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Management from the Nova School of Business and Economics.

STRATEGIC BUSINESS MODELS IN THE CAR-BASED SHARED MOBILITY -
RECOMMENDATIONS ON HOW TO IMPROVE FREE-FLOATING CAR-SHARING BUSINESS
MODEL

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Abstract

The mobility industry along with the automotive industry is currently evolving due to several global conditions which include traffic jams, pollution, and climate change. New technologies, sustainability awareness, and shared mobility are empowering the development of new strategic business models. This paper analyzes the business model evolution of car-based shared mobility in Europe while understanding the changes in customer behaviors regarding car usage. A detailed explanation of the car-sharing free-floating business model is pointed out and evaluated along with the development of recommendations focusing on improving the benefits and reducing the drawbacks that emerged within the research.

Keywords

Strategic Business Model – Shared Mobility – Car Sharing – Europe – Digitalization – Sustainability – Automotive – Car-based Mobility

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1. Introduction

The range of mobility options available and how people travel has changed considerably during the nineteenth and twentieth centuries mainly owing to developments in transportation technologies. Our means of transportation are evolving. The pandemic wave has been an additional element to rock the foundations of mobility, and additional variables like environmental concerns are requiring the evolution of the transportation systems that power the economy and our everyday lives. Accordingly, the international community is betting on shared mobility and electric vehicles as a means of increasing mobility's reliability and sustainability. The primary purpose of this Work Project is to strategically examine in detail the characteristics of business models used by different companies operating in the car-based shared mobility industry. To comprehend what makes a certain business model effective in comparison to other types of business models existent in the area of study, the key components of the car-sharing model will be discussed. Moreover, a survey was conducted in which 484 responses were collected, which paved the way for many points of the recommendations.

Structure

In particular, the following chapter will serve as an overview of the industry by defining a few crucial terms such as the shared mobility concept and the domain taken under consideration for this investigation. The evolution and variability of business models over time, as well as pertinent European governance, will be the major subject. The methodology is covered in Chapter 3 to describe the data, sources gathering, and analysis techniques used in the paper with the final goal of examining the validity of the research. With an inspection of one of the BMs implemented in the research industry, the free-floating car-sharing business model, the two sections that come next (chapters 4 and 5) constitute the core argument. Each major element of

the Business Model Canvas is investigated to subsequently derive advantages and drawbacks. Lastly, based on the analysis, we offer additional suggestions for improving the effectiveness of the car-sharing firms' current business model.

2. Literature Review

Shared Mobility has become an integral part of modern society, with millions of people around the cities using platforms such as Getaround, ShareNow, Uber, and BlaBlaCar as an innovative transportation model, to move around effectively and conveniently.

This literature review will examine the way how shared mobility, focusing on automotive vehicles, has grown and changed over time, gaining a vital role in the way people get around.

The chapter will be organized as follows. First, a thorough explanation of the main notions will be presented to clarify the focus of the research. Second, the evolution of the model throughout history and the key factors driving the expansion will be covered. Third, the several business models coexisting in the industry and their peculiarities will be discussed to provide evidence of the variety of models used by companies. Finally, since the geographical target is within the European continent, the regulations as well as incentives provided within the region will be addressed.

Overall, this first chapter aims to provide a comprehensive scenario of the shared mobility environment of the research.

2.1 From Vehicle Ownership to Vehicle Usership

As mobility is a necessary part of human life, its significance doesn't need to be emphasized. The changes taking place in the automotive sector, driven by the macro-trends defined as "CASES" (Connectivity, Autonomous driving, Shared-mobility, Electrification, Servitization), require a profound rethinking of the role and of the very concept of "car", which extends from business models of the various players in the market to the changes in the logic of purchasing and using vehicles by the final users (Deloitte 2022).

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Indeed, the automotive together with the general transportation industry is now seeking to go beyond the traditional business model of vehicle ownership introducing a new branch of doing business that moves the focus on MaaS (Mobility as a Service) and Shared Mobility concepts, according to which mobility is seen as a service, shifting the focal point from the single product to mobility provided as a transportation option through vehicles. Respectively, according to Deloitte: “at its core, MaaS relies on a digital platform that integrates end-to-end trip planning, booking, electronic ticketing, and payment services across all modes of transportation, public or private” (Goodall et al. 2017), allowing a combination of traditional and new mobility services. Furthermore, deeper into the theory of shared mobility which will be analyzed in the following paper, it refers to the use of a resource (e.g., a vehicle) that is not owned by the customer but rather accessed; the use of this service often happens through a digital platform such as a smartphone application. These types of shared mobility may include bicycles, electric bicycles (referred to as "e-bikes"), motorcycles and scooters, as well as vehicles and vans (Crozet, Santos, Coldefy 2019) and allow users to make use of short-term transportation methods (Cohen and Shaheen 2016).

It is crucial to make it clear that the paper will only examine the newly emerging business models of the shared mobility sector, which utilize automobiles and vans (car-based), ignoring other vehicle types including bikes, scooters, robots, or public transportation.

Besides narrowing it to car-based mobility, the document is focused on short-term mobility, and for that reason, car-rental business models are not included. The importance of such an innovative sector to the environment, mobility, and efficiency should be one of the main topics of our research as it may alter, in the future, the concept of how a car should be utilized and owned or not.

2.2 Historical Evolution of Car-based Shared Mobility

Shared mobility is the practice of a group of people sharing the use of one or more vehicles owned by a for-profit or non-profit car-sharing organization. This organization may require that reservations be made in advance, charge fees based on the amount of time and/or distance traveled, and establish membership requirements, including the payment of a membership fee that may or may not be refundable. (Toronto and East York Community Council 2013)

Before focusing on the present of car sharing, it is important to highlight what was the origin of such a business model.

The concept started in the 40s in an attempt to save gas, rubber, and car tires due to the scarcity of these materials in the Second World War. After the Pearl Harbor Bombing, Japan took control of the Pacific rubber plantation, resulting in a 97% rubber shortage in the US. (Frohardt-Lane, Sarah 2012)

The concept here was more of a ridesharing than a carsharing one as we know today, where the car was always driven by the owner, but its passengers circulated in the most efficient way among the cars that belonged to the Car-Sharing Club Exchange System, which was operated by the US Office of Civilian Defense. This club functioned by volunteer participation, where participants would fill out a card with their contact information and commute hours, which would then be filed geographically. Other people looking for a match would have to sift through all of the cards to find rides or passengers who met their requirements. (Bower, Dan 2015.) The propaganda around this controlling strategy by the US Government, more specifically the Roosevelt administration, was very much aligned with an anti-Hitler idea. The government insisted that if an individual chose to ride alone instead of joining the Car-Sharing Club, it would be the same as riding with Adolf Hitler, the fascist dictator, on his side due to Germany being the main supplier of oil to the United States at the time, transmitting a message that the driver was funding and supporting Hitler's project. This introduced a sense of patriotism and

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citizenship into a mundane activity such as driving, which shaped Americans' perspective on it over several years.

In 1948, the first car-sharing scheme took place in Switzerland, Zurich, called “Sefage”. This program tried to attract people by emphasizing it as a cheaper alternative to the traditional car-ownership model, which SEFAGE wanted to explicitly communicate as a very expensive asset that not many people could afford. However, due to an increase in car production around the globe and consequently a decrease in its selling prices, car-sharing didn't seem attractive to most users, leading SEFAGE to its closure in 1951 (Becker, Ciari, Axhausen 2015).

In 1974, the first concept of car-sharing as a business model appeared in Amsterdam, Netherlands. The program was called Witkar. The car in consideration was much smaller than an ordinary one, taking only $\frac{1}{4}$ of the space that a normal car took. Moreover, a dramatic technological evolution at the time was implemented, this car was 100% electric and pollution-free, being one of the main focuses of its advertising. The system was fairly simple: the client would go to one of the Witkar stations spread across the Dutch city and there would find a central computer, on which the user had the clean task to ask for the key to a car. Afterward, the client would have to leave the car at the nearest Witkar station to its desired destination to allow the car to recharge again; few were his other duties such as returning the key to the central computer that was located there, and paying the required amount for the use of the service (0,50 pence per minute), giving place to another user after. This was, then, a car-station-based business model, a model that is still employed by some companies to this day.

The strategy was put into practice to reduce traffic congestion in the city, and it ran until 1986. However, the project never had the support of the local governments throughout the years, therefore it ended in not having sufficient stations for it to work properly. Besides that, a fleet of 35 electric vehicles also required a long time to recharge, making it difficult to have cars available during the day. Another factor leading to its malfunction was that the traffic flow

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usually went in one direction only, causing an over-occupancy in some Wiktar stations, while leaving others empty. Despite its termination, this program was very important to pave the way for today's car-sharing business models because it highlighted the failures that the model could have and what needed to be improved to successfully work.

The oldest car-sharing business that still holds to this day is Mobility CarSharing Switzerland, which was founded in 1997 from the merger of two companies (ATG Auto Teilet Genossenschaft and ShareCom cooperatives, which were founded in 1987). The business model was essentially the same as Witkar, yet the differences stood in the types of vehicles used as well as in methods used for the bookings. Mobility CarSharing Switzerland employed gasoline-powered automobiles and let customers schedule journeys over the phone, introducing technology into the market for the first time while also receiving the necessary support from the government.

In 1994, the first car-sharing company, Communauto, appears in North America, and Canada, marking the first time that a car-sharing company established itself outside the European continent. It quickly spread to the Asian continent in Singapore, with Car Co-op in 1997, and in the US in 2000, with ShareCarGo! (Shaheen 2001).

In 2010, the most groundbreaking innovation in car-sharing happened with Zipcar. Zipcar was founded in 2000 in Germany being a car-sharing company. In 2010, Zipcar introduced an app, changing forever the car-sharing business model. The user, after making a reservation, would receive a confirmation email or text message with the car's location and instructions on how to access the car via the mobile app.

Users would unlock the car by holding their smartphone up to a sensor on the windshield or driver's side window. After entering their unique PIN code on the Zipcar dashboard, the user would be able to start the car and drive away. If the car was unseen by the user, he/she could ask the app for the car to produce a horn sound and blink its lights to be easier to find.

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The Zipcar service was created to be adaptable and convenient, allowing users to reserve cars for as little as an hour or as long as several days. Users could also select from a variety of car models and sizes based on their needs. (Wired 2010).

Other companies followed Zipcar, like DriveNow (2011) or car2go (2011), on introducing an app to make their service more user-friendly.

The number of car-sharing users in Europe grew from 700 thousand in 2010 to 15 million in 2021 (Exhibit 1).

Sharing a car has a lot of potential to improve livability and traffic in cities as anticipated. It allows access to a vehicle without having to purchase one and has the potential to reduce the number of automobiles in urban areas without harming people's mobility. The extensive use of social media and web platforms, which has exponentially increased in the last decades, as well as information and communication technologies (particularly smartphones), all contribute to this rise, as does the general sharing economy model, which is developing into a mode of cultural consumption. Smart technology has also improved the experience of using car sharing by making it easier to schedule, access, and use shared transportation. (Sanvicente et al 2018). Indeed, the main forces promoting the expansion of this industry are the following:

- Environmental issues: Many individuals are searching for more environmentally friendly transportation options as they grow increasingly conscious of the effects that personal car ownership has on the environment. By reducing the number of vehicles on the road, car sharing can lessen traffic congestion and air pollution.
- The emergence of the sharing economy model, which is founded on the notion of cooperative consumption and boosts efficiency and lowers waste.
- Technological and ICT advances: The sharing economy and the rise of mobile technology have made it simpler for car-sharing companies to match users with

accessible vehicles and for users to reserve and access automobiles using their mobile phones.

- Urbanization: As more people relocate to urban areas, the demand for effective transportation options rises. Those who need to go around in the city but don't want to purchase a car can take advantage of the flexible and practical options provided by car sharing.

To conclude, it is now statable that the shared mobility concept has been around for several years. With the increasing costs of petrol and increased traffic congestion in most of the cities around the world, consumer behavior changes regarding sustainability, and a higher focus on electric cars, car-sharing is posing as an easy, affordable, and efficient alternative to owning a car. Moreover, with the introduction of autonomous vehicles, the transformation in the sector is becoming beyond imaginable.

2.3 The Variation of New Business Models

Certainly, several business models that have challenged the conventional model used by most automakers and rentals have recently emerged in the automotive sector.

This demonstrates one of the most relevant changes in the sector, namely the transition from a concept of "multi-year ownership" and "fixed rental" to a logic of "flexible use" of the vehicle according to specific habits and needs.

The growth of a business service oriented in the automotive industry has revolutionized many automakers' business structures as well as allowed the rise of new companies, tech companies, which have broken the barriers of entry and gradually gained market shares. Many of them are companies that have positioned themselves in shared mobility focusing on automotive.

Their business models are also significantly different from those of traditional vehicle providers: these businesses frequently place a high priority on offering their clients convenient, user-friendly services, indeed customers only need to open an app and select this convenient

alternative to fulfill their needs in a few minutes. Moreover, these companies' business models, guiding principles, and operating procedures are constantly changing and in evolution.

Recent years have seen a tremendous expansion of the sharing economy employing business-to-customer (B2C) but also customer-to-customer (C2C) and peer-to-peer (P2P) models.

Concerning the industry analyzed in this paper, notwithstanding the diversity of the proposition and operational model, several main business models can be differentiated. From the standpoint of revenue stream, the operators could adopt multiple models: the pay-per-use model (PPU), according to which customers are charged based on how much they use the service, is a popular revenue model for shared mobility companies because it aligns with the nature of the service, where customers only pay for the time or distance, they use the vehicle. Differently, they may provide clients with discounts or other incentives based on their usage through alternative pricing structures like memberships or subscriptions. Some businesses might combine pay-per-use and subscription models, or they might provide various pricing tiers for varying degrees of consumption or access. For instance, SHARE NOW, a European market leader in car-sharing with 3.4 million users in Europe in 2021 (SHARE NOW 2022), is primarily based on a pay-per-use system, where customers pay for the time they use the vehicle, by the minute or hour. On top of that, customers can apply for a monthly subscription program, the “SHARE NOW Pass”, and take advantage of discounts and perks on rates.

Despite the revenue models, this market can be parcelled according to a variety of elements. The shared mobility proposals offering automotive services have been clustered in *Figure 1.1*, based on:

1. Type of service offered: “car service” according to which the customer rents an actual vehicle and will drive it personally, versus “ride service” where, instead, the customer pays the service of a ride, being the vehicle driven by someone else;

2. Type of vehicle ownership scheme: the vehicle could be privately owned by the single individual responsible to offer the service, or by the company provider – a fleet of vehicles).
3. The possibility to experience the service together with another customer, a stranger: providers may offer the opportunity to share the mobility minimizing travel costs ⁽¹⁾

Figure 1.1 – Cluster of Shared Mobility Proposals in Offering Automotive Services.

		Service Offered	
		Car Service	Ride Service
Type of ownership scheme	Vehicle Privately Owned	- P2P Car Sharing	- Ride Hailing or Uber-like Services - Ride Sharing ¹ - P2P Ride Sharing ¹
	Fleet Vehicles (Company Managed)	- Modern Car Sharing/Clubs	- Micro-Transit, Dynamic Shuttle Services ¹

¹: These types allow to experience the service together with another customer, a stranger (**pooling system**).

The main models identified concerning the variety of shared mobility proposals in offering automotive services are described below.

Peer-to-Peer Car Sharing. Concerning peer-to-peer car rental, it allows single individuals to rent out their cars when not needed, when unused. This means, that no other businesses (rental companies) are actively participating in the exchange of the vehicle. The availability of this service happens via a third-party digital platform, an app, or a website, which eases the transactions augmenting the possibilities to reach a vast number of potential clients (Heineke et al. 2021). Furthermore, by functioning as a marketplace, the platform manages the exchange of payments by changing a percentage.

Analyzing the model through the three dimensions chosen:

- P2P car rental provides a car service, according to which the customer is responsible to drive the vehicle;

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- Being a peer-to-peer method, the vehicles rented out are privately owned by individuals;
- Vehicles customers are non-pooled, the practice does not provide any direct carpooling service.

This “P2P” service is a consolidated practice that has already been active for about ten years in some geographical areas of Northern Europe and the United States where, however, it has always played a minor role compared to traditional forms of rental for private individuals. Contingencies, however, reversed the situation: in a post-pandemic scenario, where traditional rental car companies are suffering the global crisis, p2p car rentals such as Turo in the United States and Getaround in Europe, were able to reach a growth pick of 150%, with an increase in weekly earnings of 40% since February 2021 (Maria Francesca Moro 2022).

Modern Car Sharing or Modern Car Clubs. Modern car sharing or clubs can stand as a solution for individuals whose need is to rent an automobile on a short-term basis. Accordingly, customers use cars provided by a company for shorter periods than the traditional rental, generally remaining in a geographically limited area (Heineke et al. 2021).

Analyzing the model through the three dimensions chosen:

- Modern car sharing provides a car service, according to which the customer is responsible to drive the vehicle;
- The vehicles belong to a fleet, being managed or owned by the provider itself;
- Vehicles customers are non-pooled, the practice does not provide any direct carpooling service.

Generally, the way how modern car clubs run their services can take one of the following three forms:

1. Station-based vehicles: cars can be grabbed and returned to specific stations:
 - 1.1 Round trip: it implies the duty to relocate the vehicles to the designated station from which they were picked up (Shaheen et al. 2015);

1.2 One-way trip: it grants the customer with higher freedom since multiple stations exist and vehicles can be grabbed and returned to different stations (Shaheen et al. 2015);

2. Free-floating: vehicles can be grabbed and returned anywhere inside a city or a specific region where they are parked (Shaheen et al. 2015).

According to a Mckinsey & Company study, The European scenario of car-sharing (including P2P car sharing and modern car-sharing types) is projected to reach €4 to €5 billion by 2030 (Heineke et al. 2022), with Germany being the country with the highest number of services. Overall, companies such as SHARE NOW and Zipcar are shaping the industry.

Ride-Hailing or Uber-like Service: Ride-hailing allows individuals to move from one location to another by booking an on-demand ride. This happens through a digital platform responsible for matching riders with drivers, as well as exchanging payment.

Analyzing the model through the three dimensions chosen:

- Ride-hailing provides a ride service, according to which the customer is a car passenger, driven by someone else, the driver;
- The vehicles belong to the drivers, therefore the provider does not own any cars themselves but collaborates with drivers;
- Vehicles customers could sign up for a pooling ride, with a stranger, it is voluntary. Not all ride-hailing providers supply this type of offer (ride-sharing is explained below).

Since a flood of new businesses such as Uber, Lyft, and FreeNow are breaking the barriers of entry to the market, ride-hailing companies find themselves in strong competition with traditional taxi services.

Ride Sharing. As anticipated, it is linked to ride-hailing but allows passengers to share a ride. Operators varied from those who started out delivering ride-sharing services to those who developed from ride-hailing, providing customers with a different version of the service that

allows them to share rides to save money. For instance, Uber and Lyft do offer this service variation under the respective names of UberPool and LyftLine. Usually, people who are traveling in the same direction are paired up (Crozet, Santos, Coldefy 2019).

Analyzing the model through the three dimensions chosen:

- Ridesharing provides a ride service, according to which the customer is a car passenger, driven by someone else, the driver;
- The vehicles belong to the drivers, therefore the provider does not own any cars themselves but collaborates with drivers;
- Vehicles customers specifically sign up for a pooling ride, with a stranger, usually to lower costs and be more sustainable oriented.

Peer-to-Peer Ride Sharing. P2P ride sharing involves private-car owners transporting willing carpoolers to their destination for a fee. Moves are primarily intercity and long-distance. It is a form of ride-sharing, with BlaBlaCar serving as an illustration (Crozet, Santos, Coldefy 2019).

Analyzing the model through the three dimensions chosen:

- P2P ride sharing provides a ride service, according to which the customer is a car passenger, driven by someone else, the driver;
- The vehicles belong to the actual driver;
- Vehicles customers specifically sign up to be carpoolers.

Micro-Transit, Dynamic Shuttle Services. It typically uses smaller vehicles, such as vans or minibusses, to provide customized transit services. Unlike traditional fixed-route transit systems, micro-transit services offer flexible routing and scheduling that can be tailored to the needs of individual passengers or groups. These services may be operated by private companies, and public transit agencies, and are accessed through an app in real-time (He, Ma 2022).

Analyzing the model through the three dimensions chosen:

Group part

- Micro-Transit provides ride service, according to which the customer is a passenger, driven by someone else, the driver;
- The vehicles belong to a fleet and are managed by the company provider;
- Vehicles customers specifically sign up to be carpoolers.

The wideness of this type of shared mobility is still underdeveloped compared to the other types mentioned above, however, a successful example could be found in Spare.

2.4 European Regulations and Incentives Towards Shared Mobility

The EU has a long history of regulations about transportation. In 1957, the Treaty of Rome established the European Economic Community (EEC), according to the official European Union history website which aimed to create a common market for goods and services among its member states. In the 1960s and 1970s, the EEC began to address environmental issues related to transportation, including air pollution, noise pollution, and traffic congestion. The EEC established a common external trade policy that aimed to reduce tariffs and trade barriers with countries outside the EEC. This policy had implications for the environmental impacts of transportation, as it affected the volume and composition of trade flows and the modes of transport used (Jean-Paul Rodrigue 2021). Moreover, The EEC adopted a directive in 1970 that set limits for the emission of carbon monoxide and hydrocarbons from motor vehicles. This directive was the first of a series of measures to regulate vehicle emissions and improve air quality in the EEC (Britannica 2023). It was only in 2001 that the EU adopted the first EU-wide targets for reducing greenhouse gas emissions from transportation (Urban Agenda for EU 2016).

The more recent actions undertaken by the EU aiming at promoting smart mobility and sustainability were conducted back in 2016. As a matter of fact, the EU adopted the Urban Agenda for the EU, a partnership between the EU, its member states, and cities that aims to improve the quality of life in urban areas (Urban Agenda for EU 2016). It includes initiatives

such as developing integrated and multimodal transportation systems and promoting the use of shared mobility. Furthermore, at the end of the year 2019, the EU adopted the European Green Deal, a comprehensive plan to make the EU climate-neutral by 2050 by, for instance, supporting the adoption of shared mobility services (European Commission 2019). In 2020, the Sustainable and Smart Mobility Strategy (2020) followed, which, through the research, aimed to make transportation in Europe more sustainable, efficient, and digital. with a particular focus on shared and electric mobility. The strategy includes a range of policy measures and incentives, such as funding for research and development of new mobility technologies and services, as well as financial support for shared mobility providers (European Commission 2020). Initiatives to reduce greenhouse gas emissions from transportation, such as promoting the use of electric and hydrogen vehicles and supporting the development of sustainable and smart mobility solutions have been active.

Throughout the years, the shared mobility model has been crucial both economically by reducing transportation costs for low-income households and environmentally with a concise contribution to the EU's carbon reduction targets.

One of the primary benefits of shared mobility is its ability to reduce the need for car ownership, which can result in cost savings for individuals and families (Exhibit 2). The average cost of car ownership in the EU is around €3,000 per year. However, this cost varies significantly depending on factors such as the type of car, fuel prices, and insurance rates. In addition, the cost of car ownership is often higher in urban areas due to higher parking costs and more frequent use of public transportation (European Commission 2019). By reducing the need for car ownership through shared mobility services, individuals and families can save money on these expenses. By using shared mobility services instead of owning a car, individuals and families can save money on ongoing expenses such as fuel, insurance, maintenance, and parking.

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The research revealed that car-sharing services can result in cost savings of up to €5,000 per year for households that switch from car ownership to car-sharing. In addition to reducing the need for car ownership, shared mobility can also help to increase the use of public transportation. Furthermore, it can reduce the need for car-oriented infrastructure such as highways and parking facilities, which can be expensive to build and maintain. It can also reduce traffic congestion, which can result in time savings for individuals and businesses. (Millard-Ball, Adam 2005). Benefits can have a positive impact on the environment, public health, and the overall economic well-being of communities in Europe.

At the national level, several countries in Europe have introduced policies and incentives to encourage the use of shared mobility. For example, in France, the government has introduced a tax credit for companies that offer shared mobility services to their employees, as well as subsidies for the purchase of electric and hybrid vehicles (Ministère de la Transition écologique 2021). In Germany, the government has introduced tax incentives for electric vehicles, as well as funding for research and development of new mobility technologies (Federal Ministry of Transport and Digital Infrastructure 2021).

The introduction of policies and incentives to support the development and adoption of shared mobility services in Europe is a positive development, as it has the potential to reduce greenhouse gas emissions, improve air quality, and reduce congestion. However, it is important to ensure that these policies are designed in a way that is equitable and accessible to all members of society, including low-income households and those living in rural areas.

On the other hand, several challenges that providers face in implementing and scaling up their services exist. One of the main challenges is legal and regulatory barriers. In many countries in Europe, existing regulations and laws do not adequately address the unique challenges and characteristics of shared mobility services, which can make it difficult for providers to operate legally and effectively. For example, some cities impose limits on the number of shared bikes

or scooters that can be deployed, while others require providers to obtain expensive permits or licenses to operate (Tyndall 2019).

Consumer acceptance is another key challenge for shared mobility providers. While many people are interested in trying out shared mobility services, others may be hesitant to give up the convenience and autonomy of owning their vehicle. Additionally, some consumers may be concerned about the safety and hygiene of shared vehicles, especially in the context of the COVID-19 pandemic (McKinsey 2018).

Despite these challenges, there are also many opportunities for shared mobility to thrive and play a significant role in sustainable and smart transportation in Europe. One opportunity is the growing demand for sustainable and environmentally friendly modes of transportation. As consumers become more aware of the environmental impact of traditional modes of transportation, such as cars and airplanes, they are increasingly looking for alternatives that are more sustainable and energy efficient. Shared mobility services, such as bike-sharing and car-sharing, can help to meet this demand by providing low-emissions and sustainable transportation options.

Another opportunity is the increasing use of technology and data analytics in the transportation sector. As more and more people use smartphones and other devices to plan and navigate their travel, shared mobility providers can leverage this data to better understand and meet the needs of their customers (S. Wagner 2015). By addressing these challenges and leveraging these opportunities, shared mobility providers can help to create a more equitable, accessible, and sustainable transportation system for all.

3. Methodology

This chapter aims to provide a clear description of the research process. Firstly, the primary and secondary sources consulted to perform qualitative research will be presented. Moreover, an online questionnaire has been designed to collect quantitative information with the aim of identifying trends and patterns among different possible customer categories and providing meaningful insights. Lastly, the frameworks adopted to analyze and evaluate the business model of the free-floating modern car-sharing industry will be highlighted in the second section.

3.1 Data Source and Data Collection

Shared mobility is revolutionizing the automotive industry as well as the whole mobility sector but being considered a still young disruption, there is currently a dearth of academic research. However, given its high speed of growth, a series of articles and publications from prestigious consulting firms have been published.

For the qualitative investigation, the sources of information were evaluated to select only reliable references with a solid reputation aiming at covering the continuous evolution of the industry and the key trends influencing it. Indeed, market reports, articles, and blogs have been consulted together with research material published by Deloitte and McKinsey & Company consulting firms. These include Deloitte's (2022) *“The Future of Mobility”*, and McKinsey & Company (2021) *“Shared Mobility: Where it stands, where it's headed”*.

Furthermore, another important pillar has been constituted by the STARS project as part of the EU's research and innovation funding program. The websites of pertinent car-based shared mobility providers, especially those playing in the car-sharing sector, have been examined and data was retrieved to back findings with pertinent examples.

In addition, the main source of primary data has been constituted by an online questionnaire internally designed. The scope of the questionnaire was to investigate the customer sentiment on car sharing compared to two other shared mobility services such as ride-hailing and ride-sharing. Moreover, customer segments and behaviors were also inspected. This research was key for the in-depth analysis of the car-sharing business model.

Through social media networks, almost 500 responses (484) were collected (86% women, 14% men). 76% of participants were in the range of 18–24 years old. However, only 59% of the respondents answered that they live in a city (metropolitan area), representing the only fraction of the sample taken into consideration for the different shades of the analysis. This means that the remaining 41% were not factored in, since, by not living in a metropolitan area, they are not in direct contact with car-sharing providers. For the sake of completeness, data were collected over two weeks in April 2023 and the main recorded nationalities were Portuguese, Italian, and German. The average time needed to complete the form was registered to be 4.20 minutes.

A transcript of the questionnaire can be found in the appendix (Exhibit 3).

3.2 Theoretical Frameworks

The term “business model” has not had one exact definition that has the consensus of all researchers. Each definition is different from another in the sense that one definition might have the core elements that one business model needs to be defined, but it may not have certain elements that another business model has. After proper research to find a more general and comprehensive definition, the following was considered to be the most appropriate for this paper: the business model is an abstract representation of an organization is it contextual, textual, and/or graphical, of all core interrelated architectural, co-operational, and financial arrangements designed and developed by an organization presently and in the future, as well as all core products and/or services the organization offers or will offer, based on these

arrangements that are needed to achieve its strategic goals and objectives (Al-Debei, El-Haddadeh 2008).

In the following content, two frameworks have been used to help understand better the business model itself and what its sphere includes, namely competition, threats, components, opportunities, etc.: Business Model Canvas, and SWOT analysis.

The Business Model Canvas framework has been used as the first part of the analysis because of its transparent structure, which allows for a deeper dive into each component of an industry's business model. The Business Model Canvas (BMC) is defined as "a paper-based or computer-supported framework that claims to aid in the process of developing, improving, and communicating innovative business model strategies" (Osterwalder 2010).

The Business Model Canvas is constituted of 9 main components divided into 3 groups: Inputs (Key activities, Key partners, and Key resources and Cost Structure), Outputs (Customer Relationships, Customer Segments, Channels, and Revenue Streams), and, finally, the Value Proposition. Each of these components has been further analyzed in the following chapter. Furthermore, to evaluate the modern car-sharing free-floating business model and to derive any recommendations to improve its effectiveness, the SWOT Analysis has been used.

The SWOT analysis is useful for assessing the company from a performance perspective, as it is a technique that assesses the elements that either help or hinder an organization's success, both within and outside. It has four components namely strengths which include variables that promote desired results and weaknesses which are those that inhibit them. These two normally are within the control of the company. Then, externally, opportunities are external elements that can boost performance, whereas threats are external factors that may hamper performance and are often outside the control of the company (Silber et al. 2010).

4. In-depth Analysis of the Modern Car Sharing Business Model

Previously, it was demonstrated how several business models coexist in the sector, with the primary difference being the type of client services provided. Modern car sharing was acknowledged as one of the most recent trends in the sector. An extensive investigation of this business model's structure will follow given the potential disruption it poses. For doing this, the "Business Model Canvas" is the framework proposed. The Swiss theorist Alex Osterwalder first presented this approach in his book "Business Model Generation" (Osterwalder, Pigneur 2010). Each of the nine parts that make up the tool will be carefully examined to uncover the key elements of car sharing (Osterwalder, Pigneur 2010). Furthermore, an eye will be placed on the main players operating in the European Scenario.

4.1 The Main Players in the European Scenario

As mentioned in Chapter 1, two variations of the model exist within Modern Car Sharing: the stationed-based model and the free-floating one. Given the fact that the latter model implies a higher level of flexibility in movement, and its results are more appealing to the final users, a specific focus is placed on the Modern Car Sharing operation according to a free-floating business model (Wunder Mobility 2021). As Statista reports (Exhibit 5), the market leaders are represented by SHARE NOW, owning 17% of the shares, Zipcar, with 12%, and enjoy vehicle sharing and Zity by Mobilize, tied with 8% of the shares (Statista 2022).

SHARE NOW (acquired by Free2move) is leading the market with the highest amount of shares covered by a single company. Born in 2019 from the merger of the two already existing services car2go and DriveNow (Osservatorio Nazionale Sharing Mobility 2023), the company operates in 8 countries and 16 cities with a vast and differentiated vehicle portfolio developed and branded mainly by BMW and Daimler AG (SHARE NOW 2023) but also Citroen and Fiat, depending on the location (SHARE NOW 2023).

Second, the American car-sharing company ZIPCAR, was established as a subsidiary of the Avis Budget Group in the year 2000. Its products are accessible in several international locations. In Europe, it concentrates on the UK market, by being the country's largest and most well-liked car-sharing club (Zipcar 2023).

Founded by the Eni SpA group, the Italian streets are also crossed by Enjoy Vehicle Sharing's automobiles. Indeed, since 2013, it has rapidly grown opening the sharing service in Florence, Milan, Rome, Turing, and Bologna (enjoy 2023).

Lastly, Zity by Mobilize (Renault Group) is the fourth main competitor in Europe with 8% shares of the market (Statista 2022). The Spanish brand born in Madrid is currently expanding to other European countries such as Italy and France. Its peculiarity falls in a fully electric fleet (Renault Group 2020).

Overall, the market revenue in the European geographical area is expected to reach US\$5.54bn by 2027 (Statista 2022).

4.2 The Business Model Canvas

The first three foundations that will be analyzed (key partners, key activities, key resources) are defined as key to delivering the service on the market and executing the value proposition will be explored. Consecutively, the following four main parts that will be analyzed (value proposition, customer segments, customer relationships, channels) are intended to open up insights into how the car-sharing service is desirable from a customer perspective and whether it meets people's needs and wants. Finally, the cost structures as well as a revenue stream will be observed to give a view of the sustainability of the business. A full picture of the business model canvas can be found in Exhibit 11.

4.2.1 Customer Segments

According to the results of the survey (Exhibit 4), tourists prefer car-sharing over renting a car. In fact, the survey results show that car-sharing is the most preferred service among the respondents, with a rank of 1 out of 3 (Q7. Which one of the following services have you heard about? Car-Sharing 200, Ride-hailing 117, Ride Sharing 138). This indicates that car-sharing is more appealing than ride-hailing or ride-sharing for users/tourists who want to have more control and flexibility over their trips. The results show also that cost-effectiveness, the convenience of pick-up and drop-off locations, and availability and variety of vehicles are the most important factors that influence the decision to use a car-sharing service. Based upon the analysis of the latter, there are factors that are also relevant for tourists who want to save money, avoid the hassle, and have more options when traveling in a new city. Furthermore, vacation periods are one of the most likely scenarios for using a car-sharing service, with 171 respondents choosing this option (Q18. In which of the following scenarios are you more likely to use a car-sharing service? Vacation periods, as an alternative to car rentals 171). This suggests that car-sharing is a viable alternative to car rentals for tourists who want to explore different attractions and destinations in a city. Also, electric cars and hybrid cars are among the most desired types of cars for car-sharing users, with 109 and 91 respondents choosing these options respectively (Q22. What types of cars would you like to see offered by car-sharing companies? Electric cars 109, Hybrid cars 91). This implies that car-sharing users are environmentally conscious and prefer cars that have lower emissions and fuel consumption. This might also appeal to tourists who want to reduce their environmental impact while traveling. The sample of respondents showed that the majority of the respondents are women (416 out of 484), between 18 and 24 years old (367 out of 484), and live in a city (287 out of 483) [Q1 and Q4]. This indicates that the customer segment for a car-sharing company is mainly composed of young urban females, who might have different needs and preferences than other

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segments, such as men, older people, or rural residents. It should be noted that to target this segment, it would be necessary to offer services and features that appeal to them, such as safety, convenience, affordability, and sustainability. The same results also show that the respondents have different reasons for using or not using a car-sharing service. For instance, some of the reasons for using a car-sharing service are parking at the desired destination is too expensive (119 out of 484), emergency (81 out of 484), or transportation strikes (91 out of 484) [Q18]. Some of the reasons for not using a car-sharing service are unavailability of the service in their location (27 out of 484), cost compared to other transportation options (89 out of 484), or inconvenience or difficulty booking/accessing vehicles (20 out of 484) [Q16]. Respondents who have specific needs or pain points that can be solved by car-sharing, such as saving money, avoiding hassle, or having more flexibility, are a major segment. The study revealed also that the respondents have different preferences for the pricing structure and the types of cars offered by a car-sharing service. For instance, some of the preferences for the pricing structure are pay-per-use (152 out of 484), subscription (15 out of 484), or hybrid (121 out of 484). Some of the preferences for the types of cars are compact cars (102 out of 484), electric cars (109 out of 484), or hybrid cars (91 out of 484) [Q22]. Customers who have specific preferences for how they pay and what they drive and offer them options that suit their budget and taste also constitute a market segment. Different usage patterns for a car-sharing service have emerged. For instance, some of the usage patterns are daily (1 out of 484), several times a week (31 out of 484), once a week (37 out of 484), several times a month (61 out of 484), rarely (125 out of 484), or never (33 out of 484) [Q15]. Customers who have different frequencies and duration of use and optimize their fleet size and pricing strategy accordingly are also a major element in the matrix of segmentation.

When analyzing the figure, Free-floating car-sharing accounts for the highest share in both users and vehicle fleet, figuring in the appendix, it was concluded that Germany's car-sharing market's

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development is an essential indicator of the pace at which consumers are moving from car ownership to Mobility-as-a-Service in one of Western Europe's primary automobile markets and a top autonomous, electrified, and shared mobility hub. It also establishes a path for future mobility trends, such as Robo-taxis, Robo-shuttles, aggregate mobility providers, and Urban Air Mobility. The effective implementation of prominent automakers' Smart Mobility strategies in their home market is critical since they cannot miss out on the new revenue streams created by new Mobility Service Providers. These are two major statistics that analyze the registered customers and subscription evolution: In Germany, as of January 2021, there were 2.874.400 registered customers, and in 2020, the number of subscribers contracted by 6.9% to 2.29 million year-on-year but Q1 2021 saw a positive trajectory up by 25.5% year over year” (Exhibit 6). The customer segmentation part of a business model canvas for a car-sharing company involves identifying the different types of customers that the company will target. If the company has a high penetrating strategy in a certain region, it can expect high starting capital, high expenditure on assets, and a high depreciation rate, as vehicles are not fully purchased by the consumer. Instead, they are absorbed by a variety of clients over a number of years. It is important to note that the customer segment for a car-sharing company is usually broad and diverse.

The company may target individuals who need a car for occasional trips or who do not want to own a car, as mentioned on Renault's official website. It may also target individuals who live in urban areas where owning a car is not practical, such as those who live in high-density areas where parking is difficult. Additionally, the company may target businesses that need to transport goods or employees and do not want to invest in a fleet of vehicles. The company must also consider the geographic location of its customers. For example, it may target customers who live or work in a specific area or who frequently travel to a certain region. It is important to understand the demographics of the customer segment, such as their age, income, and lifestyle.

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The Free-Floating car-sharing market is dominated by the four large providers ShareNow (a JV between Daimler and BMW), Miles, Sixt and WeShare (Provided by VW Group). Share Now is a Free-floating car-sharing service. In 2020, around 2.9 million customers used the SHARE NOW car-sharing services, which are available in 16 cities and eight countries. The car-sharing fleet currently comprises around 9,500 vehicles, almost one-quarter of which are electrically powered. (Car-sharing grows in Germany 2021)

This information can help the company tailor its services and marketing efforts to meet the specific needs and preferences of its customers. Another important factor to consider when segmenting customers is their usage patterns. For instance, some customers may only need a car for short trips, while others may require a vehicle for longer periods. The company should also consider the frequency of use, such as daily, weekly, or monthly, and the time of day when the service is most in demand. Understanding these usage patterns can help the company optimize its fleet size and pricing strategy. Overall, a car-sharing company must carefully consider the different types of customers it wants to attract and tailor its services to meet its specific needs. By doing so, the company can optimize its cost structure and maximize its profitability. Customer segmentation is even supported by Machine Learning providing a segment of the population with enhanced accessibility and mobility options and reducing CO2 (Giordano D 2020). Obviously, this impact of ML in free-floating car models enhanced the size of customer segments, making it more and more technological.

4.2.2 Customer Relationships

In order to build and maintain long-term relationships and customer loyalty that may endure over time, the customer-centric strategy is now essential. Customer acquisition is a crucial component of the Customer Relationship Management (CRM) strategy for shared-mobility car companies. This component focuses on the methods and channels used to attract new customers and expand the customer base (Exhibit 7). One effective way for shared-mobility car companies

to acquire new customers is through advertising. Online ads, billboards, and flyers can be used to promote the service and reach potential customers. In addition, partnerships with other companies in the mobility industry can help to expand the reach of the service and attract new customers.

On another level, referrals can also be an effective customer acquisition strategy for shared-mobility car companies. This is basically done by offering discounts or other rewards to customers who successfully refer new users. It is essential for shared-mobility car companies to have a well-thought-out customer acquisition strategy to ensure a steady flow of new customers. As our research revealed, these referrals involve identifying the target audience and tailoring the marketing approach to appeal to their specific needs and preferences. By effectively implementing customer acquisition strategies, shared-mobility car companies with a free-float business model attract new customers and achieve sustainable growth. On the other hand, customer retention is a critical part of CRM that involves keeping customers loyal and returning for more. To achieve this, we witnessed personalized communication, loyalty programs, and exceptional customer service, to be a point in common between major players of the industry adopting the innovative business model. Continuously tracking customer satisfaction and feedback is crucial for successful companies, and they justify it by the enormous improvement of the overall customer experience. In this competitive market, it is important to keep customers loyal and to come back for more. To achieve this, personalized communication, loyalty programs, and exceptional customer service make a permanent part of the CRM box within the business model canvas. Moreover, personalized communication involves tailoring communication to individual customers based on their preferences and behaviors is also remarkable, for instance, ShareNow is sending targeted emails with promotions or offers that are relevant to my past behavior as a prospect. Loyalty programs can tend to be an effective way to incentivize customers to continue using the service, which

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constitutes a major advantage. This may involve offering discounts, free rides, or other rewards for frequent use.

We estimate that exceptional customer service is critical in retaining customers as well. This may involve offering multiple channels for customer support, such as email, phone, and chat, and ensuring prompt and effective resolution of any issues. According to their official websites and the cookies system we witnessed, we conclude that it is important to continuously track customer satisfaction and feedback to improve the overall customer experience. By prioritizing customer retention, shared-mobility car companies with a free-float business model can build a loyal customer base and increase profitability over time.

Providing exceptional customer service is also crucial to this component, especially to retaining customers and building a positive reputation. This involves offering multiple channels for customer support, such as email, phone, and chat, and ensuring prompt and effective resolution of any issues. In the shared-mobility car industry, exceptional customer service is paramount to ensure customer loyalty and repeat business. Providing multiple channels for customer support makes the user feel heard and valued. The free-float business model requires a high level of customer service as it allows customers to pick up and drop off cars at various locations, which may lead to potential issues or questions. Prompt and effective resolution of any issues is also critical in maintaining customer satisfaction. This may involve providing customer service representatives with the necessary training and resources to handle any potential problems efficiently. In fact, according to the questionnaire results, it resulted that many people believe that providing better customer support could increase the overall customer experience (Exhibit 4, Q21) Additionally, implementing a system for customers to provide feedback and suggestions constitutes a major pillar of this BMC, to further improve the customer service experience and increase customer loyalty. Overall, providing exceptional customer service not only retains customers but also builds a positive reputation for the shared-mobility car company.

In a competitive market, a positive reputation can set a company apart and attract new customers, leading to increased profitability and sustainability.

Finally, effective data management is key to optimizing customer relationships. This involves collecting and analyzing customer data to gain insights into their behavior and preferences. This includes tracking usage patterns, preferred routes, and payment methods. This information is then used to personalize communication and tailor offerings to individual customers. Effective data management helps companies gain valuable insights into our behavior and preferences. This information can be used to provide personalized services and tailored offerings to meet individual needs, thus enhancing the overall customer experience.

By analyzing this data, shared-mobility car companies identify opportunities to improve their services and address any pain points or issues that customers may have. For example, if customers consistently report long wait times for vehicles during peak hours, the company could consider increasing the number of available cars or adjusting pricing during high-demand periods. By effectively managing these components of CRM, free float shared car innovative business model can establish long-lasting relationships with customers, resulting in a sustainable and profitable business.

4.2.3 Channels

The free-floating car-sharing model typically relies on mobile apps as the primary channel for customers to access vehicle services. In addition, other communication channels are also used to reach customers, such as email, SMS, or push notifications through the app. These channels can be used to provide updates on reservation confirmations, trip details, or reminders to end the rental period and park the car appropriately. Marketing and promotional channels for free-floating car-sharing services can include social media, online advertising, and partnerships with other transportation providers or local businesses. For example, a free-floating car-sharing company may partner with a public transit agency to offer discounted rates for customers who

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use both services (e.g., Enjoy which partners with Trenitalia, the main public Italian company responsible for the management of passenger rail transport).

The mobile and online app is the primary channel, point of interaction between the customer and the company. Customers use the app to book a car, unlock it, and start driving. The apps estimated present on the market tend to be user-friendly, efficient and offer a seamless experience for the customer.

First, it is ensured that the app has a user-friendly interface, thus, one of the most important aspects of the mobile/online app channel for a free-floating car-sharing is to offer a user-friendly interface that enables customers to easily reserve and unlock cars. The apps share the faculty of allowing users to search for available cars, view their locations and details, and make reservations in real-time, enabling customers to unlock the car using their smartphone, and provide clear instructions for pick-up and drop-off locations.

Another crucial point is the personalized services of this channel, the app can be used to offer personalized services to customers. For example, the app can provide customized recommendations based on a user's past reservations, preferred vehicle type, and driving habits. It can also offer discounts and promotions to encourage repeat usage. Customers of this innovative BMC can view their usage history, receive invoices, and make payments directly through the app. Finally, the feedback and ratings features, as the app is used to collect feedback and ratings from customers to improve the quality of the service. Drivers are thus able to rate the vehicle and the overall experience and provide suggestions for improvements. The app provides simultaneously a channel for customer support in case of any issues or complaints (e.g., ShareNow app).

Social Media is the secondary channel. Companies in the car-sharing industry are leveraging social media platforms such as Twitter and Instagram to connect with both potential and existing customers. By using these platforms, they can increase brand awareness, build a loyal

customer base, and create a strong online presence. One way that car-sharing companies are building a loyal customer base is by providing engaging content that resonates with their audience. For instance, European car-sharing companies have been posting daily pictures of cars in scenic locations or sharing stories of happy customers who have used their service. This type of content helps to build an emotional connection with customers and encourages them to use the service more frequently. Moreover, social media platforms are also used by car-sharing companies to offer promotions and discounts to customers. For example, they might provide a discount code for first-time users or implement a loyalty program that rewards frequent use of the service. This can incentivize customers to use the service more often. Finally, car-sharing companies are also leveraging user-generated content to increase brand awareness and build social proof for their service. Customers can post pictures of themselves using the car-sharing service on social media with a specific hashtag, which helps to showcase the service and its benefits to potential customers. In conclusion, social media has become an essential tool for car-sharing companies to reach out to customers, increase brand awareness, and build customer loyalty.

Partnerships are the third channel, can be an effective strategy for shared-mobility car companies with the free-float business model to expand their reach and offer additional services to their customers. The first step in utilizing partnerships is identifying potential partners in the mobility industry: car manufacturers, parking lot operators, and public transportation companies. To integrate partners into the car-sharing platform, car-sharing companies often exhibit their brand names on their platform, while a car manufacturer provides a fleet of cars that can be integrated into the company's platform. Once the partnership is integrated, car-sharing companies market the partnership to their customers through various channels, such as email marketing, social media, and in-app promotions. Through regular analysis, they can make necessary adjustments to maximize the benefits of the partnership and evaluate performance.

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The customer support center is the fourth channel, and it is a critical element of the business model for a car-sharing company. A customer support center is crucial for a car-sharing company to ensure that customers receive timely assistance. The latter is usually easily accessible through different channels such as phone, email, smartphone application.

First, a customer support center offers phone support to customers who have questions or concerns. A dedicated team is usually hired by the pioneers of the industry to handle customer calls, with a focus on providing timely and effective solutions. Moreover, email support constitutes an efficient way to handle customer queries, as customers can send their questions or concerns at any time of the day. A dedicated team is also hired to handle customer emails, with a focus on providing quick and helpful responses.

In fact, feedbacks and complaint management play also a major role in this component, as the customer support center can also handle customer feedback and complaints. This can help the car-sharing company to improve its services and address any issues that customers are facing. The last channel is advertisement, illustrated by the Exhibit 8 figuring in the appendix, which title is Electric car-sharing penetration in Germany in 2021. This shows the direct effect of post-covid successful advertisement channel for car-sharing free floating model industries in Germany. To reach out to potential customers and increase brand awareness, car-sharing companies can use advertising. However, this can be a significant cost for the company, and therefore, it requires careful planning and execution to ensure a good return on investment. Some specific examples of these channels include Online Ads, as major car-sharing companies use cost-effective online ads such as Google Ads or social media ads to target specific demographics or geographic locations. Secondly, Billboards, Car-sharing companies also use billboards in high-traffic areas like highways, downtown areas, or popular tourist destinations to reach many people in a specific area.

4.2.4 Cost Structure

The car-sharing industry is widely recognized as a strategic area of investment for automotive manufacturers in the pursuit of future growth opportunities. To date, established car-sharing companies have been engaged by these manufacturers through joint ventures or acquisitions. Share Now, for instance, is a product of the merger of two distinct companies, car2go and Drive Now. During its formative years, car2go was a pilot initiative launched by Daimler Group (72.8% stake) and Europcar (27.2% stake). Daimler Group is renowned for producing a wide range of vehicles, including Mercedes-Benz and Smart, while Europcar is a prominent player in the global car rental industry. Through this collaborative arrangement, both entities were able to leverage their respective competencies. Europcar gained access to exclusive pricing for purchased vehicles or even received them at no cost in exchange for handling fleet management and customer service. Similarly, Drive Now, which was owned by BMW Group - a manufacturer of BMW and Mini automobiles - established a joint venture with Sixt-SE, a car rental company, mirroring the approach taken by Car2go.

This being said, it is certainly useful for car companies to search for synergies with established partners in the mobility market to maximize the rentability of their business and vice-versa, whether because of expertise or higher cost-effectiveness. It is particularly relevant in this sector to achieve joint ventures because of the much higher costs (and with that, high risk) that the business would have to incur to offer the service if no ventures were made.

A car-sharing company's cost structure is complex, and it is subject to several factors in the automobile market and how the cars are taken care of by clients.

To operate, the company has to have its service base, a vehicle. A car-sharing firm that has a high penetrating strategy in a certain region can expect a high starting capital, high expenditure on assets, and a high depreciation rate as vehicles are not fully purchased by the consumer as in a car manufacturer company, but rather absorbed by a variety of clients over several years.

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The fact that the product offered in the service is being depreciated by the usage of the company (and not attributed financially to the clients) can play a role of tax-saver, as depreciation values are subtracted from the Operational Value, thus reducing the cprofit that is subject to tax. As referred to above, if the company finds it advantageous, instead of a full vehicle purchase/ lease by the firm, a joint venture can be agreed upon with a car manufacturer. It is also important to note that a vehicle is made of numerous parts (30,000 on average), so there's a high exposure to price fluctuation (supply chain problems) that could increase the spending that the company predicted when elaborating the purchase plan of a fleet of cars, for example, or to replace damaged/worn parts of its vehicles. This being said, generally, the fleet acquisition is the main fixed cost in a car-sharing company.

Across all European continents, car insurance is mandatory. There are two main types of car-insurances, with certain additional coverages that can be added: third-party insurance and comprehensive insurance (Allianz 2023). The company has to make insurance for each of its cars to be eligible to be driven in the region. The premium paid varies according to the insurance provider, the type of vehicle, geographical location, the type of insurance cover the company has decided for, and add-on coverages. An insurance premium can increase if the vehicle is in an accident where its driver had the fault or if it receives a traffic violation. The premium is reviewed in 6 months or 12 (depending on the provider) and analyses the driver's habits and record. In the case of a car company, the same vehicle is driven by numerous clients in the course of 6 or 12 months and much more often than a personally owned car, which can increase the probability of a collision or traffic violation, thus increasing the insurance cost for the company. It is important to note that the customer is always responsible for bearing all costs related to traffic violations or accidents where it had the fault (ShareNow GENERAL TERMS AND CONDITIONS 2023).

Group part

The company has also to incur operational and administrative expenses such as office rent, employees' salaries, utilities, software, and technology. In a carsharing company, the cost structure is characterized by a high portion of fixed costs such as information systems developments to operate the app and the interface. We can state that this is one of the main fixed costs of a firm in this sector, as it doesn't need several offices like car rental companies due to the fact that the service is app-based and not in-person based. The customer service is online or by phone and the booking of cars is made in an app, with no necessity of signing a contract, paying a security deposit, etc. (Ferrero, Perboli, Musso, Vesco 2018)

The company has costs related to maintenance or fueling. Depending on the type of vehicles that are made available by the company (electric, hybrid, or combustion), fueling costs can become a relevant variable cost in its cost structure. Maintenance costs are highly dependent on the type of usage by the clients and road quality in the region. One important aspect is that if there are many cars without energy/fuel at the same time, the demand can be higher than the offer, and that can cause present clients or potential ones to feel unsatisfied and don't use the service. Therefore, many car-sharing companies like ShareNow, to minimize employee costs, attribute rewards to a client that is willing to fuel the car or recharge it at a charging or gas station. In this case, ShareNow gives 5,00€ of credit to a customer that re-fuels a vehicle with less than 40% of fuel or recharges a car that has less than 35% of battery, constituting a cost for the firm as well. In this way, the company potentializes the availability of its fleet and improves customer satisfaction.

The company can also have costs due to parking. Depending on the region and possible agreements made with municipalities, certain companies can have free parking, special parking prices, or normal parking prices. For example, in Lisbon, Portugal, a person who owns an electric vehicle pays an annual fee of 12€ to EMEL (parking company operating in Lisbon, owner of parking concessions) for a Green Card and the vehicle can be parked anywhere in the

city (except restricted parking spots/areas), in contrast to a normal Resident Card, in which the vehicle can only be parked in two adjacent areas to the person's area of residence.

Finally, the company, like every business, has to incur legal fees for acquiring licenses to be eligible to operate in a certain area. The amount that is charged by the government or the municipality varies, depending on the country and even on the city, and varies also according to the type of business that wants to obtain the license.

4.2.5 Revenue Stream

The car-sharing industry differs from a traditional automotive industry in many components, namely the revenue flows. In a traditional car dealer, let's say, the car is fully sold with the option of credit or "a pronto". In a car-sharing company, the vehicle is previously acquired by the company (or supplied in a case of a joint venture or a commission deal with the car manufacturer) and the client uses the vehicle for a limited time according to its intention.

The paper is going to base its definition of the revenue stream on the rates of two of the main players in Europe: Enjoy, and ShareNow. Only common streams are going to be highlighted in this chapter. It is important to note that even on common streams there are differences, whether in pricing, mileage limit, etc.

In the context of the car-sharing industry, a source of revenue for companies is the base fee charged to customers upon unlocking the vehicle doors, constituting a fixed fee. Both companies share a similar three-tiered rate structure, which includes a pay-per-minute rate with a distance limit, with the limit differing between the two. The final revenue for the company is determined by multiplying the duration of the trip (in minutes) by the corresponding rate. Both also present an hourly rate and a daily rate based on the distance traveled and not on the time traveled. The lack of annual financial reports by even the major players in the car-sharing industry in Europe obliges one to assume that these are the major revenue flows for a typical company in the sector due to being the core service of the business.

Group part

In specific regions where free parking is not available for car-sharing vehicles, both companies levy drop-off and pick-up fees in designated zones, such as airports, train stations, and other exceptional locations (Exhibit 9). Upon returning or picking up a vehicle in such locations, clients are charged a fixed fee that is added to the final cost of their trip, contributing to an increase in the gross revenue for the company.

Upon analysis of the terms and conditions of both companies, it was discovered that a notable number of exceptional fees exist, including administrative fees for processing traffic violations incurred by the client, interventions required for vehicle cleaning, failure to comply with customer service instructions, improper return of the vehicle (e.g., leaving windows open, lights on, etc.), fees related to cross-border travel, loss of provided materials, and so on. These fees are indicative of the comprehensive approach taken by both companies to safeguard against losses and optimize profitability, as they represent additional revenue streams beyond the core services provided.

An additional source of revenue shared by the two players is the imposition of a fee on clients for extended bookings of car-sharing services. In cases where a reserved vehicle on the street remains unutilized for more than twenty minutes beyond the scheduled pickup time, the client is charged an extended booking fee, calculated by multiplying the duration of the delay by the applicable rate per minute.

Finally, both companies also impose fees on clients for exceeding predetermined time or distance limits for their booked journeys. In such instances, clients are charged for additional minutes or kilometers at a rate determined by the company, calculated by multiplying the number of minutes or kilometers exceeding the limit by the corresponding rate, and added to the final cost of the trip.

5. Recommendations

In this chapter, three different recommendations will be presented. The main aim of this section is to suggest improvements to the business model of the free-floating car-sharing as well as fixing the main problem of the business that historically has been driving several operations to shut down in different areas, the vehicle distribution. The second recommendation is focused on filling a marketing and sales gap that it's not being properly capitalized, as concluded by the research made, in the tourism channel. Finally, the third recommendation aims to increase the number of potential customers to the business through educating and creating awareness in the general population for the benefits of using a car-sharing service for both an individual himself and the community.

Despite observing general growth in the last few years in the car-sharing industry as well as fast-growing projections, it is believed that the business can be even more profitable, by reducing operational costs and increasing revenue channels, and is not properly recognized as an efficient alternative to the famous car-ownership.

The recommendations are thoroughly described in the following sub-chapters, highlighting the “why is it pertinent”, the “how is it achieved” and the “what are the consequences derived”.

5.1 Solving the Vehicle Distribution and Availability Issues

Based on our research, one of the main pain points of car-sharing is the availability of cars in several locations during peak hours. Several scientific publications focus on relocating strategies for the companies, in an attempt to solve this problem which harms the customer intention to use the service. So, it is obvious and essential that a solution to this problem is suggested in this paper. In this first recommendation, it is important to note that it will be a combination of diverse strategies which are considered to be the most efficient way to reduce the unavailability of cars without compromising the company's financial position, in other words, to invest heavily in more cars with the risk of the revenue per car decreasing.

A car-sharing business model fits into the concept of traffic and vehicle efficiency, where the goal is to transport the maximum number of people with the minimum amount of cars, prioritizing the customer's choice of being able to ride alone, differing then from public transportation. The question lies on “how to potentialize to the maximum this efficiency?” As referred, one of the main problems of a car-sharing company is to guarantee that there are available cars in a certain location that satisfy the demand at a certain time. Car-sharing services are a popular choice for people who don't own their own vehicles but still want the flexibility and convenience of being able to drive when they need to. However, one of the biggest challenges that car-sharing companies, and any car owner, face is parking availability. Even though users don't have to worry about buying, maintaining, or storing their own cars, finding a parking spot can still be a major hassle.

To address this issue, one potential solution is to develop a system that displays real-time parking saturation in areas of the city where the car-sharing service is operating. Through research, it was found many Vehicle Detection Sensors suppliers, for example, SmartParking. SmartParking provides the physical sensor, installs it in the desired location, and has real-time parking information in its cloud, which could be then integrated into the car-sharing company app. This would allow users to quickly and easily find available parking spots near their desired destination. In order to implement such a system, car-sharing companies would need to work closely with local governments to secure permission to use proprietary parking on the street. Ideally, this Vehicle Detection Sensors would be acquired by the municipalities and not by the company itself, as SmartPzaking, for example, have one specific service for councils and municipalities.

The benefits of this solution would be three-fold. Firstly, it would be a major convenience for users, who would no longer have to waste time circling around looking for a place to park. For example, if someone needs to go to an important meeting or appointment, they can simply enter

their destination into the system, and it will show them the nearest available parking spot. This would save them time and reduce stress, allowing them to focus on the task at hand rather than worrying about where to park.

Secondly, this solution would also benefit car-sharing companies themselves. By providing a more streamlined parking experience for users, they would be able to differentiate themselves from other modes of transportation and potentially attract more customers. In addition, by working with local governments to secure parking spots, they would be able to build stronger relationships with these key stakeholders and demonstrate their commitment to being a responsible and sustainable transportation option. The most important consequence, however, is the fact that the company uses its customers to spread its vehicles and not concentrate them into one congested area, because with this tool the customer can see other parking areas that are less saturated, thus leaving the cars more distributed throughout the city.

Of course, implementing such a system would not be without its challenges. For example, it would require a significant investment in technology and infrastructure, as well as ongoing maintenance and updates. Additionally, there may be concerns around privacy and data protection, as the system would need to collect and store information about users' locations and parking habits.

Thirdly, the implementation of a real-time parking saturation system in areas where car-sharing services operate could yield significant benefits to the municipality. By forging partnerships with car-sharing companies and providing proprietary parking spots on the street, the municipality could effectively address issues of traffic congestion and parking shortages in heavily trafficked areas. By facilitating quick and easy access to parking spots via the car-sharing service, individuals may be more inclined to adopt this mode of transportation, potentially leading to a reduction in the number of private vehicles on the road, and subsequently, less traffic congestion and improved air quality. According to a report from the

European Union, 70% of its population lives in urban areas and the number is expected to increase to 80% by 2050. The same report states that, through a study, it was concluded that a 10% decrease in traffic congestion could mean a 2,9% increase in productivity and in highly congested areas it could go up to 30% gains. Moreover, traffic congestion costs, per year, an estimated 110 billion euros, which makes up for 1% of the European Union GDP. Not only the traffic congestion impacts heavily the environment and urban population health (96% of the European population is exposed to urban pollutants that the WHO considers damaging to health) but it also impacts the overall economy of a country. This being said it's concluded that an investment in efficiency in urban mobility constitutes an essential factor for a nation and its inhabitants to thrive and succeed. (European Court of Auditors 2019).

Overall, however, the benefits of a real-time parking saturation system for car-sharing services are clear. By making it easier for users to find parking spots and reducing congestion on city streets, this solution has the potential to revolutionize the way we think about urban transportation. It may require some upfront investment and collaboration, but the rewards for car-sharing companies, customers and governments could be substantial.

But this doesn't clearly solve one other major problem that car-sharing companies have, which is having sufficient cars available at peak hours close to the most saturated areas. Many customers that had the luck of parking in front of their office in one of the proprietary parking spots may not find the same car or even personally considered nearby cars. That being said, one possible measure to increase the availability of cars in peak hours in saturated areas could be to integrate a peer-to-peer model in which the car-sharing company would pay an increased commission to the car owner who is providing his vehicle to the service. For example, between 4 pm and 6 pm in the busier areas, the vehicle owner who decides to make his car available for renting earns a 30% commission instead of 20%.

By integrating a peer-to-peer car-sharing model into their service, free-floating car-sharing companies can potentially overcome this challenge by leveraging the underutilized vehicles owned by community members.

Peer-to-peer car sharing allows individuals to rent out their personal cars to other individuals through an online platform. By integrating this model into the service offering of free-floating car-sharing companies, car owners can offer their cars to the company during peak hours, allowing the car-sharing company to increase the supply of available cars without having to invest in more cars themselves. In turn, this can potentially lead to more efficient service delivery, higher customer satisfaction, and increased revenue for the car-sharing company.

However, implementing a peer-to-peer car-sharing model in conjunction with a free-floating car-sharing service requires careful planning and execution. One of the main concerns is quality verification, as the car-sharing company needs to ensure that the cars offered by community members meet the required standards. This can be achieved through rigorous checks and inspections to ensure that the cars are in good condition and meet safety standards.

Another concern is insurance coverage, as the car-sharing company needs to ensure that both the car owners and renters are adequately covered in case of accidents or other incidents. Liability issues also need to be addressed, as the car-sharing company needs to establish clear guidelines and communication channels to ensure that all parties involved understand their roles and responsibilities.

Despite these challenges, integrating peer-to-peer car sharing into the service offering of free-floating car-sharing companies has the potential to provide an innovative solution to address the issue of car availability during peak hours while also providing an additional income stream for car owners. By carefully planning and executing this model, car-sharing companies can potentially achieve a competitive advantage by providing a more seamless and efficient service delivery, thereby increasing customer satisfaction and loyalty.

5.2 Creating New Partnerships and Constant Revenue Streams

The survey results reveal that vacation periods are one of the most likely scenarios for using a car-sharing service (Q18, with 171 respondents choosing this option). This suggests that car-sharing is a viable alternative to car rentals for tourists who want to explore different attractions and destinations in a new city. This also aligns with the trend of mobility in tourism, as car-sharing services can offer convenience, flexibility, personalization, and sustainability to travelers and hospitality providers. The survey results indicate that electric cars and hybrid cars are among the most desired types of cars for car-sharing users (Q22, with 109 and 91 respondents choosing these options respectively). This implies that car-sharing users are environmentally conscious and prefer cars that have lower emissions and fuel consumption. This might also appeal to the German car-sharing market, as Germany is a top autonomous, electrified, and shared mobility hub, and has ambitious goals to reduce its greenhouse gas emissions by 2030. Based on these reasons, it is concluded that, potentially, tourists prefer car-sharing over renting a car according to the survey.

The first recommendation would be to establish partnerships with hotels and hotels brokers (e.g. Booking, Trivago), global travel search websites (e.g. Momondo, SkyScanner), and travel agencies in countries where the business is operating. By advertising there, and offering discounts to guests and passengers to overthrow car rentals, tourists can be a constant revenue channel for the company during their stay and a driver of relocating vehicles as well (they don't have the same schedules as a worker). In this context, the recommendation is to identify and contact hotels that are in areas where the car-sharing service operates or plans to expand, as well as explore which travel websites are most used for searching European flights. The company should present its value proposition and benefits, such as generating additional revenue and enhancing the hotel/travel agency's image as a sustainable, innovative, and ethically responsible business. A very pertinent recommendation would be to negotiate and

agree on the terms and conditions of the partnership, such as the duration, scope, and exclusivity of the agreement, the commission that the business will receive for each referral or booking, and the responsibilities and obligations of each party. The car-sharing company should therefore provide the desired partnered business with promotional materials for example, and tools to advertise the car-sharing service to its guests, such as brochures, flyers, posters, banners, or digital displays. The promotional materials should highlight the advantages and features of the car-sharing service, such as cost-effectiveness, convenience, flexibility, variety, and sustainability. The promotional materials should also include a special code or link that guests can use to access the car-sharing app and receive a discount on their first ride, or a free trial period as big-scale worldwide known groups in different sectors offer. It would be also recommended to offer incentives and rewards to hotel guests who use the car-sharing service frequently or for longer periods of time, such as additional discounts, free upgrades, and loyalty points. These incentives and rewards should aim to encourage repeat usage and consequently increase the retention of customers, as well as word-of-mouth referrals and recommendations. Last, but not least, it is a necessary part of the solution to monitor and evaluate the performance and impact of the partnership, using KPIs such as the number of referrals, bookings, rides, revenue, customer satisfaction, feedback, and retention. The company and the business with which it has partnered should also communicate regularly to solicit suggestions on how to improve and optimize the partnership. It is assumed that these recommendations would increase the customer base and revenue of the car-sharing service by targeting tourists who are looking for an alternative and flexible way of traveling in a new city. It would also create a win-win situation for both the car-sharing company and the hotel partners, as they would benefit from each other's network, reputation, and resources. Moreover, it would reduce the need for relocating vehicles by matching supply and demand more efficiently.

Through this study, the conception and development of an app, serving as a special page for tourists, with routes to monuments, where to park, etc..., could also be beneficial, as it would offer a more personalized service. Although it's for tourists, this would be accessible to everyone. The information should include the address, opening hours, admission fees, and a brief description of each attraction. The app should also provide guidance on where to park the car-sharing vehicle, near each attraction, for example, such as designated parking spots, public parking lots, or street parking. The guidance should include the availability, cost, and duration of parking, as well as any restrictions or regulations that apply to the case of usage. Furthermore, this solution should allow users to create their own customized routes based on their preferences and interests. Users should be able to select which attractions they want to visit, how long they want to spend at each one, and how they want to travel between them (e.g., by car-sharing vehicle, public transportation, walking, etc.). The app should then generate an optimal route that minimizes travel time and cost and maximizes user satisfaction. This recommendation would also offer some predefined routes that cover the most popular and recommended attractions in each city. Users should be able to choose from different themes or categories, such as cultural, historical, natural, or fun. The app should provide a brief overview of each route, including the number of attractions, the total distance and duration, and the estimated cost. Users who live in the city or visit frequently might also benefit from discovering new places or revisiting old favorites. The app should allow users to rate and review each attraction and route they visit and share their feedback and suggestions with other users. This recommendation would enhance the user experience of the car-sharing service by providing more value and convenience to users who want to explore different cities. It would also attract more potential customers who are looking for an alternative and flexible way of traveling. Moreover, it would increase brand awareness and the reputation of the car-sharing company as

a provider of not only transportation but also a more personalized service, differentiating them from car-rentals.

5.3 Improve Brand Awareness while Augmenting the Channels available

It is always less doubtful how smartphone applications and fully digital platforms are revolutionizing the way people buy and access goods as well as services. As analyzed, accessing public and private transport has taken a new direction in the last decades: the collaboration among different means of transportation has allowed users to benefit from tailor-made trips. In this scenario and given the results of the online questionnaire of own elaboration, it is possible to identify a gap between the car-sharing service itself and the common approach customers have towards it. Indeed, it has been clear how the majority of the respondents were not even conscious of having such a unique transportation opportunity like the car-sharing service: in fact, according to the survey's results, 71% of the respondents are not aware of any car-sharing services in their area (Exhibit 4, Q10), demonstrating that such an innovative service it is not well-known and utilized. In analyzing the real number of users, according to the survey, it is even more obvious how the majority of the respondents have not been direct consumers, with a total of 74% that never used a car-sharing service before the survey (Exhibit 4, Q11). Intending to go into more detail, one of the major aims of the survey was also to deeply understand clearly and concisely the reasons why people generally decide to opt for such a service. The main reason for using a car-sharing service seems to be the convenience of pick-up and drop-off locations, with the possibility for rentals to be accessed at any time and easily within a specific area. Other two important reasons are the cost-effectiveness of the service and its flexibility, enabling not only the consumer to choose a more spontaneous mobility option but also a more decisive transportation cost cutting, with no fuel costs, road taxes, insurance costs, tire changes, potential parking fees on the consumer back. A less valued reason, but still relevant, regards the possibility of being independent of public transportation and infrastructure,

allowing consumers to have a more fast and easy option at their fingertips. While the less “voted” reason resulted to be the sustainability side of this service, with just 4 votes out of 96 respondents, demonstrating the poor overall knowledge of the potential of the connection between sustainability and the car-sharing industry. (Exhibit 4, Q12). The rationale behind this recommendation begins with this data just proven, with the final goal to show the positive outcome that everyone may gain from this service’s aspect.

As a conclusion, a higher effort should be placed on establishing correct knowledge and education over the availability of car-sharing providers in several areas across Europe, along with the major benefits correlated. This goal could be accomplished through several methods, mainly with the use of marketing and advertising, but also by augmenting the processes through which the various customer segments could be reached.

Regarding the first one, it is proven how marketing plays a crucial role in increasing visibility and brand awareness. The techniques are manifolds, from online to offline. In this specific case, it is believed that adopting a mix of the two approaches could be a quick-win path due to the car-sharing fully digital nature but also due to the physical presence of the service within the cities.

Communicating the flexibility and sustainability aspects could increment the number of active users. This could be accomplished through higher involvement of the companies on digital and social media by augmenting the interactions with the audience but also by investing in billboard advertising in city centers, and next to big venues such as highways, airports, and the most congested areas of the cities.

Furthermore, smart technology, through the use of big data, machine learning, and AI gives a sense of simplicity in booking, accessing, and using car sharing, increasing the service friendliness. This could be maximized by investing in on and offline Maas (Mobility as a Service), in order to improve city functioning and better integrate personal mobility with

deliveries, besides obtaining a valuable return on investment. MaaS platforms transform the access and use of transportation into a flexible and on-demand model that can ensure users are provided with a variety of travel options, for instance, integrating vehicle-sharing apps and public transportation such as trains, buses, and subways. It could be stated that MaaS aggregators work as “mobility hubs” since all the necessary information within the customer journey are incorporated, from the ticket counter to the payment, from all the mobility solutions available in a city (MaaS Alliance 2021).

More concretely, the platform will allow for consultation on timetables, rates, and proposed routes with different modes of transportation, matching the client’s request. Additionally, it directly offers the opportunity to pay for the specific journey (pay-per-use). A second level of this platform also already exists (e.g., Whim, active in Helsinki), which, through a subscription model, it could offer broader and quicker access to a range of means of transportation, working as a “universal” ticket (Dans 2018).

This single point of access could ensure that the ecosystem as a whole operates more efficiently. From the car-sharing provider's perspective, this new way of offering the service could be helpful in reaching a higher volume of customers, since it will be scalable on a new channel, while, on the other hand, the customer could dispose of a more personalized choice of mobility, according to own needs while feeling a higher level of user orientation service. Lastly, the public sector would also benefit from a more effective transportation system while remodeling the management of traffic congestion, incidents, and road space (EPOMM 2017).

6. Limitations and Conclusions

This last session of the work project aims to highlight the limitations encountered while conducting every step of the research as well as sum up the main insights derived from analysis and the evaluation of the car-sharing free-floating business model presented as conclusions.

6.1 Limitations and Future Outlook

When elaborating on a research paper, it is common to encounter various limitations that can impact the quality and validity of the study, for this reason, the main pain points that could impact the evaluation of the work project are presented in the following.

Firstly, a strong limitation impacting the elaboration lies in the type of resources used. In fact, the main sources of information were secondary data. Although the quality of data has been checked and evaluated as appropriate by the authors, there has been a higher relevance on secondary data rather than on primary data. This was due to a poor availability of primary research works regarding the industry analyzed given the young development and the continuous changes happening in the sector. For instance, a lack of financial reports published by the companies was faced. Since, most of the car-sharing companies analyzed are privately held, or subsidiaries of traded companies, finding disclosed information, such as annual reports, on the “health” of the companies and on their business profiles has been challenging. As a result, secondary sources such as news articles, and industry reports, have been consulted, although may not be accurate or complete as company information is directly disclosed by businesses.

Another limitation encountered was the **difficulty in being in contact with industry experts in order to have closer insights into the field**. In fact, no interviews with experts working both in different companies or involved in the industry of car-based shared mobility and precisely car-sharing have been reached.

On the other hand, as of primary source, an online questionnaire internally designed has been developed. However, the majority of the respondents resulted to be Portuguese, women, and between the age of 18-24 years old deriving potential bias conclusions. Indeed, this could limit the generalizability of findings, as the car-sharing industry may operate differently depending on the specific region or country.

To ensure a representative sample of participants, specific surveys could have been conducted, limiting the nature of respondents to their country of residence. Accordingly, given the still early stage of development and awareness of the shared mobility sector, it is difficult to make predictions. Once more data will be disclosed and the overall sector will be more stable, it would be interesting to analyze the different scenarios within Europe comparing country to country as well as investigating the car-based shared mobility development at a global level. Moreover, having a deeper look at the growing trends, mainly focusing on innovative technology and connectivity, could draw a more specific path of how customer behaviors are changing and impacting mobility along with the car manufacturers industry.

6.2 Conclusions

The mobility industry has changed significantly in recent years and sustainable business models have emerged as a critical solution to the traditional business models based on car usage. Indeed, as reported, the highly competitive scenario made it possible to have a vehicle-based service provided with several shades. The car-sharing offering is one possible solution that presents itself in different ways: P2P, stationed based and free-floating. Among the benefits they provide are: help in reducing cities' congestion, air pollution but also contributing to reducing the shortage of parking spaces.

Car sharing are business models that allow the customer to access car-sharing via a smartphone application while allowing providers to establish a strong relationship with users and having a recurring source of revenue.

By analyzing the free-floating type of model, it emerged the impact that partnerships play in the overall business. For instance, car-sharing providers are not owners of vehicle fleets, but they rather enter into partnerships with car manufacturers. Several of the key activities are performed in collaboration with external parties in terms of the usage of resources or outsourcing of tasks. This leverages the business by leveraging efficacy on business development. Furthermore, it emerged how companies could deal with costs and revenue structures differently: the revenue models implied by the companies taken into consideration are often pay-per-use, subscription, or hybrid models. This model could be seen as sustainable due to its potential attractiveness to local inhabitants and also travelers. In this situation, the business model and its value proposition can substitute for the sale, lease, or rental of cars.

Nevertheless, what concerns Europe, there is a consensus among reports that the revenues coming from the ride-hailing businesses are actually higher than the ones generated from car-sharing businesses, and it is undeniable that in terms of brand awareness, Uber-kind providers are leading the market. This being stated, to turn the current situation and increase their performance, car-sharing businesses need to narrow this gap and expose themselves more directly to the portion of target customers.

Overall, considering young people's behaviors and their preferences for sharing rather than owning the near future is likely to be positive and on growth. In the upcoming years, car-sharing companies are likely to gain a more important role in the urban mobility sector, with car manufacturers already turning their attention to a possible dramatic shift in customer patterns with the certain introduction of autonomous vehicles.

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Appendix

Exhibit 1 – Car-sharing users (in Millions) from 2011-2020

Exhibit 2 – Passenger car ownership in Europe

Exhibit 3 – Online questionnaire

Exhibit 4 – Online questionnaire results

Exhibit 5 – Car-sharing: key players operating in Europe (market shares)

Exhibit 6 – Free-floating car-sharing accounts for the highest share in both users and vehicle fleet in Germany

Exhibit 7 – Tasks operated by CRM Software

Exhibit 8 – Electric car-sharing penetration in Germany in 2021

Exhibit 9 – ShareNow coverage parking area in Berlin

Exhibit 10 – Revenue car-sharing 2017-2027 in Europe

Exhibit 11 – Free-floating car-sharing Business Model Canvas

Exhibit 1 – Statista – Car-sharing users (in Millions) from 2011-2020

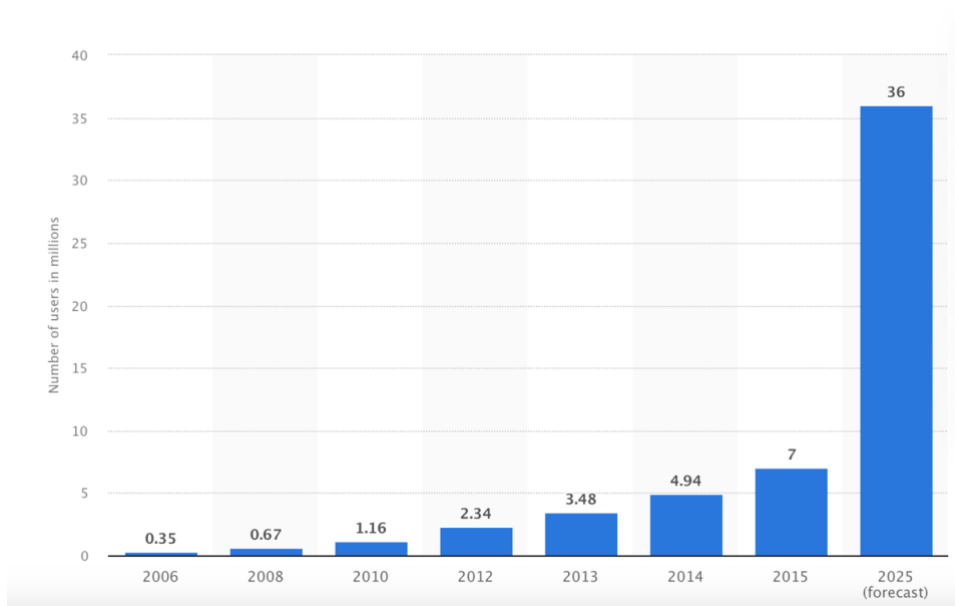


Exhibit 2 – European Environment Agency – Passenger car ownership in Europe

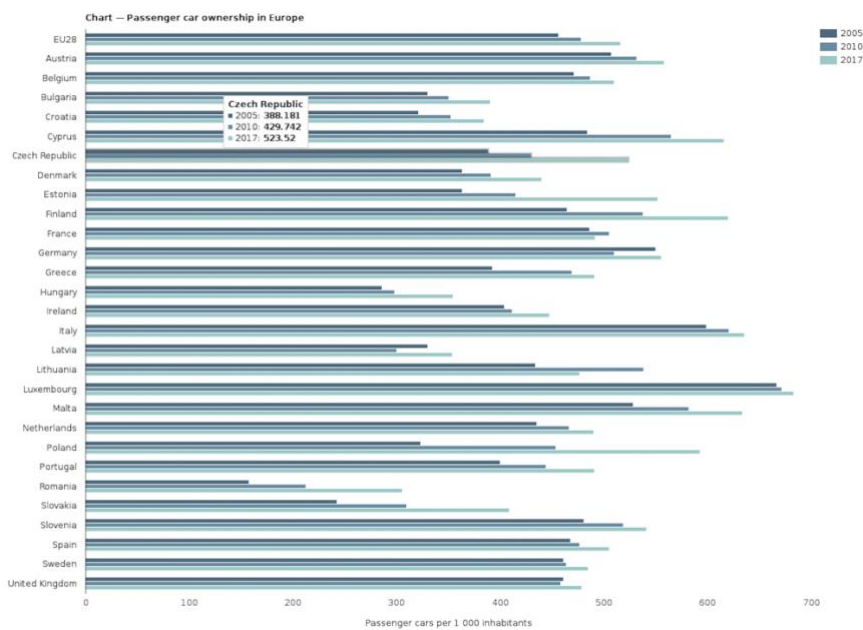


Exhibit 3 – Of own elaboration – Online questionnaire

We are a group of students from Nova SBE working on their Master Thesis on Strategic Business Models and we are conducting a research on the car-based shared mobility in Europe. By answering the questionnaire you are granting permission to use the information you write in your answers as data to conduct the study. This information will be used completely anonymously and without any commitment required on your part.

Before anything else, we would like to thank you to the contribution that you're about to give us. Your answers are highly valued and part of our Master Thesis at Nova SBE.

If you are not comfortable with your English, feel free to answer in your mother-language.

Before start answering the survey, we would like to provide you with some definitions on the research topic:

Car Sharing: it allows customers to rent out/share cars for shorter periods of time than traditional rental, generally remaining in a geographically limited area. Examples of providers are: ShareNow, Zipcar, Enjoy.

Ride Hailing: it allows customers to move from a location to another by booking an on- demand ride. This happens through a digital platform responsible from matching riders with drivers. Examples of providers are: Uber, Bolt, Lyft.

Ride Sharing: it is linked to ride hailing but allows passengers to share a ride. Operators varied from those who started out delivering ride sharing services to those who developed from ride hailing, providing customers with a different version of the service that allows them to share rides in order to save money. Examples of providers are: UberPool, LyftLine, BlaBlaCar (offering a peer-to-peer service).

Filter questions, section 1:

Q1. How old are you? [18-24 / 25-34 / 35-44 / 45-54 / +55]

Q2. What is your gender? [Woman / Man / Non-binary]

Q3. What is your nationality? [Enter your answer]

Q4. Do you live in a city? [Yes / No]

- Only respondents answering *Yes* were able to continue the questionnaire questions -

Q5. Where do you live? (City name) [Enter your answer]

Q6. What is your current professional status? [Student / Employed / Self-employed / Unemployed / Retired].

Section 2:

Q7. Which one of the following services have you heard about? (Refer to the definitions above, multiple choice allowed)

[Car-sharing / Ride-hailing / Ride-sharing / None]

Q8. Have you ever heard about these companies? (Multiple choices are allowed)

[DriveNow / Car2go / Zipcar / Enjoy / GetAround / Turo / Emov / Other]

Q9. Which service are you more likely to use? Please rank them (you can refer to the definitions given in the beginning of the questionnaire, reorder the following items)

[Car-sharing / Ride-hailing / Ride-sharing]

Q10. Are you aware of any car-sharing services in your area?

[Yes / No]

Q11. Have you ever used a car sharing service before?

[Yes / No]

Q12. If yes, what is the main reason why you have used a car sharing service?

[Cost-effectiveness: you pay only when you drive (e.g., no fuel costs, road tax, insurance, tires changes, potential parking fees) / Convenience of pick-up and drop-off locations: rentals can be accessed at any time, easily within a specific area / Flexibility: spontaneous mobility can be accessed through a smartphone Being independent from public transport and infrastructure /

Sustainability reasons: participating in reducing traffic congestion, CO2 emission and the shortage of parking spaces / Other]

Q13. At which extent do these factors influence your decision on using a car-sharing service?

- Cost-effectiveness: [Not important / Indifferent / Somewhat important / Important / Very important]

- Convenience of pick-up and drop-off locations: [Not important / Indifferent / Somewhat important / Important / Very important]

- Availability and variety of vehicles: [Not important / Indifferent / Somewhat important / Important / Very important]

- Safety and cleanliness of vehicles: [Not important / Indifferent / Somewhat important / Important / Very important]

- Ease of use of the car-sharing app: [Not important / Indifferent / Somewhat important / Important / Very important]

- More environment-friendly: [Not important / Indifferent / Somewhat important / Important / Very important]

Q14. What pricing structure would be the most attractive to you for a car-sharing service?

[Pay per use: A pricing model where you pay for each ride you take, with rates varying based on the length of your trip and time of day / Subscription: A pricing model where you pay a monthly or annual fee and receive a set number of rides per month or year / Hybrid: A pricing model that combines both pay per use and subscription options, giving you the flexibility to choose which model works best for you based on your usage patterns / Other]

Q15. How often do you think you would use a car sharing service in a month?

[Daily / Several times a week / Once a week / Several times a month / Rarely / Never]

Q16. If you picked "Never", "Rarely" choose one or more of the following reasons:

[Unavailability of the service on your location / Cost compared to other transportation options (e.g., owning a car, public transportation) / Concerns about the cleanliness or condition of the vehicles Inconvenience or difficulty booking / accessing vehicles / Other]

Q17. Would you increase your use of a car sharing service if the operator would provide you with discounts or rewards (e.g., 10-15% discount or refuel rewards)?

[Yes / Maybe / No]

Q18. In which of the following scenarios are you more likely to use a car- sharing service? (Multiple choice allowed)

[Parking of the desired destination is too expensive / Emergency / Vacation periods, as an alternative to car rentals / Drive in the city as a daily habit / Transportation strikes]

Q19. Have you ever experienced any issues or problems with a car sharing service?

[Yes / No]

Q20. If yes, please tell us what the issues were and how were they handled by the company.

[Enter your answer]

Q21. What could car sharing companies do to improve their user- experience? (Multiple choice allowed)

[Offer more flexible payment options (e.g. pay-per-ride, subscription, prepaid credits) / Increase the availability of vehicles in more locations / Improve the condition and cleanliness of vehicles / Provide better customer support and communication channels / Offer more vehicle types and models to choose from / Offer more incentives and rewards for loyal customers / Improve the accuracy of estimated trip duration and distance / Increase the number of parking spots and designated parking areas for car-sharing vehicles / Provide more detailed information about the vehicle's features and controls / Increase the overall sustainability and environmental impact of the service]

Q22. What types of cars would you like to see offered by car-sharing companies? (Multiple choice allowed)

[Compact cars / Sedans / SUV's /Luxury cars / Electric cars / Hybrid cars / Sports cars Indifferent]

Q23. Final question: How likely are you to recommend a car sharing service to a friend or colleague?

[Very unlikely / Somewhat unlikely / Neither likely nor unlikely / Somewhat likely / Very likely].

Exhibit 4 – Online questionnaire results

Total respondents: 484

Q1. How old are you?

Age range	Answers	%
18-24	367	75%
25-34	76	16%
35-44	10	2%
45-54	18	4%
+55	13	3%

Q2. What is your gender? [Woman / Man / Non-binary]

Gender	Answers	%
Woman	416	86%
Man	66	14%
Non-binary	2	0%

Q3. What is your nationality? [Enter your answer]

Nationality	Answers	%
Brazil	1	0%
Bulgaria	1	0%
Canada	1	0%
Ecuador	1	0%
France	1	0%
Germany	9	2%
Italy	34	8%
Morocco	1	0%
Portugal	417	86%
Tunisia	18	4%

Q4. Do you live in a city?

Yes/No	Answers	%
Yes	287	59%
No	196	41%

Q5. Where do you live?

Cities with at least than 3 answers:

City	Answers
Berlin	4
Braga	7
Coimbra	7
Funchal	3
Guimaraes	3
Hamburg	3
Laira	5
Lisbon	122
Madrid	3
Milan	20
Munich	5
Paris	6
Porto	19
Rome	3
Setubal	4
Tunis (outside EU)	3

Q6. What is your current professional status?

Status	Answers	%
Student	147	51%
Employed	122	42%
Self-employed	13	5%
Unemployed	3	1%
Retired	3	1%

Q7. Which one of the following services have you heard about? (Refer to the definitions above, multiple choice allowed)

Service	Answers	%
Car-sharing	200	40%
Ride-hailing	117	24%
Ride-sharing	138	28%
None	42	8%

Q8. Have you ever heard about these companies? (Multiple choices are allowed)

Companies	Answers
DriveNow	111
Car2go	111
Zipcar	56
Enjoy	37
GetAround	34

Turo	15
Emov	27
Other	73

Q9. Which service are you more likely to use? Please rank them (you can refer to the definitions given in the beginning of the questionnaire, reorder the following items)

Ranking	1 st choice	2 nd choice	3 rd choice
Car-sharing	135 (47%)	94 (33%)	58 (20%)
Ride-hailing	110 (38%)	55 (19%)	122 (43%)
Ride-sharing	42 (15%)	138 (48%)	107 (37%)

Q10. Are you aware of any car-sharing services in your area?

Yes/No	Answers	%
Yes	83	29%
No	205	71%

Q11. Have you ever used a car sharing service before?

Yes/No	Answers	%
Yes	74	26%
No	214	74%

Q12. If yes, what is the main reason why you have used a car sharing service?

Reason	Answers	%
Cost-effectiveness	24	25%
Convenience of PUDO	28	29%
Flexibility	19	20%
Independence from public transports	15	16%
Sustainability	4	4%
Other	6	6%

Q13. At which extent do these factors influence your decision on using a car-sharing service?

	Not Important	Indifferent	Somewhat Important	Important	Very Important
Cost-effectiveness	1%	7%	14%	39%	39%
Convenience of pick-up and drop-off locations	1%	6%	11%	38%	44%
Availability and variety of vehicles	11%	26%	12%	38%	14%
Safety and cleanliness of vehicles	3%	11%	13%	32%	41%
Ease of use of the car-sharing app	3%	12%	12%	48%	26%

More environment-friendly	5%	23%	13%	42%	18%
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Q14. What pricing structure would be the most attractive to you for a car-sharing service?

Pricing structure	Answers	%
Pay per use	152	53%
Subscription	15	5%
Hybrid	121	42%
Other	0	0%

Q15. How often do you think you would use a car sharing service in a month?

Time	Answers	%
Daily	1	0%
Several times a week	31	11%
One a week	37	13%
Several times a month	61	21%
Rarely	125	43%
Never	33	12%

Q16. If you picked "Never", "Rarely" choose one or more of the following reasons.

Options	Answers
Unavailability of the service on your location	27
Cost compared to other transportation options	89
Concerns about the cleanliness or condition of the vehicles	12
Inconvenience or difficulty booking/accessing vehicles	20
Others	15

Q17. Would you increase your use of a car sharing service if the operator would provide you with discounts or rewards (e.g., 10-15% discount or refuel rewards)?

Increase usage	Answers	%
Yes	113	40%
Maybe	151	52%
No	24	8%

Q18. In which of the following scenarios are you more likely to use a car-sharing service?

Scenario	Answers
Parking of the desired destination is too expensive	119
Emergency	81
Vacation periods, as an alternative to car rentals	171
Drive in the city as a daily habit	69
Transportation strikes	91

Q19. Have you ever experienced any issues or problems with a car sharing service?

Issues	Answers	%
Yes	16	6%
No	272	94%

Q20. If yes, please tell us what the issues were and how were they handled by the company.

	Answers
1	Avaria
2	Car cleanness issues.
3	Car didn't unlock itself when I wanted to start the ride. After calling the hotline, where they answered immediately, the remotely unlocked the car for me.
4	Dirty car and damaged car. I changed car.
5	Ending the trip.
6	Find a place to park
7	Problem regarding the lock of the vehicle. Impossibility to end the rent and no answers by the client service. After 20 minutes they did answer and finally I was able to lock the vehicle. Fortunately, I obtained a refund (Enjoy).
8	Unavailability of cars, inefficient app, problems on the cleanliness.
9	You cannot park in some city zones, later at night there are less cars available.

Q21. What could car sharing companies do to improve their user-experience?

Improve	Answers
Offer more flexible payment options	135
Increase the availability of vehicles in more locations	190
Improve the condition and cleanliness of vehicles	70
Provide better customer support and communication channels	108
Offer more vehicle types and models to choose from	49
Offer more incentives and rewards for loyal customers	123
Improve the accuracy of estimated trip duration and distance	55
Increase the number of parking	132
Provide more detailed information about the vehicle's features	50
Increase the overall sustainability	77

Q22. What types of cars would you like to see offered by car-sharing companies?

Type	Answers
Compact cars	102
Sedans	17
SUV's	55
Luxury cars	17
Electric cars	109
Hybrid cars	91
Sports cars	24
Indifferent	117

Q23. How likely are you to recommend a car sharing service to a friend or colleague?

Likeliness	Answers	%
Very unlikely	24	8%
Somewhat unlikely	35	12%
Neither likely nor unlikely	93	32%
Somewhat likely	94	33%
Very likely	42	15%

Exhibit 5 – Statista – Car-sharing: key players operating in Europe (market shares)

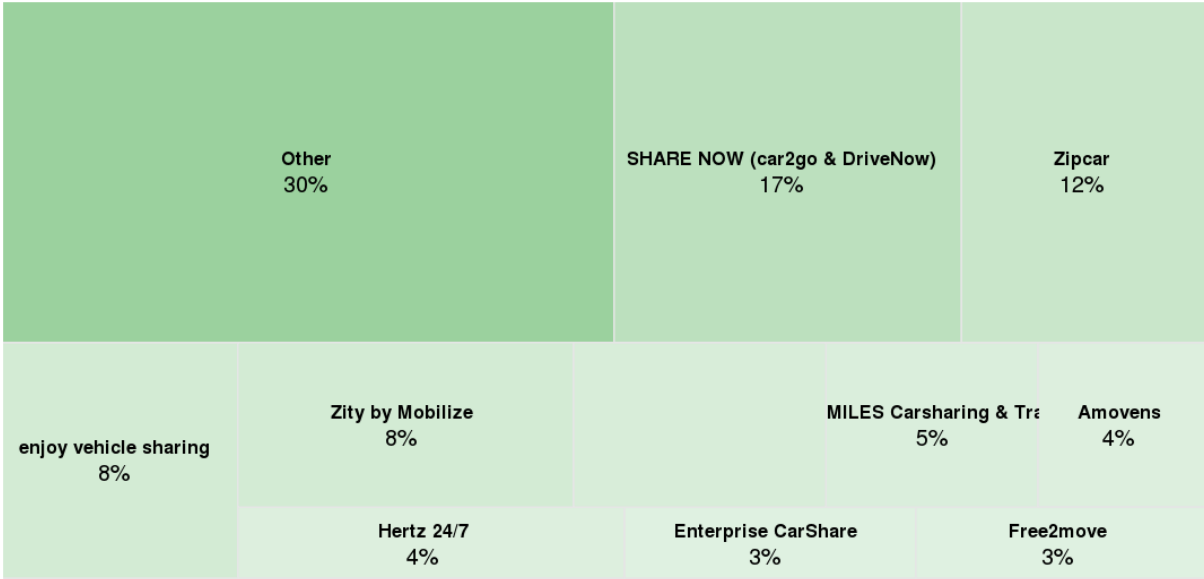


Exhibit 6 – AUTO2X – Free-floating car-sharing accounts for the highest share in both users and vehicle fleet in Germany

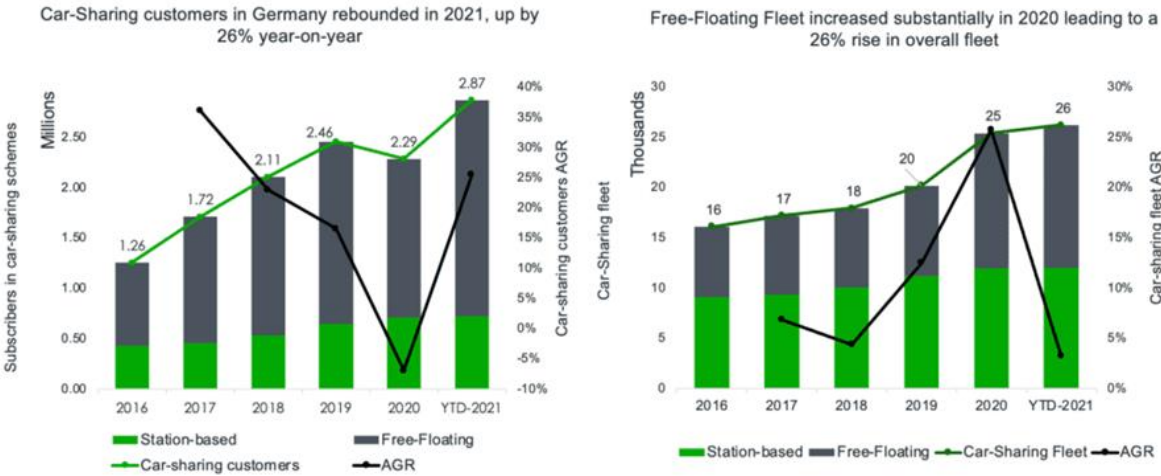


Exhibit 7 – VariableSoft – Tasks operated by CRM Software



Exhibit 8 – AUTO2X – Electric car-sharing penetration in Germany in 2021

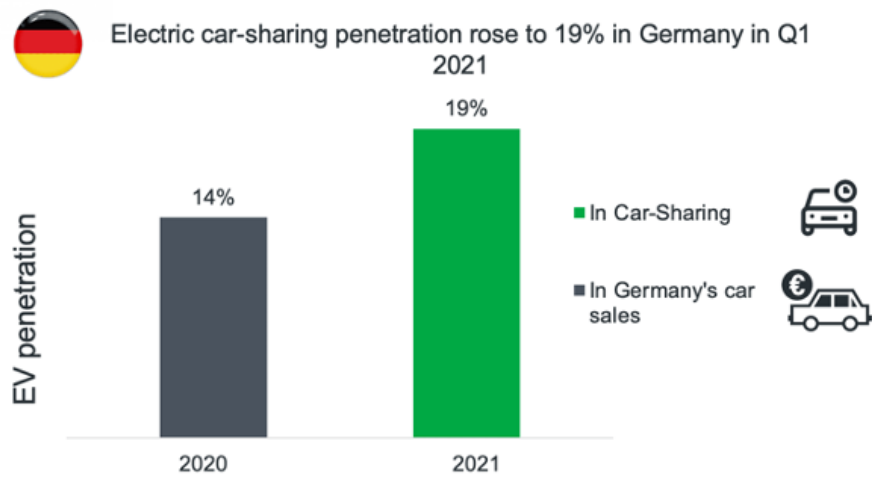


Exhibit 9 – ShareNow – Coverage parking area in Berlin

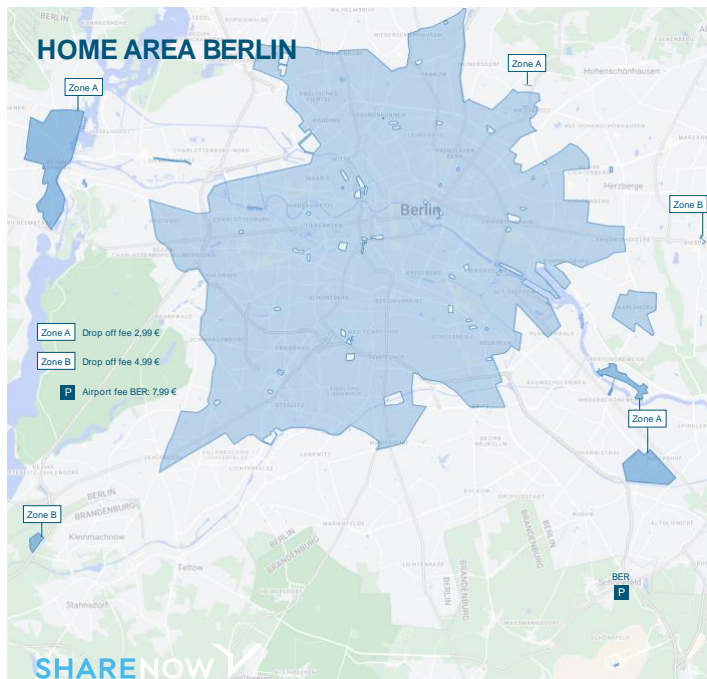


Exhibit 10 – Statista – Revenue car-sharing 2017-2027 in Europe

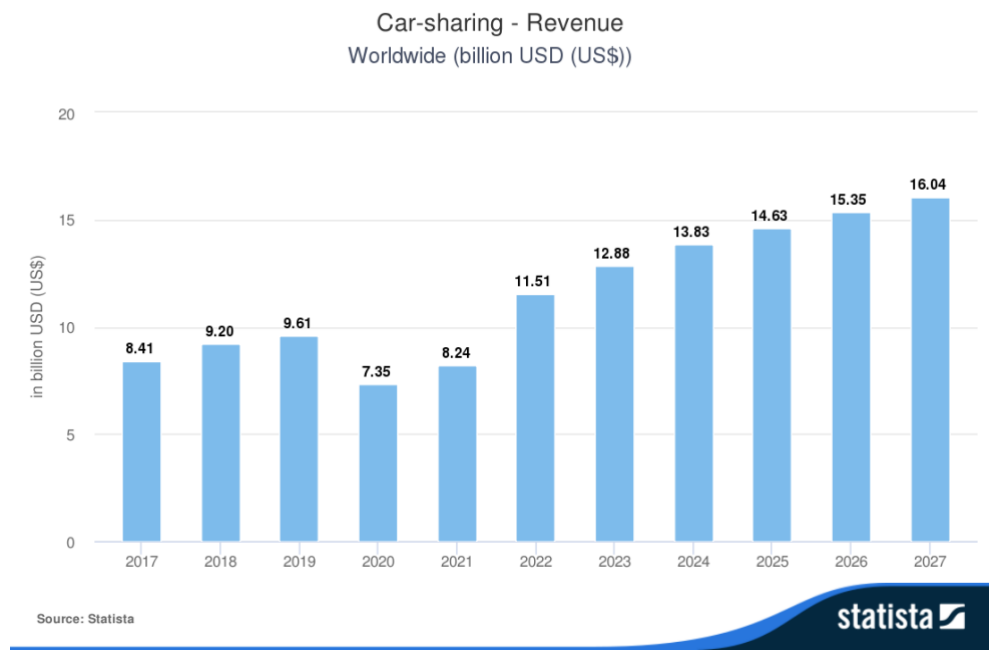


Exhibit 11 – Free-floating car-sharing Business Model Canvas

Key Partners	Key Resources	Value Proposition	Customer Relationships	Customer Segments
<ul style="list-style-type: none"> Technology & info providers Car manufacturers Insurance providers Local municipalities 	<ul style="list-style-type: none"> Fleet of vehicles Tech infrastructure and data asset Active users-network effect Parking spots Skilled Personnel 	<ul style="list-style-type: none"> 24 Access to a range of cars 24-hours without the burden of ownership Convenience & flexibility in the offering Technology & innovation always present Sustainability Make cities more liveable 	<ul style="list-style-type: none"> Self-service Personalized Community building Loyalty Programs 	<ul style="list-style-type: none"> Urban inhabitants Tourists Business travelers Environmentalists
Key Activities <ul style="list-style-type: none"> Technology development & maintenance Vehicle fleet management Customer Service & Support Marketing & Promotion 			Channels <ul style="list-style-type: none"> Mobile App Social Media Customer support Advertisement 	
Cost Structure <ul style="list-style-type: none"> Vehicle Acquisition/Leasing Maintenance/Fuelling Parking fees Administrative costs Insurance costs Legal costs 			Revenue Stream <ul style="list-style-type: none"> Fees related to car providing Drop-off and Pick-up fees Extraordinary Fees Extended Booking fees 	

