illustration based on Habibi (2017) & Belk (2010)

Figure 2 shows this continuum, where, e.g., the CS company Zipcar shows dominant exchange characteristics but still shows attributes from sharing. For BMs with dominant exchange characteristics, Habibi et al. (2017) recommend (1) deprioritizing community building, (2) emphasizing efficiency and utilitarian benefits, (3) not focusing on sustainability and political concerns, and (4) emphasizing calculated benefits. This work accepts the general classification of dominant sharing characteristics on the continuum but does not emphasize the general recommendations. Furthermore, this work focuses on other BMs competing with the CS BM and dives deep into internal and external factors to recommend specific changes of the BM.

3 METHODOLOGY

This paper is based on a qualitative research design. The foundation is an in-depth BM analysis of different models used in the car provisioning industry. A broad review of industry reports, podcasts, newspaper articles, and company websites was conducted to analyze the industry and each BM. The BM's key characteristics must be evaluated under the same conditions, which is why frameworks are used to make the individual parts of a BM comparable. There are different frameworks which all have a raison d'être such as BM Schematics (Weill & Vitale, 2001), Technology-market Mediation (Chesbrough & Rosenbloom, 2002), The Entrepreneur's BM (Morris et al., 2005), Four Box BM (Johnson et al., 2008) or Business Model Canvas (Osterwalder & Pigneur, 2010). The latter is a strategic management framework that helps to describe, design, and analyze BMs and is divided into the following nine sections: (1) Key Partners, (2) Key Activities, (3) Key Resources, (4) Value Propositions, (5) Customer Relationships, (6) Channels, (7) Customer Segments, (8) Cost Structure, and (9) Revenue Streams. The following sections will use this framework to identify and compare the different BMs in an industry. It was selected as the core of this thesis due to the detailed segmentation of BM components and their comparability relative to alternatives.

As part of this procedure, three industry experts were interviewed (see Table 1). Participants for the expert interviews were recruited from personal networks and via contact on the professional social network platform LinkedIn. Each interview lasted approximately 40 minutes. The sessions were conducted with a preplanned interview guide and were structured into three parts. The first part consisted of open-ended questions about current industry and market trends to elicit the experts' personal opinions without bias from the interviewer's question. The second part focused on specific topics related to the car sharing BM and included personalized questions based on the individuals' expertise. In the third part, recommendations for the CS BM were presented to the interviewees who were asked to evaluate their potential.

Candidate	*Role*	*Company description*	*Region*	*Age*	*Interview type*	*Date*
Expert_1	Executive Director	Car sharing provider	Europe	~ 40 years	40 minutes interviewer-led	17.11.2022
Expert_2	Founding (Ex-) CEO	Car sharing provider	Europe	~ 50 years	40 minutes interviewer-led	02.12.2022
Expert_3	Senior Consultant	Strategy consultancy	Europe	~ 35 years	40 minutes interviewer-led	03.12.2022

Table 1: List of expert interview participants
Source: Own illustration

Based on insights and data from the previous sections, opportunities were identified that have potential to address weaknesses and challenges of the current CS BM. These opportunities were then evaluated through expert interviews to assess their impact and feasibility and to derive recommendations. Combining the insights from the BMC, the interview outcomes and scientific and practical research allows deep dive into the CS BM.

To assess the relevance of these recommendations, they were pinpointed and categorized into internal and external factors using an adjusted version of the Innovation Project Scorecard (see Appendix B). The Innovation Project Scorecard was developed by Osterwalder et al (2020). It enables the assessment of an innovation's current state against a standardized set of criteria within a given company. These criteria cover all nine aspects of Osterwalder's BMC. Additional criteria include the innovation's strategic fit, the scale of the opportunity and the adaptability of the innovation to changes in the external environment. Users assign a score, on a five-point Likert scale (Osterwalder, et al., 2020). The framework covers all relevant aspects of the BM, and the value of each recommendation can be quantified. As this thesis' purpose is to find recommendations that can optimize the BM, the criteria to assess strategic fit and the scale of the opportunity were omitted as these are a measurement of company-specific aspects.

This leaves the scorecard with the following assessment criteria: Desirability (includes customer segment, value proposition, channels, and customer relationship), feasibility (key resources, key activities, and key partners), viability (revenues, and costs), adaptability (industry forces, market forces, key trends, and macroeconomic forces). All BM optimization opportunities are mapped against these aspects and are assigned a score from 1 (very little) to 5 (very strong). The resulting score informs how much value potential a recommendation holds. The adjusted scorecard is referred to as BM Recommendation Scorecard (see Appendix C).

In a next step, the McKinsey 3 Horizons framework was used to map each recommendation against a time variable. The 3 Horizons model supports prioritization and helps illustrate how to bridge the gap between profitably operating the BM today and optimize it so that it becomes a strong BM for the future (Baghai et al., 2000). Merhad et al. (2000) defines three horizons by which optimization initiatives can be classified. Horizon 1 initiatives provide continuous innovation to a company's existing BM and core capabilities in the short-term. Horizon 2 initiatives extend a company's existing BM and core capabilities to new customers, markets, or targets. Horizon 3 covers the creation of new capabilities and businesses to take advantage of or respond to disruptive opportunities or to counter disruption. The result is a ranking of recommendations, giving practical advice on if and when each recommendation shall be implemented.

4 CAR PROVISIONING INDUSTRY

4.1 Definitions

The car provisioning industry includes four different BMs: car leasing, car subscription, car rental and car sharing. To understand why each of these sectors are considered separately, self-contained but all in the car provisioning industry, it is necessary to define all of them before evaluating each BM. Due to comparability, the definitions include the typical duration and the services included, which determine the different offerings. The services considered are fuel, insurance, maintenance, repairs, parking (inner-city), and taxes.

Car leasing, also called vehicle leasing, is the rental of a vehicle for a fixed amount of time and an agreed, fixed fee (Leaseplan, 2022). The number of services included is limited, and there is no obligation to include specific services. Nevertheless, sometimes taxes are already included and there is a service agreement. The usual time frame is between 24 and 48 months (Schellong et al., 2021).

Car subscription also constitutes the rental of a vehicle for a fixed amount of time and an agreed fixed fee. Although there is variation regarding the included services, the common sense is to include maintenance, repairs, insurance, and taxes. The typical duration also varies, between one and few months (Schellong et al., 2021).

Car rental is the BM where a car is provided for a short-term, usually for a couple of days against a fixed fee. The covered services are insurance, maintenance, repairs, and taxes. Commonly, firms have offices near areas with many travelers, through which the rental process is organized, and cars are distributed. (Schellong et al., 2021).

Car sharing can be defined as “a membership-based service available to all qualified drivers in a community” (Carsharing Association, n.d.). Contrary to the other BMs, no written agreement is required each time a member decides to use a vehicle (Carsharing Association, n.d.). All trip-

related services are included: fuel, insurance, maintenance, repairs, parking (inner-city), and taxes. This is due to the shared use where the platform operator takes care of all these services and the typical usage duration, which usually is between minutes and hours (Schellong et al., 2021).

Car provisioning services are defined by the fact that they provide vehicles for rent on a fixed-term basis, without transferring full legal ownership of the vehicle to the client. The provisioning company retains ownership of the vehicle and requires its return at the end of the rental agreement. Figure 3 shows each model based on the number of typically included services and the average usage duration.

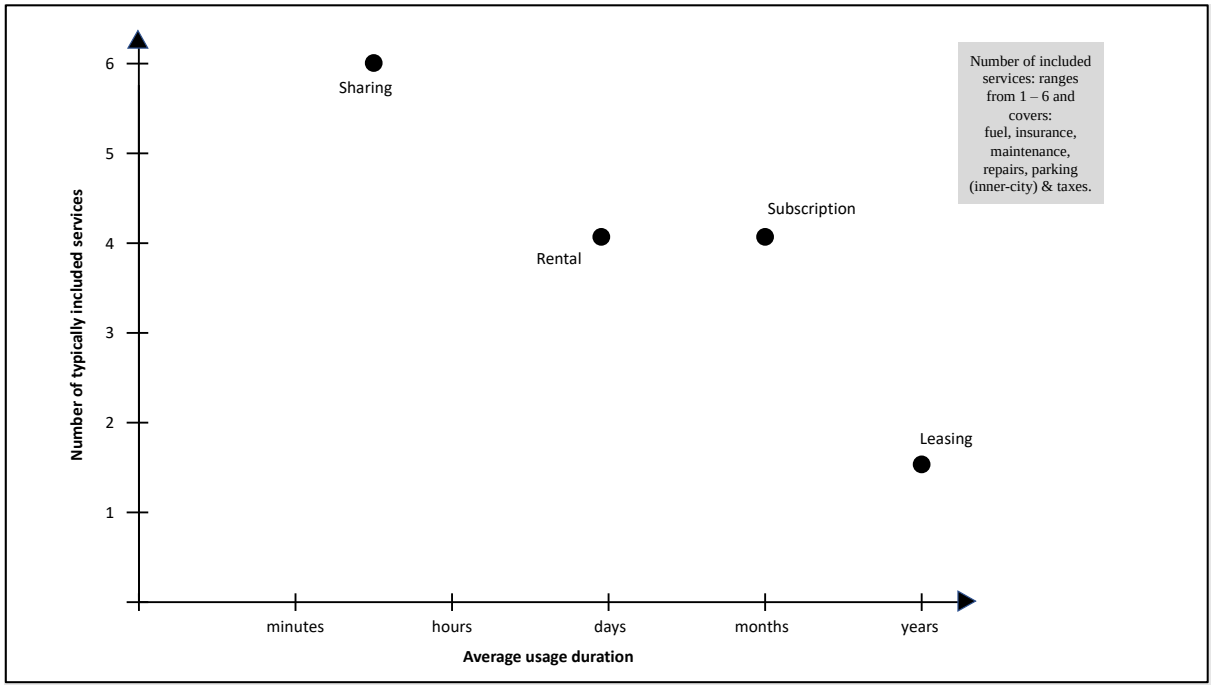

Figure 3: Service - Duration matrix of car provisioning Business Models
Source: Own illustration based on Schellong et al. (2021)

4.2 Evolution

Car leasing has its origin in the US, while Deutsche Leasing GmbH, founded in 1962 in Düsseldorf, Germany was the first European company to offer leasing contracts. Back then, OEMs saw leasing to put customers in high-end vehicles with low monthly payments (Deutsche Leasing, 2022). Already in the early years of operation, car leasing companies either engaged

in partnerships with banks or were founded as part of a bank to provide manufacturer-independent vehicle leasing (ALD Automotive, 2022; Arval, 2022).

Car subscription is new compared to the other models. Vehicle subscription offerings from OEM have been around for a few years, but only recently has this model gained traction with consumers and investors. Due to changing market environments, original manufacturing companies (OEMs) and car dealers are exploring new BMs to stay relevant (Schellong et al., 2021).

The German company Sixt, established in 1912, started off with three cars for rent and expanded quickly (Sixt, 2022). For people who could not afford their own car, renting was considered an option to get access to one. An increase in travel volume led rental companies to go international. Growing financial and public sectors enabled rentals to work with corporate clients and thus becoming large companies. From a BM perspective, little has changed about the car rental BM, other than some process optimizations due to technology advancements (The Hertz Corporation, 2022).

The cooperative Sefage (German abbreviation for self-driving community) introduced the first car sharing model in Zurich, Switzerland in 1948. Sefage operated until 1998. Next to Sefage, there were several attempts to start CS models including Procotip in France, Witkar in the Netherlands, Green Cars in Great Britain, as well as Bilpoolen and Bilkoopeartiy in Sweden (Cohen et al., 2008). Following the increased number of these providers, the European car sharing organization was founded in 1991 to help with the growth and development of the CS model (Shaheen et al., 1999). However, all these experiments had one thing in common: they were unsuccessful. Main reasons for their failure have been inadequate planning, financial management and a lack of support from local governments (Britton, 2000). According to Shaheen et al. (2008), early CS companies mostly consisted of demonstration projects. Over

time, many projects were replaced by permanent CS companies. Car share benefited massively from technology. Due to the technological invention of smartphones being able to unlock car doors, car sharing operators were able to expand their member base dramatically. Thus, the car CS market has developed tremendously and now encompasses a wide range of companies and geographical coverage (Shaheen, 2018).

4.3 Variations

4.3.1 Car Leasing

The customer segments served are large corporates, SMEs (small and medium-sized enterprises) and private individuals. As a representative example, Leaseplan Corporation N.V. showed a split of serving 73% large corporates, 20% SME'S and 7% private individuals in 2020 (Statista, 2021), which clearly indicates a focus on large corporates. The value proposition for large corporates and SMEs are to preserve capital and lines of credit, provides tax advantages and may offer advantages by transferring the equipment residual risk to the lessor (Schallheim, 2009). The value proposition for private individuals is to drive a car with less financial commitment. The time-limited nature of the contract and the option to replace the vehicle with a newer model, as well as the inclusion of service contracts, align with Arval BNP Paribas Group's mission statement, which states that the company aims "to provide a broad range of options beyond the car, accounting for everyone's aspirations, whether their priority is to save time, be more responsible, or simply be comfortable" (Arval BNP Paribas Group, 2022). This can be summarized as a care-free journey. Car leasing providers have little contact with the end-user beside the contract, as they use the car manufacturers and connected distribution channels like car dealers or corporates as their main channel. ALD Automotive distinguishes their customer relationship promise between car administrators and drivers (end-users). They serve corporates, car dealers or manufacturers with active key account management, ensuring professionality, reliability, and transparency. The relationship to the end driver is characterized

by high availability, quick response times and a helpful customer service (ALD Automotive, 2022). Exemplary for the industry, VW Financial Services AG distinguishes between operational and finance leases, so the main revenue streams are revenue from operating leases (lease-fee), interest income from finance leases, income from service contracts and gains from the disposal of used vehicles (VW Financial Services AG, 2022). The operational leasing accounts for the main key resource. Substantial for the leasing model is a strong financial base to finance the fleet, as the leasing company keeps the ownership during agreements. According to IFRS 16, Leasing is "A contract, or part of a contract, that conveys the right to use an asset for a period of time in exchange for consideration" (ACCA Global, n.d.), so the car leasing company's key activity is to provide the cars (asset). The subsequent activities are all based on contractual agreements, so the task is to optimize the contracts with clients and suppliers. As a logical consequence, the key partners are car manufacturers and car service providers. Some of the biggest car leasing providers are subsidiaries of large banks, showing evidence that banks are important financial partners (e.g., ALD Automotive, Arval BNP Paribas Group). As the whole BM is based on providing automotive vehicles to the clients, it stands to reason that they also account for the largest part of the cost structure, in form of depreciation from leasing transactions which exemplary makes 67% of VW Financial Services AG overall costs in 2021 (VW Financial Services AG, 2022). Besides that, the cost of selling cars, cost of service agreements and SG&A costs significantly influence the cost structure of the largest competitors in the market (Arval BNP Paribas Group, 2022; ALD Automotive, 2022; Leaseplan, 2022; VW Financial Services AG, 2022).

By leasing a car, the client borrows the difference between the current value and the expected value at the end of the contract. Price fluctuations on the market are therefore a risk but also an opportunity for the provider. The advantages for customers can be seen as strengths of the BM. Belamkar & Das (2021) identified the following advantages for customers: lower monthly

payments, which are 30-60% lower versus buying a car, no repair and low maintenance costs, no effort with used cars, tax benefits in a business context, driving the latest cars and less money required upfront. Nevertheless, leasing is a long-term BM compared to other provisioning solutions which use a pay-per-use model and are therefore not as flexible and adjustable. Even though there is no ownership, vehicle leasing does not follow the trend of shared mobility and would be affected by a reduced need for personal vehicles (Deloitte, 2017). Furthermore, the positive aspects for clients are partly serious challenges for the providers. They face challenges with insolvent lessees who want to drive a car they cannot afford, thin profit margins due to the ownership of vehicles, which requires a large fleet size (economies of scale) and tighter tax and depreciation regulations by governments (MBA Knowledge Base, 2021).

According to Business Wire, the European vehicle leasing market is characterized by high fragmentation and many players. The largest player is ALD Automotive, who strengthened their market leasing position by acquiring one of their largest competitors. Arval, Deutsche Leasing and BPCE complete the list of the largest manufacturer independent leasing companies (Business Wire, 2017). This list must be extended by the leasing subsidiaries of the worldwide leading car manufacturers, such as Athlon (Mercedes-Benz), VW Financial Services AG (Volkswagen), Alphabet (BMW), RCI Bank and Services (Renault), Free2Move Lease (PSA) and Leasys (Fiat). Together, they account for more than 80% of the European vehicle leasing market and 15% of the overall new car sales in Europe in 2019 (Fleet Europe, 2019).

4.3.2 Car Subscription

Car subscription means that customers pay a monthly fee to use a car, moving the experience from ownership to usership. Tax, maintenance, repairs, roadside assistance, registration fees, and insurance are usually included in the price. The customer only pays for gas and any tolls or penalties. A car subscription offers individuals as well as businesses the chance to temporarily own the car without committing to a full purchase of the asset. Some providers offer one-month

subscriptions, whereas selecting a 12 or more months subscription would be offered with a discounted monthly fee. Some companies, such as Porsche Drive offer changing the car model as part of their subscription plan for no extra cost (Porsche AG, 2022). Companies offering car subscriptions mostly provide an all-online service to the customer. This provides an effortless experience to access a car compared to the bureaucracy associated with leasing or purchasing a car. Once the subscription model is selected, no additional deposit is required, and the payment is made online.

To make this BM work, the car subscription company sources cars for their fleet in most cases directly from the manufacturer. In an asset heavy BM, assets are directly moved onto the firms' balance sheet. Whereas in an asset light BM, they are only mediating access to the cars. The car subscription company then uses its website to connect with the buyer. Customer service is provided via email or phone while the delivery and pickup of the vehicles is done in person.

For the car subscription company, this BM allows to stay much closer to the customer and makes customer service an integral part of the offering. NIO inc. for example offers all its cars solely via a subscription model which includes battery as a service, access to exclusive NIO houses, and autonomous driving as a service. The subscription model allows NIO to bundle all these services and create an experience, allowing a direct relationship with the customer (NIO inc., 2022).

For the car provider, it is crucial to always have the right car available for the customer so that the benefit of choosing among various brands and types remains. On the company side capabilities other than just offering the car play a crucial role. For one the utilization of cars within the fleet needs to be maximized (always aiming to minimize depreciation in residual value) but also the timing of reselling cars in line with the residual value impacts the profitability of the car subscription BM. Once vehicles get too old, they can be offered via

established remarketing channels or other mobility offerings such as CS (Joas & Deinlein, 2019). Fleet management, operational processes, digital capabilities, and customer service are essential to run an attractive subscription offering. These are aspects not native to car manufacturers which has given space for startups to enter this segment of the market. The leading players are all creating digitally sophisticated service platforms to capture long-term business potential. Apart from these capabilities, successful players need to balance the length and flexibility of their contracts, the age of vehicles offered and optimize their pricing models (Zayer et al., 2021).

The main advantage of the subscription model over ownership is that it reduces commitment costs, while increasing flexibility. This is especially relevant for new types of (electric) vehicles, where some of the customers are not yet willing to take the risk of purchasing the vehicle. The customer avoids the upfront cost of a car purchase, along with the other hidden costs of ownership such as maintenance. According to a survey from Schellong et al. (2021) this is an important selling point, as people tend to underestimate the total cost of car ownership. The survey included 7,000 households in Germany and shows that people underestimate the total cost of car ownership by more than 50% (Schellong et al., 2021). While the ability to swap between vehicles and flexibly enter shorter-term agreements with service providers is a perk of the subscription model, it is more expensive than leasing or buying a vehicle in the long term. Many companies are restricting the kilometrage of vehicles for a given period. Exceeding this restriction incurs additional fees.

The market consists of three types of players: traditional car manufacturers (e.g., Care by Volvo, Porsche Drive), car rental companies (e.g., Hertz My Car, Sixt plus), and startups/independent third-party providers (e.g., FINN, Cluno). Major players are adopting growth strategies such as expansion, acquisition, partnership, and product development to manifest their market positioning (Allied Market Research, 2021). Some OEMs such as Audi or BMW have launched

and after just a little time, ceased their subscriptions businesses again showing that this BM inherits challenges for traditional automakers (Engadget, 2021).

The market is highly competitive with global and established regional players in the market. The introduction of connected smart vehicles is expected to drive growth as services related to this model are well-suited for a subscription-based BM (Data Bridge Market Research, 2022). Europe is already an established market for car subscriptions, having the largest market share globally compared to other regions. The subscription model evolves between on-demand ride-hailing, CS, traditional car sales and car leasing. Europe is the highest revenue market for car subscriptions globally and is predicted to grow with a CAGR of 22% to 29% by 2029 (Straits Research , 2022; Data Bridge Market Research , 2022).

4.3.3 Car Rental

The BM most car rental firms use is homogenous. First, companies either purchase or lease a fleet of vehicles. Then, the vehicles are rented out to customers for a fee. The rental period depends on the rental purpose but usually ranges between hours and weeks. The value proposition of the traditional car rental BM for its customers is high flexibility, the provision of all car-related services, such as insurance, and low organizational effort compared to long-term or full-ownership approaches. Hence, the rental process is simple and often only consists of an online booking and a subsequent vehicle pick up at a predefined rental station. There are attempts to digitalize and thus, to simplify the pick-up process. For example, at selected locations, Sixt customers can book a vehicle shortly before the rental period and pick up the car without any physical contact at the rental station counter (Sixt, 2021). Furthermore, major car rental companies can offer trust and reliability due to their well-known corporate brands.

There are three main customer segments that the car rental BM targets: business/corporate clients, leisure travelers, and individuals with needs for special occasions. First, leisure travelers make up the largest target segment. Most firms generate a significant revenue share of this

segment at airport stations. For example, Sixt reported that in 2021, this accounted for 50% of their total rental revenue (Sixt, 2021). The remaining revenue primarily originates from stations in busy urban areas. The second largest segment is business/corporate clients renting cars for work travel. Most of them have employees that travel frequently. However, some corporations also make use of car rental services instead of purchasing vehicles for financial reasons, such as positive cash flow effects or higher efficiency due to the easonality of car demand (Sixt, n.d.). The third customer segment is individuals seeking to rent a vehicle for special occasions, such as moving or marriages. However, this segment has car needs and therefore, specialized rental companies often serve it.

Car rental firms use different channels to generate customers' awareness for their services. The most widespread ones are traditional media channels, partners (e.g., airlines and travel agencies), and digital marketing. Furthermore, distribution channels through which customers make their bookings can be clustered into Business-to-Customer (B2C), Business-to-Partner (B2P), and Business-to-Business (B2B). Private customers, such as leisure travelers, can make their bookings either directly through the rental firm's website (B2C) or use third-party booking providers (B2P). These third-party providers range from travel agencies to airlines and receive a fee for rental bookings. Business customers can also use the above-mentioned distribution channels (B2B). However, there are additional efforts by rental companies to attract large corporations as their customers (B2B). For instance, Hertz has a sales force designated to attract potential business customers via phone calls (Hertz, 2021).

With the car rental BM, companies generate revenues primarily from rental fees calculated based on the rental period and included services. Firms can generate additional revenues for refueling or washing cars. Additionally, other revenues from the rental business can include compensation for damages. Due to the rental purpose of most private customers, revenues are seasonal and peak in vacation periods such as summer months. This seasonality impacts fleet

utilization. For instance, the Avis Budget Group's fleet utilization was 72% in the third quarter of 2021, compared to 67% in the first quarter of the same year (Avis Budget Group, 2021).

The key cost drivers of this BM can be categorized into fleet expenses, depreciation of rental vehicles and property, personnel expenses, and commissions. Fleet expenses include variable costs of the rental business, such as repairs and maintenance, fuel, insurance, and transportation. Per definition, these costs vary depending on the utilization of the fleet. In 2021, for Sixt, this expense category represented 26% of all operating expenses (Sixt, 2021). Another major cost category is the depreciation of firm assets, primarily vehicles and property. Most rental companies have buy-back agreements that oblige car manufacturers to repurchase the vehicles for a predefined price after a certain period. This significantly reduces risks related to reselling efforts and fluctuating used-vehicle prices. For Sixt, vehicle depreciation resulted in 12% of total operating expenses (Sixt, 2021). At the same time, Sixt's personnel expenses accounted for 19% (Sixt, 2021). Lasty, a major cost type of the rental BM is commissioned for third-party agencies and platforms through which sales are generated. Similarly to fleet expenses, commissions are variable and only occur if any revenue is realized. According to Sixt, in 2021, this accounted for 10% of all operating expenses (Sixt, 2021).

The car rental BM primarily serves a particular customer segment, travelers. As a result, its intersection with other BMs is limited, which can be interpreted as an advantage. Moreover, customers often seek trust and quality, which gives an edge to established industry incumbents. On the other hand, it results in an extreme dependency on this segment. Reduced travel due to economic downturns and restrictions such as Covid-19 can heavily impact its success.

Furthermore, the BM relies on a steady supply of new cars to meet customers' demands, making it particularly vulnerable to global supply chain issues. As described, a significant revenue share is generated through rentals at airports. Commonly, airports licenses are limited. Hence, long-term partnerships with airport operators are vital to maintaining essential distribution channels.

The car rental market's revenue was USD 12.3 billion in 2021, following a significant decrease due to Covid-19 (Statista, 2022). It is projected to grow with a CAGR of 13.21% until 2026, reaching a market volume of USD 18.4 billion (Statista, 2022). European players using car rental as their primary BM are Hertz Corporation, Avis Budget Group Inc, Europcar and Sixt SE.

4.3.4 Car Sharing

CS is the most short-term oriented BM within the car provisioning industry. Several studies investigated the customer segments in the past. A WiMobil study showed that the main target group for ShareNow (former DriveNow) are academically educated male customers with high average incomes and a tendency not to own a car (Bundesverband Car Sharing, 2016). As more people live in the city, sharing services are offered in these areas. The value proposition of the CS BM differs among the competing firms, especially because of the different modes. Nevertheless, most of the providers have some key propositions in common, which are about accessibility without ownership (Perboli, 2018). Ferrero underlines this and adds several practical, flexibility and environmentally friendly related items (Ferrero, 2015). An unpersonal, fast app-based interface characterizes the customer relationship. Customers value a fast and uncomplicated user experience through the app where no personal contact is needed as this distinguishes CS from other provisioning services (Share Now, 2022). As a logical implication, the app is the main channel to reach the clients during the customer experience cycle, which is supported by slogans like "all that you need is our app" (Share Now, 2022). Further communication and advertisement channels are social media, website, and referral marketing, but also channels such a as showrooms and advertisements on the cars (Webspotting, 2020). Branded cars have been crucial to strengthen the clients' feelings of a high density of featured cars in a city. Revenue is generated by charging a fee for the rental of a specific car. ShareNow charges per minute if the usage is below one hour; afterwards there is a fixed fee per hour/day

and an additional fee per kilometer (Share Now, 2022). The revenues from rentals accounted for more than 90% of Miles Mobility GmbH overall revenue in 2020, where other revenue streams were proceeds from the sale of vehicles with a total loss, reimbursements for repair costs and charging of penalties to end customers. CS companies consider their vehicle fleet, IT platform and member rewards as key resources (Tart et al., 2018). The type of fleet influences the price and target segment, the IT platform simplifies the process, and member rewards lead to customer loyalty. Supporting activities are vehicle maintenance (including cleaning and fueling), fleet management (including car repositioning), and customer service (Ferrero, 2015). Key partners on the supplier side are car manufacturers, while partnerships with cities and governments are crucial when it comes to supporting firms in establishing their operations (e.g., provisioning of parking spaces) In some cities, CS companies get government subsidies as car sharing promotes a mean of greener transportation (Tart et al., 2018). Looking at the cost structure, the main cost driver is the costs for cars, which are influenced by the type of car and the depreciation method, as well as relationships to OEMs (Share Now as part of Stellantis). Additional cost drivers are customer support, technology development, and maintenance (AT Kearney, 2020).

In the highly fragmented market of CS providers (more than 170 providers in Germany) (Bundesverband Car Sharing, 2019), the key players do not represent a majority. This large number of providers is due to specific offerings in smaller cities, but mostly related to station-based sharing. For station-based CS, the critical number of cars is much lower than for free-floating, where the big players rule the market. A detailed review of the leading market players is conducted in Chapter 5.3. In general, most of the relevant players belong to either a car rental firm (SixtShare) or car OEMs (ShareNow). Furthermore, some companies use M&A as a growth strategy, which might change the group of key players in the market. The merger of

Mercedes-Benz' Car2Go and BMW's DriveNow into ShareNow and the recent acquisition of WeShare (formerly VW) from Miles Mobility are good examples.

Comparing the CS BM to the other provisioning models, the main strengths are the pay-per-use revenue model, which is the only applicable model for short-term trips. CS can reduce the number of privately owned cars and thus tively contributes to tackles both suggestions, and overall CO2 emissions (Jain, 2022). Dia & Javanshour (2017) conducted an agent-based simulation in the Melbourne metropolitan area, showing a decrease of fleet size by 43%. Dia & Javanshour (2017) show a reduction of parking demand by 58%. CS is offered fully digital with the CS app serving as the only interface to the customer.

To reach a critical mass and be profitable, CS requires a high density of customers in the cities where a firm is operating. This makes it hard for new market entrants, but also established key players to become profitable (AT Kearney, 2020). From a customer point of view, they must weigh the price and environment related advantages against the disadvantages of unpredictability and limitations regarding the area for driving and parking (The weekly driver, 2021). Whether the use of CS instead of owning a car or using other transportation methods makes sense depends on the frequency the car is used. Lastly, the platform-based BM is vulnerable to technical difficulties, e.g., if the car does not unlock itself.

4.4 Converging the Business Models

After reviewing the models, it becomes clear that car leasing is a financing option to own a car (ownership), while subscription, rental, and sharing offer solutions to use the car (usership). Value creation for a usership model can be divided into five steps: First, the sourcing of vehicles, including vehicle procurement and financing. Second, building the platform, which includes building software and tools (rental companies still have physical branches). Third, acquiring and retaining customers, which includes marketing and sales. Next, the operation of

the fleet which includes delivery and logistics, customer service, maintenance, and repairs. Lastly, the remarketing of vehicles, which includes the process of selling the vehicles to secondary buyers.

The value proposition of these services towards the customer is defined by the digital experience, convenience, availability, simplicity, flexibility, and continuity of the service (Deloitte, 2021). Combining the business models can lead to the optimization of these aspects. While e.g., CS comes as the most flexible one by giving the customer the opportunity to only pay for the car when it is needed, it lacks in the aspects of availability and continuity (Luca and Pace, 2015; Deloitte, 2021). For this work's purpose, CS and its optimization potential is studied in more detail.

5 DEEP DIVE INTO THE CAR SHARING BUSINESS MODEL

5.1 Different Modes

5.1.1 Free-floating Car Sharing

The most popular mode of B2C car sharing is the free-floating mode. This model is characterized by a fleet distributed throughout an area, predominantly city centers. Customers can locate, reserve, and unlock cars through an app. Usually, routes are flexible, in contrast to drop-off locations that must be within a predefined zone. Due to the high dependency on technological innovation in all steps of the renting process, this CS mode is relatively new (Sprei et al., 2019). The major reason for this recent rise is customer satisfaction linked to the great flexibility of the service. It enables individuals to use the car for only a short period, as the effort of bringing the vehicle to a specific drop-off location is omitted.

However, the free-floating mode comes with operational challenges. First, there is a mismatch between supply and demand of vehicles in certain areas, meaning that more people plan to depart from one location than arriving there. As a result, manual rebalancing of the fleet is necessary to even out this effect. Secondly, customers expect to park anywhere within the zone flexibly. As many cities have paid parking areas, such an offer is linked to extensive efforts. Hence, companies form partnerships with governments that allow them to use public parking slots for fixed fees. For instance, Expert_3 claims that in many cities, providers pay a three-digit monthly Euro fee per car for such a parking permit. Lastly, to achieve a customer satisfaction, a certain density of cars is necessary, which requires a relatively large fleet size compared to the other two modes of CS (Friedel, 2021). This is linked to the flexibility expected by the free-floating model.

5.1.2 Station-based Car Sharing

Per definition, with the station-based model, customers pick up and drop off cars at fixed stations. Usually, the two stations do not have to be the same, which enables non-round trips.

As the commute to and from the station generates additional time efforts, the length of the rental period is commonly in the hourly range (Friedel, 2021). The most prominent advantage of this mode is the lower barriers to enter the market and to operate. For example, Expert_3 stated that for most CS companies it is easier to get local governments' approvals for station-based services than free-floating ones.

Despite these benefits, this mode has downsides as it drastically limits use cases. Customers can only access the cars at a station which may be far away from where the customer would need the car. This can significantly reduce usage frequency and thus lower revenue potential (Expert_3). Furthermore, it has been reported that customers could not find a free parking slot at the desired station, which forced them to drive to another, less optimal one.

5.1.3 Peer-to-peer Car Sharing

Peer-to-peer car sharing is a marketplace BM, in which users rent out their vehicles to other users and the company acts as an intermediary. Additionally, it provides services such as organizing roadside assistance. Contrary to the other modes, this model requires a pickup and return at the same location (Turo, 2022). Due to manual efforts by the individual owning the car, a minimum rental period of several hours is common. From a company's perspective, an advantage is that this model is substantially less capital intensive than the other two modes where companies own the vehicle fleet. Furthermore, there is an argument that no additional cars are put on the street, which at least in the short term minimizes the lock up of public traffic infrastructure including parking slots. According to this line of reasoning, the environmental footprint of the service is also lower (Friedel, 2021).

However, the upside potential from a BM point of view is limited and bears additional risks. As the platform provider adds less value, less monetization opportunities are at hand. Furthermore, the dependence on individuals reduces the influence firms can have on the supply

of vehicles. Potentially, availability issues as well as quality and cleanliness concerns can have significant but uncontrollable impacts on customer satisfaction. As this thesis focuses on car provisioning services, which implies companies' ownership of the fleet, this mode of CS is not considered for detailed analysis.

5.2 Platform Offering and Processes

In this section, the typical CS platform will be illustrated on the example of ShareNow, which is one of the largest players in the European market. Three major components of the platform will be explained: Registration, rental process, and product offering. The information stated below was extracted from the ShareNow app on November 16th, 2022.

To access the platform, customers must download the ShareNow app, available for iOS and Android. Next, registration is required, including a verification process and an upload of a driver's license. Within a brief period, the company digitally validates the license. To enable the rental process, users must select one of three payment methods: Debit/ credit card, automatic bank transfer (SEPA), or PayPal.

In the app, a map helps users to see the available fleet. At every time of the day, it is possible to reserve a vehicle for up to 20 minutes. Within this time, to keep the reservation, a user must arrive at the parking location and can unlock the car via the ShareNow app. However, a reservation extension is optional for an additional fee. Also, reservations can be canceled at any time. When unlocking the car, the user can choose between a range of rates, depending on the intended rental purpose and period. Optionally, it is possible to report potential car damage or cleanliness-related quality problems.

After starting the ride, users are allowed to drive to any desired destination. However, a drop-off is only possible in a so-called home area, which is a predefined operating area within a city. However, stopovers outside this area are possible at any time, enabling a wide range of intended

rental purposes such day trips or personal moves. Within the home area, parking is possible on any public street parking space. Additionally, drop-off zones outside exist – for example at very popular locations such as airports – but lead to additional fees. Once parked successfully, the trip can be ended via the app by using a digital slider.

The offering portfolio of ShareNow is defined by two variables, the vehicle type, and the intended trip duration. There are four different vehicle sizes (XS, S, M and L), with increasing prices for larger cars. Each size category has convertible options available at an extra fee. The second variable is the intended rental period, which also affects the pricing. For short trips, a per minute rate is applied. However, longer rental options exist, ranging from one hour to 30 days. These options are priced based on a per kilometer rate with an additional standard base fee depending on the selected period. For example, an XS vehicle has a fixed fee of EUR 9.99 as well as EUR 0.19 per kilometer for 1 hour, and a fixed fee of EUR 599.49 plus EUR 0.19 per kilometer for 30 days. These offers include free refueling and parking. All vehicles can be fueled or charged for free at gas stations that have a corporate partnership with ShareNow. Moreover, within the home area, users can park the car at any public parking slots as often as desired, even for long-period rentals (ShareNow, 2022).

5.3 Market Players

According to McKinsey & Company (2022), the European CS market has an estimated value of about EUR 3bn today. This entails free-floating, station-based, or peer-to-peer models. By 2030, CS market size is projected to reach more than EUR 4bn (McKinsey & Company , 2022).

The market is widely fragmented, with mostly local players. Many companies focus on just one city, some larger ones on multiple cities within their home country. Only a few players are active in more than two countries (see Appendix D and Appendix E).

Notably, free floating BMs cover larger city areas and thus only operate in a few locations. For example, ShareNow currently operates in 17 cities across Europe. Miles, the second largest free-floating player in Germany, operates in 10 cities (see Appendix D). Some station-based providers offer services in more than 100 locations, often smaller cities and municipalities. Some examples are Flinkster in Germany (>400 cities), Enterprise Carshare in the UK (202 cities), Citiz in France (170 cities), and GoCar by Europcar (>100 cities) (see Appendix E).

Looking at this landscape, the CS BM clearly encompasses some local components that lead to a fragmented market of local players. Station-based CS seems to work best in smaller locations as well as larger cities. The free-floating BM, however, is only applied in larger cities.

The station-based model is like the car rental business, leading to a higher utilization of the car by making customers use the car for a fixed amount of time. It leaves the customer with less flexibility but reduces the risk of supply and demand insufficiencies that are inherent to the free-floating BM in low demand areas (Expert_1). The German company Sixt is running pilot projects to connect smaller villages to the city of Munich. The communities in these municipalities pay Sixt a certain amount so that the company can operate at a profit. Although costly for the communities, the concept is part of a mobility concept and complements the public transport system, enabling the inhabitant to be more connected to the city (Expert_1).

In the past years, the market has seen a trend towards consolidation as larger companies have been following the strategy of mergers and acquisitions to expand their service offerings (see Appendix F). Most OEMs left the CS market, mainly because they lack the competencies to profitably run the CS BM (Groos & Stoličná, 2021). Their main competency is building cars, whereas the CS model requires mostly IT and operations capabilities to take care of the cars. Nevertheless, there are large automotive conglomerates behind some players, namely Stellantis, Volkswagen Group, and Toyota. The acquisition of smaller players is part of a growth strategy

independent of their OEM portfolio companies, to become strong players in the mobility market, while some of the smaller players are giving up (see Appendix_F). The participation of these conglomerates also impacts the BM. For example, Toyota states that their retailer network will play a crucial role. Their ambition is to extend their partnership with retailers to transform them into mobility service providers. According to their own website (Toyota UK Magazine, 2020) their carsharing company Kinto Europe "will enable them to go beyond their traditional sales and maintenance role to offer new mobility services that give customers on-demand access to vehicles from their existing premises.".

A larger fleet of vehicles, more cities, and a larger set of capabilities all create network effects. More cars and more customers mean more opportunities to balance supply and demand and thus improve the service (Expert_1, Expert_2). For the OEMs, offering and giving their cars to CS providers enables them to sell their newest cars. Stated by Expert_1, most car sharers purchase the newest cars under a buy-back agreement, meaning that cars remain in their fleet for only half a year before they are sent back to the manufacturer (Expert_1). As a larger company, purchasing more cars from an OEM increases the ability to negotiate discounts and increases the ability to flexibly shift cars between locations. Another positive effect of being a larger player is that companies can decrease costs for running the IT platform as they can keep the same app while adding locations. Customers benefit from more convenience as they do not have to use a different app for each new city, they want to access a shared car. This also pays to the branding of the CS provider and may increase customer retention. The more locations a CS provider can offer, the more visible it is for the customer and the easier it is to just stick with one app.

5.4 Market Trends

CS combines the sharing economy with the automotive market into shared mobility and is therefore affected from both sides when it comes to market trends. Three overarching trends

are expected to change future mobility: shared mobility, electric vehicles, and automated vehicles (Sperling, 2018; Axsen & Sovacool, 2019).

The CS BM has gained importance in the last two decades, due to the shift from ownership to access based BMs, contributing to shared mobility. (Christensen et al., 2022). Although this change of consumer behavior has been a topic of scientific research for a long time, disruptive changes are still ahead. While CS is seen as an additional means of mobility, it has not reduced the number of privately owned cars significantly. However, it is expected to reduce this number in the future (Kolleck, 2021). For future development, it is critical to cover areas which are big enough and that the service offered ensures quick accessibility to the shared cars, so that it can serve as an alternative to other means of transportation. The reasons for this shift away from ownership are price-related advantages and an increase flexibility (Shaheen & Chan, 2016).

The trend of electric vehicles entering the automotive market in general, and the CS market specifically is not a completely new one. The most important advantages are significant emissions benefits over conventional vehicles and lower energy costs compared to conventional combustion engine cars (US Department of Energy, n.d.). On the other side, supply shortages for sufficient raw products, an insufficient infrastructure and distance limitations still lead to the fact that the full potential could not be realized. Nevertheless, McKinsey predicts that by 2035 the largest automotive markets will be fully electric (McKinsey, 2022). Adding up to this, key characteristics of CS and electric vehicles overlap, and the combination leads to a promising mode of inner-city transportation (Abdelkafi et al., 2012). Both are preferably used for urban mobility based on their capabilities, and a decrease of emissions compared to the traditional transportation modes is part of their value proposition. From an operator point-of-view, they both take advantage from high utilization as the significant amount of fixed costs decreases (Illgen & Höck, 2018).

Lastly, the trend of autonomous vehicles will shape the future of CS, as it tackles different car related mobility problems. There is no need for a driver which leads to time savings, parking is more efficient, the road safety can be improved and an optimized traffic flow through cars communicating leads to emission reductions and capacity improvements (Mounce & Nelson, 2019). Early transportation services with high levels of autonomy are already on the market, and McKinsey suggests the next generation of AVs will occur soon, nevertheless expects a roll-out to the mass markets later (McKinsey, 2021). But why is the current development status not ready to combine AVs with a sharing economy context? First, the status requires pre-mapped highways and clear weather, which is not compatible with the need for unrestricted use in CS. Furthermore, commercialization remains challenging due to the need of technological advances, regulatory support, and available capital. Anyway, AVs will be a critical factor for the sharing economy, in form of shared autonomous vehicles (McKinsey, 2021). As this combination would change the CS BM in its key elements, a detailed consideration of the future of SAVs follows in chapter 6.2.7.

In a nutshell, the CS BM tackles all the three overarching mobility trends and connects them. In the future, CS companies will further contribute to a shared mobility environment, focusing on an electric and automated fleet. This demonstrates that CS is not only a niche segment but can shape future mobility.

5.5 External Challenges

The CS BM, widely seen as the mobility concept for the future, causes a lot of discussions, both in academics and in practice. Besides many positive aspects, there is until now no CS provider who publicly stated and demonstrated its profitability, besides the Swiss Cooperative Mobility Sharing (Lagadic et al., 2019). This underlines the several challenges of the BM, which do not only result from BM vulnerabilities but also from external drivers. The dependency of car

manufacturers, labor shortage, regulations, and distinctive characteristics across urban and rural areas are the most critical challenges.

CS providers depend on car manufacturers, which provide the cars already with the sufficient requirements needed for shared use. As stated by Expert_1, OEMs currently face supply bottlenecks which directly affect CS providers as the fleet typically consists of new cars younger than one year. These bottlenecks are a result of Covid-19, which led to missing cable harnesses and semiconductors (ADAC, 2022). Especially EVs contribute to this trend as they need more microchips than conventional driving types, but as already stated the CS BM is dependent on EVs to underline their sustainable value proposition. Besides the OEM-related problems, telematic solutions, which provide necessary data for shared mobility providers, are also affected by the global chip shortage.

Another challenge is the labor shortage in Western Europe countries. Expert_1 stated that the company is facing various challenges to get qualified personnel. Cars must be relocated and transferred, cleaned, and maintained. Although this is a non-industry specific trend, it forces CS providers to extend their expenditures in the search for personnel.

Regulatory restrictions and uncertainties are another challenge Cs providers currently face. Besides the positive aspects, when the government or single municipalities are contributing to shared mobility by providing the necessary landscape, there is a big downside. As a recent example, the German capital Berlin, which was an early supporter of CS initiatives, decided to introduce a law which restricts offering shared cars in the city. This would require providers to obtain the appropriate permit to set up and rent out their vehicles. In addition, they must pay high parking fees (Süddeutsche Zeitung, 2022). The success of CS is heavily influenced by rapidly changing regulations, which can either support or harm the business model. The fine line between these two outcomes is often determined by political opinions. Some parties support

CS as a means of promoting sustainable cities with lower emissions, while others view it as a threat to other urban transport methods and an increase in the number of vehicles in urban areas.

The free-floating CS BM has only been proven to have potential in urban and large cities. In smaller cities and rural areas, the challenges are much greater due to lower demand, caused by a combination of unfavorable factors such as higher levels of car ownership, more available parking spaces, and less public transport services to continue the journey (Rotaris & Danielis, 2018). As noted by Expert_1, greater involvement from municipalities is necessary for expansion into rural areas. In a recent example, the Expert_1 described how their company expanded into rural areas near a large German city under the condition of financial compensation from the municipality.

6 CAR SHARING – BUSINESS MODEL RECOMMENDATIONS

6.1 Relevance and Approach

The strengths and vulnerabilities of the different service offerings, evolving market trends and external challenges determine the CS BM today, but also provide opportunities for BM innovation in the future. This chapter will follow with specific recommendations how the CS BM can be innovated, based on the BM comparison in the provisioning industry and the CS deep-dive. Within an established BM, innovations are the only source of sustainable advantage, as the potential to reduce costs of the BM in the traditional way is exhausted (Gama et al., 2007). As an example, the main cost drivers are related to the car (acquisition, maintenance, fuel etc.), but reducing costs by offering less expensive or older cars would negatively affect the value for the customers. The BM should not harm its value proposition but focus on new combinations and changes in the service offered through BMI, which can generate the potential to either increase revenues or reduce costs.

By creating an overview of the car provisioning industry, deep diving into the CS BM and its environment and conducting interviews with relevant market players, some key insights have been identified and serve as a base for the BM recommendations.

First, the success of CS providers is determined by the huge demand fluctuations, regarding time and location. As stated by Expert_1, the peak demand is on the weekend, with rising demand starting on Thursday, but low demand and utilization from Monday to Wednesday. Furthermore, utilization shrinks after 8pm. Expert_2 focused on the geographic side of utilization, where he highlights the trend that cars are driven to the outskirts of urban areas by people who drive home from work. Right now, there is no effective solution to tackle these fluctuations.

Adding up to this, another key insight is that high manual labor is necessary to relocate the cars and ensure that the cars are located at frequently demanded locations. A distinction is made between operator-based and user-based strategies, but there is no effective user-based relocation strategy. This leads to the need of operators to solve the balance problem by manually relocating cars from low-demand to high-demand locations (Cepolina et al., 2014). Expert_2 stated that there is no efficient solution for it, and several trials (e.g., using students as cheap temporary workers to relocate the cars) were not (cost-)effective.

The third key insight is that the boundaries between the individual BMs in the car provisioning industry are blurring. Several CS providers offer the option to rent the car for a longer time, ShareNow offers a rental offering up to 30 days (ShareNow, n.d.). Right now, the BMs are still different, targeting different customer segments and showing distinct characteristics. Nevertheless, large key players which provide rental and sharing offerings are already using synergies, e.g., by using the rental carpool during peak demand, stated by Expert_1.

Another key insight is the dependency on local governments which determine the success in large urban areas and prevent a uniform expansion of the network. Stated by bExpert_1 and underlined by recent examples (e.g., further restrictions in Berlin), a profitable CS BM is dependent from the help of local government, to provide the infrastructure for EVs, allow cost-effective parking and allow shared vehicles to enter car-free zones. The support of the government correlates with its trust in CS as the leading transportation service in the future and is determined by the perceived risk of cannibalization effects to public transportation offerings.

The last insight, the trend of autonomous driving will affect the CS BM. The bandwidth of literature about shared autonomous vehicles (SAVs) underlines this. Uncertainty when the technology will be ready for the market and what it will take to be successful is high, but it is considered certain that autonomous driving will be the future.

In this chapter, a variety of BM recommendations, based on the key insights, will be discussed. This will be followed by a qualitative evaluation based on the desirability, feasibility, viability, and adaptability of each recommendation. The Innovation Project Scorecard quantifies these factors in a company context. As explained in Chapter 3, this framework served as the foundation and is adapted and extended to the BM context (Osterwalder et al., 2020). This analysis will end up with a score of the single items and an overall score, serving as the basis for deciding which opportunities should be adapted by the CS BM and so are recommended.

As stated in Chapter 5, the peer-to-peer CS is out of scope. The free-floating and station-based offering show some similarities, such as car ownership of the providers, but they also differ in how they work. In the interview with Expert_2, the expert clarified that the free-floating version would shape the future of CS, as it is the only method can reach the value proposition of private cars. It is driven by the opportunity to park the car flexibly, allowing door-to-door rides. This becomes clear when looking at the largest market players, all of which focus on the free-floating mode. Therefore, all recommendations are specifically for the free-floating mode to ensure that the recommendations fit existing BM components and to each other. All in all, this approach results in a holistic BM for the future.

6.2 Recommendations

6.2.1 Exterior and Interior Vehicle Advertisement

Advertisement on different public physical assets has been around for decades. In most major cities, it is common that buses, trains, and trams serve as advertisement billboards. This is an indicator of its financial potential. Taylor et al (2006) identify four key reasons why companies use billboards: high visibility, media efficiency, local presence, and tangible response. Research suggests that taxis constitute an effective medium for advertisement (Veloutsou & O'Donnel, 2005). This leads to the hypothesis that CS companies could incorporate this type of advertisement as an additional means of revenue. Like taxis and public transport, car-sharing vehicles spend the most time on public streets. Hence, they have a high visibility potential as well as significant combined exterior space.

There are numerous ways to put external advertisements on vehicles, such as car wraps or rooftop advertising. For instance, Firefly Systems Inc. specializes in the installment of digital screens on taxis and rideshare vehicles in the United States (Firefly Systems Inc., 2022). The firm works together with global brands to display its ad campaigns. Drivers can place the firm's advertisement screen on top of the car and in return receive monthly compensation of USD 300 (Mascarenhas, 2019). Comparable solutions could be used by car sharers to benefit from the fleets' high public visibility. However, Expert_1, suggests that currently, CS firms see the exterior of their vehicles as a way for self-advertisement. Consequently, the introduction of third-party advertisements could dilute consumers' attention to their brand. To balance out this effect, car sharers would be required to invest in more expensive marketing. Therefore, external advertising should only be introduced once its' financial potential exceeds the benefit of self-advertisement.

Alternatively, options for interior advertisement exist, which is widely used by other mobility providers, such as airlines. For example, in airplanes, headrests can serve as advertisement space. However, this form of advertisement benefits from long travel times with little distraction. As travel times in CS cars are limited and only passengers can pay attention to ads, this practice's effectiveness is limited. Overall, the monetization potential of interior advertisement can be assumed to be below the potential of roof-top screens or car wraps.

Regarding the BM Innovation Scorecard, advertisements are not desirable for the customers, as they do not show any value for the customers. Advertisements would be easy to implement in the current system, as they do not need special technologies, therefore the feasibility is high. The viability is moderate, as low costs are offset by moderate revenues, due to the non-proven effectiveness. However, indirect effects caused by a diluted self-advertisement of CS providers reduce the attractiveness of this initiative. Furthermore, it does not change the key elements of the BM fundamentally, therefore it has low potential to innovate the BM. With 33, the overall value of this recommendation seems to be low, with strengths regarding the ease of implementation (see Appendix G).

6.2.2 Private Car Integration

A key insight from expert interviews is the significant fluctuation in demand. Expert_1 stated that at peak times, the demand exceeds the car supply. As a result, the revenue potential is not fully exhausted. Similarly, at times of low demand, much of the fleet can be found idling on the street. One conceivable way to balance out these fluctuations is to incorporate private cars into the fleet. As the inherent benefit of the CS BM is to share a car and make the asset available to multiple users to maximize its utilization, using existing private cars that are unused could be a viable solution. The principle is simple: a private individual makes his/her car available for CS and gets compensated for it by the CS company (see Figure 4).

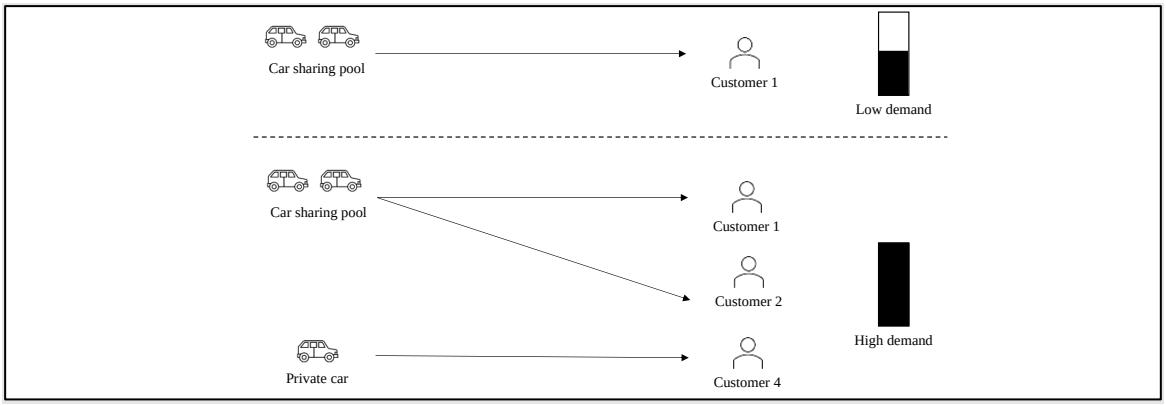

Figure 4: Increasing carpool by integrating a private vehicle
Source: Own illustration

The CS provider needs to incentivize the private individual in a way that the car is made available in peak demand times. To make this model work, certain requirements need to be met. The first one is a technical requirement, both on the car owner's side as well as on the sharing provider's side. The car owner needs to be able to activate his/her car via his phone so that users of the sharing service can see the car on the sharing app. This requires the hardware of or in the car to be able to do this, as well as a solution (e.g., using blockchain technology for the car registration) to change the ownership status of the car (Rosado, 2018). This also entails the technical capabilities of geolocation/GPS and integration of the car into the sharing provider's platform. Many companies are already offering hardware solutions for CS providers e.g., Hiyacar or Invers (Hiyacar, 2022; Invers, 2022). Another requirement is that the CS provider can ensure the car conforms to the quality standards of the provider's offering. This can be verified by entering a contract in which the car owner takes responsibility for the data provided about the car being accurate and that the car is kept clean. Lastly, there is the problem of relocating the car to the owner's location after the sharing period ends. This can be solved by offering the car owner free trips with a shared vehicle to go to his/her private car or incentivizing CS users to relocate the car to the owner's location via methods such as pricing discussed in this thesis. Multiple options can be explored.

In an own-to-share model, individuals can sign into a car-sharing provider's platform and request access to make their car available for sharing. The car must meet the provider's standards, and the owner may need to retrofit the car with the necessary technology. This model requires retrofitting of the cars, which is costly and increases the complexity of the CS BM. Some newer cars may already have the necessary technology, enabling easier integration into a car-sharing system. In 2018, Porsche for example tested blockchain applications in their vehicles, which could facilitate car-sharing by allowing the platform to communicate directly with the car without the need for hardware retrofitting (Porsche, 2018).

In a fractional ownership model, an individual can purchase a share of a car and receive a certain number of hours of access to the car per year. The model is employed in the executive jet industry and involves partial ownership of a vehicle (NetJets, 2022). The concept is suitable for individuals who want regular access to a car without incurring the full costs of ownership. The car-sharing provider would take on the largest share of ownership of the car and distribute the remaining ownership to other interested parties. To maximize car utilization and fleet optimization, the provider can offer fractional ownership programs that grant access to cars during low-demand periods for a reduced price.

In a lease-to-share model, leased vehicles are integrated into the car-sharing system. In this model, the person leasing the car can sublet their unused capacity to the car-sharing provider. It increases the speed of the vehicle’s depreciation (Novikova, 2017). The car-sharing provider can then offer a larger fleet of cars without incurring the full cost of ownership. This model is advantageous because the buyer is committed to sharing their car from the start, and once they have experienced the benefits, they are motivated to continue sharing. This model has been experimented with by companies such as Ford and SnappCar (SnappCar, 2022; Ford, 2015)

By evaluating this recommendation with the BM Innovation Scorecard (see Appendix H), the desirability of a customer's point of view is unclear as it increases the supply during peak demand but may influence the condition of the vehicle negatively. It would be feasible, due to the availability of necessary resources and proven by peer-to-peer CS systems. As discussed, the costs to implement it in an existing system are high, compared to a low increase in revenue as the provider must set incentives for the private car owner, resulting in low viability. Private car integration does not satisfy the adaptability to current market trends. This recommendation would dilute the free-floating with the peer-to-peer BM and therefore shift away from a more profitable to a less profitable BM (stated by Expert_2 and Expert_3), resulting in a low value (score of 28 on the scorecard). Additionally, it increases the complexity due to the specific characteristics of each car and integration would be more complex.

6.2.3 Complementary Use

The acquisition and maintenance of the vehicles are the most significant costs for CS providers, thus offsetting these costs by resource utilization is crucial. Whereas Chapter 6.2.2 explores possibilities of increasing the supply of cars during specified periods, this chapter is about utilization maximization during low-demand periods. Complementary use for vehicles is a useful measure that can increase utilization by moving capacity to areas with demand when it is lacking from the regular user base. Shifting demand either requires the provider to identify the demand in the market or to create that demand by promotion or incentives. While customers of the B2C segment might show a higher demand for CS over the weekend, corporate CS vehicles are mostly used during weekdays (stated by Expert_1). This makes it attractive for CS providers to establish a mix of B2C and B2B customers. The customer base can be further broadened to, for example, pharmacy deliveries in the early morning hours and overnight express package deliveries during nighttime. According to Dablanc et al. (2017), if the innovations already used for passenger-based vehicle sharing can be adapted to freight-

dedicated solutions, segments like city logistics and last mile delivery can be optimized, posing opportunities for both, logistics and CS companies. Usually, companies are already using their own logistics networks or use service providers such as DHL or UPS to deliver their products. With the right level of communication, shared fleets can complement these existing networks, to reduce total fleet ownership costs and make them more environmentally friendly (Van Duin et al., 2020). Larger CS providers benefit from large data sets on user behavior and have more diversified fleets. Providers with vans in their fleet for example, can target smaller e-commerce shops whose occasional transport needs do not justify the maintenance of their fleet and incentivize them to use the vehicle during early morning and evening hours.

According to Expert_1, various parties such as driving schools or delivery services are interested in accessing a shared fleet. CS gains more attraction during the weekend, demand from Friday to Sunday is high but Mondays to Wednesdays demand is low. The same goes for the evening hours. Most cars remain unused after 8pm. That opens opportunities for partnerships with driving schools that can access the vehicles during the week and logistics/delivery companies to use the vehicles in the evening hours.

Finding, and capturing these alternative sources of demand is associated with various costs. These include the increased complexity of managing multiple customers, identifying user groups and sales costs to target different user segments. It is recommended to implement complementary use into the existing platform, as the infrastructure already exists and only needs adjustments for the specific context. A third-party platform would increase IT infrastructure requirements and lead to compability issues. (Strulark-Wójcikiewicz & Wagner, 2021). The strategy can serve to grow the provider's user base and increase revenue while keeping fixed costs at a steady level. For companies focusing on availability or market positioning for a specific user base, this strategy is less appropriate. While increasing the user base causes a risk

of losing current users, companies can focus on niche segments to build a competitive advantage in these segments.

Mapping the complementary use of vehicles on the BM Innovation Scorecard, a high customer desirability is expected, targeting new customer groups which need a vehicle during CS's usual low-demand times. These new customer groups would need an alternative way to access the platform as the pricing and usage time differ from the normal price, which can be integrated into the current platform. This contributes to a good feasibility, which is supported by the fact that the cars can handle different complementary use cases as a means of transport. Added costs would only arise from increased car use, resulting in added revenues, which show high viability. With complementary use, the BM adapts the trend towards a sharing economy, which is gaining interest in a B2B context (Brooks, 2022). This ends up in a score of 40, which writes down a high value for the BM (see Appendix I).

6.2.4 Dynamic Pricing

Dynamic pricing is a pricing strategy used by companies to adjust prices based on factors such as demand, availability, and location (Fuchs, 2022). This method has been used successfully in industries such as ride-hailing such as Uber and Lyft. Ride-hailing providers use dynamic pricing strategies by applying a multiplier, an additional surge amount or an upfront fare (Uber, n.d.). Several studies propose an integration of dynamic pricing into the free-floating mode, but until now there has been no successful realization of a dynamic pricing model in practice (Neijmeijer et al., 2020; Ren et al., 2019; Wu et al., 2022).

One way that dynamic pricing can be used to maximize revenue for CS firms is by increasing prices during times of high demand. This allows the company to take advantage of the increased demand and maximize profits. For example, if demand for cars is high in a certain area, prices can be increased to maximize revenue. Additionally, variable pricing schemes can be used to

reduce utilization imbalances and make the car-sharing system more profitable, as demonstrated by Jorge et al (2015). In addition to its potential benefits for revenue and fleet rebalancing, dynamic pricing can also be used to increase utilization during times of low demand. For example, prices could be reduced if demand is low to encourage people to use the service and thus, to increase the idling of cars. This can help to improve utilization and make the car-sharing system more sustainable. Former CS provider DriveNow has experimented with similar methods by offering lower prices for cars with a substantial idling time (Lagadic et al., 2019). Another potential benefit of dynamic pricing for CS companies is its ability to incentivize a rebalancing of the fleet. For instance, if there is a high demand for cars in a certain area, an incentive could be set for customers to bring cars to that area. This can help to improve the distribution of the fleet within the network and increase utilization. Furthermore, dynamic pricing can be used to incentivize refuelling or parking at charging stations for electric cars by offering discounts. According to Waserhole (2015), this will not only improve the utilization and revenues but also reduce costs associated to manual relocation efforts by CS firms' employees. Currently, firms send employees to relocate and recharge the fleet, which results in substantial operational costs. According to Expert_3, in some cases, it even makes sense to offer rides for free to incentivize the relocation of a vehicle.

However, the dynamic pricing method comes with risks. A recent report by Kearney (2019) suggests that price transparency is the single most key factor among CS members when evaluating CS services' attractiveness. Therefore, fluctuating fees could result in customer dissatisfaction with consequences for market growth and penetration. Additionally, contrary to ride-hailing services that use similar dynamic pricing models, CS companies have no insights into customers' routes. Hence, it is complex to transparently communicate variable prices upfront the ride. To overcome this challenge, it is recommended to introduce discounts as incentives instead of price increases.

As the CS service differs from other BMs where dynamic pricing models are applied, the underlying mechanisms and factors should be adapted. It is recommended to take the above factors into account to design a sufficient pricing scheme. The implementation process should follow the subsequent steps. First, a company must quantify consumer behavior through the collection of usage data. Insights could be gathered on demand levels during different times in each operating area. Followingly, the price elasticity should be determined by testing demands at different price points. This data can be used to see at which price rides can be guaranteed simply by a low price. Consequently, a core pricing scheme can be determined that maximizes utilization. This origin-based method serves as foundation for the dynamic pricing strategy, where different users see different prices. This price difference should neither be based on socio-demographic characteristics (e.g. age, gender, and income) nor on previous trip characteristics, as users which use CS as an alternative to ownership are very price sensitive (Müller et al., 2021). This work proposes to define a maximum price for each specific case, then using discounts on this price for incentivizing.

The price difference should maximize the overall utilization, taking the alternative vehicles for each user into account. Figure 5 demonstrates this case exemplary with three drivers and four cars nearby. In this case, the price is presented as a percentage of the maximum price, where a lower percentage means a lower price. The user with more vehicles nearby (User B & User C) faces a higher price for Car 2 than User A who only has this specific vehicle in walking distance. This should incentivize User B not to take Car 2. Furthermore, User C can decide between four different cars and User B between three cars. Both are incentivized not to take Car 2 and Car 3, as this would reduce the options for the other users. This dynamic pricing model can be extended and adjusted to a real-life scenario.

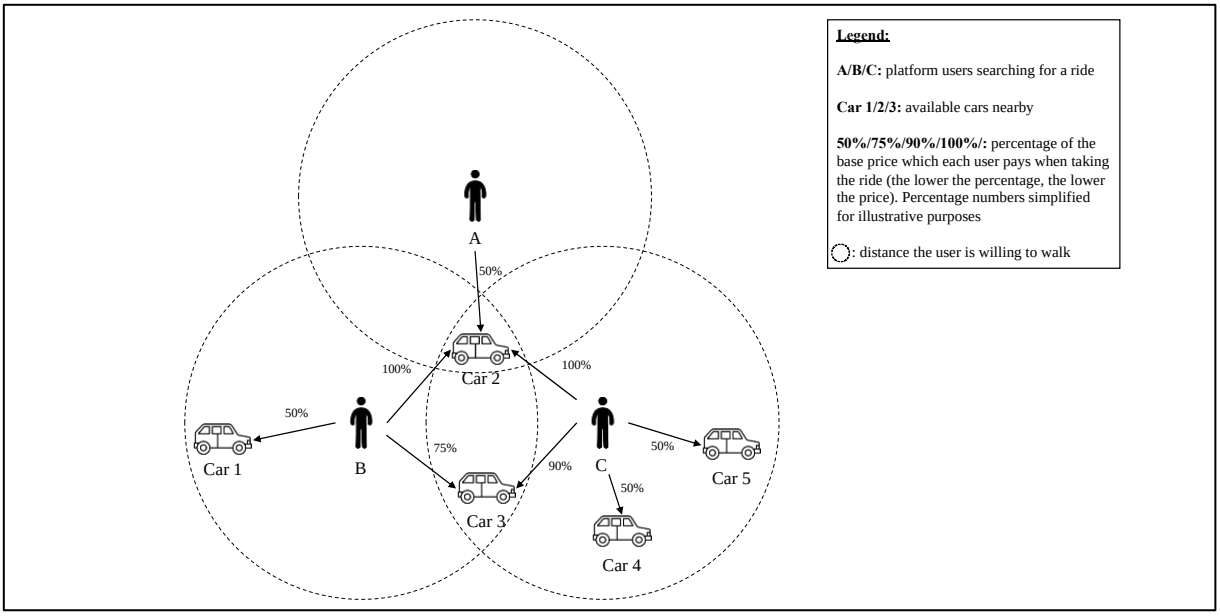

Figure 5: Dynamic pricing model with different prices for each user
Source: Own illustration adapted from Müller et al. (2021) and extended by a third user

Additionally, monetary incentives should be implemented to encourage specific user behavior. For example, users can receive discounts for parking in certain areas or to refuel vehicles. This mechanism of dynamic pricing serves to reduce manual efforts of car sharing providers such as fleet rebalancing or refueling. All in all, there should be a guaranteed fee limit, which is only lowered to increase utilization or for incentives. This allows car sharing firms to meet consumers demand for price transparency.

Dynamic pricing's impact on the desirability can be seen as both positive, as the average price stays the same and shifts down situationally. The feasibility of this measure is high. However, it takes time to implement sufficient factors into a flexible pricing model. Generally, an improved pricing scheme has the potential to increase revenues through improved utilization at little costs. Furthermore, it helps to succeed to compete against other BMs in the industry by improving the attractiveness. The scorecard value is high with a score of 41 (see Appendix J).

6.2.5 Integration with Other Mobility Solutions

The user is looking for the most convenient option to go from A to B. CS is only one of many options when deciding which means of transport to take. Especially the availability of other

services, such as public transport, bikes or scooters may diminish the need to own a car and thus has the potential to also increase demand for CS. Hence, combined mobility, by enabling the integration of shared services with traditional services, represents a key lever to encourage their use (Shaheen & Chan, 2016). Likewise, combined products that are tied to monthly or annual public transport tickets help encourage occasional public transport users to switch to higher value products (Bundesverband CarSharing e.V., 2010).

Integrated mobility services relate to a mobility platform that gives users access to various mobility services via just one card, registration, or app. This is an essential step for mobility as a service (MaaS) which is denoted by a full integration of information, booking and billing to get from point A to B across all steps. It includes an integrated way of doing pricing (e.g. combining a public transport and CS trip into a single ticket price, based on duration and distance) but also single telematics (e.g., a metro card can be used to open a shared car if there is money loaded on it) and joint operations (e.g., using the same customer service center). CS providers and public transport operators can cooperate by mutualizing different services (Lagadic, 2019). These are namely hotlines, online platforms, institutional integration ticket integration, integrated urban planning, communication, marketing, and information integration. One of the best examples of an integrated offering, combining multiple providers and different modes of transport may be the Helsinki based whim (Whim, 2022). Leaning on Lagadic et al. (2019) and Bundesverband CarSharing e.V. (2010), other examples of such integrated transport system are shown in Table 3.One of the best examples of an integrated offering, combining multiple providers and different modes of transport may be the Helsinki based whim (whim, 2022). Leaning on Lagadic et al. (2019) and Bundesverband CarSharing e.V. (2010), other examples of such integrated transport system are shown in (Appendix G).

The biggest challenge is data sharing across different parties, especially in the competitive market environment. To successfully integrate services, data must be made transparent by all

parties. A consolidation in the market environment would support partnerships between public transport and local CS providers, leading to a better customer experience.

The integration of other mobility solutions into the CS BM is questionable due to feasibility issues, potential negative impacts on profitability, and concerns over whether the CS BM's sales channels are appropriate for other means of transport. Market trends and industry forces suggest that integrated mobility solutions are relevant, but not a breakthrough compared to existing solutions. This leads to a moderate score of 35 on the BM Innovation Scorecard (see Appendix K). The interviewed experts (Expert_1, Expert_2, and Expert3) warn of increased dependence on partners and the need for shared cars near other means of transport, which could move the offering towards a station-based model and diminish the benefits of the free-floating model. Revenue increases are expected to be moderate, and the costs of integration may be high.

6.2.6 Supplementation of Rental and Subscription Offerings

The CS industry has been challenging for players since its origin. Weaknesses such as limited profit margins, low utilization, and high demand fluctuations have forced companies to withdraw from the market. Our interview with Expert_1 has indicated that a combined product offering of CS with additional services can be a significant lever to overcome these difficulties. For example, companies can add rental or subscription offerings to their portfolio to generate diverse operating synergies. One synergy is the existence of crucially different peaks in demand. For instance, Expert_1 specified that during Christmas holidays, demand for CS is limited. On the other hand, the demand for rental vehicles reaches a yearly high. Hence, vehicle shifts from the CS pool towards the car rental pool can be used for significant utilization enhancements. Additionally, most car provision services benefit from similar capabilities and operational resources. This means that companies can achieve valuable economies of scope when combining several services. Direct consequences can be lower operational expenses and higher profitability. Several firms have started to implement such practices. For instance, Miles

Mobility introduced a subscription service and Sixt leverages their capabilities by offering a wide range of services including rental, sharing, and subscription (Miles Mobility, 2022; Sixt, 2021).

The rental and subscription offering can be implemented in different ways, which are the creation of a new platform, the integration into the existing platform or the integration directly into the sharing offering. Due to the main opportunity to realize economies of scope, it is recommended to implement it as close as possible to the existing sharing offering. From a practical point of view, customers have the flexibility to decide which service they want to use when they start their journey (sharing, rental & subscription). The user must decide in advance which service offering he wants to use, as they have different pricing models. It is recommended to keep the existing pay-per-use model for sharing offerings and extend it by a fixed price model for longer rentals.

Widening the service portfolio comes with significant investment requirements into the firm's organizational infrastructure, IT, knowledge, and vehicle fleet. However, benefits outweigh underlying costs. As stated by Expert_3, operating synergies can lead to overall significant utilization improvements and cost reductions.

The desirability of the core CS business is not affected by offering additional services. However, customer relationships could be strengthened as customers will not have to switch providers when seeking different services such as car rental. However, as this will require a separate set of activities and capabilities, the implementation is predicted to be complex, despite being feasible. Moreover, this recommendation is viable from a financial viewpoint. It will result in additional revenue streams and have a negligible impact on the costs, as the same fleet can be used for the other services. Overall, this measure achieves a score of 43 on the scoreboard and is highly recommended to be included in the future CS BM (see Appendix L).

6.2.7 Adaption of Shared Autonomous Vehicles

The CS BM faces challenges from the automotive industry as well as from the sharing economy. In the future, the mass suitability of autonomous vehicles will be a new technology in the automotive market and force disruptive BM innovations, which will define new ways of transportation. Autonomous vehicles can be in general defined as a "vehicle that can guide itself without human conduction" (Ilková, 2017). They provide advantages such as time savings for drivers, parking assistance, improved road safety, cooperative driving, and an increased access to personal transport (Mounce & Nelson, 2019). The Society of Automotive Engineers defines Levels of driving automation, providing clarity regarding the grade of automation from 0 (no driving automation) to 5 (full driving automation). While level 0 to 2 still requires the driver to drive manually and level 3 needs the driver to drive when the support feature requests it, levels 4 and 5 define the stage where no driver is needed (SAE International, 2021). In the following, levels 4 and 5 will be part of the discussion about (shared) autonomous vehicles. After setting up a common definition, the BM including SAVs will be evaluated, followed by a determination of the key drivers for success.

Hao & Yamamoto (2018) describe the combination of shared services and autonomous vehicles as "shared autonomous vehicles" (SAVs), seeing them as the transportation mode in the future. Glotz-Richter (2016) sees high potential for a reorganization of urban mobility, as AVs will be a powerful enabler for CS providers as they contribute to the operational costs, maneuverability, and time effectiveness (Bert et al., 2016) SAVs represent "a convergence of megatrends like electrification, shared mobility, autonomous driving, and connectivity" (Vaughn, 2022) and are therefore the most relevant future topic for sharing providers.

A future implementation of SAVs in a CS business changes the future service offering significantly, going hand in hand with the need to innovate the business mode. A potential SAV service model landscape is shown in Figure 6 by Stocker & Shaheen, (2017). CS providers keep

their offer of mostly individual rides and therefore concentrate on micro and small vehicles, being able to serve point-to-point and flexible rides.

Vehicle Type / Capacity	***Ownership Modes***	***Pooled Option***	***Temporal Service Attributes***	***Spatial Service Attributes***
Large vehicles (20+ pax)	• B2C, Hybrid	Yes	Fixed schedule	Fixed-route service, low flexibility
Mid vehicles (7-20 ax)	• B2C, Hybrid	Yes	Fixed & more flexibly schedule	Fixed-route service with demand-based
Small vehicles (3-7 pax)	• B2C, Point-to-point, Hybrid	(Yes)	On-demand or loosely scheduled	Flexible with deviation
Micro vehicles (1-2 pax)	• B2C, Point-to-point, Hybrid	Some cases	Likely on demand	Point-to-point with little/no deviation

Figure 6: Different service offerings in a SAV landscape
Source: Own illustration based on Stocker & Shaheen (2017)

Being able to absorb features from both the CS system and autonomous vehicles, the combination of efficiency, environmental friendliness and cost-saving potential while providing a safe and comfortable service will be part of a superior BM which shows advantages to the existing BMs (Hao & Yamamoto, 2018).

As shown in Figure 7, SAVs combine the value proposition of CS and AVs. The following part will discuss how a future car provisioning BM will look like with this combination, focusing on changes regarding the user group, new areas, parking demand and fleet size.

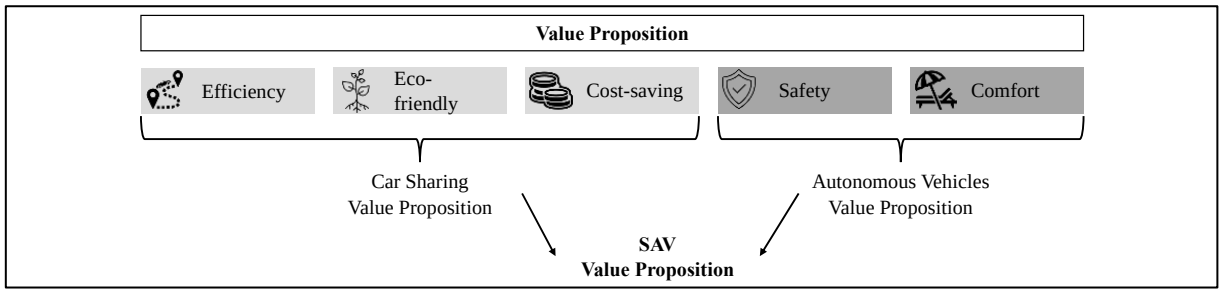

Figure 7: Combination of CS and SAV value proposition
Source: Own illustration based on Hao (2018)

Autonomous vehicles do not require a driver, so car travelling can also be provided to new customer segments, which are not able or allowed to drive by themselves by today (Lutin et al., 2013). The largest groups of additional users are elderly, children, and adults without a driving

license (Meyer et al., 2017). Additionally, people which are able and allowed to drive but did not user CS for different reasons might consider CS with SAVs in the future, which are namely the user group who wants to use the travel time by doing other things and the user group which can use it after the consumption of alcohol.

Next, the focus of CS providers is mostly on urban areas with high population density, to keep relocation problems small and ensure low walking distances for users (AT Kearney, 2020). As SAVs would be able to drive autonomously to areas with high density and demand, the relocation problem can be solved and trips to low-density areas would be possible. In this sense, SAVs maintain accessibility to auto dependent locations for everyone (Ohnemus & Perl, 2016). By widening the area, new customer groups can be reached, and the network can be broadened, which not only affects low-density areas but also the connection between urban cities. In a CS BM with SAVs, the single networks of urban areas can be combined to one extensive network. As mentioned, SAVs can solve the relocation problem, which contributes to a problem the sharing economy is already tackling: the parking problem, caused by the lack of space in urban areas. AVs in general can optimize the offered parking space by parking inches to each other, as there is no need to enter the car before start driving (Hayes, 2011). Nourinejad et al. (2018) further elaborated this scenario by designing AV specific parking facilities, with multiple rows where vehicles are stacked behind each other. In an economy where private vehicles are replaced by SAVs, parking space can be saved because it is unnecessary to park the SAV after finishing the ride (Kondor et al., 2018). This assumes a balance between supply and demand, where an SAV is driving most of the time and is less needed to find parking spaces. The revenue stream of taking a fare for providing the transportation service will still be the dominant one in the future, but nevertheless there are opportunities to generate extra revenue. By using software and sensors required for SAVs, the fleet can generate data which is monetizable in form of advertisements and can be targeted directly to the users in a vehicle (Wegscheider et al., 2022).

Next, an evaluation of what it takes to have a successful BM within a SAV environment will follow. The value chain of SAVs will differ from existing value chains, as they do not only face common needs like today's shared vehicles. Wegscheider et al. (2022) showed the expected value chain for SAVs, starting with the AV tech stack, followed by the vehicles/fleet, the fleet operations, and the customer platform (see Figure 8). In general, CS providers should focus on the fleet operations and customer platform, where they already show experience (Wegscheider et al., 2022). By deep diving into the different value chain activities, it becomes clear that the main tasks in the future are already covered by sharing providers today, which brings them into a strong market position.

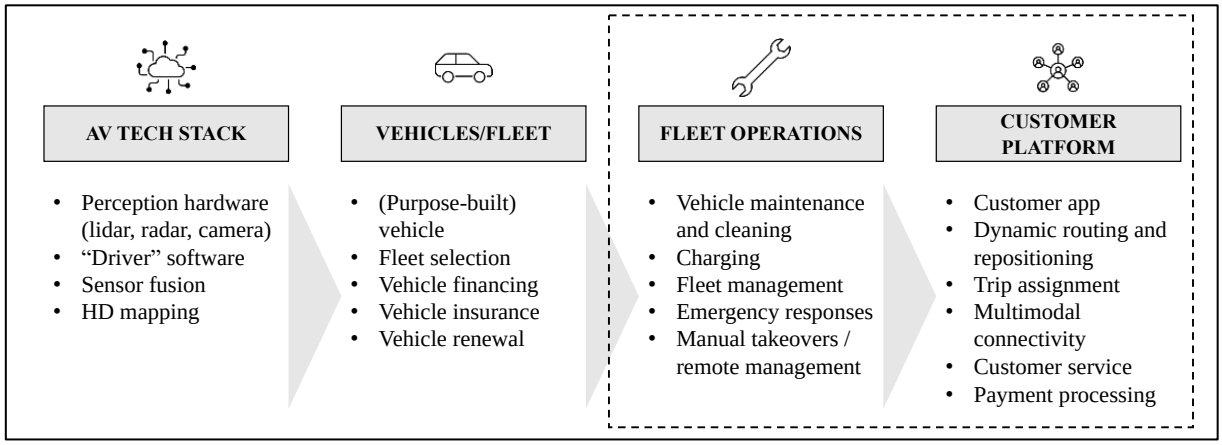

Figure 8: Different stages along the SAV value chain
Source: Own illustration based on Wegscheider et al. (2022)

As described in a discussion paper for the International Transportation Forum, a SAV BM review concluded that the existing characteristics for CS and ride hailing will blur when no driver is needed anymore. Instead, the critical factors for a winning BM will be (1) who owns the vehicles and (2) who controls the network related operational decisions (Stocker & Shaheen, 2017). Compared to other BMs, the CS BM already operates with own cars and the operational network, which can be the foundation for building a leading SAV based service. The ownership of cars being included in the B2C CS BM provides an advantage, as the providers already have experience regarding vehicle amortization and customer preferences. This experience leads to a high knowledge about pricing for different car models. But owning non-autonomous vehicles

now does not automatically lead to the ownership of autonomous cars. CS providers should use their financial resources to add new cars to their fleet and shift the focus to cars which are equipped with self-driving hardware. As an example, Tesla already equips all new cars with fully self-driving software since 2016 (Bloomberg LP, 2016). Changing the fleet little by little ensures that as soon as AVs are allowed for the broad mass, the CS provider is directly able to offer it to the customers. Also, if in the beginning only SAE level 3 or 4 automation is allowed, the provider can collect early customer behavior data to adjust necessary change fast.

Therefore, it is proposed that the future decision-making process of buying new cars should not only include price, environmental friendliness, durability, and customer preferences, it should also be extended by self-driving capabilities. The benefits of AVs can only be realized once a significant part of the fleet is autonomous, a high number of AVs in an early stage will be a winning factor (Mounce & Nelson, 2019). CS providers can shape the future towards SAVs as other BMs do not keep the ownership.

The second success factor, network control is more challenging because other big market players operate large networks such as the ride hailing providers Uber, Bolt and many more. Successful platforms with fast growth show characteristics that in the end only one large player remains in the market (winner takes it all), as it is difficult to compete for organizations that started later (Van der Aalst et al., 2019). The current CS landscape does not show one large player, which mainly comes from the different environment and regulations in different areas. Especially with SAVs which need costly investments, it is necessary to reach a critical mass of customers to realize economies of scale.

In general, a successful platform is determined by the dimensions of value creation, value delivery and value capture (Rohn et al., 2021). The most important action to create value is to offer SAVs via the platform to match the supply with the demand for all areas and at any time,

while it is crucial to have a large enough fleet size in the areas where the demand is. A variety of different offerings is necessary to reach different customer segments. The value is delivered by bringing the customer exactly to his/her desired destination with short waiting times and at lower costs than an owned car. The platform must contribute to that with a good algorithm to fulfil these criteria. To capture value, it is crucial to have a certain revenue model, either by offering a pay-per-use or subscription model, while the payment is also processed via the platform. Figure 9 illustrates the interdependencies and shows that value is created, delivered, and captured via the platform.

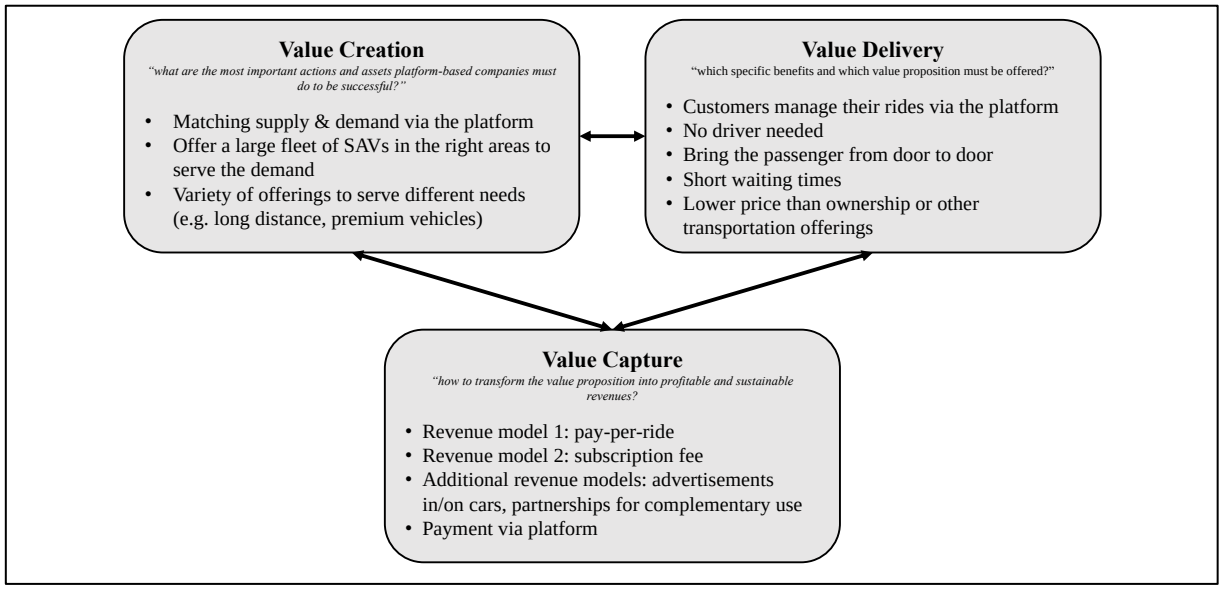

Figure 9: Interconnections between value creation, value delivery & value capture
Source: Own illustration based on Rohn, Bican, Brehm, Kraus & Clauss (2021)

To show how a platform based SAV service offering can look like in specific, a model based on Allahviranloo & Bouyeure (2022) is proposed, adjusted to the free-floating context. This model is based on three pillars, which are a travel behavior model, a market matching mechanism, and the platform design. The travel behavior model must be developed to collect data about the type of activities, the location and the time user would use the offering. This is crucial to manage the utilization, as Expert 2 stated that during rush hours the demand is higher. Furthermore, the existing data about care sharing user behavior is not sufficient, as it is expected that user behavior changes with SAVs. Based on this, a matching mechanism is needed to match

the right SAVs to the user, matching the needs of the user to the right vehicle type. The current matching mechanism needs adjustments as SAVs will attract new users and need different pricing. The third component is the platform design, divided into the user interface, a database, and a backend computation system. These components are already part of the existing CS offering and therefore underline the ability of the BM to adapt to the new needs of a SAV offering quickly. The user interface does not need adjustments and the database will be extended by new customer data. The backend computation needs adjustments as SAVs can move without a driver and therefore change the matching criteria (Allahviranloo & Bouyeure, 2022).

As autonomous driving technology is not yet ready for the broad market. The recommendations therefore come with limitations, typical for disruptive innovations. (1) It is not clear when the technology is mature enough and will not only be available for luxury cars, but for smaller cars which are used for CS as well. (2) Geographical differences, as it is easier to implement level 4 AVs to areas with good street conditions and a clear road layout. (3) Next, it is uncertain how customers will react, when they trust AVs. This is expected to be fast as the technology will be more secure than driving manually, but the question is how much the customers are willing to pay for that. (4) Last, the legal conditions for AVs and SAVs must allow use in a sharing economy, which includes open point as who to blame for an accident or if technology does not work as expected (Heineke, 2019). Vaughn (2022) points to requirements of an increased life expectancy, durability, and robustness, also mentioning the ongoing innovations in this area like Nexteers Automated Steering Actuator (Nexteer, n.d.).

To sum it up, by adding SAVs to the CS BM, a variety of new customers can be attracted, new areas can be explored, different urban areas can relate to each other, the distance to the next available vehicle can be reduced, the parking demand will decrease, and the relocation problem is solved. The new requirements, which are not hardware, but software-related, widen the

landscape of competitors. Besides traditional OEMs which show advantages in manufacturing and mobility providers being strong in connecting cars with people, some big tech-companies as Google (Waymo) as well as entrepreneurs try to gain a competitive advantage by developing software designs (Forbes, 2021). The final recommendation is not to implement AVs right now, but to create the right conditions, being able to include AVs quickly when the technology is ready for the market. The most important factor is to have control over the operational network and data.

SAV integration will be a game changer for the BM. For the customers SAVs are highly desirable, as they extend the value proposition by higher availability and convenience, similar to today's ride hailing. CS providers have the right capabilities to build up solutions, which makes the recommendation feasible. Future revenue potential coming from a large customer base for SAVs is higher than the expected initial investment. Autonomous driving integration is the most critical trend of the future of the industry and will range far beyond the CS BM. It is highly adapted to current market shifts, namely the trends of sharing and autonomous driving. With 55 points, it shows a significantly high value on the BM Innovation Scorecard (see Appendix M).

6.3 Classification of the Recommendations

The McKinsey 3 Horizons Model is used to plot each recommendation against value and time. The value was mapped based on the BM Recommendation Scorecard value as well as the inputs from the three expert interviews and the industry deep-dive. Table 2 shows the final score of each recommendation. The score gives guidance on the relative value of each recommendation. A lower score indicates a lower value of the recommendation. In addition to the inputs from the three qualitative expert interviews, it is proposed either to include the recommendation into the CS BM or not. Therefore, it is proposed to implement recommendation 3, 4, 6, and 7. Recommendation 1, 2, and 5 could not be validated as a viable recommendation.

ID	Recommendation	Score
1	Exterior & Interior Vehicle Advertisement	33
2	Private Car Integration	28
3	Complementary Use	40
4	Dynamic Pricing	41
5	Integration with other Mobility Solutions	35
6	Supplementation of Rental and Subscription Offerings	38
7	Shared Autonomous Vehicles	55

Table 2: BM recommendation scores
Source: Own illustration

The time variable is based the criteria used by Mehrhad et. al. in the Alchemy of Growth (2000): In Horizon 1, Recommendations assigned to Horizon 1 directly contribute to bottom line results and cashflow. By using existing capabilities, productivity can be improved, costs reduced, and thus net income increased. Recommendations 3 and 4 fall into this spectrum of "superior execution". Horizon 2 recommendations require the use of added resources and new capabilities development while they supply access to new customer segments and revenue streams. Recommendation 6 falls in Horizon 2 and creates a "positional advantage" for CS providers. Horizon 3 recommendations' focus is on creating long-term strategic value. Implementation requires foresight and changes of the current setup of a company (technological and organizational). Recommendation 7 will disrupt every aspect of the BM and therefore falls into this Horizon 3.

Based on the final ranking, practical guidance on which recommendations CS companies should focus on to optimize their BM is supplied. The following recommendations can be made:

The desirability of complementary use is high while finding the right partners poses the biggest challenge. This gives the recommendation a high value, which is also confirmed by the interviews conducted with industry experts. The biggest challenge will be to find a partner that shows complementary demand patterns to use the vehicles. While existing resources can be

used, engagement with partners will be necessary and thus positions recommendation 3 towards the end of Horizon 1. CS providers should find solutions for complementary use as it helps the BMs value proposition.

The value of dynamic pricing is high and can be a differentiator for profitability. While it takes time to build the proposed intelligent pricing scheme, an implementation does not require a change of the BM. Implementing dynamic pricing is strongly recommended to improve the existing BM as it also supports vehicle relocation.

Integrating rental and subscriptions offerings will improve vehicle utilization, de-risk the BM and lead to the ability of increasing the vehicle fleet. Business planning, implementing novel offers and adjusting to changes in the BM pushes this recommendation further to the right on the Horizon Model. Companies should look at integrating a comprehensive car rental and sharing offer with intelligent pricing bundles.

The value of SAV adaptation is extremely high, both from a business and from a customer perspective. Recommendation 7 is dependent on the adaptation of SAVs and thus places it in Horizon 3. Technological solutions to manage an autonomous fleet can already be built and companies need to foresee changes in the BM. SAV can eliminate the weaknesses of the current CS BM. Figure 10 illustrates the recommendations within the Horizon model.

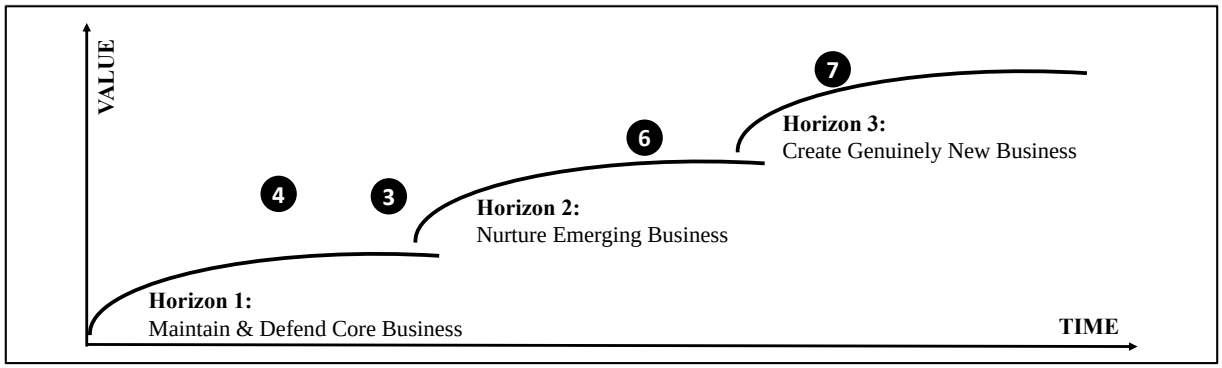

Figure 10: Time-value classification for all recommendations
Source: Own illustration based on the McKinsey 3 Horizon Model Merhad et al. (2000)

6.4 Future Business Model

In the following section, a potential future BM is illustrated based on the BMC framework that was introduced in previous chapters. This BM considers the recommendations highlighted in chapter 6.3. However, SAVs are not considered in this first step as the timeline of readiness for the market is yet unclear as well as general legal requirements have yet to be determined to state clear use cases. In a second step, an outlook and how the BM changes with the adaption of SAVs is proposed

The value proposition of the future CS BM improves by broadening the service portfolio to include car subscription and car rental. In this case, customers do not have to switch providers to satisfy their varying needs. Hence, it significantly increases customers' flexibility and has the full potential to replace private cars.

Due to the same recommendation, customer segments served are widened to include customer segments of all now included services. Moreover, dynamic pricing methods could further increase it. With fixed pricing, every customer pays the same, which eliminates customers below the price threshold. In the new scenario, there are situations when prices are heavily reduced either to incentivize certain car movements or to increase utilization. Consequently, the service becomes attractive for additional customers with a lower willingness to pay. Furthermore, complementary use cases, such as providing cars to delivery services during low demand times, can attract a completely new corporate customer segment.

The customer relationship is likely to intensify when offering additional services. As mentioned previously, customers do not have to switch providers as frequently and therefore, they may become more loyal to one provider. The channels through which are reached and acquired remain unchanged. A strong focus is set on online channels as well as companies' mobile applications.

In this future BM, the key resources are still the vehicle fleet and the IT platform. An extended fleet to include a rental and subscription offering may be necessary but is dependent on a company's existing fleet. Depending on the complementary use case, the type of vehicles in a fleet might need changes. For a food delivery service, the type of car does not matter, whereas for parcel delivery larger vehicles would be necessary. It is clearly recommended to base the complementary offering on the existing fleet capabilities, as it serves as an additional revenue stream, but passenger transportation will remain the most relevant revenue stream.

The key activity is still the provisioning of vehicles, but with an extended service offering including rental and subscription. This leads to a longer rental period, and as the provider does not take care of refueling and relocating during a rental period, these activities will be reduced by the additional service offerings. A dynamic pricing strategy contributes to this as incentives and lower prices for driving towards desired areas reduce the relocation efforts. An additional key activity is the initial provision of cars used for subscription, as the customers value the delivery of the car to the desired location and that the car is fueled, maintained, and cleaned before. For complementary use in the form of delivery services, it is necessary to extend the platform to the additional needs of delivery services, where they can book the needed periods and cars which meet the specific needs.

Building partnerships with delivery services and other potentially complementary users is sufficient to retain them on the platform and ensure the attractiveness of the offer. Depending on the CS provider's internal environment and if there already is a rental or subscription offering, it is recommended to combine these divisions. While CS is mainly focused on private individuals, rental and subscription is especially attractive for corporates which causes the need to partner with relevant corporates in the future.

The main parts of the cost structure will remain the acquisition and maintenance of the fleet as well as operating the platform. Extending the platform to a B2B offering still causes moderate initial investments, as well as the development of a dynamic pricing strategy which needs to be tested before changing the current pricing. As discussed, the initial provision of vehicles rented for longer periods is expected to increase, while the refueling, maintenance and cleaning costs decrease during the rental. The overall costs of maintaining the fleet will decrease as the savings during the longer rental period will overcome the costs of the initial provision. The goal of implementing new services is to drive growth and therefore increase the revenue, but first they need to gain customer attention through a launching strategy (Buffoni et al., 2017). Initial investments to promote complementary use and rental/subscription offering are necessary, as well as promoting the advantages of dynamic pricing so the customer does not perceive increased prices. By incentivizing users to park vehicles in desired areas with dynamic pricing, the relocation effort will be reduced.

The recommendations all have in common that they have the potential to increase utilization. In this sense, complementary use and the rental/subscription offering generate new revenue streams, as they mainly attract new customers. When offering rental/subscription, the effect of cannibalization must be considered but is expected to be low. Some current users using CS frequently might switch from sharing to rental or subscription, to optimize their spendings. But this can also be considered positively, as these users might switch to another platform to use rental/subscription if this offering is not available within the CS context. Besides this cannibalization effect, the new services directly contribute to the revenue (assuming that the revenues are higher than the expenditures). Rental/subscription will mainly target different customer needs, while a complementary use is designed to generate revenue during times where revenues are low or do not exist (since CS shows low demand at night). Furthermore, the goal of dynamic pricing is to increase revenues as well, by taking higher fees during peak demand

where the need for vehicles is high and alternatives are limited. By taking lower fees during low demand times, the users are incentivized to use CS instead of other solutions (e.g., train, scooter, private cars).

When SAVs are ready for the mass market, the CS BM is expected to face a disruptive change. SAVs will be implemented in the existing platform, as the main channel and tool to further optimize the customer relationship. The vehicles remain a key resource, nevertheless large adjustments are needed to switch from the current fleet to an autonomous fleet. As the vehicles can relocate themselves, this will not be a key activity anymore. The key activity of passenger transportation as well as platform management will remain the same but must be extended by managing the SAVs how and where they drive when not transporting a user. Therefore, a new focus will be to develop algorithms for the efficiency problem. Additionally, to the existing key partners, the focus on partnerships with leading OEMs is important, as success with SAVs is determined by the vehicles' capability to drive autonomously. Future partners should be the OEMs which are one step ahead in the development of small and micro-AVs. Significant changes in the cost structure are determined by high costs for R&D in advance, as well as significant investments for an autonomous fleet and for the right algorithms. On the other hand, the personnel costs for relocation fall away and increased driving efficiency will lead to lower costs of fueling. With SAVs, the provider can increase its prices to the prices for ride hailing, as it provides the same value proposition and therefore increases the existing revenue stream. Furthermore, the increase in efficiency leads to a higher utilization for all offerings, in an optimal scenario the cars are exactly in the areas of high demand. The new customer segment contributes to higher revenue as well as the possibility of widening the offer to new areas which are easier without the relocation problem.

7 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

This chapter is divided into methodology-related limitations, including the structure, frameworks, quantification, interviews and content-related limitations including the theoretical and practical evaluation of the industry and the CS BM.

The frameworks used in this work, namely BMC, BM Recommendation Scorecard and the McKinsey Horizon Model come with some limitations: (1) The BMC only provides limited information, as it is a simplified version. An environmental analysis is not included, as well as a trend analysis and the boundaries between the elements are not exclusive (Becker & Daube, 2018). Lastly, only the leading BM of each industry is considered, but each company has its specific BM which deviates to some extent. (2) The BM Innovation Scorecard serves as decision-making tool, but information asymmetries between the individual recommendations could lead to a distortion of the result. As it is based on the BMC and Porters Five Forces, which are static frameworks, the BM Innovation also provides a snapshot of the current situation and evaluates this (Goyal, 2021). 3) The McKinsey Horizon Model serves as a method to map the recommendations regarding time and value, but the boundaries between the Horizons are blurring (Blank, 2019). E.g., the future of SAVs is unpredictable, but can also play a role soon, where Horizon 1 or Horizon 2 are mapped. Once a disruptive technology is ready for the market, it can rapidly be implemented.

The interviews were conducted to get practical insights, and therefore focused on high quality and different points of view. More interviews would be necessary to validate the findings, which was out of scope for this work. The interviewed experts show high knowledge about the CS industry, but nevertheless they also include the interviewee’s personal opinions. It is therefore limited to the specific people who have been interviewed and needs more validation in the future.

In a content point-of-view, this work focused on the car provisioning industry in general and the CS BM in specific. The car provisioning industry includes BMs where the provider keeps the vehicle ownership. This leads to the fact that other BMs, which currently and in the future compete with CS, are not considered in detail. Especially car ownership, public transport and ride hailing are not considered. The BMs of car leasing, car subscription and car rental are only evaluated with the BMC, followed by an overview over the key players, strengths, and vulnerabilities. A deep dive into these BMs was out of scope.

Furthermore, all recommendations are based on the dominant BM in the industry, which is the free-floating mode used by large companies. Structural differences (size, organizational structure etc.) between different companies are not considered, as this work basis is the industry-centric perspective, leaving out the company-centric perspective. Additionally, this work focuses on top-line growth instead of bottom-line savings. Stated by Expert_3, the saving potentials are almost fully exploited. Chapter 5 provides an overview of the relevant costs, but a detailed analysis was not pursued due to limited information and structural differences across the companies using a free-floating CS BM.

In further research, it is recommended to test the applicability of the recommendations in a real-life environment. While this work provides an overview of relevant changes for the BM in general, further research should switch to a company-centric perspective to show which characteristics are important to adapt the recommendations. Especially the recommended dynamic pricing model needs to be extended to a real-life scenario in the future.

Furthermore, there is a need to deep-dive into the BMs of car leasing, car subscription and car rental as well as other related BMs, to evaluate how they must change in the future in order to be successful.

8 CONCLUSIONS

The CS BM has gained significant momentum in recent years as a result of changing consumer preferences and technological innovation in the automotive industry. In response to these changes, a wide range of alternative services to ownership have become more popular, including car leasing, car subscription, car rental, and CS. CS has emerged as a promising BM that incorporates many of the key trends in the automotive industry, including shared mobility, automation, electrification, and connectivity. Despite its potential, however, many CS providers have struggled to achieve profitability.

This research investigated the CS BM as part of the car provisioning industry, identifying its strengths and vulnerabilities, and assessing opportunities for improvement. Expert interviews showed that one of the key strengths of the CS BM is its ability to provide flexible, on demand access to transportation without the need for ownership. This is particularly appealing to younger consumers, who are increasingly prioritizing access over ownership. Additionally, CS helps reducing the overall number of cars on the road, which can have positive environmental and congestion-reducing effects. Despite these strengths, the CS BM faces a number of challenges that must be addressed in order to achieve profitability. One of the key challenges is the high cost of acquiring and maintaining a fleet of cars, which can be difficult to recoup through user fees alone. Additionally, competition from alternative transportation providers, such as ride hailing services, can make it difficult for CS providers to differentiate themselves and attract users.

In order to overcome these challenges and achieve profitability, the CS BM must be adapted and extended in several manners. Seven ideas based on the key insights were evaluated in the categories of desirability, feasibility, viability, and adaptability. Furthermore, qualitative insights from expert interviews were considered to include criterion of exclusion. With an

application of the McKinsey 3 Horizon framework, the recommendations were mapped on a value-time matrix.

The results showed that (1) interior and exterior advertisements, (2) the integration of private cars and (3) the integration with other mobility solutions show a low value and insufficient BM fit. Therefore, they should not be implemented. Interior and exterior vehicle advertisements dilute the brand effects of CS providers, which currently devote their carpools for self-advertisement. Moreover, the inclusion of private cars is not combinable with a free-floating model due to operational challenges and its limited scalability. An integration of other mobility solutions would lead to an increased dependency of partners and is not coherent with the free-floating mode, as vehicles would be required at certain locations such as train stations.

However, four extensions to the BM are recommended to implement due to their high value and proficient BM fit. These are namely (1) complementary use, (2) dynamic pricing, (3) supplementation of rental and subscription offerings, and (4) the integration of SAVs. Complementary use cases, such as delivery services, can counterbalance demand shortages which occur especially at night and therefore increase utilization. Dynamic pricing contributes to the relocation problem by setting incentives to bring vehicles to desired locations. Furthermore, it helps to maximize the revenues by capitalizing on varying levels of willingness to pay. Additionally, an inclusion of rental and subscription offerings to the service portfolio can provide valuable synergies. Lastly, SAVs are expected to disrupt the automotive industry. An early adoption of the necessary autonomous vehicles and its network is recommended to take a leading position in the future of mobility.

Mapping the BM recommendations in the context of value and time, dynamic pricing and complementary use cases can leverage core capabilities to improve the existing BM in a short-term. A supplementation of the product portfolio with a rental and subscription offering extends the BM and core capabilities to attract new customers in the mid-term. SAV integration is time

and effort intensive, contributing to the BM in a long-term. With the creation of capabilities towards the needs of SAVs, the BM can exploit this disruptive technology.

This work's research goal was to elaborate a superior BM for CS. Specific recommendations were not only proposed, but also brought into the overarching CS BM context. This led to an innovated and reconfigured BM, being superior to the variety of existing BMs. The existing scientific research of future mobility in general, and car sharing in specific, were linked with the current challenges in practice and hands-on recommendations were derived.

All in all, this research showed that significant BM modifications are required to achieve financial viability and long-term success. An integration of recommended measures is subject to firm-specific capabilities and resources. Therefore, the optimal future BM may vary on a firm level. For further research, it is suggested to switch from the BM perspective to the firm-level perspective to take structural differences into account. As a next step, it is recommended to test the innovated BM in a real-life environment.

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APPENDIX

A: Innovation Types

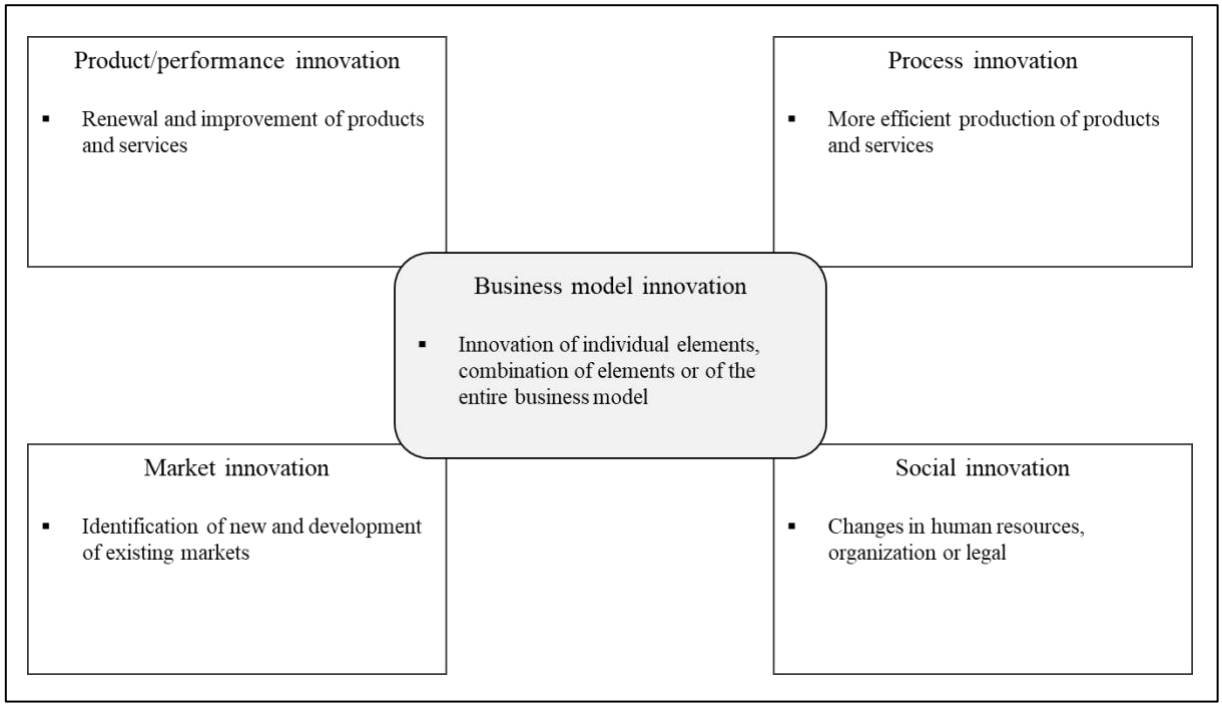
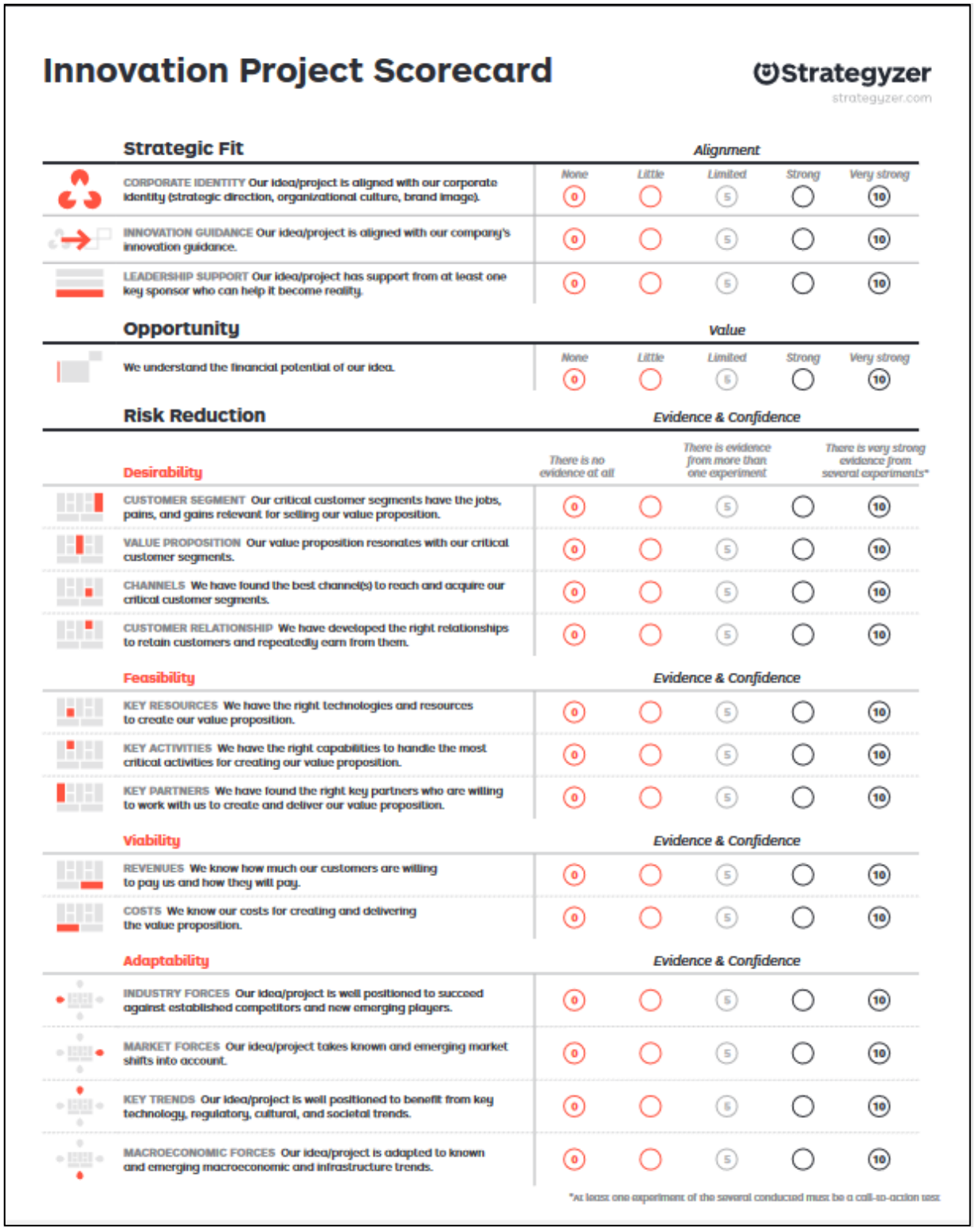


Figure 11: Graphical representation of the correlation between the types of innovation
Source: Own representation according to Schallmo (2013)

B: Original Strategyzer project innovation scorecard



Innovation Project Scorecard

Strategyzer
strategyzer.com

Strategic Fit

	Alignment				
	None	Little	Limited	Strong	Very strong
CORPORATE IDENTITY Our idea/project is aligned with our corporate identity (strategic direction, organizational culture, brand image).	0		5		10
INNOVATION GUIDANCE Our idea/project is aligned with our company's innovation guidance.	0		5		10
LEADERSHIP SUPPORT Our idea/project has support from at least one key sponsor who can help it become reality.	0		5		10

Opportunity

	Value				
	None	Little	Limited	Strong	Very strong
We understand the financial potential of our idea.	0		5		10

Risk Reduction

	Evidence & Confidence				
Desirability	There is no evidence at all		There is evidence from more than one experiment		There is very strong evidence from several experiments*
CUSTOMER SEGMENT Our critical customer segments have the jobs, pains, and gains relevant for selling our value proposition.	0		5		10
VALUE PROPOSITION Our value proposition resonates with our critical customer segments.	0		5		10
CHANNELS We have found the best channel(s) to reach and acquire our critical customer segments.	0		5		10
CUSTOMER RELATIONSHIP We have developed the right relationships to retain customers and repeatedly earn from them.	0		5		10
Feasibility	Evidence & Confidence				
KEY RESOURCES We have the right technologies and resources to create our value proposition.	0		5		10
KEY ACTIVITIES We have the right capabilities to handle the most critical activities for creating our value proposition.	0		5		10
KEY PARTNERS We have found the right key partners who are willing to work with us to create and deliver our value proposition.	0		5		10
Viability	Evidence & Confidence				
REVENUES We know how much our customers are willing to pay us and how they will pay.	0		5		10
COSTS We know our costs for creating and delivering the value proposition.	0		5		10
Adaptability	Evidence & Confidence				
INDUSTRY FORCES Our idea/project is well positioned to succeed against established competitors and new emerging players.	0		5		10
MARKET FORCES Our idea/project takes known and emerging market shifts into account.	0		5		10
KEY TRENDS Our idea/project is well positioned to benefit from key technology, regulatory, cultural, and societal trends.	0		5		10
MACROECONOMIC FORCES Our idea/project is adapted to known and emerging macroeconomic and infrastructure trends.	0		5		10

*At least one experiment of the several conducted must be a call-to-action test

Figure 12: Original Innovation Project Scorecard
Source: Osterwalder et al. (2020)

C: Business Model Recommendation Scorecard

BM Recommendation Scorecard

EXAMPLE

		very little	little	some	strong	very strong	Reasoning
Desirability							
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	1	2	3	4	5	Recommendation specific reasoning
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	1	2	3	4	5	Recommendation specific reasoning
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	1	2	3	4	5	Recommendation specific reasoning
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	1	2	3	4	5	Recommendation specific reasoning
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	2	3	4	5	Recommendation specific reasoning
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	2	3	4	5	Recommendation specific reasoning
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	2	3	4	5	Recommendation specific reasoning
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	2	3	4	5	Recommendation specific reasoning
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	2	3	4	5	Recommendation specific reasoning
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	1	2	3	4	5	Recommendation specific reasoning
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	1	2	3	4	5	Recommendation specific reasoning
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	2	3	4	5	Recommendation specific reasoning
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	1	2	3	4	5	Recommendation specific reasoning
						Overall score:	

Figure 13: Example of a BM Innovation Scorecard
Source: Own illustration based on Osterwalder et al. (2020)

D: Overview over Free-floating Car Sharing Providers in Europe

Company	*Countries*	*No. of cities in Europe*	*Source*
Citybee	Lithuania, Latvia, Estonia, Spain	15+	(CityBee, 2022)
Free2move (Stellantis)	France, Spain, US	2	(Free2Move, 2022)
Green mobility	Netherlands, Denmark, Sweden, Belgium, Germany, Finland	11	(Green Mobility, 2022)
Miles	Germany, Belgium	10	(Miles Mobility, 2022)
ShareNow (Stellantis)	Germany, Austria, Denmark, France, Netherlands, Italy, Hungary, Spain	17	(ShareNow, 2022)
Sixt Share	Germany, Netherlands	11	(Sixt Share, 2022)
Spark	Lithuania, Bulgaria	4	(Spark, 2022)

Figure 14: Free-floating car sharing providers active in more than one European country
Source: See right column

E: Overview over Station-Based Car Sharing Providers in Europe

Company	*Countries*	*No. of cities in Europe*	*Source*
Citiz	France	170	(Citiz, 2022)
Enterprise carshare	UK, US, Canada	202	(Enterprise CarClub, 2022)
Flinkster (Deutsche Bahn)	Germany	400+	(Flinkster , 2022)
GoCar by Europcar	Ireland	100+	(GoCar by Europcar, 2022)
Kinto Share (Toyota)	Germany, Denmark, Italy, Sweden, Spain	?	(Kinto Mobility, 2022)
Move About	Sweden, Norway	40	(Moveabout, 2022)

Figure 15: Selected European station-based car sharing players
Source: See right column

F: Overview over recent M&A activities

Date	*Summary*	*Reason stated by acquirer*	*Source*
Feb-18	Seat acquires Respiro	SEAT to become benchmark mobility solutions provider within its parent company Volkswagen Group, specifically for Southern Europe.	(El Mundo, 2018)
Jul-19	Car2go (Mercedes Benz Mobility AG) merges with DriveNow (BMW Group), becoming Share Now	Growth: larger selection of cars as well as cities via a fully integrated car-sharing app.	(ShareNow, 2022)
Apr-21	Launch of Kinto Europe (Toyota)	Participating in the market to provide users with a wide range of mobility related services. building a one-stop shop for mobility services, aiming to become the mobility provider of choice for all types of customers.	(Toyota Europe, 2022)
Feb-22	Green Mobility acquires Fetch Mobility	Growth: several ways to enter new cities. Either we acquire mature, local businesses or we enter independently by our own means. Acquisitions will likely be an easier way to scale our business than pure organic city launch and provide flexibility and efficiency in our growth opportunities.	(GlobeNews wire, 2022)
Mar-22	Free2move (Stellantis) acquires Opel rent	Accelerating growth in Germany and Austria and the transition from rent to mobility provider	(Free2move, 2022)
Jul-22	Stellantis acquires Sharenow	Growth, competition/strategic move, synergies.	(Free2move, 2022)

Jul-22	Green Mobility Holding (Volkswagen group) acquires Europcar Mobility	Aiming to secure a significant share of the global market for mobility services over the next decade	(Volkswagen Group, 2022)
Nov-22	MILES acquires & enters partnership with WeShare (Volkswagen Group)	Participate in the trend of increasing demand for mobility services. Strong partner to operate the fleet and with vehicles from various Volkswagen Group brands, CS will become available to an even broader spectrum of customers. MILES portfolio will be bookable via the Volkswagen mobility platform.	(Volkswagen AG, 2022)

Figure 16: M&A activity European CS market
Source: Own illustration, specific sources in the right column

G: Overview over other Mobility Solutions

Location	*Name/Offer*	*Description*
Madrid, Spain	Integrated transport card	Access to public transport and round-trip CS
Brussels, Belgium	Partnership	Partnership Brussels Intercommunal Transport Company (public transport) and Cambio (CS provider)
Switzerland	Partnership	Partnership Mobility CS and CFF (Swiss Federal Railways)
Hannover, Germany	Hannover mobil	Combo package offered by the regional association of public transport operators of Hannover
Freiburg, Germany	RegioMobilCard	Combo package regional public transport and CS
Milan, Italy	Partnership	Partnership Azienda Transporti Milanesi (public transport) und GuidaMi (CS)
Vienna, Austria	SMILE platform	Prototype of multimodal, integrated information, booking and payment system
Montpellier, France	EMMA project	Centralized access to all transport services (public transport, bike-sharing, CS, tram, car parks and on-street parking) with multimodal information and sales

Table 3: Examples for integrated transport systems
Source: Lagadic et al. (2019) and Bundesverband CarSharing e.V. (2010)

H: Scorecard Recommendation 1 – Exterior & Interior Vehicle Advertisement

BM Recommendation Scorecard

Recommendation 1 – Exterior & Interior Vehicle Advertisement

Desirability		very little	little	some	strong	very strong	**Reasoning**
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	**1**	2	3	4	5	No need for the customers
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	**1**	2	3	4	5	Does not affect value proposition
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	**1**	2	3	4	5	Does not support the existing channels
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	**1**	2	3	4	5	Does not help the customer relationship
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	2	3	4	**5**	Easy to integrate in/on cars
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	2	3	4	**5**	Easy to handle
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	2	3	**4**	5	Seems likely, as the costs are low
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	2	**3**	4	5	new stream, but low expected revenues
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	2	3	4	**5**	Low costs
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	**1**	2	3	4	5	Generates a new revenue stream
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	**1**	2	3	4	5	Not connected to market shifts
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	**2**	3	4	5	Not based on trends
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	1	2	**3**	4	5	Can be adapted easily

Overall score: 33

Figure 17: Score for Recommendation 1
Source: Own illustration based on Osterwalder et al. (2020)

I: Scorecard Recommendation 2 – Private Car Integration

BM Recommendation Scorecard

Recommendation 2 – Private Car Integration

		very little	little	some	strong	very strong	Reasoning
Desirability							
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	1	2	**3**	4	5	Greater supply & variety, can dilute quality
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	1	2	**3**	4	5	Supports but doesn't increase proposition
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	1	**2**	3	4	5	Limited sales channel contribution
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	**1**	2	3	4	5	Does not help the customer relationship
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	2	**3**	4	5	Easy to build on existing IT infrastructure
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	2	**3**	4	5	Platform as facilitator
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	**2**	3	4	5	Only few will be willing to share own car
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	**2**	3	4	5	Revenue increased but shared with owner
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	**2**	3	4	5	Relatively high costs compared to revenue
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	1	**2**	3	4	5	Limited contribution to success of BM
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	**1**	2	3	4	5	Not connected to market shifts
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	2	**3**	4	5	Based on shared mobility trend
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	**1**	2	3	4	5	Low connection

Overall score: 28

Figure 18: Score for Recommendation 2
Source: Own illustration based on Osterwalder et al. (2020)

J: Scorecard Recommendation 3 – Complementary Use

BM Recommendation Scorecard

Recommendation 3 – Complementary Use

		very little	little	some	strong	very strong	Reasoning
Desirability							
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	1	2	**3**	4	5	Relevant for some segments
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	1	2	3	**4**	5	Similar value proposition for a new segment
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	1	**2**	3	4	5	Needs to be adjusted for new customer segment
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	1	2	3	4	**5**	High potential to create stable customer base
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	2	3	**4**	5	Easy to integrate B2B platform
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	2	**3**	4	5	Car distribution as a challenge
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	2	**3**	4	5	Seems likely, as the costs are low
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	2	3	**4**	5	More revenues through increased utilization
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	2	3	**4**	5	No significant cost increase
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	1	2	**3**	4	5	Partnerships can make the difference
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	**1**	2	3	4	5	Not connected to market shifts
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	2	**3**	4	5	Trend towards sharing, also in B2B context
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	**1**	2	3	4	5	Little connection

Overall score: 40

Figure 19: Score for Recommendation 3
Source: Own illustration based on Osterwalder et al. (2020)

K: Scorecard Recommendation 4 – Dynamic Pricing

BM Recommendation Scorecard

Recommendation 4 – Dynamic Pricing

		very little	little	some	strong	very strong	Reasoning
Desirability							
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	1	2	3	**4**	5	Can exploit customer preferences
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	**1**	2	3	4	5	Does not affect value proposition
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	**1**	2	3	4	5	No effect on channels
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	1	**2**	3	4	5	Can attract new customers
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	2	3	4	**5**	Easy to implement
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	2	3	4	**5**	Easy to handle, can support car distribution
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	2	3	4	**5**	Seems very likely
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	2	3	**4**	5	High potential for increased revenue
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	2	3	4	**5**	No additional costs (except development)
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	1	2	3	**4**	5	Can give competitive advantage
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	1	**2**	3	4	5	Limited potential to adjust to market shifts
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	**2**	3	4	5	AI needed for successful pricing engine
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	**1**	2	3	4	5	Not based on trends

Overall score: 41

Figure 20: Score for Recommendation 4
Source: Own illustration based on Osterwalder et al. (2020)

L: Scorecard Recommendation 5 – Integration with Other Mobility Solutions

BM Recommendation Scorecard

Recommendation 5 – Integration with other Mobility Solutions

		very little	little	some	strong	very strong	Reasoning
Desirability							
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	1	2	3	**4**	5	Same and additional customer segments
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	1	2	3	**4**	5	Increases value proposition
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	1	2	**3**	4	5	Channels can be extended via partners
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	1	**2**	3	4	5	Limited potential to improve relationship
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	**2**	3	4	5	Data as biggest challenge
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	**2**	3	4	5	New capabilities needed to handle
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	**2**	3	4	5	Limited options
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	2	**3**	4	5	Pot. new stream, but low expected revenues
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	**2**	3	4	5	Integration may be costly
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	1	2	**3**	4	5	Potential to capture higher market shares
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	1	2	**3**	4	5	Considers trend of not owning a car
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	2	**3**	4	5	Mobility as a service
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	1	**2**	3	4	5	Infrastructure may develop for benefit

Overall score: 35

Figure 21: Score for Recommendation 5
Source: Own illustration based on Osterwalder et al. (2020)

M: Scorecard Recommendation 6 – Supplementation of Rental & Subscription Offerings

BM Recommendation Scorecard

Recommendation 6 – Supplementation of Rental and Subscription Offerings

		very little	little	some	strong	very strong	Reasoning
Desirability							
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	1	**2**	3	4	5	Different type of customer
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	1	2	**3**	4	5	Similar value proposition
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	1	2	**3**	4	5	New channels may be required to attract cust.
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	1	2	3	**4**	5	Can strengthen relationship
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	2	**3**	4	5	Similar resources required
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	2	3	**4**	5	Same key activities
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	2	3	4	**5**	Very likely as risk is reduced
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	2	3	**4**	5	New stream
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	2	3	**4**	5	Low costs + fleet purchase discounts
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	1	2	**3**	4	5	Generates a new revenue stream
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	1	2	**3**	4	5	Shift towards flexibility
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	2	**3**	4	5	All-in-one solution trend
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	1	**2**	3	4	5	Low connection

Overall score: 43

Figure 22: Score for Recommendation 6
Source: Own illustration based on Osterwalder et al. (2020)

N: Scorecard Recommendation 7 – Shared Autonomous Vehicles

BM Recommendation Scorecard

Recommendation 7 – Shared Autonomous Vehicles

		very little	little	some	strong	very strong	Reasoning
Desirability							
CUSTOMER SEGMENT	The critical customer segments show the jobs, pains and gains relevant for selling the value proposition	1	2	3	**4**	5	Increases customer satisfaction
VALUE PROPOSITION	The value proposition of the recommendation resonates with the BM's current value proposition	1	2	3	4	**5**	No need for a driver
CHANNELS	With the recommendation, BM's channels are desirable to reach and acquire the critical customer segments	1	2	3	**4**	5	All current customers can be reached
CUSTOMER RELATIONSHIP	The recommendation contributes to develop the right relationships to retain customers and repeatedly earn from them	1	2	**3**	4	5	Does not help the customer relationship
Feasibility							
KEY RESOURCES	The BM has the right technologies and resources to integrate the recommendation	1	2	3	**4**	5	Disruptive technology, high need for resources
KEY ACTIVITIES	The BM shows the right capabilities to handle the most critical activities for creating the recommendation	1	2	3	**4**	5	Easy to handle
KEY PARTNERS	The relevant key partners are willing to cooperate and support the recommendation	1	2	3	4	**5**	Only logical step
Viability							
REVENUES	The recommendation will contribute to the existing revenue streams or create new revenue streams and customers are willing to pay	1	2	3	4	**5**	Maximized asset utilization
COSTS	The recommendation's costs for creating and delivering value are apparent and are in good proportion to the revenues	1	**2**	3	4	5	No driver, autonomous relocation
Adaptability							
INDUSTRY FORCES	The recommendation will contribute to succeed against established BM's and new emerging players/BM's	1	2	3	4	**5**	Outperforms existing BM's
MARKET FORCES	The recommendation takes known and emerging market shifts into account.	1	2	3	**4**	5	Shift towards automation
KEY TRENDS	The recommendation shows the right characteristics to benefit from key technology, regulatory, cultural, and societal trends.	1	2	3	4	**5**	Variety of trends taken into account
MACROECONOMIC FORCES	The recommendation is adapted to known and emerging macroeconomic and infrastructure trends.	1	2	3	4	**5**	Adapts infrastructural trends

Overall score: 55

Figure 23: Score for Recommendation 7
Source: Own illustration based on Osterwalder et al. (2020)

O: Expert_1 Interview

Interviewer: We would start by asking open questions about general topics. Maybe we can start with current challenges in the CS market.

Expert_1: The biggest challenge currently is that there are no cars on the market. In the wake of Corona, there are incredible shortages from both manufacturers and suppliers. And even the cars we already have need to be equipped with telematics solutions so that they are digitally accessible. There is a lack of any equipment on the overall market. Then there is also the problem of the shortage of skilled workers - cars have to be transferred, cleaned, in other words, everything to do with services. These are the current challenges that we didn't have before.

Interviewer: You said that one problem is getting new cars. Do you plan to put significantly more cars on the road or to internationalize, or what are the cars needed for?

Expert_1: First of all, to ensure the supply. We generally always have new cars in the fleet and normally we always work with so-called buy-back contracts, which means we always buy cars for half a year and then they go back. That's an important requirement for CS for us because we want to improve mobility. That means we do not want to have old cars driving around in the city, but only the latest models with the latest driving technologies. That's why our cars are never more than half a year old. In the course of this, the fleet has now gone down a lot.

Interviewer: Are the buy-back contracts designed in such a way that you really have to return them, or is it possible to delay the whole thing for another six months or years?

Expert_1: As a rule, you have to return the vehicles. Of course, you can also buy the vehicles, but then you have an increased risk.

Interviewer: And are there any other changes in the market when it comes to CS per se?

Expert_1: Yes, we are just seeing that the market is consolidating. Not least just that Miles bought WeShare, and Miles of course has become a very strong competitor - simply because they have more cars and customers when they combine everything. So, I think that's been the biggest change in the last month. And other than that, though, we're seeing a lot of competitors give up. WeShare has given up, ShareNow has given up to some extent. A lot of smaller ones just aren't making it either. So, it is already a difficult market, especially because it is very asset-heavy, it is very expensive. I think next year it will be extremely exciting to see who will be left.

Interviewer: You mentioned that many car manufacturers have divested from their ventures. Do you know why they did that? Is that a change in strategy or because it wasn't worth it?

Expert_1: Because it just wasn't worth it. They just realized they couldn't run it profitably. The big difference between us is that they are still OEMs, they make cars. That is their core competence. But their core competence is not IT, and 90% of CS is simply IT and taking care of the vehicles logistically. We still see that when we do projects together with the OEMs. When an app is involved or when it comes to the digitalization of vehicles, you just notice that this is not their core competence.

Interviewer: Will you be able to offer CS profitably?

Expert_1: Yes, we can do it. The big difference for us is that CS is not a stand-alone product. What is generally expensive in CS are the cars. And cars only earn money if they are driven. In CS, the utilization rate is nowhere near as high as in car rental. If it is Christmas or a holiday, the worst-case scenario is that vehicles are parked for a whole day or only have one trip. This is the case with all providers. Then the car produces costs, but you have no income. The difference with us is that we can flexibly shift the fleet between CS and car rental. For example, at Christmas we move half of the fleet to the car rental company, where it is rented out for the

Christmas vacations while there is nothing going on here in the city, and at the beginning of January we bring the vehicles all back again. This way we can utilize the vehicles optimally.

Interviewer: Is it expensive, when you get a new car, to convert the car so that it is CS capable? Or can you just do a software update?

Expert_1: Unfortunately, it is not that simple. We're always told by the manufacturers that this will come as standard soon, but that's usually not the case yet. BMW, for example, has that, but unfortunately that's not compatible with our system. Unfortunately, it is not a standardized process yet. That means we take care of each vehicle ourselves. There is an effort involved because we first have to see whether we can convert the vehicle at all, then we have to install everything in the vehicle. The whole thing also has to be approved by the TÜV. That's usually a process of 4 weeks per model, and then we can install it in every vehicle.

Interviewer: If we now jump to the legal framework conditions, what are you thinking about? Are there any problems?

Expert_1: Yes, in Berlin, for example, the special use for CS was to be changed. They wanted to restrict how many car sharers there are, how many cars we're allowed to have, what district we're in, what the electric vehicle share is, no concession on parking fees and so on. That's a huge thing for us, of course.

Interviewer: What kind of impact does that have on you guys?

Expert_1: Extremely. What's important in CS are two things: How big is our fleet and where is our business area. Because if I put a car somewhere where there is no population density, where there is no demand, then it doesn't make money. And in the long run, the store goes out of business. The second thing is the number of vehicles. There should really always be a car within 500 meters. Everything that is further away has bad effects on demand. That means that

it is important that you can determine it yourself and also that the city accommodates you with advantages and privileges for CS. For example, lower or no parking fees for e-vehicles. In general, that's the way to run the business profitably.

Interviewer: Are local authorities afraid that people will be pulled out of public transportation, or what is their incentive?

Expert_1: That's always an issue, that they think we're weakening public transportation. I say clearly no, we are a complementary mobility. It is mainly there for things like driving at night or in bad weather, or going on an excursion with four people. The second reason is always that people say we are flooding the city with vehicles. I understand that, but you have to see the long-term effect. I flood the city with vehicles and when I open, there are 500 more cars on the road. But the goal is that you see that there is flexible mobility, you do not need a private car anymore, and above all I do not need a second car anymore, which in most cases is only used every few weeks, and so I get rid of my car. In the long run, this leads to 10 households accessing a CS car and in the long run, there is less vehicle.

Interviewer: What kind of users do you generally have who use CS?

Expert_1: Our target group comes from urban areas. Unfortunately, most of them are male, are all between their mid-20s and mid-30s, of course many without children and tech-savvy.

Interviewer: You just mentioned urban areas. Does CS only make sense there?

Expert_1: Yes, the assumption is partly correct. If you operate CS on your own, then the higher the population density, the higher the demand and the more lucrative it is. So if I put all the vehicles in Berlin Mitte, I make the most money. But I also totally understand the argument that we have to get out into the rural areas. That's why we started pilot projects in Munich, for example, where we cooperated with four communities outside the city. We said we'd meet

somewhere in the middle and they'd pay us part of the loss of revenue that we have there. That is, the communities just pay an amount of X euros per month and for that we connect them as a community. In addition, they are in a good position as a municipality, which is always important, that you position yourself well in relation to the city. They are then in a good position with the citizens and are more sustainable. And we can continue to develop. This works great and we would like to expand it further.

Interviewer: And how big does a city have to be for it to be profitable?

Expert_1: You can't say exactly. We always start with pilot projects near cities and not somewhere far away. Then we put a few vehicles there and see how it goes. The nice thing is that it is super flexible. If you see that the service is not being accepted, then you can close it again tomorrow. If it goes well, you can continue to operate it and make it a fixed model.

Interviewer: That means even in the smaller locations, these are just free-floating models?

Expert_1: Yes, exactly, we only do free-floating. We do not do station-based. That's a different BM. I stand for the fact that we say we offer flexible mobility and that means on demand and minute-based. Station-based is more like car rental. That means it is rigid and connected with pre-booking and by the day. Here we do not want to cannibalize our core business.

Interviewer: But doesn't it make more sense in smaller towns if there is a parking lot for the vehicles in the town center? Does that have advantages?

Expert_1: Yes, it has advantages for the company. And that's why in most small towns there are only station-based models, because that means better utilization for the provider. You practically force people to take the car 24 hours a day. But I'm convinced that it is not better for the customer. It is cooler if you can say I only need the car for half an hour.

Interviewer: We were thinking about what could be done to improve CS. A major sticking point of the BM is utilization. That's why many of our suggestions relate to it.

Expert_1: Yes, utilization and costs, because the costs are enormously high. You have to pay parking costs, take care of the cars. That means looking if there is damage, cleaning the car, driving transfers if the cars are on the outskirts. So the cost block is extremely high. And as a tip, what you can also look at is pricing. You can manage the fleet really well if you have a good pricing model. And as I said, anything that has to do with the city is also a huge lever - anything that's political.

Interviewer: All right. One idea we had would be partnerships with, for example, delivery companies. That they could use the cars at night, for example, to increase utilization.

Expert_1: Absolutely. We get requests for that all the time, too. Or also from driving schools. CS is a weekend product. From Thursday on, demand increases and from Friday to Sunday I have no problem at all. If the other days were the same, we would be highly profitable. The problem is the demand from Monday to Wednesday. And at night, after 8 p.m. the cars just stand around.

Interviewer: And on weekends, are the cars really on the road all the time?

Expert_1: Yes, exactly. At weekends, the problem is rather the availability of a car in the city with which you can do something for 10 minutes. But they are all booked up for weekend trips.

Interviewer: And have you ever thought about integrating private cars to have more cars?

Expert_1: No, peer-to-peer is just another BM and we do not want that.

Interviewer: And why do not you want that?

Expert_1: Again, every car is different. I already told you that it is difficult to get cars into the fleet per model. It is not scalable.

Interviewer: We had seen that Uber and Bolt now want to introduce this as pilot projects. So we thought it might be interesting for CS companies as well.

Expert_1: Yes, but you always have to make a strong distinction between companies like us and VC companies. We are profitable and do not burn money. We are managed in a completely different way. We make sure that it has a long life and that no money is burned. It is a very different approach. You always have to distinguish between something that is very expensive and you might win the market with it, or you look that you have a stable BM in the long run.

Interviewer: Do you think CS is an all-or-nothing market?

Expert_1: All-or-nothing maybe not. But I think there will be two that survive. In Berlin

for example, we have 10 car sharers and that's garbage.

Interviewer: Another point: Does it make sense to put advertising space on the vehicles? I think ShareNow just tried that out. Have you already played with it?

Expert_1: Of course we are in contact with them. I definitely believe that such advertising has a super visibility. But we decided against it, because we see our cars as our own advertising space. That's why they have nice stickers on them, because we know that the cars on the road have the greatest visibility for the brand and the product. For us, that's much more cost-effective than advertising elsewhere.

Interviewer: But that would mean it would come eventually, once you have enough visibility?

Expert_1: If I were the market leader now and I had no need to advertise, I would do it.

to advertise, then I would do it yes.

Interviewer: All right. Now again as a last point. At some point it will happen that there will be autonomous vehicles and then many BMs will meet. Then probably CS will compete with other products like ride-hailing. Where do you see yourselves in that position?

Expert_1: That this will merge. We are also already planning a pilot project for Q1 next year. That will be our autonomous ride-hailing. In the beginning, there will still be one person in it, but he will disappear at some point. Then at some point it will become a BM. After all, it is all individual mobility. At the moment, the only difference between CS and ride-hailing is that you drive yourself, which makes it cheaper. But the idea is the same.

P: Expert_2 Interview

Interviewer: What challenges do you see in the car sharing market?

Expert_2: Diverse streams. Before Corona, the world was fine because there were increasing numbers of users. During Corona, few trips were made in Europe because with the lockdown there was no need or no way to go anywhere. That got the business into quite a bit of trouble. My experience with CS is: if you're in the black, then you've got it well under control. The BM is extremely cost-intensive. 70-80% are the vehicles. And at the end of the day you have to say car2go made a mistake because they went in way too low. So, the price point of car2go was too low from the beginning, which was also driven by drivenow at that time. It was driven by BMW. At that time, it was not yet possible to estimate what mobility costs. In the meantime, we have arrived at a price level that scares off many users, because many say 40 cents per minute or kilometer is a lot. The other is that I do not want to share a car with Corona anymore because the hygiene factor plays a big role.

Interviewer: Which means the aftermath of Corona is still noticeable?

Expert_2: They are still noticeable because people have left. There have been painstaking efforts to get people interested in CS. With Corona, these efforts were de facto put back to 0 and people are now being introduced to CS again. But during Corona, many people have made other arrangements, either with home offices, or some people have bought their own car and are actually more or less away from CS. There are not so many people who use CS today. So, there are certainly fewer, so at least in my experience and what I see in the respective cities, the vehicles are used less than before.

Interviewer: This brings us to the next question, and that is, does free-floating carsharing as a BM only make sense for large cities, or does BM have a future in smaller cities as well?

Expert_2: If you look at the statistics from the Bundesverband Carsharing, you can clearly see that free floating was the game changer. Without free-floating, no one would be talking about CS today. Free-floating has brought in much more vehicles than station-based ever had. Then, the convenience factor is extremely important, because you do not want to go somewhere where you can find a parking space that might be cheap at the main train station or somewhere else. That all costs time - you want to find your car at the front door. And if you look at the models, it is no secret, there was car2go black. There was the great idea, and it wasn't mine, I was eliminated by that, that you bring a fleet of cars stationary in the train stations and to the airports, similar to what a normal car rental company, Europcar or Sixt do. This failed grandiosely because Sixt and Europcar are much better known, many people use them, or the traffic of the cars is mainly business travelers. And of course, they all have corporate agreements with Sixt or Europcar. So car2go has then relatively quickly turned back and dissolved the issue. Others, like a colleague, had a stationary car-sharing system where you could park it within a certain radius of the station, but you had to bring it back there. But you had to bring it back there. That also failed, because you cut off 80% of the user cases with that alone.

Interviewer: You brought up the subject of Sixt and other providers offering rental services. What we noticed is that large CS providers either belong to a car rental provider, such as Sixt, which is also relatively large in sharing, or are part of an OEM. For example, Stellantis bought Sharenow, and before that there were two large OEMs in it, Mercedes and BMW. Why is that and what makes companies take up such a BM?

Expert_2: The nucleus of CS was earlier were curios providers who had 5-6 cars had the communal idea that it is nonprofit. Members instead of cars - which run the stationary CS model. This had no scalability and was, if you were lucky, a break-even story, rather loss-making probably. And then came the free-floating and that was of course driven by Daimler and BMW. They thought that they themselves do not have this rental know-how and have

therefore taken these rental companies like Europcar and then like drive now or just Sixt. Europcar has brought nothing but a lot of trouble for Car2go. Europcar had no money to expand internationally and everything we wanted to do was always said you can't do that, you're not allowed to do that because we must have a say in it. But we were lucky that Europcar only had a 25% share. That's why we had the decision-making power and that's why we internationalized. We were in cities like Rome, Milan, Vienna etc. Sixt has successfully prevented this with BMW because Sixt also has no money in contrast to BMW at least. And they were only focused on Germany because they had no money to expand internationally. And Sixt successfully prevented it at that time because they had shares of about 50% and could then tell BMW no, we're not expanding, and that's why they lost the competition internationally against car2go relatively quickly. Why did the OEM primarily drive the issue? Because they had cars, they were sitting at the source. Sixt also has many cars, and for a car rental company, Sixt has managed to set up digital processes compared to its peers. Companies like Europcar have failed because they are an old messed up, completely analog store. Similarly, stores like Hertz, which once had a CS fleet, but you must be honest, they can't do anything digitally. They still live in the 18th century.

Interviewer: We find the combination of CS and car rental exciting. The range of services is expanding all the time. How do you see it, will the offers come together? Because the difference between rental and sharing is no longer huge, except for the time period and where you must park the car. Are these individual BMs and will they come together?

Expert_2: I think that's already consolidated in the background. I think that the customers are still afraid of contact or have no understanding for it because it is not their daily concern that you will continue to keep it as individual BMs. You need the rental because you need to have a predictability for business travelers that they have a vehicle at the station at that time. That's one part. The other part is, you see with others, with Sixt for example, they go into the

subscription market. We had that in the past under Sixt leasing. Subscription is nothing other than short term leasing, which they are now entering, making use of the overcapacities they have, making use of the subscription market and additionally making use of the CS market, where in case of doubt, they bring vehicles that they have additionally purchased, because they get a better fleet discount with them, into this sharing market. They just try to address as many customers as possible on the subject of mobility and behave almost like a car manufacturer, which now also, for example, like Volkswagen, offer everything on the subject of mobility. The OEM primarily earns its money with car sales and Sixt tries to pick up the rest of the chain, in which they are now also active everywhere where the topic of vehicles plays a role.

Interviewer: We would like to continue by giving you some of our suggestions. Could you maybe give us a little bit of your opinion on this? The first topic is utilization. Do you see the possibility of increasing the utilization by complementary offers, e.g., the use of vehicles for delivery services?

Expert_2: This makes sense. One must not forget that the vehicles are subject to the will of the user, which means in plain language: In the evening, the vehicles are usually parked on the outskirts of the city, where people live. If a delivery service or any complementary service wants to access the vehicles, then it must see a way to get to the vehicles itself. On the outskirts of the city, where their core business does not actually take place. The actual way to the customer must be carried differently because the way to the car is not coherent to where the customer is. I've always had the problem of finding a complementary business that can use the vehicles and bring the vehicles back into the city from the outskirts and provide the vehicles for people who want to drive out again.

Interviewer: So there is the need for a solution that brings cars from the outskirts to the city center?

Expert_2: Exactly. In the beginning, we hired people from car2go ourselves who drove the cars back into the city in the evening for a small fee. At some point, we realized that it wasn't worth it. The hourly wage is too high and what we get per minute is too low. The distribution of cars in the evening is still an issue today. The cars accumulate at the outskirts and are no longer used there. That's why the free-floating model doesn't make sense outside of social conurbations. If you have deep pockets and want to lose money, it is not an issue at all. If you want to make economic sense, I would not recommend it to anyone because I've seen it only lose money.

Interviewer: That means expansion only into more major cities and not by increasing the size of the territories?

Expert_2: We tried that in the past in Cologne, Düsseldorf, there were many attempts to combine the Rhine, Neckar, Ruhr area to find a larger business area with more people living there. That didn't work. It works in big cities like Milan or Madrid. Even in Lisbon it is difficult also because of parking. That is of course an important criterion. We experienced a huge fiasco in London with car2go. It looked like there was a lot of potential there, but in principle London is like a village. Because it consists of 33 neighborhoods and each neighborhood has its own mayor or committee and everyone has their own opinion about parking regulations. So, nobody has a clue where to park the cars. And that has ended in quite a fiasco, so that we have ended it quickly again.

Interviewer: There is also P2P sharing. Is it an option to support the fleet with private cars when utilization is high?

Expert_2: I have seen fewer options where there were not enough vehicles. The problem is rather where the vehicles are located. Kluno from Daimler, for example, is an example of a P2P model but was quickly abandoned because it turned out to be nonsense. P2P does not work at

all in Europe. This is something for private person to private person, but as a commercial intermediary in between you do not earn any money.

Interviewer: Have you investigated dynamic pricing strategies?

Expert_2: That has always been a core issue. Even today, I still see dynamic pricing as a USP for a CS provider. If someone could set up a decent pricing engine, that would be phenomenal. We didn't manage that at car2go because the technology didn't allow it and neither did our IT capacities. Because this is a more complex issue. Companies are busy using AI to create a certain predictability and the other is dynamic pricing. I believe the topic of pricing would be a game changer for the whole free floating CS. You can already see small approaches. If you have a car with a discount code on it to create the incentive for people to take the cheap car and maybe make trips that normally would not be on the list. E.g. in the morning in the traffic jam and drive into the city center Because the car costs you de facto nothing. That is, instead of taking the train and saying the car is just there. The similar is from the city center out, that you say if large demand is there, I charge 1.40ct instead of 40ct. Then not everyone takes it but the person who takes it then pays properly.

Interviewer: Do you have key points on how CS can become the transportation model of the future?

Expert_2: We are always speculating that we will move away from the private car. For example, the topic of autonomous driving. De facto, we see that autonomous driving does not yet work. The market is difficult. It is difficult to predict what will happen. Currently, I do not see the trend. Most people still want to have their own vehicle, at least in Europe. The only incentive to get away from private cars is when cities restrict individual traffic. Even in London it does not help that you must pay money to drive in the city. More restrictive measures are needed than just building bike lanes and creating more congestion. It must be clearly stated that

private vehicles are no longer allowed to enter the city - only with special permission. And then CS will have a chance again, because CS will be an alternative to owning a car, and they will also have permission to drive in, but only electrically.

Interviewer: So, is politics still a big factor?

Expert_2: The way CS is now; it is a very difficult issue. I do not know if the cities will ever restrict the use of private cars that much. That's not something that can be decided overnight. I think the euphoria we had in CS has long since faded. Disillusionment has set in. Scooter providers are also leaving the market because it doesn't pay off. Sharing continues to be a difficult topic, especially for cars, because the cost factor is so high.

Interviewer: How can CS play a decisive role in the SAV market?

Expert_2: If autonomous driving comes on such a large scale, then CS must be part of it because that will be the only mode of survival. For CS, it is no problem to switch from the current fleet to a robotaxi fleet. The on demand would then also be the service that would take place. Many CS providers are already involved in the topic and the implementation should not be so difficult. The big question mark is when.

Q: Expert_3 Interview

Interviewer: What challenges do you currently see in the car sharing market?

Expert_3: The biggest challenge is the issue of profitability. Offering that is profitable in itself under based on the external framework condition given to you. From city to city, it varies what parking fees you have, for example, whether you have advantages in the area of parking, how strongly is carsharing promoted by the city, for example, through the use of electric vehicles. In the end, it's an operations game. You need a lean, streamlined team to cut costs. Even if you manage to do that very well, car sharing is a low-margin business. So it's not surprising that Miles or other providers are looking for more ways to utilize their fleet. Possibilities for this are, for example, to go into a subscription model where a higher margin can be generated. Here you have a fixed revenue on the one hand and on the other hand the vehicle is not used as much as in a car sharing use case.

Interviewer: Which carsharing model is the best in terms of profitability? Free-floating, station-based, or also P2P?

Expert_3: With P2P you definitely reduce your costs but hardly make any revenue. Operationally, station-based is easier than free-floating, because you have the vehicle at a fixed point, you have other users who take better care of the vehicle, you have a higher utilization rate because customers use the service not only for short trips, but for longer trips like going to the lake or on a short vacation. You also don't have reallocation fees, which are relatively high otherwise. With free-floating, however, you have significantly more customers on the vehicle and a higher attractiveness. Station based in easier and a bit more predictable. How much the free-floating offer is used depends very much on the general conditions. P2P is far from profitable.

Interviewer: What has to change in the legal framework to make another big leap in the direction of profitability?

Expert_3: On the one hand, parking. That one has the same parking fees as the private car. For example, Berlin: Here you pay 200€ per month in parking fees for a carsharing vehicle. For a private vehicle it is currently 20-30€ for two years, which will eventually go up to 20€ per month. Car sharing pays as a factor 10 for parking.

The other theme for car sharing is CO2 neutrality. It needs incentives to make electric car sharing attractive. It needs a charging infrastructure that is accessible and widely available, and it needs support because it has high operational costs. E.g. the vehicle has to go to the charging station more often.

Parking costs as well as parking space - this creates attractiveness. Plus the topic of electrification, that one cushions the operational challenges there. You can also say that you restrict individual traffic by reducing parking spaces and making parking more expensive, entry bans, inner city tolls etc. These are all things that would contribute to a traffic turnaround.

Interviewer: Is it important for scalability that there are nationwide laws?

Expert_3: Yes, that would help the providers. This would give them a case that they don't have to plan differently for each city, which would allow them to scale up more quickly. Carsharing use is very strongly regional. Because there are many different factors that affect the viability and use of car sharing, it has to be tested on site in most cases. The more uniform the framework conditions, the simpler the case and the easier it will be to absorb other special effects.

Interviewer: We're going to walk you through our recommendations a little bit. The first question is: are there opportunities to increase utilization through complementary use cases?

Expert_3: Difficult. Here you must see how much you can go down with the price for such cases and what risks I take. I would rather say no. Something like delivery is not quite optimal because then the car smells like food and the condition of the vehicles could be worsened. I don't think you would find a price point that is attractive for a pizza service. On top of that there are the cleaning costs. But you can see if you can bring in daily, weekly or monthly rent. At peak demand times, it may also be possible to find use cases that do not require increased cleaning. E.g. renting the fleet to nursing services, flower delivery or so. Here, of course, is the issue that you also need a certain reliability in B2B. The question is whether a carsharing provider can provide this.

Interviewer: Do you see the integration of a rental or subscription offering as realistic and feasible? Can synergies be realized here?

Expert_3: Of course, it depends on how the offer is structured. Especially when it comes to IT landscape. Often you look at it and realize that it is built on the car sharing case. Using a monthly pricing together with pay per use pricing can become relatively complicated. For example, in the credit check, you do another check if the customer only drives the vehicle for a few minutes or several months. You need a few more capabilities that some car sharing providers don't have. But that is in the interest of profitability. You have to look at where I have low utilization rates and how I can put he vehicles to use and then make the customer an attractive offer. For example, you can lower the costs for a weekend rental. Then I have a reliable customer who drives 100km. The vehicle stands there for 2 days but for the 2 days of standing time that I otherwise do not get monetized, I get that monetized at once, without much utilization and without large damages to the vehicle. This of course leads to a true turnaround when you say I have a sharing vehicle that covers my entire mobility needs. Miles, for example, expanded its offering during Covid because public transportation was limited. In this way, they showed their

customers a sign of trust, so to speak, that as a car-sharing provider they ensure mobility for the customer.

Interviewer: Does it make sense to use carsharing cars as advertising space?

Expert_3: I don't quite know if that works, you get 50€ and have something stuck on for it. An independent provider would have an easy time with it and can, for example, advertise for the public transport company in the sense of its own company value proposition. A large provider with a corporate behind it has to look at what fits the brand. What is exciting is how digital this can be done. That's an idea that can be discussed with a car-sharing provider, but it's not a huge boost to the profitability of the business model.

Interviewer: What do you think about dynamic pricing, does a dynamic pricing strategy make sense?

Expert_3: Definitely. Especially if you want to control the vehicle reallocation through your pricing. This saves you significant reallocation costs, which are relatively high. The costs that would otherwise be incurred if you reallocate the vehicles through employees can also be passed on to the customer. With search-based pricing, such as with uber, you must see how the customer reacts. Of course, you don't have such effects with your private car. In peak demand, this is difficult. But you can combine it with e.g. subscriptions, then the price is reduced. Or something like parking etc. It becomes cheaper in certain areas at certain times. Marginal increases make sense, I do not think that the doubling of the price at some times as with uber would prevail, because you would burn the customers. How strong the price sensitivity of customers is would have to be tested. You can also combine them. If you go to certain areas or cities that are terribly busy, it will cost you more than if you go to the airport, for example. But if you don't do that and go to a nearby ride & park parking lot where I have high demand for

carsharing cars, it is even cheaper and it is incentivized to avoid such areas. This is relatively complex and causes a lot of interaction and combination with the city.

Interviewer: What role do you see SAVs playing? How do you see the business model of the future?

Expert_3: Once we have autonomous vehicles on the road, there will be no more car sharing - at least no driver-based car sharing. You will be on the road with shared autonomous vehicles and there will be different booking classes. There will be vehicles where you drive alone from A to B or there will be an approach like Moya, where you share the car with others.

Interviewer: Is car sharing a business model that can adapt well to this disruption?

Expert_3: I think so. At the end of the day, you're operating a fleet, and even here, the vehicle has to be cleaned and maintained. Even if the vehicle is autonomous, you still need people on the ground to ensure safety. Car sharing providers have the capabilities here. Public transport or cab companies also have these capabilities. This is exciting because such SAVs have even higher financing costs. Smaller companies would not be able to afford this, and cab companies would be excluded, but I can imagine larger car sharing providers. These are companies like OEMs with the auto banks and urban mobility providers that are entering the market. Driving a hybrid model like Way is of course exciting compared to a pure car sharing focused model.

Interviewer: Are there any other topics that are relevant but that we haven't addressed?

Expert_3: It is important to mention that the profitability of a car sharing provider depends purely on processes. It's about thinking about how to use as little space and as few people as possible. This is mainly about deep integration and not so much about earning a little extra through advertising. Rather, do I have my own workshop, can I repair the vehicles myself, can I equip the vehicles in such a way that I use parts that subsequently retain the residual value.

Can I get cheap insurance, really along the value chain and get the cost per km down. That's something to look at and have creative solutions there. Other revenue potentials are limited. That's a psychological factor, because with car sharing in particular, people see that driving a car is expensive and don't see that the costs are cheaper than with their own car because they only ever look at the cost of gasoline. Reducing costs is therefore more important than increasing revenue. It also makes sense to integrate car sharing into all mobility solutions. That means enabling broad access to car sharing and having low barriers. Then, you should look at what kind of vehicles you can offer that will generate additional profit. What is also exciting is to look at B2B cooperations. What are sectors that have a certain workload, to which I can then provide vehicles. Maybe even provide my capabilities that I have as a car sharing provider. That is my IT capabilities, my operations capabilities and also sell them. For example, co-managing the vehicle pool of a nursing home. If you are a mature provider, it can help you because you can see that solutions like vehicle management and fleet management are not really mature outside of car sharing. When it comes to revenue, you really have to look at what customers want. For example, if they think it's great that you can rent an e-bike via the carsharing app. These are topics that you have to try out, but they only make sense once you have really squeezed out the value chain.

Interviewer: Can car sharing replace car ownership?

Expert_3: You can see that big companies like Stellantis are already getting into car sharing, which shows that they think you can earn money with it. One can make the carsharing model still a bit more attractive. You have to make carsharing as easy as possible, for example by making sure that there is a parking space available when you get home in the evening, because there are designated carsharing parking spaces. You don't have that with your own car. Otherwise, if you can make carsharing a good offer that is attractive compared to car ownership,

it can definitely be a solution for urban areas and reduce private car ownership. In rural areas, it will be difficult to make a case for car-sharing providers.

Interviewer: We see that car sharing providers can play a big role in adapting SAVs, which cab companies or companies like uber cannot do. They have the ability to manage the vehicles and they have the platform, which is something that an OEM doesn't have.

Expert_3: Yes, I would agree with that.