

HOW AUTOMAKERS CAN ADAPT THEIR BUSINESS MODEL TOWARDS THE  
ADOPTION OF NEW MOBILITY SOLUTIONS

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## **Abstract**

The collective paper aims to analyze the current trends and challenges of the automotive industry and identify the main drivers of transformation within the sector. Automakers continuously need to respond to the environment and shifts in consumer preferences. This paper aims at understanding possible measures to adapt the traditional business model of car manufacturers towards new mobility solutions. Based on the literature review, three innovative business models were examined: car sharing, multi-sided platforms and subscription models. A quantitative survey was conducted in Italy to analyze consumer perceptions and demonstrated attractiveness for more sustainable and connected business models.

Keywords: Strategy; Automotive Industry; Automotive retail; Business Model; Business Model Innovation; Mobility Services; Car Sharing, Subscription model; Multi-sided platforms; Sustainability; Consumer perceptions

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## **Introduction**

The automotive industry (ATI) has been a significant pillar in the worldwide economy for over 100 years since its beginning in the late 19<sup>th</sup> century after the breakthrough of Carl Benz (Daimler 2016). Already in its early stages, the industry has been a driver for technological innovations and constant improvements in mobility efficiency. The ATI has gone through several stages of development within its history but is currently in the middle of one of its most significant transformations to date. The digitalization of society and technological advancements of the past 20 years will completely restructure the ATI and force every player within to rethink its strategies. Given these dynamic times, the main challenges of digitalization that the industry has to face are electrification, connectivity, autonomous driving, and mobility services.

Since the ATI has developed constantly since its beginnings, it has created several sub-sectors and industries that rely entirely on it and its changes. Therefore, these sub-sectors such as passenger transportation, freight and cargo transportation, Rent-a-Car, mobility services, or generally the automotive retail industry are all impacted by the challenges of digitalization, as well.

Some of these sectors flourished in the past decades, such as the Rent-a-Car industry, which is strongly linked to the success of the tourism sector, which benefits strongly from a world that is more globalized than ever.

In addition, the past decade was strongly marked by innovative and digitalized mobility services that have taken on the traditional approaches to personal mobility. Companies like Uber and Bolt found new ways to disrupt the ATI and its large OEMs, causing the competition landscape to change.

Furthermore, the car-buying process, in general, has been a strong subject to change since consumer behaviour has become increasingly impacted by digitalization. The

constant connectivity means that consumers have access to an extensive range of information, becoming more demanding with their buying experience.

Additionally, the rise of digital channels creates the need to better integrate the customer experience across online and offline channels and ensure a seamless journey. These changes put the OEMs in a challenging environment in which they need to optimize their presence across channels and better connect the car-buying process, creating an omnichannel ecosystem.

The technological innovations and developments of software and hardware components in the ATI, and growing awareness for sustainability in society, lead to new customer expectations and a drastic change in the production of the automotive vehicle. Electrification is a key driver in the fight against climate change and, therefore, a key performance indicator for automotive manufacturers to stay relevant and compliant with all regulations in the future. That requires innovative new business models with adapted value propositions, revenue streams, and retail channels.

These trends require the help of many different technologies such as artificial intelligence (AI), augmented reality, internet of things, robotics, et cetera. As these are all dependent on sophisticated data analytics, Blockchain is emerging into an optimum tool to verify the authenticity of this data, store it, protect it, and share it safely.

As the current state of the ATI is highly dynamic, this work project intends to analyse critical aspects of the enormous challenges of digitalization, provide valuable insights for the industry about current trends, consumer preferences or behaviours, and deliver competent advice through recommendation plans.

## **1. State of the Art and Literature Review**

### **1.1. Description of the Automotive Industry**

#### **1.1.1. Economic figures**

Since the first automobile was invented by Carl Benz back in 1886, the ATI was destined to be a pillar in the old continent's economy. Technology and engineering were developed to the fullest throughout the last century, from the steam engine, passing by the internal combustion and now the electric engine. It is not just personal mobility, getting from A to B. Its commercial vehicles deliver goods and services which we and businesses consume daily, carrying around 75% of freight transported over land (Cornet 2019). Collectively represented in 2016, it reached 1.85 trillion km (Cornet 2019). Its importance relies on the fact that it includes our daily work commutes, waste removal, business-to-business (B2B) and business-to-consumer (B2C) distribution, emergency services, etc. Given such a variety of usage, we can still consider it the backbone of a functional society. The above-mentioned facts show how dependent modern societies are on freight overland transport. With the birth of the internet, the e-commerce channel was opened for companies, the ability to connect business to consumers all around the globe. Eventually, this channel started to pick up momentum, and the B2C freight market blew up. As of 2017, total turnover in the transport sector in the EU-28 reached a whopping €353,6 billion (European Commission 2020).

Due to its extensive value chain, car manufacturing stimulates economic growth all around the different industries, such as Natural Resources and Mining, Computer and Electronic Product Manufacturing; Oil and Gas Extraction; Electrical Equipment, Appliance, and Component Manufacturing; Plastics and Rubber Products Manufacturing; Textile; and many more (NAICS 2021). Not to mention the array of service industries associated with the car selling/leasing/renting process, such as Finance and Insurance, Advertising, etc.

The paradigm evolved, and so did the industry results for one of the biggest producers of vehicles globally, Europe. As of 2020: the automotive sector turnover represents 7% of the EU's total GDP (Cornet 2019). This is reflected in its taxes, the ATI is a great contributor, as governments received €398.4 billion in tax contributions (ACEA 2021), in EUR-14 countries alone, Europe's biggest markets (over two times the total budget of the European Union), up from €396 billion in 2014 (ACEA 2015). Due to the emergence of Asian manufacturing (Cornet 2019), which often provides more attractive prices and faster deliveries, Europe has been importing more motor vehicles and consequently damaging its trade balance. As of 2020, the trade balance surplus of motor vehicles reached €76.3 billion (ACEA 2021), down from €95.1 billion (ACEA 2015) in 2015. This was due to the growth of imports outpacing the growth of exports. In the five years, exports grew around 8%, while imports grew approximately 98% (ACEA 2015) (ACEA 2021).

Regarding job allocation, in 2018, 6,6% of total EU employment (ACEA 2021) was associated with the automotive industry, whether through Direct manufacturing, Indirect manufacturing, Automobile use, Transport, and Construction, up from 5,6% in 2012 (ACEA 2015). This equates to respectively 12.6M (ACEA 2021) and 12.1M (ACEA 2015) employees all around the continent.

The ATI workforce produced around 13 million motor vehicles in 2020, representing 16,7% of global motor vehicle production (ACEA 2021), down from 17 million motor vehicles in 2014, representing 19% of global motor vehicles production (ACEA 2015). Regarding registrations, the trend mentioned above holds. EU motor vehicles registrations have been declining since 2014, from 14.4 million units to 11.4 million units in 2020, representing 16% (ACEA 2015) and 14,5% (ACEA 2021) of global motor vehicle registrations.

Moreover, the ATI R&D investment is also highly essential and relevant, as of 2019, €62 billion (ACEA 2021) was allocated to it just by ATI, up from €41.5 Billion in 2013 (ACEA

2015), making it the most significant contributor, out of the top 10 industrial sectors accounting for around a third of EU total R&D investment.

### **1.1.2. COVID-19 impact**

The pandemic has taken its toll in all industrial sectors. Restrictive measures and supply and demand shortages have affected the ATI industry tremendously in the last two years (Accenture 2020). Several value chain disruptions have happened, such as the worldwide microchip shortage, which on its own is forecasted to cost the automotive industry \$210 billion in lost revenues in 2021 (AlixPartners 2021). From labour shortages (quarantine factories) to steel, leather, rubber, etc. (Chow 2021), production lines have been slowed down in major OEMs (Accenture 2020), which consequently has an impact on the time it takes to produce new vehicles. Some automaker dealers have been quoted stating waiting times for new vehicles of up to a year (Evans 2021). Simultaneously, OEM's manufacturing has been dealing with its fair share of quarantine and reduced workforce, and in extreme cases, facilities shutdown (Muramatsu 2021) contributes to longer vehicle manufacturing periods.

Liquidity has also been damaged, with the decline in orders and their respective cash flows (less 23,7% of new vehicle registration in Europe from 2019 to 2020) (ACEA 2021), short-term liabilities and other current/fixed expenses have burned their way into the incumbents' reserves (Accenture 2020). This situation is one of the most daunting ones, given that it is unsustainable for more extended periods and might be taking the remaining lifelines of automotive manufacturers.

## **1.2. The importance of the Automotive Industry**

Today's ATI is of great relevance for developing the world's economic and social factors and requires great investments and expertise. The industry is currently booming, with an increasing number of countries being part of it (Saber 2018).

The ATI is not just impacting these countries' economies; it also affects other sectors and is greatly important. The initiative links to other industries and works as a multiplier effect in the economy, impacting upstream and downstream sectors. The automotive industry significantly affects the upstream sectors of steel, iron, aluminium, plastic, glass, rubber, and textiles. Half of the world's oil and rubber output is caused by the sector. This impact results in an industry growth of 1% in developed countries and a GDP increase of 1,5%. In these developed countries, the share of the automotive industry of the total GDP ranges from 5 to 10%, meaning that one invested dollar into the sector increases the GDP by \$3 on average. There is no equal impact on any industry like the automotive industry, as its development goes hand in hand with economic growth in given countries (Commission 2020).

In the past years, the stake of the global industry in the GDP structure expanded, establishing new jobs and increasing the regular sector wage. Besides, the sector adds to the enlargement of the taxable base and revenues of the state budget. It grows complementary divisions, affects technical progress, and asserts stable demand and living standards in given countries. As a result, the satisfactory performance and improvement of the automotive sector are of great importance economically and socially (Saberri 2018).

### **1.2.1. Social Significance**

Henry Ford was one of the automotive industry pioneers, giving ordinary people the opportunity not to be geographically limited anymore. People were now able to take the car and move to another location, experience new places, or meet new people – this shaped the social transformation and opened the world for mobility. The total effect of this on society's social customs and living habits is still, to this day, valuable, as the impact is enormous.

The ATI quickly changed urban life, allowing outward expansion into suburbs and even beyond. Of course, this trend started in the U.S. but rapidly appeared worldwide, where automobiles took place. This new mobility quickly introduced a decentralization trend –

highway transportation, leading businesses, and industries to move out of the cities. As more space was available, the land was cheaper better accessibility for cars and trucks.

The cities were affected by this transportation change, even more so the rural areas. Before introducing the automotive, they mainly used horses as a way of transportation, which limited them in their movements to around 15-25 km. Everything beyond that would not have been possible for the horses or the people living in these areas, meaning that any farm or community beyond this vicinity was detached from the central economic and social life. The first cars and concrete tracks have tightened the disparity between rural and civil areas, allowing for more mobility and increased business opportunities. Farmers could quickly ship by truck and go into the city if they needed to. Furthermore, essential establishments such as schools and hospitals were now accessible by bus and car for everyone, enabling better education and health system – even for people living outside of the cities (Binder and Rae 2020).

### **Effects of motor vehicle production**

The production of motor vehicles caused several effects on social life. First, the marketing of cars accelerated the increase of using credits. The possibility of instalment transactions existed even prior to vehicles but was much more limited. Using credit to buy a car was introduced in 1916 in the U.S. by some manufacturers of medium-price cars. The reason for that was to compete against the low-priced model T, as more people were now able to buy a more expensive vehicle using low instalments. This practice became universal and caused people to acquire other goods the same way (Binder and Rae 2020).

The second significant effect of motor vehicle production was the impressive development of drive-through businesses, mostly eating establishments. People could now stay in their car and order their meals or even eat them while in the vehicle, increasing comfort. Furthermore, shopping malls were introduced and designed solely to be accessed by car,

meaning that people could enter the building through the parking lot, spend the whole day at the mall, consume goods, and leave comfortably with their car again (Binder and Rae 2020).

The introduction of automobiles also enhanced the possibility for people to travel for recreation. Devices such as trailers, campers, or bicycles could easily be attached to the car and improve the scope of recreational opportunities for the people.

Besides all the new opportunities the automobiles have created, some adverse effects are also caused. Traffic congestion, especially in cities, air pollution, and highway accidents. Each of the points will be explained more in detail now.

### **1.2.2. Traffic**

Traffic is one of the main problems caused by the introduction of automobiles. Though city streets were crowded before the automobiles were introduced, they expanded heavily by the number of automobiles entering or leaving the cities during prime times. As a steady increase in automobiles adds to this problem, it will be challenging to decrease traffic. One of the critical problems in many city streets has not been redesigned for traffic yet, meaning that 2/3 of the vehicles in central areas that are only passing through could easily be redirected around the city using circumferential highways. Still, many cities do not have the capability of using these highways as they do not provide access into downtown areas yet and must be rebuilt. Though, this is not as easy as it seems since building roads in cities might disrupt neighbourhoods or destroy scenic and historic areas of the cities. The steady increase of automobile usage has declined public transport use going in and out of the town. This topic has been much discussed in urban areas. Still, it seems debatable that mass transportation systems will decrease automobile traffic due to the dispersion of people and businesses in urban areas. Nevertheless, public transportation is the most economical way of mobility used (Binder and Rae 2020).

### **1.2.3. Air pollution**

Looking at the air pollution caused by cars, we see that automobile exhaust is driving half of the pollutants in larger cities and even more in municipalities with climatic and topographic conditions contributive to smog creation (Binder and Rae 2020).

In the United States, the civil constitution required the instalment of automotive controls to reduce pollutant radiation during the 1960s. At the end of the 20th century, the majority of scientists speculated that discharges caused by automobiles and industrial plants led to a build-up of carbonic acid within the air, which would cause a rise in the Earth's temperature with the possibility of fatal long-term results. This forced governments to act, requiring an increase in fuel economy and reducing carbon dioxide output. Since then, manufacturers have developed many fuel alternatives (Binder 2020; Brand 2018).

### **1.2.4. Highway accidents**

Since the introduction of motor vehicles, the fatalities caused by them have risen to hundreds of thousands each year (WHO 2021). Such accidents' social and economic cost is still priceless, as many people lost their lives.

Governments and manufacturers make many efforts to improve the safety measurements of cars and highways. The increasing number of accidents diminishes the decreasing ratio of fatalities per distance travelled due to the growing usage of motor vehicles (WHO 2021). Since the 1960s, car manufacturers have standardized safety features worldwide, including seat belts, headrests, and airbags, making them a standard part included in every car (Binder and Rae 2020).

The high number of fatalities led the legislative to focus on speed limits in several countries, limiting the speed to a maximum of 110-130 km/h. Some countries, such as Germany, still do not have a speed limit, which led to many political discussions in the past years (Binder and Rae 2020).

### **1.3. Evolution of the Automotive Industry**

#### **1.3.1. The early days (19th century – World War II)**

According to Nyamwange and Nyamwange (2014, 40), an automobile, also referred to as a car can be defined as a wheeled vehicle carrying its motor and transporting passengers and goods. Ever since the emergence of the first automobile, the ATI has been marked by significant developments and innovations over an extended period all over the world.

The first motor vehicles dependent on steam power and electricity appeared in France and the U.S., dating back to the early 19th century (Bharadwaj 2018, 2). Despite it being the first significant development towards the conventional vehicle known today, given the high complexity and heaviness of the steam- and electricity-powered car, the market was initially slow to develop (Nyamwange and Nyamwange 2014, 40), plus, it was highly concentrated on wealthy customers as the cars were expensive and only crafted on the specific request of individual buyers. A vehicle was considered a luxury good directed towards individuals passionate about innovation and who wanted to stand out from the crowd (Candelo 2019, 3).

In the last two decades of the nineteenth century, Nicklaus Otto, Carl Benz, and Gottlieb Daimler built the first four-stroke internal combustion engine, albeit independently, signalling the birth of the modern ATI. (Candelo 2019, 3-4). Its numerous advantages led to a substantial increase in the worldwide demand for automobiles, a maturity which had not occurred until then.

In 1886, Carl Benz became the first to patent a three-wheeled vehicle powered by a gas engine. Yet, the first cars using this engine were unreliable and expensive, built based on demand, and customized by a limited number of consumers willing to bear the high prices (Candelo 2019, 4). Shortly afterward, Rudolf Diesel invented the diesel engine. Nevertheless, although the lower price of diesel made this a more economically beneficial option than the gas

engine, it proved to be an unreliable design that led to a poor overall market impact (Bharadwaj 2018, 2).

Henry Ford introduced the Model T in 1908, designed to be an affordable and accessible product, considered a historical disruption in an industry characterized, until then, by the prevalence of wealthy customers and high product customization (Bharadwaj 2018, 2). The event marked the introduction of mass production, which was made possible by Ford's groundbreaking methods of standardized mass production centered on the assembly line (Candelo, Troise, et al. 2021, 3). As a result of this innovation, the U.S. gained a 60% market share of the worldwide market, establishing the country's emergence in the industry (Parissien 2013, 14). The Model T's dominance was only challenged in the 1920s when new competition emerged from the fellow American companies, General Motors and Chrysler, who rapidly started to adopt Ford's production practices. The three companies became later recognized as the "Big Three" and positioned the U.S. on the leading edge of the automobile industry. By the end of the same decade, General Motors overtook Ford in sales volume due to the marketing-oriented strategy adopted by the company, a segmentation approach aiming to offer different products at different prices, attracting new and unexplored market segments (Candelo 2019, 17).

The diesel engine resurfaced again in the 1930s after developments carried out by the British company F. Perkins Ltd., culminating in a more reliable engine (Jones 2014, 159; Candelo 2019, 17). The French company Citroën was the first to take advantage of the new diesel engine in 1934, followed by Mercedes-Benz in its 260d model the following year (Bharadwaj 2018, 3).

The 1940s were marked by the extreme impact of WWII on the industry. The production of automobiles had a primarily military focus and was even ceased to the civilian population in 1942, which caused car travel to drop dramatically during the war. Besides, tires and gasoline

were severely rationed. As a result, the evolution of automobiles stagnated as they remained practically the same as in the pre-war years.

### **1.3.2. Post-war recovery (World War II – 1960s)**

In the early 1950s, Western European countries had a surprisingly large production recovery. Especially in Germany, France, and Italy, mass production-oriented companies began to establish themselves, quickly setting their mark on the market, as was the case of Volkswagen in Germany, Peugeot and Citroën in France, and Fiat in Italy (Candelo 2019).

When the war ended, both in the U.S. and in Europe, the car was a real status symbol, and the repressed consumer demand for new cars created a new boom in the industry, with profits hitting new highs. The world's total output increased almost ten times during the following 35 years, most of this increase occurring outside the U.S. (Binder and Rae 2020). Many innovations also took place during this period, like the introduction of the first automatic transmission (1948), followed by power steering (1951), disk breaking (1955), cruise control (1957), and three-point seatbelts (1959) (Berger 2001, 419-421). The industry also saw new safety and environmental regulations and speed limits being created. In this post-war period, the sector gained more and more importance. The concept of transportation had been revolutionized, and cars became an icon of freedom. It was possible to find both mass and luxury products in the market.

As the popularity of diesel continued to rise in the 1960s, so did the competition against the Big Three from outside of the U.S., mainly from Asian economies. Consumers started to look elsewhere for different vehicles, and the foreign model experienced rapid growth (Klinge 2014, 487). With the opening of international markets, car manufacturers oriented their strategies towards a process of decentralization. The reasons were varied and concerned both internal and external conditions of the companies. They could be linked to political or economic aspects or, again, to reducing costs. The growth of international companies lowered the market

shares of the Big Three, who criticized the government for failing to support its domestic automobile industry (Klinge 2014, 487).

Moreover, the greater proximity to the outlet market also allowed for a better understanding of consumer preferences (Caroli 2016). In fact, for example, the Americans favoured large vehicles, given the more advanced development of the road network and the reduced cost of fuel. On the contrary, in Europe and Asia, smaller and fuel-efficient cars were preferred.

Regarding new car features, heated seats and the electronic fuel injection system were both introduced in 1966, the later one helping with fuel delivery to the car engine, which improved the desired engine efficiency.

### **1.3.3. Setbacks and globalization of the industry (1970s – 2000s)**

However, the oil crisis of 1973 came to upset this period of growth. It led to the reversal of the strategies of various car manufacturers and exposed many weaknesses in terms of flexibility, especially in the Old Continent. Also, in 1975, the Energy Policy Conservation Act changed the rules regarding fuel efficiency and emissions, setting new minimum standards, penalizing less-efficient cars (Bharadwaj 2018, 5). Skyrocketing oil prices and increasing public awareness of environmentalism caused a shift in the U.S. towards more minor, less-polluting European and Japanese automobiles (Olson and Mendoza 2015, 110).

This allowed the entry of new players, such as Japanese manufacturers (Toyota, Honda, and Nissan), who managed to shake up the European market thanks to the cost advantages they enjoyed.

Regarding product development, the first passenger airbag was installed, in 1973, by Oldsmobile, a brand at the time held by GM. The U.S. federal government would later, in 1998, demand all passenger vehicles to include dual frontal airbags.

A second oil crisis (1979) brought instability to the sector again. In this case, North America suffered the most as the price of fuel increased, and consumers were increasingly moving towards small-displacement, low-consumption cars. This orientation favoured European and Japanese manufacturers who saw a substantial increase in exports of their models. For the American carmakers, the need to improve both the production process and the product features was evident. Thus, the first joint ventures were created around the world. Even in Europe, the extreme rigidity of the market and the increasingly demanding consumers pushed towards developing and strengthening alliances at the international level.

The second oil shock mentioned before led to the early 1980s recession (1980 – 1983) and the extension of consumer preference for affordable, fuel-efficient vehicles. Japan would surpass the U.S., in 1980, as the biggest automaker in the world, which emphasized the globalization of the automotive industry. In response to the increasingly saturated and competitive market, the U.S. automotive industry underwent a massive organizational restructuring and technological renewal: the Big Three engaged in plant capacity and personnel cutbacks to create leaner firms to maintain profits with lower volumes. After a five-year, \$80 billion program of plant and equipment modernization, cars became smaller, safer, more efficient, and less polluting (History 2018). This was an era in which technology became a big selling point, with electric windows and doors, sunroofs, keyless entry systems, and CD players becoming standard features.

The 1990s consolidated the globalization trend, with U.S. companies building huge overseas facilities and large multinational automakers engaging in mergers. This growth and diversification of the industry resulted in greater quantity and variety of products in the marketplace, empowering consumers and increasing competition among automotive players. New and more specialized markets emerged, like Southeast Asia and Latin America.

We have the hybrid car as an example of one of these new products. Even though the first hybrid vehicle – Lohner-Porsche Mixed Hybrid, by Ferdinand Porsche – dates to 1901, this technology was only acknowledged starting in the late 1990s, with the Toyota Prius (1997) and Honda Insight (1999). Initially, due to the low cost of gasoline, hybrid cars weren't seen as a great advantage; however, given the several oil-price increases throughout the history of the automotive industry, hybrids conquered their market space.

#### **1.3.4. The recent decades (2000s onwards)**

The growth of the automotive sector resumed at a steady pace until the outbreak of the Global Financial Crisis of 2007-2009. This crisis cut almost one-third of light vehicle sales from Chrysler, Toyota, Ford, and Nissan. It also subtracted about a fourth and a seventh of Honda's General Motors' sales, respectively (Belser, Nelson e Poma June 2013). In 2006, the U.S., which led the automobile industry production for many decades, was again overtaken by Japan until 2009, when China became the world's largest car manufacturer (OICA 2021).

During the 20th century, the significant concerns of car manufacturing companies were centred on safety, fuel, and car efficiency. Recently, the focus has shifted to integrating new technology to make cars more intelligent, connected, and comply with environmental regulations.

Since then, the new norms regarding fuel efficiency and emissions have posed new challenges for car manufacturers, bringing many new opportunities. In the mid-2000s, Toyota was the first to develop a reputation as a green company, with its affordable hybrid model, the Prius, as the centrepiece. In the European landscape, automotive companies also took advantage of the rise of environmentalism, innovating new technologies to change their business model and adhere to more stringent regulatory requirements (Bailey, et al. 2010).

## **1.4. Automotive Retail**

To get a thorough understanding of the retail process in the ATI, it is crucial to first look at the history of automotive retail and how it has developed in the past decade. Similarly to the production of the first automobile, the first retail of a car was also carried out by a member of the Benz family. Bertha Benz – wife to Carl Benz – was the first saleswoman in the industry and started with direct retail at her husband’s factory, where the customers would pick up their vehicles (Autohaus 2021). In the early 1900s, the total number of automotive vehicles had reached around 8.500 in Europe. Since then, this number has reached a staggering 224 million over 100 years later (Brachat 2009). A big turning point not only for the industry of automotive production but also automotive retail was the transition from a product exclusive for luxury customers to a product for the broader masses. This was initially due to Ford's introduction of mass production and subsequently its Model T. With increasing population and economic growth in the past decades, the need for automobile retail has grown exponentially, leading to over 80.000 car dealerships all over Europe today (Brachat 2009). However, this expansion implied new opportunities and many new challenges as it was no longer feasible to have every customer pick their vehicle at the factory, like Bertha Benz had done. Therefore, the increased complexity of the retail demands led to different types of retail methods necessary to reach out to the highest possible range of customers, to maximize a company's exposure and presence all over a country or continent.

### **1.4.1. Different types of automotive retail**

#### **Introduction to Retail**

Understanding the basic structures and strategies of retail in general will be beneficial, before going into the different types of automotive retail in the current state of the industry. Starting off with a definition, retail is the activity of selling goods to the public end-consumer, which usually takes place in shops and similar establishments. If a company grows larger and

expands to new regions, there is a need for more retail establishments to be closer to the customer and increase the convenience of reaching its store. Thus, larger company – such as automotive manufacturers – implement a sales network system.

There are different types of structures for these networks with the first one being a Centralized Sales Network. In this scenario, sales are considered centralized when they are carried out by a company's own marketing and sales department. The tasks and activities are all operated here, which means that they are organizationally combined in one place. The central sales department is thus responsible for all processes, decisions, and measures in connection with sales and has the necessary powers and competences (Seifert, Thonemann and Sieke 2006).

The second type of structure is the Decentralized Sales Network, which is applied if the distribution is carried out through the company's own branches or sales offices. In this context, decentralized means that sales tasks and decisions are transferred to self-managing organizational units or departments.

The third variant is Outsourced Distribution. In this case, distribution is handed over to legally and economically independent companies. The main differences between the different distribution networks are thus who is responsible for the distribution tasks and what economic and legal position the distribution organization has (Seifert, Thonemann and Sieke 2006).

Once a structure of a sales network has been implemented, there are two different types of strategies that can be applied, which is either a direct sales strategy, or an indirect sales strategy. The term direct selling covers all forms of distribution in which the sale of products or services is made in the name and for the account of the company. The company thus maintains direct relations with its customers and the sales contracts are concluded directly between the company and the respective customer. This strategy offers the advantage that the company can shape and influence the sales activities itself, and there is also the possibility of direct control of success (Ross, Direct vs. Indirect Distribution Channel: What's the Difference?

2021). In addition, the company can directly collect information about the customers and use it accordingly. On the other hand, however, direct sales require a high level of management effort and involve the highest fixed costs on average due to the fact that they are handled by the company's own employees. On the other hand, for indirect sales, intermediaries are interposed who look for suitable customers and handle the sales and transactions. This concept offers the advantage that sales networks can be built up quite quickly with the help of appropriate sales partners. In addition, the costs are usually significantly lower than with direct sales because the employees are usually not salaried employees of the manufacturing company. The disadvantage, however, is that the company can only exert limited influence on the design and implementation of the sales activities and a sales partner often works for several companies, which can lead to sales conflicts (Ross, Direct vs. Indirect Distribution Channel: What's the Difference? 2021). Now that the different possibilities of retail have been established, the next step is to identify the types of retail that are present in the ATI.

### **Sales Network with Dealerships**

A dealership sales network is currently the most common retail type within the industry. This approach uses a centralized retail structure with an indirect sales strategy. Therefore, the marketing and overall strategic decisions are carried out on headquarter level and communicated with the dealer partners. The dealerships, however, are independent entities and are responsible for the actual retail and sales process of the vehicles. Therefore, the car manufacturer does not have to cope with too much complexity and organizational burdens, while still maintaining nation-wide distribution retail that reaches even the smallest villages (Pieper 2013).

### **Direct Sales Subsidiary**

A different retail type is if the car manufacturer uses direct sales subsidiaries. Whilst these are also part of a centralized retail structure, the sales strategy is rather a direct approach.

These retail establishments are often very large and serve the purpose of flagship stores. Typically, large car brands only operate a handful of these direct sales subsidiaries in high priority cities. These are usually metropolises such as capital cities or the origin city of the brand and therefore the company maintains the highest possible control in their priority markets (Pieper 2013).

### **City Stores**

City stores are a new trend of automotive retail that are most known to be operated by Tesla. These types of stores are usually located in the centre of a city in prestigious locations of large cities. The advantage of this is, that the manufacturers show more presence in the city and therefore get higher brand exposure as more potential customers walk by the stores, which is much less likely for the traditional dealers outside of the city. The disadvantage, however, is that the showroom space is much more limited, and thus, only a part of the vehicle line-up can be displayed. Since Tesla only offers a small variety of products, the company minimizes this disadvantage in comparison to its competitors. Nevertheless, traditional manufacturers such as Mercedes or Porsche have also implemented this retail type as time limited pop-up stores (Gao, Kaas, et al. 2016).

### **The Agency Model**

With a collaborative approach of manufacturer-driven online sales and traditional trade distribution, the agency model manages a perfect balance that takes advantage of the existing infrastructures and the digital distribution to ensure benefits for all stakeholders. A cross-sales ecosystem allows OEMs to have a perfect all-around view of the customer for the first time, while accomplishing new revenue streams and lower sales costs. This not only creates opportunities for an omnichannel sales process which is customer orientated, but also for a more targeted approach and more transparent reporting. (Capgemini Invent 2020) This model

redefines the previously mentioned definitions of direct and indirect sales strategies and operates in a more blurred area between the two within a more centralized retail structure.

It is an evolution of the current characteristics of automotive retailers as it develops from a stationary retailer to a digital agent for the brand, while maintaining the “trusted face” for the consumer. However, this more centralized approach comes with a drawback for the OEMs. Challenges such as assuming the once decentralized financial risks of the trade, such as capital commitment and inventory risk, in order to protect the existence of the dealer network, particularly in times of crisis have to be faced by the manufacturer instead of the dealer with this model.

However, a worldwide study carried out with over 6000 participants by Capgemini Invent implicates that this evolution of the dealership model is very desired by the consumer. It states that 95% of consumers highly value a seamless, simple, and efficient buying process and that 75% would also be willing to purchase their next car through an online process. Additionally, 77% of participants would like to have fixed prices that do not deviate between offline and online, and a generally higher price transparency from the OEMs (Capgemini Invent 2020). The agency model can directly tackle these needs with its omnichannel sales approach and its universal price consistency. Therefore, it offers a relevant solution for the future of automotive retail.

#### **1.4.2. Digitalization of Automotive Retail**

In comparison to other industries the automotive manufacturers were significantly slower in adapting highly digitalized sales processes into their retail strategies. While the rise of Amazon pushed the retail digitalization in many industries such as book retail, the ATI only had its biggest development in this area because of the COVID-19 pandemic in 2020 as it forced them to reevaluate their previous traditional retail approach. Since then, according to Google’s global automotive director Christian Richter, the number of first-time buyers in metropolitan

areas searching for cars online has increased substantially as well as the interest for having the vehicles delivered to homes to achieve an almost contactless car-buying experience (Richter 2021).

Digitalization within the industry has created a great momentum of a change in demand for the car buying process. Almost 60 percent of potential customers under 45 prefer to purchase their vehicle online and even within the older generation of customers over 65 years of age, 45% consider an online purchase (Complojer 2021). This clearly shows, that after the disruption of the pandemic, digitalization has sustainably taken over the industry's retail and changed the way the OEMs are approaching their customers. Previously, there were about 900 individual consumer touchpoints in the process, ranging from digital advertising, websites, customer relationship management (CRM), and more. Nowadays, digitalization has created a need for all those data points to be connected, to get it all to work together and ultimately the attention of the consumer (Richter 2021). To have an omnichannel customer journey creates major challenges for the dealers in the industry, as each step has to be offered on the communication channel that each individual customer prefers, both online and offline. The requirements for such a technological and organizational ecosystem within a dealer network are highly complex (Barchetti 2020). Automotive dealership experts suggest that OEMs and dealer associations have to build alliances within this dynamic time of digitalization in the industry, since these parties are highly depended on each other (Barchetti 2020).

### **1.5. Car Buying Process**

The car buying process is one of the most important parts of customer retention and loyalty in the ATI. It is designed to provide the customer with an enjoyable and seamless experience where one can feel valued. The process uses a customer-centric approach where the whole process of selling a car is often less about the actual product and more about the relationship with it and how it makes consumers feel.

To better understand the state of the art of the car buying process, we have interviewed Nuno Rochinha, Mercedes-Benz Retail Sales Manager. As we have mentioned before, we shall focus on the operational side of the Car Buying Process, starting from the moment the client walks into a dealership.

#### **1.5.1. Interview – Nuno Rochinha (Mercedes-Benz Retail Sales Manager)**

By interviewing Nuno Rochinha, we obtained the following description of the car buying process at Mercedes-Benz Retail (systems designation were hidden to comply with non-disclosure agreement):

As soon as a possible client enters the retail space, he/she is presented with an open space specifically designed for the customer to feel welcomed. Organization and presentation are critical at this stage, given that Mercedes-Benz offers premium products. This excellence should be aligned with the dealership's quality and attention to detail.

#### **1.5.2. First stage – Filtering**

The process starts as a possible customer enters the dealership. In this first stage, he/she is addressed by a Star Assistant. The role of this first approach is to assess what is the customer need, does he/she want to purchase a car, or does he/she want to clear some doubts regarding his/her vehicle or just general information (these are the most likely outcomes). By filtering the visitors into possible clients and help seekers, the Star assistants will redirect each of them to either a salesperson (possible buyer) or product expert (help seekers). Further, he/she is recommended to sit down and have a drink or a bit to eat while he/she waits for the arrival of a Mercedes-Benz Retail employee.

#### **1.5.3. Second stage – Assessment**

In the second stage of the process, the salesperson will assess the client's personality and needs, what is he/she looking for, how much he/she expects to spend, will the customer require a buyback, etc. This is a crucial stage since this is when the connection with the

salesperson starts, which is the regular SOS contact, as we will see further down the line. Consequently, the salesperson should present themselves as trustworthy person. The client might fancy the brand, but he/she is also looking for an experience, and the salesperson is the one who needs to guarantee this.

#### **1.5.4. Third stage - Configuration**

In the third stage of the process, the client is invited to a specific environment within the facilities (depending on the client's privateness/personality) to proceed with the vehicle specification. At this stage, the salesperson starts configuring the vehicle in a system called "A". The platform has many features for customers: it provides a clear and intuitive configuration of their future vehicle and previews the colour combos, interior trim, and overall vehicle look. The dealer has embedded a livestock management tool (in the case of the car configured already exists in stock, delivery time is cut down significantly), and it is also a platform of sales/salesperson performance control. This can provide massive amounts of data, such as their primary customers, ages groups, preferred vehicles, preferred options and who are the best salespersons, how much they contribute, etc.

#### **1.5.5. Fourth Stage – Acquisition**

The fourth stage is the acquisition, where the customer engages in price negotiation. In this, we have two possible situations.

Indirect sales model, where dealer acquires the vehicle to the manufacturer and proceeds to sell it to the customer with a premium. In this case, dealers all around the country establish their prices for the same model. Thus, customers can acquire the exact vehicle from different dealers at higher or lower prices, consequently increasing customer bargaining power.

Agency model, where the dealer is an agent who acts on behalf of the brand (Mercedes-Benz), where the price of the exact vehicle is standardized throughout the whole country, leading to a lower customer bargaining power.

With negotiations wrapped up, the bureaucracy of car purchase starts. Documents such as sale and purchase agreement, Citizen Card, anti-money laundry document, copy of the "A" system description, data protection, and in case of trade-in, customers need to deliver DUA (Documento Único Automóvel) and supporting vehicle inspection. The customer needs to pay an upfront fee (later deducted from the total price paid) to signal the purchase, usually about 20% of the total vehicle value.

#### **1.5.6. Fifth Stage - Processing**

The fifth stage is internal order processing, "A" system sends the detailed car configuration to an internal system "B" which orders the vehicles to the manufacturer. The manufacturing process can be followed through a platform called "C". The platforms provide helpful insights into the ordered vehicle's state. With this feedback, the salesperson will regularly update the customer on the current production phase of his vehicle until it is ready.

When finished, the vehicle is sent from the manufacturer to the dealership. Upon arrival, it is inspected to ensure that the order and vehicle specifications match after those license plate is requested from the authorities (IMT).

#### **1.5.7. Sixth Stage - Handover**

The sixth stage is the handover process, the most important day in the Car Buying Process. This stage aims to make sure the customer feels exceptionally special. Everything must be perfect. The salesperson or the vehicle expert will brief the client on his new purchase. This included a description of the car and how to operate the car features. Again, critical elements of this stage are to make sure the client is the centre of attention. He/she has gone through this whole process and expects the delivery of his dream car to be a once-in-a-lifetime experience.

#### **1.5.8. Seventh stage - Benchmark**

The seventh and last stage is evaluating the process, also known as 5 Star Rated. The objective of this stage is to benchmark the experience the customer has had since stage one and

make it evident that client satisfaction is a priority. It consists in engaging in a phone call with the client five days after the handover to enquire if he/she is happy with the purchase or if something has come about. In this contract, the salesperson also informs the client that a customer satisfaction survey will be sent to his/her email. This stage is the final connection regarding the sale of this product. If, in the future, a customer has technical difficulties with his/her vehicle, this contact is still essential to clarify them.

Notwithstanding, the contact is also crucial for future sales. If you feel you have had an extraordinary experience with a specific salesperson (in which you deposited your trust), this will be the one you seek out in future acquisitions.

## **1.6. Digital transformation in the automotive industry**

This chapter of the work project aims to analyse how digital transformation impacts the ATI. With that purpose, an overview of digitalization and digital transformation concepts will be discussed. Afterwards, given the impact of digitalization, it is essential to define customer journey and omnichannel concepts to better comprehend the car-buying journey and its current challenges. Finally, to narrow the scope to current impacts on the automotive industry, the four major digital trends and respective challenges will be addressed.

### **1.6.1. Digitization vs. digitalization concepts**

For a clear understanding of the impact of digital innovations, it is important to distinguish and reduce the ambiguity of the concepts of digitization and digitalization.

Digitization was at the centre of the third industrial insurgency in the 20<sup>th</sup> century, the era of the digital revolution and computing advancements. The concept translates the transformation of analog/physical data into digital data, commonly referred to as the conversion of atoms into bits (Bacher and Manowicz 2020, 4). The digitization process helps build user-friendly data, being a suitable tool to generate more value for business solutions (Williams and Schallmo 2018, 4-5).

On the other hand, digitalization has been driven by the emergence of a fourth industrial revolution and the exponential expansion of technologies such as artificial intelligence (AI), big data, cloud computing, the Internet of Things (IoT), or machine learning (Bjorkdahl 2020, 18). Thus, the concept of digitalization reflects the integration of digital technologies into a company's business model (Borcan 2021); (Bjorkdahl 2020); (Williams and Schallmo 2018).

### **1.6.2. Impacts of digital transformation in the automotive industry**

Recent literature defines digital transformation as the process of using digital technologies (e.g., cloud computing, big data, IoT, and AI) to improve performance and profitability, enable a fast response to the emerging opportunities/changes while creating value (Westerman, et al. 2011) (Siebel, Digital Transformation: Survive and thrive in an era of mass extinction 2019) (Williams and Schallmo 2018). Some have argued the digital transformation process goes beyond implementing the latest technology, whereas technology is only the enabler for the shift to more flexible businesses and organizational cultures capable of reacting quickly to opportunities as they arise (Stone 2018) (Herbert 2017)

The ATI is undergoing radical changes given the emergence of digital transformation, focusing on car manufacturers, who will have to implement digital strategies to remain relevant and competitive in the market (Aargaard 2019, 60). In comparison to other industries' retail experiences, the global ATI seems slower to adapt to new consumer expectations (Bacher and Manowicz 2020) (Fanderl, et al. 2019). The slow adaptation may result from the OEMs' extensive and complex networks (Fanderl, et al. 2019). Yet, it intensifies significant pain points at various stages of the car-buying journey (Köstring, et al. 2020). The pain points become even more prominent as tech-based disruptors like Tesla enter into the market, offering seamless experiences or customer-centric tech companies emerge – e.g., Amazon, Uber, Airbnb).

### **1.6.3. Customer Journey**

Understanding the concept of the customer journey is essential for optimizing the customer experience (CX) and deep understanding the customer behaviour. The literature defines the customer journey as a customer-centric process aiming to explore a customer's interaction with an organization through different stages and touchpoints (Bacher and Manowicz 2020); (Hamilton e Price 2019). It is worth noting that since consumer decision journeys are understood to be both dynamic and structured processes by previously developed models, current knowledge and theory combine varied perspectives resulting in a lack of common terminology (Santos and Martins Gonçalves 2021). Only one of the models designed by the consulting firm McKinsey & Company will be described for the present dissertation.

Over many years, the customer journey was represented by a funnel-like phenomenon, where consumers would start by considering a potential number of brands. As marketing was directed towards them, this number was funnelled down until they reached a single brand that they chose to purchase (see [Appendix I](#)). With the rise of digital channels and consequent explosion of information, the funnel-based model failed to capture all touchpoints of a better-informed customer, and it urged for a more sophisticated approach that would meet customer expectations (Court, et al. 2009). As a result, in 2009, McKinsey created a framework entitled the 'Consumer Decision Journey' to replace the classic funnel and better portray the consumer experience (Greenough 2019). The framework was created using data from 20,000 customer purchasing decisions in the US, Germany, and Japan markets (Greenough 2019). According to Court, et al. (2009) and Bommel, Edelman and Ungerman (2014), the model argues that the decision-making process is more circular, with the customer experience being individual at each touchpoint and each touchpoint representing an opportunity for engaging the customer with the brand.

The model consists of four phases: initial consideration set, active evaluation, moment of purchase, and post-purchase experience (Court, et al. 2009). A graphical representation can be found in Figure 2 ([Appendix II](#)). According to Court, et al. (2009), the process begins with a trigger, when the customer realizes the need for a given product/service leading them to find brands that offer it. Therefore, the initial consideration is the set of brands that come to the consumer's mind after the trigger occurs and is generally associated with and dependent on the level of exposure between the customer and the brand until that moment. The customer then moves on to an active evaluation phase. By gathering information about several brands, they evaluate them and may add or subtract more brands in their decision. The research and filtering made based on the previous phase lead to choosing of a brand and, ultimately, a purchase decision. The post-purchase experience is critical to keep the customer on the next journey.

#### **1.6.4. Omnichannel**

As reviewed earlier, the rise of digitalization and the prevalence of online channels have brought radical changes to industries and retailing (Verhoef, Kannan and Inman 2015, 174). Three global trends identified by Deloitte can explain the rise of the omnichannel concept: more connected consumers, a new retail concept, and the rise of digital technologies (Dinsdale, Willigmann and Glueck 2016, 5). Thus, alongside the growth of digital, consumer expectations have also been growing sharply as the selling process is affected by the presence of online channels at different touchpoints along their journey (Gallino and Moreno 2019, 1). The omnichannel approach emerges from the potential for retailing transformation in line with changes in consumer behaviour and its impact on industries (Piotrowicz and Cuthbertson 2019, 11), having gone from virtual non-existence to one of the most popular retail-related search terms over the last ten years, according to Gallino and Moreno (2019, 3).

Omnichannel advocates the integration of all communication channels between the retailer and the customer to provide seamless experiences across channels (Piotrowicz and

Cuthbertson 2019, 7-11). The omnichannel concept can be interpreted as an extension of the multichannel concept to efficiently cover the emergence and impact of digital channels, promoting cross-channel performance and integration (Piotrowicz and Cuthbertson 2019, 14). According to Verhoed, Kannan and Inman (2015, 176), omnichannel retailing can be defined as the “*synergistic management of the numerous available channels and customer touchpoints*” to optimize the customer experience along the journey as well as the performance of the various channels.

#### **1.6.5. Four emerging trends**

The global ATI is facing one of its most significant transformations in decades, widely associated with the era of Industry 4.0. From an industry related to innovations at the mechanical level, today innovations are associated with interconnectivity and technological advances, causing the disruptive entry of tech-core companies, experts in the use of big data, and business intelligence (Candelo 2019; Hofstätter, et al. 2020). As mentioned by General Motors CEO Mary Barra at the Davos 2016 Congress, it is believed that the “auto industry will change more in the next ten years than it has in the last 50.” (Barra 2016). In fact, the outbreak of the COVID-19 crisis came to accelerate trends that had already been emerging for some years in the industry (Hensley, Maurer and Padhi 2021). By April 2020, sales in Europe had dropped by 80 percent (Hensley, Maurer and Padhi 2021), due to the closure of dealerships and factories as well as the sharp reduction in mobility. This major crisis created a need to accelerate digital developments in an industry that displays a digitization deficit compared to other industries’ digital maturity (Hofstätter, et al. 2020).

According to the literature, four major trends are impacting the industry: electrification, connectivity, autonomous driving, and mobility services (Banher and Manowicz 2020, 80; Candelo 2019, 118; Fanderl, et al. 2019; Heineke 2020). McKinsey aims to summarize the four major trends impacting the industry through the acronym ACES, i.e., autonomous driving,

connectivity, electrification, and shared mobility (Holland-Letz, Kässer, et al., Profiling tomorrow's trendsetting car buyers 2018). According to McKinsey, the innovations affecting the automotive industry in some respects are more disruptive than those that, for example, have involved other sectors such as telephony. The entire mobility ecosystem will be redesigned thanks to the intersection of the automotive industry with the hi-tech one. As shown in the figure below, the changes will affect both the hardware and software components and, in addition, the business model (Beiker, et al. 2016), see [Appendix III](#).

### **1.6.5.1. Electrification**

#### **Forces of change: sustainability and regulatory concerns**

As already described in the previous chapter about the importance of the ATI, this is one of the largest industries globally and is also one of the main contributors to climate change (Günther, Kannegiesser and Aurenrieb 2015). The main reason is based on the vast amounts of greenhouse gas emissions (GGEs) produced by vehicles with internal-combustion engines (ICE) using fossil fuels (Rodrigues Vaz 2017). According to estimates by the IPCC (Intergovernmental Panel on Climate Change), transport is responsible for 14% of the total pollution and GGEs, compared to a share of 21% generated by the industrial sector and 25% by the production of electricity and heat. Due to an increased sensibility towards the environment, it has become critical to find new solutions and technologies to reduce GEEs. The ATI is highly regulated and there are numerous limitations in terms of emissions (especially CO<sub>2</sub> and fine dust). Due to new regulatory pressures and incentives, the ATI has commenced the transition toward the manufacturing of more sustainable vehicles (Rodrigues Vaz 2017).

According to a (McKinsey 2021) study, the EU has recently implemented its “Fit for 55” program, which aims to align climate, energy, land use, transport, and taxation policies to reduce net GGEs by at least 55% by 2030. Moreover, the Biden administration introduced a

50% electric vehicles (EVs) target by 2030. Therefore, the electrification of vehicles is widely seen as the key technology to improve air requirements and meet the new climate goals.

### **Electric Vehicles (EVs)**

The birth of these vehicles is not recent but dates back to the late 19<sup>th</sup> century. After the first carriage was built by Robert Anderson at the beginning of the century, there was the first prototype of the automobile designed by Thomas Parker in 1884. Until the beginning of the 20<sup>th</sup> century, the electric engine was highly appreciated. It guaranteed, in fact, greater comfort and reliability. Soon, however, due to limits related to speed (maximum of 32 km/h), to reduced distances travelled, and to technological advancements that led to the improvement of gasoline cars, EVs lost of popularity. After a long absence, it reappeared on the market in the 80s and then disappeared again. In the last ten years, due to energy and environmental issues, companies returned to put efforts in the development of EVs to face new strict regulatory issues, as a solution to the energy and production context.

In general, with the term EV, we include all types of cars equipped with an electric motor. Differently from the internal combustion engine, the one of electric cars exploits the electrical energy accumulated in one or more rechargeable batteries, which is transformed into mechanical energy necessary to move the vehicle. In addition to the batteries and the motor, the third main element is the power management unit, called the "inverter". Thus, we can consider the batteries to be the real engine of electric cars. In fact, the final performance of the car is determined precisely by its ability to store energy. The progress made in the technological field, today, allows the market to have models whose autonomy can even reach over 600 km. However, despite the numerous improvements found in the electric field, the weaknesses related to the technological and economic aspect have pushed the ATI to design hybrid vehicles. They have two propulsion systems, normally, one electric and one with combustion, which coexists and work synergistically, precisely because they are complementary.

### **1.6.5.2. Shared mobility**

#### **Definition of SM**

Shared mobility is today one of the most debated topics in the field of transport and is one of the solutions suggested by the European Commission to orient mobility towards greater sustainability. The Sharing Economy (SE) includes the macro area of Shared Mobility (SM), which concerns all those practices aimed at sharing vehicles between users of a digital platform. Although today there is no consensus on its definition, it can be summarized as an access economy where the sharing aspect becomes secondary, and the market is mediated by an intermediary undertaking (Eckhardt and Bardhi 2015).

Therefore, users do not exclusively use owned vehicles for travelling, but they can adopt rental services solutions enabled by the interaction with digital platforms. This system describes a transport service that includes public transport and taxis, bike-sharing, car-sharing, ride-sharing, carpooling, scooters, shuttle services, and others. The SM aims to respond to new travel needs, offering new options and solutions for transport. This system can provide multiple mobility choices to users, connecting the last mile with the first mile, reducing traffic congestion. Especially in big cities where these services can replace public transportation and private vehicles, they can represent the future of sustainable mobility. Moreover, SM can help reduce transportation costs, increase transportation efficiency, and offer travel options to those who cannot afford their vehicle. Furthermore, mobility serving platforms also aim at solving some historical problems that traditional mobility faces: a) facilitating the sharing between individuals of vehicles and routes, b) creating "tailor-made" services for each platform user, and c) maximizing the use of latent resources.

#### **Shared Mobility market, advantages, and future developments**

According to a study from McKinsey (McKinsey 2021), the SM market accounted for approximately \$130 billion to \$140 billion in global consumer spending in 2019. The biggest

share is represented by E-hailing (riders order a car with the driver to pick them up via a virtual device), which accounted for \$120 billion to \$130 billion, more than 90% of the total market. Less than 10% is represented by the car-sharing and the peer-to-peer car sharing taken together. Following this study, E-hailing has the dominant position in the market, having its share tripled in the last four years. Also, the share of micro-mobility has seen an even bigger adoption. Electric scooters did not play a major role in 2017, however, their growth accelerated tremendously between 2018 and 2019 with approximately 160 million tips in 2019. According to McKinsey, shared micro-mobility could potentially reach between \$300 billion to \$500 billion globally by 2030, becoming three to four times larger than today's global e-hailing market.

Kumar et al. (2018) note that shared services allow the exchange of value because a) they allow those who use them to save time thanks to convenience; b) generate monetary value for service providers who offer their goods (cars); c) provide time and money to those who enable the services; and d) allow to avoid investing significantly in human resources or capital (Kumar, Lahiria e Bahadir 2018). According to a (McKinsey 2021) study, the growth in SM will depend on how effectively the industry eliminates existing customer pain points. Autonomous driving is likely to change the game in the SM, especially with autonomous taxis (so-called robot-taxis) and airborne varieties, which have received massive investment acceleration in recent months. However, when these new modes may arise will depend mainly on technological developments (such as readiness of autonomous driving) and regulatory developments.

### **1.6.5.3. Autonomous driving**

#### **What is it?**

First of all, it is important to clarify the concept. Sometimes, the terms “self-driving”, “autonomous”, and “driverless” are used to refer to the same idea (Simoudis 2017), however, they actually relate to different levels of driving automation.

The Society of Automotive Engineers (SAE) defined five levels of driving automation, from total human control to total machine control. SAE Level 0 means the driver is only supported by warnings and momentary assistance, like blind spot or lane departing warnings and automatic emergency braking. SAE Level 1 vehicles include brake/acceleration support or steering assistance, like lane centering or adaptive cruise control, though the driver is still responsible for most of the driving. SAE Level 2 provides both features from the previous level simultaneously. Starting from SAE Level 3 the main “driver” is the vehicle, however, the human driver is expected to be able to intervene and takeover whenever necessary; this level includes features like super cruise and traffic jam chauffeur, vehicles that fall under this category may be referred to as “self-driving”. SAE Level 4 vehicles are able to independently handle an entire trip under limited conditions, even if the human driver doesn’t respond; these vehicles are called “autonomous”. Finally, SAE Level 5 refers to complete automation, the driving system controls every aspect of the vehicle, entire trips can be handled under any condition; in this case we have “driverless” vehicles, which, sometimes, don’t even include a steering wheel or pedals (e.g., “Google Cars”) (SAE 2021) (Candelo 2019, 162-163).

#### **Why is this technology important?**

The World Health Organization (WHO) estimates that approximately 1,3 million people die each year as a result of road crashes (WHO 2021), ranking this type of accident as the eighth leading cause of death worldwide for all age groups and the first for people between five and 29 years of age (CDCP 2020). Furthermore, a National Highway Transportation Safety

Administration survey on over two million light vehicle crashes found that human error was the probable critical cause in around 94% of them (S. Singh 2018). So, one of the main advantages of autonomous driving is the elimination of human error: machines do not get tired, have longer attention spans, respect road code, make fewer mistakes, and there is no risk of drunk/drug driving. Wadhwa and Salkever, in *The Driver in the Driverless Car*, defend that the diffusion of this technology will “slash accident and fatality rates, saving millions of lives”.

The authors also mention that, because driverless cars do not include steering wheels, pedals, and other systems enabling human control, they are lighter and more fuel-efficient. This results in fuel savings, extended ranges, fewer emissions, and improvements in air quality (Wadhwa and Salkever 2019, 152-155).

By removing the human contact, driverless cars are also expected to provide social benefits. Women and children are probably the most benefitted groups in this regard, as they won't have to worry as much when getting a cab ride late at night (Wadhwa and Salkever 2019, 153).

### **Main drawbacks**

Even though this technology seems to be a very promising one, there are still some roadblocks ahead. A lot of consumers are still sceptical about vehicles driving around with no driver behind the steering wheel. If, in fact, this technology is able to reduce the number of accidents and deaths on the road, it is important that consumers are aware of this situation. A McKinsey & Company 2018 study showed that only 46% of respondents react positively to family members using fully autonomous vehicles (Holland-Letz, Kässer, et al., *Profiling tomorrow's trendsetting car buyers* 2018). Furthermore, a survey by the American Automobile Association (AAA) in 2018 revealed that 73% of American drivers would be “afraid to ride a fully self-driving vehicle” and 63% of U.S. adults would actually “feel less safe sharing the road with a self-driving vehicle while walking or riding a bicycle” (AAA 2018).

Driverless vehicles demand extremely detailed 3D maps, with a high degree of precision, so that they understand the environment and move effectively. So, only with more advanced and reliable technology, and more testing – which requires big investments –, will consumers and authorities be open to embrace this technology (Candelo 2019, 163-164).

Also, with the higher and higher digitization level of vehicles, there are concerns about how hack-proof these are. For example, vulnerabilities in driverless vehicles' systems may be exploited for terrorism, such as controlling them to drive into places of mass gatherings (Torre, Rad and Choo 2020).

Finally, there are still some legal issues regarding the adoption of self-driving cars: in the case an accident occurs, who's responsible? The driver or the vehicle/manufacturer? In 2016, in Florida, a man using Tesla's Autosteer died after crashing into a truck. In 2018, Arizona, a self-driving Uber car hit and killed a pedestrian crossing the street while the safety driver was looking elsewhere (Wadhwa and Salkever 2019, 150-151). These are just two examples of accidents raising worries about this technology's safety and legal implications.

#### **1.6.5.4. Connectivity**

##### **What is it?**

Similarly, to SAE's chart of vehicle autonomy levels, the McKinsey Center for Future Mobility also created a framework describing the five levels of vehicle connectivity and user experience: the McKinsey Connected Car Customer Experience (C<sup>3</sup>X) framework (Bertoncello, Husain and Möller 2018). Level 1 (General hardware connectivity) means only the driver is able to do basic vehicle monitoring. On Level 2 (Individual connectivity) the driver has access to digital ecosystems and platforms, like Android Auto and Apple CarPlay, through its personal profile. Level 3 (Preference-based personalization) allows all vehicle occupants to personalize their experience (custom controls, individual infotainment content, etc.). Level 4 (Multimodal live dialogue) means everyone in the vehicle is able to interact live with it. Finally, a vehicle on

Level 5 (Virtual chauffeur) is capable of performing complex, unprogrammed tasks to fulfil every occupant's needs, even if unstated, by using AI ([Appendix IV](#)).

These different levels of connectivity depend on the vehicle's ability to communicate with different sources of information, like other vehicles (V2V), infrastructure (V2I), pedestrians (V2P), and the network (V2N). All of these together are usually referred to as vehicle-to-everything (V2X) communications (de Aragón, Alonso-Zarate, and Laya 2017).

### **A growing market**

Customer data is one of nowadays' most wanted assets and vehicle connectivity has the potential to generate vast amounts of it. This driver-vehicle data is critical to generate revenue, reduce costs, and increase safety within the industry. McKinsey estimates that data generated by vehicle connectivity could represent a value pool of up to €650.000 million by 2030 (Bertoncello, Husain and Möller 2018).

The growth of this market has been backed by the development of several technologies. A study conducted by the McKinsey Center for Future Mobility shows that, with the advancement of autonomous driving, respondents would use, for example, their vehicle's infotainment system more often (Holland-Letz, Kässer, et al. 2020). Also, as seen before, the evolution of AI solutions is critical to achieve further vehicle connectivity and to better understand passenger needs, consecutively reaching higher levels of user experience. The growing utilization of IoT technologies in the ATI is also very significant for the improvement of car connectivity and is considered to extend opportunities to create, extend and improve seamless solutions for the comfort of users (Rahim, et al. 2021).

Adding to these emerging opportunities, there is also a clear pressure from the consumer side to enhance connectivity solutions. When asked about who was driving the connectivity agenda, Agustín Martín, President and Managing Director at Toyota Great Britain, says

“Consumers. There is a clear desire on their part to have a seamless life. We must respond to this, and technology is the enabler.” (Automotive News Europe 2018).

### **Challenges**

Even though vehicle connectivity is arising as a catalyst of the ATI and as an enhancer of user experience, there are some challenges to keep in mind for the future. The first has to do with the vast amount of data generated by connected cars: who collects, controls, and distributes the data? (Athanasopoulou, et al. 2016).

There is a trade-off between privacy, security of consumers and opportunities of new mobility services. While distant monitoring systems may contribute to preventive maintenance or helping to increase safe driving based on navigation support, there is also a downside of cars becoming more vulnerable to hackers, for instance via infotainment apps (Athanasopoulou, et al. 2016).

Platform competition may be a problem as well. Both car manufacturers and operating system vendors, like Google or Apple, offer these connectivity solutions, so there is concern around how the first ones should respond: fighting for their own platforms or engaging in platform envelopment strategies? (Mohagheghzadeh and Svahn 2015).

Agustín Martín also commented on the biggest challenge for the future of connectivity: “adjusting a 100-year-old planning process to the “I want it now” mindset of today's consumers.” To provide the seamless life consumers are looking for, many operators and industries must collaborate, otherwise they may go out of business (Automotive News Europe 2018).

#### **1.6.6. Overview of current ATI challenges**

As we have been analysing, multiple changes vigorously shake up the ATI while inducing large-scale transformations for the first time this century. While the opportunities for OEM players are numerous, the pressures and challenges are equally abundant, all of which

must be taken into consideration to ensure they do not hinder growth and survival in the marketplace. Among various drivers, two critical aspects can be highlighted as potential challenges: environmental and social pressures, and the digital requirements necessary to raise the four trends mentioned previously in section 1.6.3. that can become a deal-breaker for many traditional industry players (Moran 2021).

Society's growing awareness of environmental issues, combined with the urgency of responding to gas emissions, has created intense pressures on the ATI, demanding urgent action. In the EU, those two drivers have led to increased regulations on environmental norms, such as stringent CO<sub>2</sub> targets and electric vehicle quotas (Mohr, et al. 2013, 9; Jonnaert 2019). In addition to the rigorous demand of these targets, the interval between emergence and implementation implies a response at an unprecedented pace from OEMs, which results in a significant rise in research and development (R&D) costs. Likewise, the European Commission's plan envisions the exemption of car emissions by 2035 (Ewing, Reed and Alderman 2021), which implies a drastic change in the brands' product offerings as well as total investment in the development of alternative low-emission solutions, that might represent a leap into the unknown future of not knowing what the predominant technology will be (Mohr, et al. 2013, 9). The second consequence of social and environmental pressures is undermining the sustainability of the private ownership of the vehicle. The increase in global population implies an increase in urban traffic (Firnkor and Müller 2011; Diehlmann and Häcker 2013; Ewing, Reed and Alderman 2021). Forecasts by the United Nations – Department of Economic and Social Affairs (UNDESA) further reinforce this concern. By 2050, it is expected that around 70% of the world's population will be living in cities (Diehlmann and Häcker 2013). Hence, in addition to the need to restrict gas emissions, there is also the social problem of high traffic in cities and new mobility alternatives. To summarize, the demanding environmental targets coupled with equally tight deadlines have three major implications for ATI: a significant

increase in investment to create viable zero-emission alternatives quickly; a complete restructuring of the OEMs' current portfolio; and an uncertain future landscape as to which solution will ultimately prove to be the prevailing one. Meanwhile, the population growth threatens the survival of the existing private car ownership model and forces the exploration of new mobility concepts.

As for the second driver, demanding digital technologies could pose a significant challenge to traditional competitors with less expertise in emerging technological trends. The reality is that today's OEMs are also competing with the big high-tech players, including platform providers (e.g., Uber, Bolt) and rising start-ups (Bertoncello, et al. 2021; Heineke, et al. 2020; Candelo 2019, 131) with more outstanding savviness in customer-centric models and better expertise in technologies such as machine learning, big data, or IoT, that are essential enablers for the rise of the four megatrends already identified. The competitive landscape is dramatically transforming into an inter-industry race (Candelo 2019, 175). Traditional players will have to adapt their business models by combining their traditional value proposition, considerably associated with operational excellence, and new technologies.

#### **1.6.6.1. Current perceptions on the retail model**

Regarding the ongoing challenges of the current automotive distribution model, there are four challenges that the industry is facing, all of them interrelated: consumer frustration with the overall car buying process; new customer buying expectations due to the rise of digitalization; the imperative need for integrating online and offline channels; and, lastly, the operational challenges that the new approach to sales entails. The four challenges will be analysed in-depth in the following paragraphs.

As analysed in the previous section (see section 1.4.), the distribution model has been chiefly dealer-based and has historically remained stagnant without major fluctuations (D. B. Walton 2019). Moreover, car-buying has traditionally been considered a long-lasting process,

even more so in an era characterized by a quick and accessible response. Literature reveals that the process is seen as intimidating, untransparent, stressful, and complicated, as only one in three consumers feel ‘very satisfied’ with the current model, according to a study conducted by Cox Automotive (2020). Predominant frictions can explain this in the journey, such as the lack of customization and integration between channels that lead to the customer spending several hours at the dealership, the bureaucracies and paperwork being too complex and time-consuming, or the lack of transparency of the salespeople regarding prices (Nerad 2021). The Automotive E-commerce Report (Givens 2020) estimates that customers spend an average of more than three hours at the dealership during the entire process of choosing, negotiating, trade-in and paperwork, with 58% of customers being unhappy with the length of the transaction.

The growing consumer dissatisfaction is directly connected with the new buying expectations because of the rise of digital shopping alternatives across all sectors. Regardless of the product, the consumer expects the experience to happen fluidly and frictionlessly, and automotive retailing is no exception.

Subsequently, to ensure a seamless experience, it is crucial to integrate online and offline channels, especially when combining customer data across channels. One of the major weaknesses of the current car-buying process is the disconnection between the OEM and the customer, as customer data often does not move between digital and physical channels, which in the current distribution model is usually translated by the OEM’s website and the dealerships, respectively. For example, when the customer arrives at the dealership after configuring the vehicle online, the process frequently goes back to zero due to the lack of integration across touchpoints, which causes a substantial delay in the whole process. One approach to solving the lack of integration between channels is to provide an omnichannel experience that reflects the consumer's path to purchase along their touchpoints, whether online or offline.

Finally, as vehicles are conventionally sold through a decentralized structure – involving importers, dealers, and ultimately customers –, OEMs usually do not directly contact with their customers (Dahlheim 2019). This gives rise to operational challenges on ensuring a connection with the customer while optimizing their current structure. Therefore, several OEMs have considered the Agent Model, where the role of dealers is shifted to agents operating on OEM's behalf (Schmidt, Trenka, et al., The future of automotive sales 2021).

## **2. Methodology**

The first part of the current work project aimed to understand the current situation in the automotive industry and the impact of digital transformation. For this purpose, secondary data on the topic was initially collected and analysed, such as research articles, books, reports from consulting companies, news, and websites. The use of secondary data assists in understanding theoretical concepts such as the importance and evolution of the industry, current retail models, and the trends and current challenges of the ATI. Furthermore, using primary data, an interview was conducted with Nuno Rochinha, the sales manager of Mercedes-Benz Retail, to comprehend the current car-buying process.

The second part of the project comprises individual contributions that rely on primary and secondary data. The individual contributions address a range of current challenges faced by the ATI. As such, each part had a different and unique methodology to address the research questions of each one. A summary of the research methods in each study is described below, although a more in-depth methodology can be found in each of the individual contributions.

First, both qualitative and quantitative research was conducted to discover which potential factors can be developed in the future business model of OEMs while considering new mobility solutions such as car-sharing, multi-sided platforms, and subscription models. Usually, the strategy to conduct business-related research can be inductive or deductive (Gabriel 2013). As this part of the work project aims to analyse from a different perspective a recent

phenomenon, to answer the research question “*How traditional business model in the automotive industry should adapt towards new mobility service solutions?*” the inductive approach was considered more suitable. To understand specific preferences and needs of generations, a web-based survey with multiple answers using a 9-steps Likert scale was selected as an appropriate approach to gathering data. Subsequently, additional open questions among participants were integrated to gain more specific insights about consumer perceptions.

To address the research question “*Can the agency model enable OEM’s RAC offering for the B2C segment?*” of this dissertation, the qualitative research method seemed most appropriate to address it, specifically inductive reasoning, which provided the foundations to the findings. To reach them, a review of the current literature related to the topic was conducted, an analysis of the market size of the business model (RAC), and an assessment of why OEMs should set up their RAC business model. Afterwards, based on a framework developed by Capgemini – “Capgemini Invent Agency Sales Framework” – an implementation plan for the current strategy was conducted, addressing the advantages and disadvantages of this model for OEMs. Lastly, an interview with an industry expert was conducted to gauge the applicability of this new venture for OEMs and define limitations and future work.

Regarding the research question “*What are the necessary strategic decisions premium car manufacturers such as Mercedes-Benz have to make to align their dealer network with the ongoing digitalization process in the automotive industry?*”, a quantitative research approach was used to identify the needs and desires of consumers with regards to car dealerships and their locations. The specific research type in this part of the dissertation is a self-completed online survey which perfectly helps to understand the preference and tendencies under investigation as thoroughly as possible (Saunders, Lewis and Thornhill 2016).

Furthermore, to investigate “*What are the main drivers that disrupt the business of Car Dealerships?*” it was used a qualitative method based on expert interviews, centered on the

framework of a guided interview. The interviews were conducted with experts within the automotive sector regarding retail and digital transformation. The two interviewees were chosen by their work experience and retail and digital transformation knowledge. As the topic is still in the development phase and the experts are still learning about the topic itself, it is not easy to find suitable interview partners. This paper focuses on quality rather than quantity, which is why the number of interview cases is 2. The experts received the interview questions before the interview to prepare for it. All experts were provided with the same questions from the guided interview to enhance comparability. The results were derived from the content analysis and were categorized and coded with the tool MAXQDA by several factors of importance for the hypothesis. The results either confirmed or contradicted the hypothesis created from the literature review.

As for the analysis of the research question *“To which channels (online or offline) do each of the current customer journey stages belong? Are they aligned with consumer preferences?”*, secondary data was used to theoretically frame the topics of customer experience, current changes in consumer behaviour, and the multichannel and omnichannel approaches. This literature review assisted in better understanding the research model and respective research question. Subsequently, primary data was obtained, resorting to quantitative data through an online survey, aiming to allocate the touchpoints to digital and physical channels across the customer journey and understand how OEMs and dealers could optimize their presence throughout the car-buying stages and better design an omnichannel experience. This analysis provided insights into which channel customers are most present in during each stage of the car-buying process. Based on the research, an action plan was developed to support the OEMs’ implementation of an omnichannel experience.

Finally, to breakdown the research question *“How can blockchain technology impact the automotive industry?”* while getting a better understanding of how blockchain technology

works, how it appeared and evolved throughout the years, the main advantages it offers, and the impact it is having in several industries, the report initiates with a review of the relevant literature over the topic, mainly analysing published academic research articles. Then, to assess blockchain's current and potential future impact in the automotive industry, the primary data sources were industry reports and surveys. These reached a substantial part of the players operating in the industry and provided solid evidence regarding the present adoption of blockchain and on the industry stakeholders' openness to further invest in this tool.

#### **4. Group Conclusions**

This research paper analysed the current situation and transformation of the automotive industry. This paper started with a description of the industry, its importance and evolution, then presented automotive retail with a focus on the car buying process and went into the digital transformation of the industry. Afterward, the individual parts of each group member are presented.

The first part of the individual research aimed to understand how existing car manufacturers adapt their business model towards new mobility solutions and identify the consumer attractiveness of innovative business models. The findings indicate that consumers are generally satisfied with the existing business model of car manufacturers in Italy, and generations targeted demonstrated interest towards innovative business models. Ridesharing and car-sharing were rated positive in cities and urban areas, but the willingness to use the selected mobility services was not considered very high or equal among generations. Following the analysis on consumer preferences towards new mobility solutions, some elements in the front stage of the current business model of car manufacturers can be implemented. Sustainable and environmental activities were stated essential and needed to be integrated into the value proposition. Moreover, existing channels and customer relationships need to focus on online

channels and increase digital interaction with customers. Lastly, revenues streams should adapt to more flexible models among Millennials and Generation Z.

The second part of the individual research indicates that significant challenges lie ahead of the current business model for traditional OEM, such as electrification, connectivity, autonomous driving, and mobility services. This poses a substantial threat to the OEM's long-term competitive position in the ATI. These companies are expected to adapt to the current market and consumer preferences changes. In the case of mobility services, some OEMs have expressed their eagerness to change from manufacturers to mobility services providers, such as car-sharing. The research paper effectively provides enough evidence for a possible solution for OEMs to achieve the overall objective of becoming mobility providers. Most of these mobility services businesses are based around a Rent-A-Car structure, where the business model is a slight adaptation of the previously mentioned, providing evidence that the Rent-A-Car business model is a starting point for these firms to address the challenges.

Further, the paper shows that the used business model directly affects the feasibility of this new desired venture. With the agency model, the execution of such a venture would benefit from it. The research illustrates that if OEMs implement an agency RAC model, this will effectively be an enabler to kick-off the path to mobility services provider (RAC), when compared with starting from square one, since through it there is a dealer onboarding strategy (network location), reduce overall cost structure, benefit from Backoffice synergies, direct-to-consumer approach and capitalize on a renting-based business.

Following this, the third chapter of the individual research aimed to provide detailed strategic recommendations for premium car manufacturers on how an optimized car dealership network should be established in the future. An analysis of customer preferences and expectations towards car dealerships has been carried out through an online survey. The research has shown that particularly in the premium segment, the need for extensive physical

dealerships remains very strong due to the physical advantages such as test drives and in-person display of an entire model range that competitive models cannot accomplish. Furthermore, the results show that despite an increasingly urbanized society, in which people want to have everything close by, the willingness to drive long distances to the desired car dealership is still very high. Therefore, the dealerships do not need to relocate into the centres of cities, whereas a suburban industrial location is an optimum solution that fulfils all the needs of the premium brand's customers.

The fourth chapter then further analysed the current state of automotive retailers in the form of dealerships and the disruptive changes that occur during the digital transformation of the industry. Based on literature review and qualitative analysis in the form of expert interviews, it can be concluded that the model and importance of Car Dealerships is changing. With the rise of online retail, Car Dealerships need to offer more than just selling cars to their customers. Showrooms are re-developed to provide an interactive customer experience to increase the customers' willingness to enter the dealership. Furthermore, customer data is more critical than ever. Dealerships need to understand their customers' needs and preferences by collecting personal data along the customer journey. Using an omnichannel approach is vital to offer a seamless transition between online and offline channels. In addition, the Personalization of products and processes becomes a primary metric, while the customers are always at the center of attention. The goal is to simplify the buying process at Dealerships while increasing the convenience for the customers at all stages. Overall, this paper identifies that Car Dealerships will still exist in the future, but as a hybrid model of online and offline channels. Most manufacturers invest heavily into their Dealerships to re-develop them and increase the customer experience and convenience along the buying process. Furthermore, through the digitalization of the showrooms and the introduction of the omnichannel approach, Dealerships will likely play an essential role in the future of car buying.

Regarding implementing an omnichannel ecosystem in the automotive industry, an analysis was conducted on the allocation of touchpoints at the various stages of the car-buying journey, from the awareness phase to the moment of purchase. After surveying 64 recent car-buyers and analysing their journey, it was concluded that the process occurs across both online and offline channels. More specifically, the awareness and initial consideration phases occur primarily through digital channels, while the following steps of active evaluation and moment of purchase occur physically. Besides, evidence shows the physical experience is vital for consumers while also the number one obstacle to buying cars online. Considering the results, to maximize the buyers' experience across channels and leave the decision-making power in their hands, OEMs will have to implement an integrated omnichannel experience. As digitalization grows, OEMs and dealers must be prepared to ensure a complete experience for customers who want to buy through online channels and those who do not, and those looking for a cross-channel experience. For that purpose, all the touchpoints provided must be strategically connected to avoid any shadows across the car-buying journey that may occur.

As shown throughout the report, the ATI is going through a profound digital transformation process. Current trends include autonomous, connected, electrified, and shared vehicles (ACES). Several technologies – like AI, AR, and IoT – are being studied and adopted to materialize these tendencies. Although these trends are expected to enable innovative mobility paradigms, new revenue models and businesses, safer commutes, less road congestion, and lower emissions while reducing mobility costs, their underlying technologies require many user data to deliver the promised results. So, in a world where customer data is becoming more critical, a transparent, rigorous, and secure technology is needed to collect, store, and use this data to achieve the previously mentioned goals. Based on the opinion of thousands of automotive OEMs and suppliers, blockchain technology has the potential to be the technology to do it. Whether used to increase transparency along the supply chain, secure valuable car

usage data against hacking, provide information and simplify payment/insurance processes, or improve the integration of the several stakeholders of the automotive ecosystem, blockchain can be an essential technology for the future of the ATI.

### **5. Group Recommendation plan**

Given the reached conclusions, we have structured a recommendation plan to present the practical implication/solution that our individual contributions have achieved.

Regarding the future business model of car manufacturers, mixed-based models with increasing mobility service offerings are likely to arise, often called servitization of the industry, where OEMs will start to provide mobility services, challenging the hegemony of the current platforms. A path to achieve this objective can be through implementing a Rent-A-Car business, as we have presented the case, preferably through the usage of the agency model, since it will provide a structural base to establish other mobility services offering and reap the benefits from the used model.

OEMs might consider increasing more sustainable measures in the value proposition, adopting electric vehicles for urban mobility and pay-per-use services. Integrate more flexible payments such as subscription-based solutions. Focus on online channels and digital interaction, for example, increasing virtual reality showrooms, digital payments, and assistance via video chat. Specific hubs can improve customer experience to provide information about products and services.

With regards to developing the optimized dealer network for premium car manufacturers must consist of large dealerships that are predominantly located outside of cities and provide a convenient parking situation for its customers. Furthermore, it must capitalize on its physical advantages by providing its entire model range in the dealership and allowing regular test drives for the customers. This typical dealer should be supplemented with selected

stores in city centres that capture the more enthusiastic customers and a competent online appearance to offer online purchases, targeted at the more basic line-up models.

Moreover, manufacturers should re-design their Dealerships and offer them all the necessary equipment and knowledge to fully adapt to the digital transformation. To succeed in the future, Manufacturers and Dealerships need to work closely together, invest heavily into customer data and customer experience within the Dealerships and along the customer journey.

Furthermore, it is essential to introduce an omnichannel approach to have a seamless transition between online and offline channels. To sustain an omnichannel experience, OEMs should leverage their official websites and mobile apps, as this can serve as a common touchpoint for all stages of the car-buying process. More so, the website/app can become the central hub that gathers customer data for OEMs and dealers and the platform that enables the customer to be connected with the entire process. Although there are further strategies to implement that strengthen the omnichannel atmosphere, the existence of a platform can be a crucial component in building a customer-centric ecosystem.

Additionally, customer convenience should always be at the centre of attention. Interactive showrooms are the key to attracting customers. They offer them a unique experience while shopping for their new vehicle. These showrooms could include digital technologies such as VR in combination with a fully digital car configurator and offline experiences such as lifestyle products, beverages, comfortable furniture, music, and scents to address all customers' senses.

There doesn't seem to be a reason to believe the pace of ATI innovation will slow down, so automotive players must realize that doing nothing isn't an option when it comes to blockchain and other industry-disruptive technologies.

However, blockchain is not a one size fits all magical solution. Organizations looking to explore its benefits should set a clear strategy to increase their probabilities of success: where

are frictions being experienced in my organization? Where and how can blockchain drive value in my business? Who should be part of my blockchain business network? How can every part benefit from this solution? Can these new blockchain-based services be used to complement and scale existing revenue models? Can they even create new models? How are my competitors and other industries using blockchain? Additionally, it is also important to mention that blockchain is likely to have a more significant impact when adopted with other technologies – big data, IoT, AI, etc. – that mutually boost each other's effect.

## **6. Group Limitations and Future Work**

### **Limitations**

In general, the main limitation of the studies presented is the small size of samples used. The first dissertation – the adaptation of traditional ATI models to new mobility service solutions – and the third one – alignment of premium car manufacturers' dealer network with the ongoing digitalization of the ATI – suffered from this constraint. Plus, as the surveys were conducted only in one country, there is a strong potential for a cultural bias in the research data, so their interpretation and analysis may be subject to cultural, environmental, and political factors. This way, a significantly larger sample size could potentially mean different results and, therefore, further recommendations.

Likewise, the study conducted on the fifth report – current customer journey stages and their alignment with consumer preferences – was based on a relatively small sample. Therefore, the findings are only as representative as the sample size. Furthermore, the car-buying journey model used for the research design may be customer-specific and dependent on individual preferences and the market segment of each brand.

The second dissertation – agency model and OEM's RAC offering for the B2C segment – provides evidence to support multiple claims. Of course, the evidence is based on past data, which might not be the best source to predict the future outcome of the industry. Past

information neither guarantees nor predicts the future performance of dynamic markets which are regularly altering/being disrupted.

In the fourth project – disruption of Car Dealerships – the deeper analysis on each component of the Dealerships and the study of the change in the overall business model of Dealerships was limited. Furthermore, it was challenging to find suitable interview partners, as they should work within the automotive industry, preferably at one of the prominent manufacturers. The interviewees were also limited with their insights due to trade secrets.

Limited data was the primary limitation of the last project – blockchain in the ATI. Blockchain is still a recent technology, and this tool is still in its early stages of maturity and adoption. At the end of 2018, most ATI OEMs and suppliers were still “considering” adopting the technology. Blockchain’s use cases, especially at the ATI level, are still limited, so it is not easy to find concrete, real-life examples of its applications, let alone quantitative results.

### **Future work**

This study can be integrated with financial feasibility and cost-benefit analysis of our claims in the future. Given that some research followed empirical research and other quantitative analysis, further diligence regarding the financial output and environmental impact can be explored. Given that this industry directly affects society, a future assessment could be conducted to analyse the impacts that our claims will have on the remaining stakeholders and their reaction to such change.

Moreover, since some quantitative analyses were based on sample size and conducted only in single countries, these studies can also be extended to other countries and might be applied to different industries. Doing so with a larger sample would effectively address one of our main limitations, the small sample size. Furthermore, how the advancement of autonomous driving and regulations impact consumer preferences towards new mobility solutions can be

investigated. Finally, integrating an accurate analysis of the blockchain's financial applicability and scalability can be conducted in the future.

### **3. Individual contributions**

#### **3.1. Luca Rainaldi – 40782**

##### **1. Introduction**

The automotive industry is undergoing a radical change due to digital transformation, which does not only affect the products and the value creation of car manufacturers, but especially their business models. Digitalization and servitization have impacted every industry, in particular the automotive with four main trends: electrification, shared mobility, connective services and autonomous drive. Moreover, technology-led innovation, increasing pressure for regulatory conditions and changes in customer needs and preferences are disrupting the nature of mobility, bringing strategic and operational opportunities as well as challenges for car manufacturers. While many firms struggle to generate profits with product sales, others can identify opportunities by integrating product-related and value-added services (Kumar, Bikfalvi and Arbussa 2021). Information Communication Technology (ICT) enabled a digital revolution, allowing firms to find new opportunities in the emerging personal mobility landscape through digital platforms. On-demand service mobility providers such as Uber, Drive Now, and Car2Go experienced increasing growth before the pandemic among young and older generations and undoubtedly shaped the future of mobility. These mobility providers, have shown the ability to attract customers by serving them differently, changing the way individuals move, either by connecting drivers to a platforms (car-pooling) or passengers to cars (“Drive Now”, “Car2go”, “Enjoy”). Innovation plays a critical role for businesses to create new products and services (Amit and Zott 2021) and many scholars have proved already the importance to exploit new ways of doing business and achieve long-term success. However, studies about the impact of business model innovation in the automotive industry are limited.

Moreover, the market is changing rapidly with new generation of customers coming up with different expectations, particularly towards new mobility solutions. Thus, the need for car manufactures to adapt to changes in the customer base and environment, improving digital interaction via new channels, and discover innovative solutions for the mobility of the future. This study aims to contribute the literature regarding the business model innovation in the automotive industry; analyzing how automakers can adapt existing business model and which innovative mobility-based model (Car sharing, Subscription or Multisided platforms) is more attractive for Millennials and generation Z.

## **2. State of Art & Literature Review**

### **2.1. Traditional Business Model in the Automotive Industry**

In this chapter, we provide a common understanding from the literature review about the definition of the business model. Then, we narrow our research with an overview of the traditional business model in the automotive industry.

#### **Business Model**

The common opinion discovered in the literature review defines the business model as those mechanisms through which an organization distributes value to customers and generates revenues. Some authors described the business model as the set of mechanisms that allows the creation and distribution of value to consumers (Chesbro 2018). Others have emphasized its composition, proposing classifications of the elements that constitute it and the relative connections that are established. Christensen, K. and his colleagues, for example, identify four key elements: the *customer value proposition*, the *profit formula*, the *key resources and processes* (Johnson, Christensen and Kagermann 2009). Given the multiplicity of similar illustrations, Foss and Saebi explained the concept of business model, starting from the key components recurring in the numerous definitions: *the value proposition*, *the target segments*, *the organization of the value chain and the mechanisms used to make profits* (Foss and Saebi

2016). Therefore, the BM is used to identify business logics, as a basis for strategic planning; to respond to changes in the external environment and to support the development of new organizational forms or the expansion of product lines. According to Magretta, J. who defines the differences between the business and strategy: the first explains how to create value for customers and generate revenues, while strategy describes how to beat the competition and differentiate (Magretta 2011). One commonly used tool to explain how a firm creates and distributes value is the Business Model Canvas. According to Osterwalder and Pigneur, “*The business model describes the rationale of how an organization creates, delivers and captures value*” (Osterwalder and Pigneur 2010). The [Appendix 1](#) shows the nine elements that define a Business Model: Value proposition, Customer Segments, Customer relationships, Channels, Revenue Streams, Key Partners, Key Activities, Cost Structures and Key Resources. The authors also differentiate between the “back stage” of the business and the “front-stage” of the BM (Osterwalder and Pigneur 2010). The first addresses all the resources and activities inside the firm, as well as the strategic partnership providing value. The second, represents all the activities that are visible addressing the customers. It includes the value proposition, the revenue streams, customer relationships and channels (Osterwalder and Pigneur 2010). Our research focus mainly on the front-stage elements: value proposition, customer segment, channels, revenue streams and customer relationship.

### **Traditional Business Model in the Automotive industry**

In the traditional business model of car manufacturers, value creation comes mainly from the company’s resources and capabilities as well as from the supply chain network and activities, but within the automotive environment. OEMs following the traditional model, mainly focus on the production of cars, after-sales services and financing. Revenues streams are generated mostly from selling cars, leasing models and other aftersales services such as maintenance and repair. According to Wirts and Daiser, the most important channel to

communicate and attract the customers in the traditional model is mainly focused on the show room and the interaction face-to-face with customers (Wirtz and Daiser 2018). In the traditional model, OEMs use the dealer network and its distribution channels in order to deliver cars as shown in the [appendix \(figure 2\)](#). The customer segment is focused on people who are willing or want to buy cars.

## **2.2. Innovative Business Models in the Automotive Industry**

From the different definitions regarding the business model, it is clear that the BM is not a one-time activity during the life of a company. Instead, it requires modifications and adjustments in response to changing contingencies. If we consider changes in the competition, the development of new technologies, and shifting customer preferences and needs; innovating the way in which the value is created becomes the only way for companies to survive (Randhawa, Wilden and Gudergan 2020). In the following chapter, we describe three innovative business models developed in the automotive industry: *Car Sharing*, *Subscription* and *Multi-sided platforms*.

### **2.2.1. Car Sharing Model**

Companies are investing more in new mobility service solutions based on data collection and digital platforms (Björkdahl 2018). One innovative business model developed in the automotive industry is the car-sharing model. In the last decade, given its sustainability and scalability, car sharing has gained many attentions. In Europe, the car sharing market reached 15 million users in 2020, from 700 thousands in 2011 (Statista 2021). This on-demand system, enabled by the new app-based mobile technologies, gives the possibility to use a car for a demanded duration any time. According to a survey study, car sharing reduces transportation emission by 50% (Chen and Kockelman 2016). Daimler's Car2go is the first example of B2C car sharing operations in 2008, it complements Daimler's core business model with on-demand

mobility solutions, with city smart car fleet as we can see in the [Appendix \(Figure 3\)](#). Within the Car sharing business model we can find three different types:

**a) Free-floating:**

This model is the most recent as free-floating providers have been in the market for less than 5 years. Customers can pick up the car and return it within a restricted area. The main advantage of this model is flexibility, but it has higher prices as they are based on time only. The majority of free-floating providers are OEMs such as Daimler's Car2go, or Drive Now after the merger with BMW-group.

**b) Stationary:**

This model is older than 20 years and it is based on fixed stations and usually the starting and ending point is the same. It is more adapt for longer trip, thus, utilization is higher because of longer distances while turnover is lower compared to free-floating.

**c) Peer-to-peer**

This car-sharing-based model provides vehicles owned by private individuals to a community. Companies offer the service through a digital platform; prices are usually based on a daily rate, and cars must return to the pick-up area. Therefore, they are less flexible than free-floating and a valid alternative to rental autos.

In the table below, the front-stage elements of the car sharing business model are summarized.

<b>Business Model Areas</b>	
<b>Value Proposition</b>	<ul style="list-style-type: none"> <li>• Alternative of ownership, flexibility with pay per use</li> <li>• Without insurance, fuel or electricity costs</li> <li>• Availability 24/7 and free parking slots</li> <li>• Sustainable and economic convenience of mobility</li> </ul>
<b>Customer Segment</b>	<ul style="list-style-type: none"> <li>• People who need last minute reservations</li> <li>• One-way travellers and people taking trips in the cities</li> <li>• Sustainable-conscious individuals</li> </ul>
<b>Revenue Streams</b>	<ul style="list-style-type: none"> <li>• pay as you drive based on minute, hours or days</li> <li>• All inclusive solutions (maintenance, fuel, rental, insurance, etc. )</li> </ul>

**Table 4:** Front-Stage Business Model Car Sharing

### **2.2.2. Subscription Model**

In the age of digitalization, this model has gained much attention from manufacturers, implementing new solutions to monetize products and services, as customers are increasing their interests in mobility performances more than products (Kumar and Kumar 2004). Recently, car manufacturers are recognizing the increased demand for flexible vehicles subscription models, transforming the OEMs to an all-inclusive sales and customer service model. One example is Care by Volvo subscription model, which provides monthly payments for customers with all-inclusive services and the option to change vehicle. This model is particularly preferred by Gen Y and Z, but also older generations showed interests because of the depreciating costs associated with new products (Martinez and Walsworth 2018). The main elements of the Subscription model front stage are described below.

<b>Business Model Areas</b>	
<b>Value Proposition</b>	Offer mobility solutions such as the use of cars, based on usually monthly payments and with limited Km
<b>Customer Segment</b>	Consumers are usually young generations, who mainly need more flexible and cheaper solutions, convenience on the use rather than ownership
<b>Revenue Streams</b>	Usually there are monthly payments and other sources of revenues can come from additional services

**Table 5:** Front stage of Subscription Business Model

### **2.2.3. Multi-sided Platforms**

Another innovative business model in the automotive industry is the one followed by Uber: the multi-sided platform (MSP). This model is enabled by a digital platform which connects several group of customers with mutual interests. For example, Ubers connects drivers with passengers, it works as a marketplace where customers and drivers conduct their transactions. This model gives flexibility to drivers by not having schedule time and to customer by facilitating and providing information. The front stage elements of a ride sharing business model like Uber are described:

<b>Business Model Areas</b>	
<b>Value Proposition</b>	<p>Value for customers:</p> <ul style="list-style-type: none"> <li>• Convenience of not looking for a taxi</li> <li>• Availability of cars 24/7</li> <li>• Trackability of the routes</li> <li>• Know before how much the ride costs</li> </ul> <p>Value for Drivers:</p> <ul style="list-style-type: none"> <li>• Source of income</li> <li>• Independency with flexible working schedules</li> <li>• Destinations provided already on the app</li> </ul>
<b>Customer Segment</b>	<p>Rider segment:</p> <ul style="list-style-type: none"> <li>• People who do not have their own car</li> <li>• People who need to travel</li> <li>• People with specific needs, ex. go to the airport</li> </ul> <p>Driver Segment:</p> <ul style="list-style-type: none"> <li>• People who work professionally</li> <li>• People who want to start or need an extra-job</li> </ul>
<b>Revenue Streams</b>	<p>Sources:</p> <ul style="list-style-type: none"> <li>Payments per ride</li> <li>Fees charged per ride</li> <li>Dynamic pricing on demand and distances</li> </ul>

**Table 6:** The front stage elements of Multi-sided platform

### **3. Methodology**

This chapter presents the research question, the design and approach of our data collection, and the analysis. Additionally, the research analysis is discussed, and the method for respondent selection is explained.

#### **3.1. Research Question**

As consumer preferences and needs are rapidly changing towards new mobility solutions, particularly in younger generations, it is important that car manufactures such as Mercedes, recognize which potential factors can be developed in the future business model of the automakers. Moreover, the literature review about business model innovation in the automotive industry is limited, and new generation of customers are coming up with different

expectations. Thus, this dissertation aims to contribute to the literature about business model innovation in the automotive industry. Considering three innovative business models developed in the automotive industry (Car Sharing, Subscription model and Multi-sided platforms) the purpose of this study is to analyze:

*How existing business model should adapt towards new mobility service solutions ?*

*Which innovative business model is more attractive for Millennials and Generation Z ?*

### **3.2. Research Method**

To discover which potential factors can be developed in the future business model of car makers while considering mobility service solutions such as Car Sharing, Multi-sided platforms and Subscription, both qualitative and quantitative research have been conducted. Usually, the strategy to conduct a business-related research can be inductive or deductive (Gabriel 2013). As this paper aims to analyze from a different perspective a recent phenomenon, to answer our research question, the inductive approach is therefore preferred.

### **3.3. Data Collection**

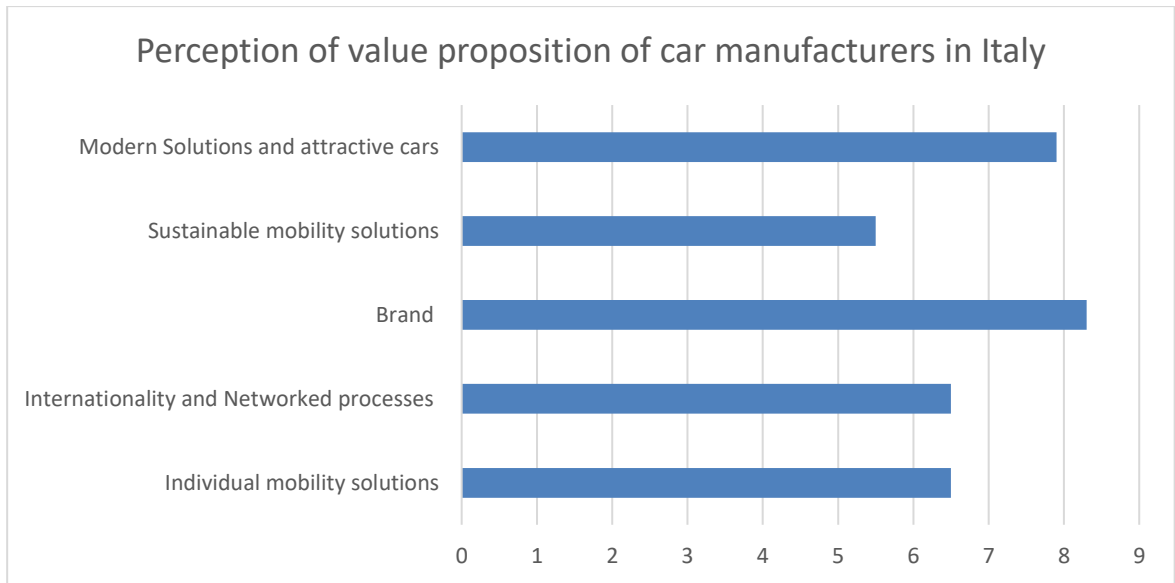
The method to gather data for the development of this study was performed mainly through primary and secondary data. To analyze the current market of mobility services in the automotive industry a research was conducted using articles from academic journals, library and additional consulting reports. Moreover, to understand generation specific preferences and needs a web-based survey with multiple answers using a 9-steps Likert scale was selected as an appropriate approach to gather data. Finally, the questionnaire was integrated with open questions among participants to understand deeper potential areas to implement in the front-stage business model of car manufactures. Overall, 148 participants answered the survey, 135 of the selected generation target Millennials and Generation Z. The survey is structured into three main pillars which include questions regarding: 1) satisfaction of the traditional business model with regards to value proposition, customer relationship, payments methods, channels

offerings; 2) generation preferences of car ownership (ownership vs mobility services; disadvantages of car ownership); 3) attractiveness of mobility service business models (attractiveness car sharing, multisided-platforms, subscription models).

#### **4. Analysis & Discussion of Findings**

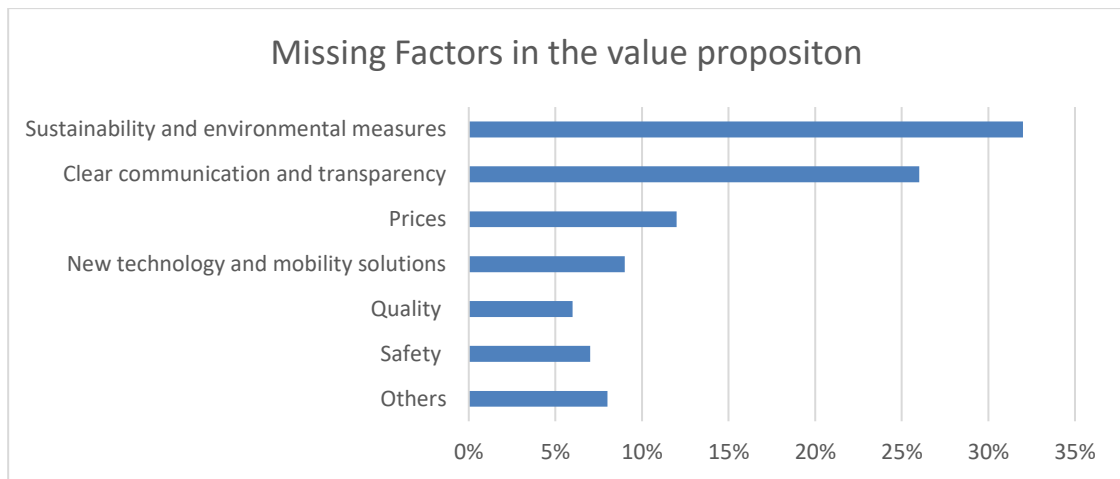
##### **4.1. Consumer perceptions of traditional business model in Italy**

In regards to the satisfaction with the existing business model of car manufacturers in Italy, the sample results showed an average range between 5.6 and 8.3 meaning that overall they are satisfied since the values are greater than the mean. In the table below, the results regarding the perception of the value proposition of carmakers in Italy are summarized. The overall perception of car manufacturers value proposition in Italy in terms of providing modern solutions and attractive cars was rated with a mean of 7.8. Regarding the importance of brand image, it was considered the most important element with an average score of 8.3, suggesting an high position for automakers brand quality in Italy. Furthermore, the international and networked presence and the individual mobility solution offering received a pretty high valuation, respectively 6.4 and 6.5. Instead, regarding sustainable mobility solutions, car manufacturers in Italy were perceived not properly positioned with an average score of 5.2, suggesting potential for improvements in this area.



### **Value proposition missing factors**

When asked for pain points in the existing value proposition of traditional car manufacturers business model in Italy, the answers received indicate that particularly environmental and sustainability measures and clear communication and transparency are not well-positioned. Based on the survey, sustainability and environmental factors are perceived by 32% of respondents as a major missing element in the value proposition. Additionally, lack of clear communications was perceived as missing factor in the value proposition by 26% of the respondents. Regarding prices, new technology and mobility solutions were considered missing respectively by 12% and 9%. Quality and safety were not really perceived as missing elements and seemed to be properly addressed in the current value proposition with only by 6% and 7% of the respondents.



The results of the survey indicate that more than 58% of the respondents perceived missing elements in the value proposition of traditional business model especially with regards to sustainability and environmental issues and clear communication and transparency. Thus, these two areas need to be implemented, based on the sample results, with a potential for improvements.

#### **Satisfaction with current customer relationship, payments methods, and channels**

To gain deeper insights about current pain points and missing elements in the other areas of the front-stage of the business model (customer relationship, revenue streams and existing customer channels), more open questions were integrated in the survey. The open questions contributed with the following data:

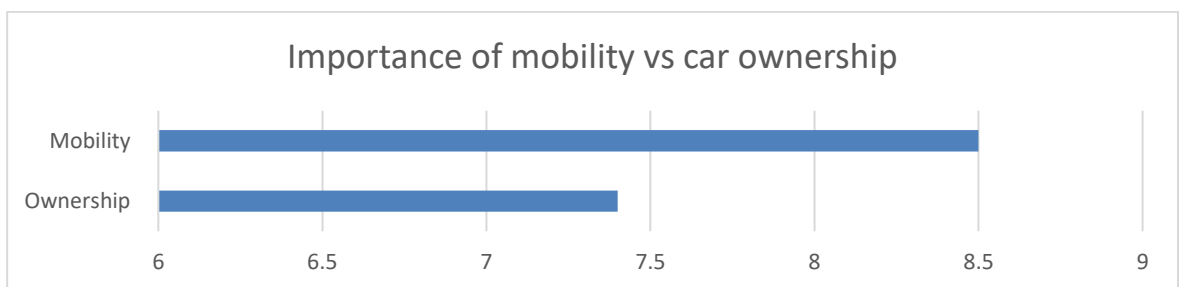
- More than 52% of the respondents stated that they are not completely satisfied with the current channels and asked for increasing offering of online channels via social-media and websites. Almost one third (28%) asked for more personal and contact channels while around 20% of the participants answered that additional channels are not really needed.
- More than half of the respondents (63%) asked for increasing flexibility of payments methods. Around a quarter of respondents (24%) requested additional

flexibility such as leasing and subscription models. Only 13% did not ask additional payments methods.

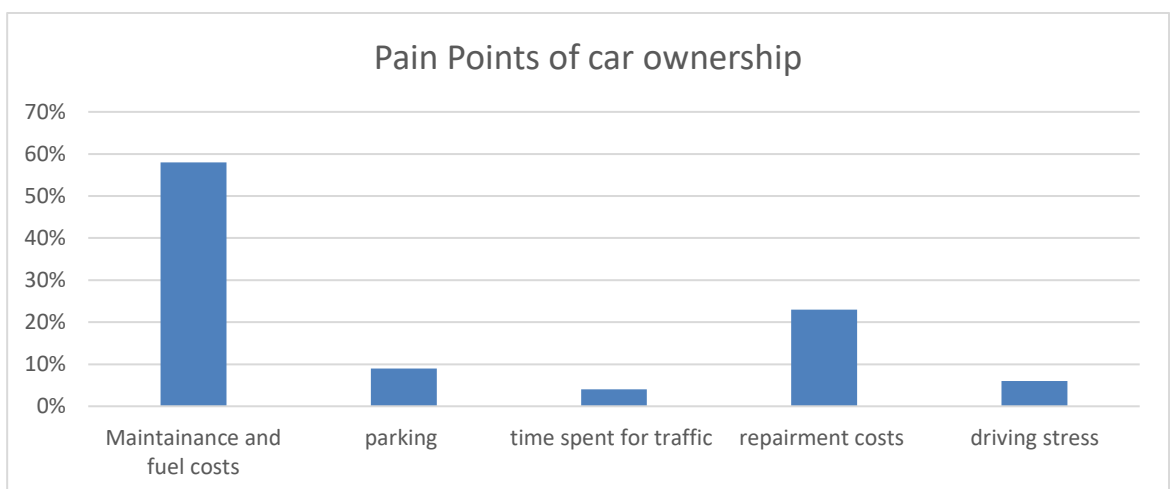
- Customer relationship practices should be improved according to the majority of the respondents. The majority of the respondents asked for increasing information and instructions about the car services. Particularly, more than half (58%), requested increasing virtual reality and test-driving experiences and interaction via hubs/show rooms.

#### 4.2. Generation preferences and needs of car ownership

The results of the survey regarding the importance of mobility compared to the importance of ownership of the car, showed that although car ownership in Italy is rated important with an average of 7.5, the importance of mobility is considered higher at 8.5.

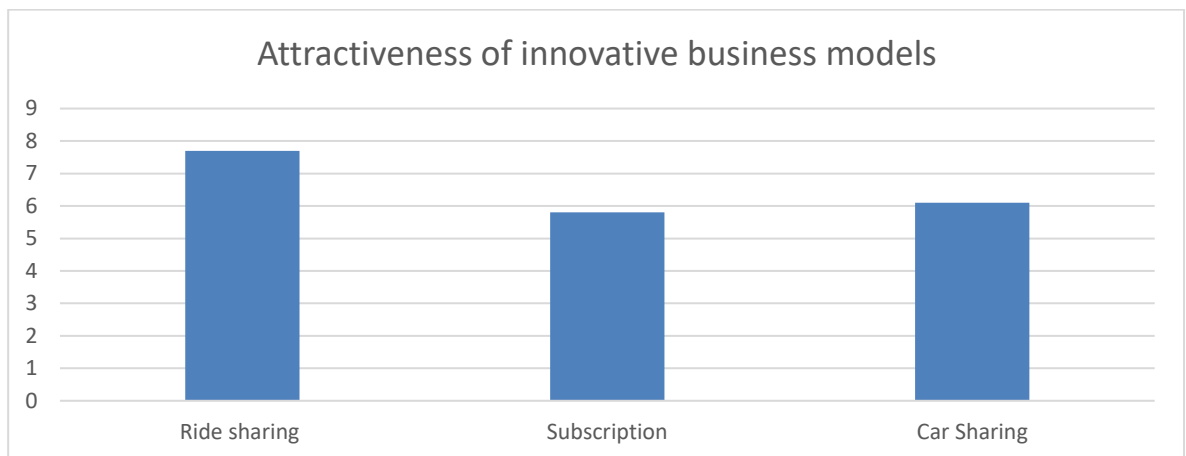


When discovering the principal pain points of car ownership, the main reasons were considered due to maintenance (60%) and fuel costs and additional costs for repairs (23%).



### 4.3. Attractiveness of innovative business models

With regards to the attractiveness of mobility service business model, and particularly the proposed three innovative business models (car sharing, subscription, multi-sided platforms), a summary of the results is described in the table below. Overall, the most attractive one seem to be multi-sided platforms such as ride sharing like Uber (7.7). Car sharing and subscription models were also considered attractive especially from younger generations, from 15 to 24 years old, with an average of respectively 6.1 and 5.8. In general, Millennials and younger generation seem to be positively attracted by innovative business models particularly by ride-sharing such as Uber, car sharing and subscription-based.



### 5. Conclusion & Recommendations

The findings indicate that consumers are overall satisfied with the existing business model of car manufacturers in Italy, and generations targeted demonstrated interest towards innovative business models. Particularly in the cities and urban areas, but the willingness to use the analyzed mobility services was not considered very high and not equal among generations. Following the analysis on consumer preferences towards new mobility solutions, some elements in the front stage of the current business model of car manufacturers can be implemented. In fact, based on the conducted research, there is potential to create more value and adjust the business model of car manufacturers mainly in four areas. Firstly, the value

proposition can be adapted increasing sustainability and environmental measures. For example, shifting towards electric vehicle fleet, particularly for car-sharing services. Secondly, as consumer preferences especially in generation Z and Millennials require increasing flexible payments methods, revenue streams can be implemented via subscriptions and pay-per-use models. Thirdly, improving customer relationship focusing on online channels such as social networks and websites. Finally, consumer experience should be implemented increasing digital interaction such virtual-reality based showrooms to proactively provide information about products and services. As mobility services are radically shaping the automotive industry, with new opportunities as well as challenges for car manufacturers, in the future, mixed business model with increasing mobility service offerings are likely to arise. Thus, car manufacturers might consider to implement the following recommendations to adapt the traditional business model:

#### **Value Proposition**

- Increase of electric vehicles for mobility in the cities and urban areas
- Integrate mobility service solutions such as car sharing and multi-sided platforms

#### **Revenue Stream**

- Focus on more flexible payments such as subscription or leasing models
- Increase revenues sources as service mobility providers such as car sharing or pay-as you drive options

#### **Channels**

- Increase digital interaction via new channels
- Focus on online channels and implement digital solutions

#### **Customer relationship**

- Extend support via online channels such as video chat and messaging

- Implement specific hubs in the cities and virtual reality-based showrooms to provide assistance and information about products and services

## **6. Limitations and Future work**

This study has different limitations which need to be considered particularly regarding the research sample. In fact, the survey was conducted only in one country, thus its interpretation and analysis of data can be subject to cultural, environmental, and political differences. Moreover, the results of the survey are only representative of a sample size. The possible future work from this paper might be based for example on the analysis of other means of transportation such as E-scooter and/ bikes. It can be useful to identify how consumer preferences and needs might change considering other offerings such as bikes or scooters, particularly in the urban areas. Moreover, it could be useful to investigate the financial, sustainability and cost-benefits analysis of each business model to implement specific measures. Additionally, other elements of the business models such as key partnerships, key resources, and key activities can be performed for a specific company in the future. Furthermore, since the survey and open questions were conducted mainly in Italy, it might be interesting to understand how cultural differences and habits differ from other countries. Finally, this study could be implemented by exploring the impact of autonomous driving on consumer preferences towards new mobility solutions when it will be more regulated and advanced in the future.

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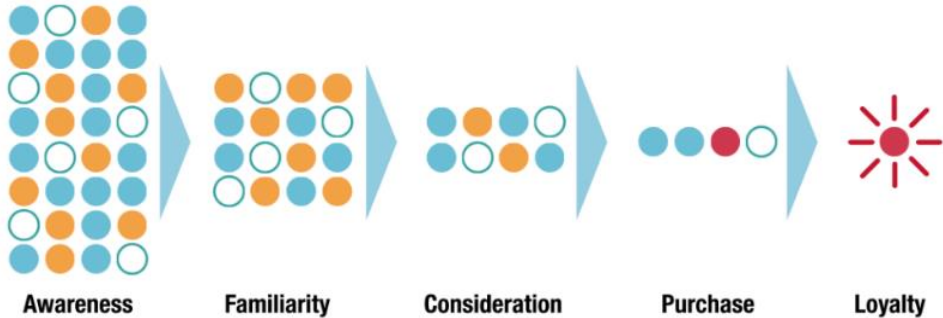
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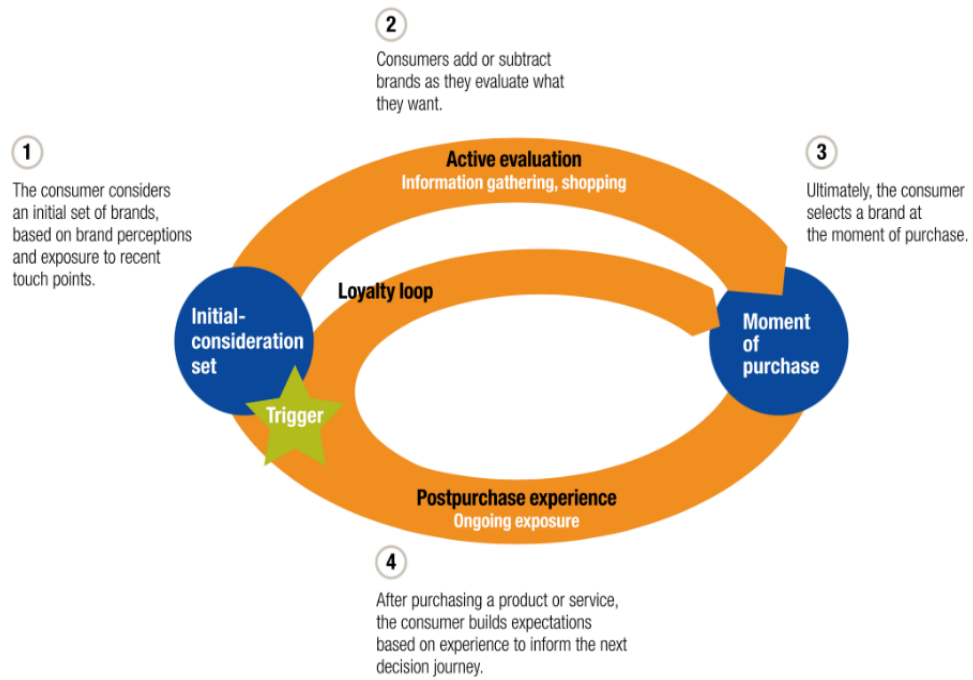
**8. Appendix**

**8.1. Appendix Collective**

**Appendix I – Traditional funnel model (Source: Court, et al. 2009)**

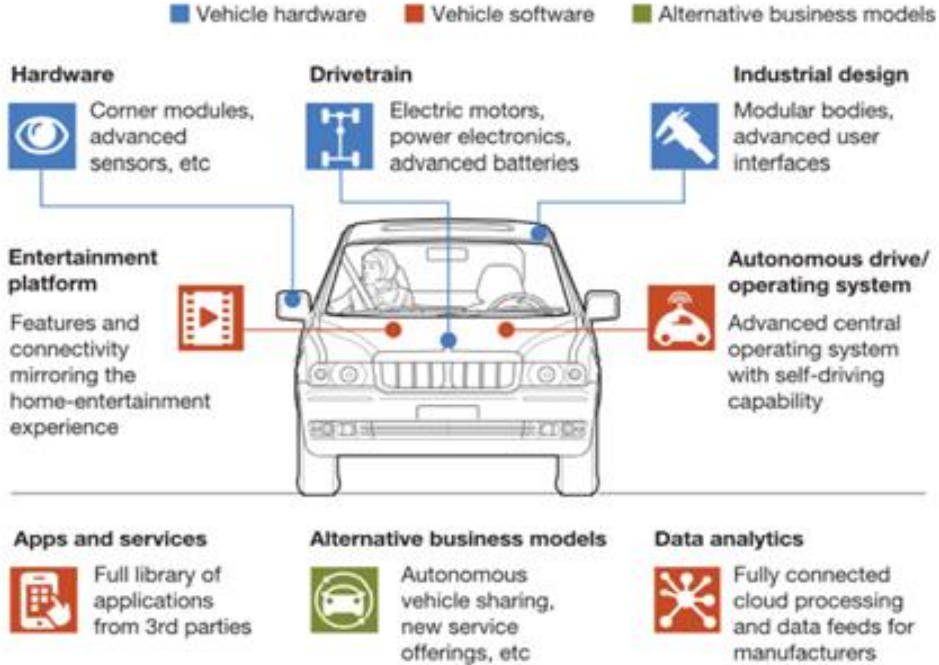


## Appendix II – Circular consumer journey (Source: Court, et al. 2009)

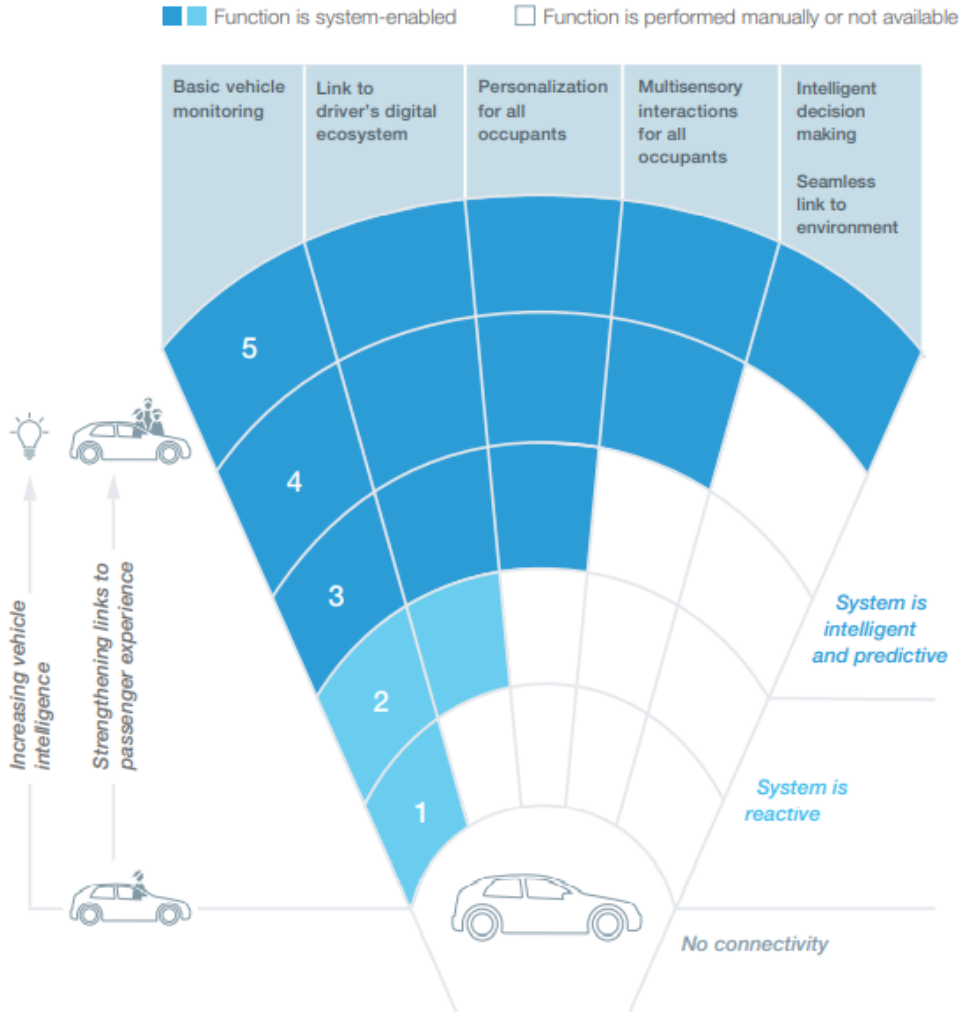


**Appendix III – How the conversions of Automotive and Tech will create Ecosystem**

(Source: Beiker, et al. 2016)












**Appendix IV – McKinsey Connected Car Customer Experience framework (Source: Bertonecello, Husain and Möller 2018)**



## 8.2. Appendix Luca Rainaldi – 40782







### Appendix I – Business model Canvas

**Figure 1:** Osterwalder Business Model Canvas including descriptions (Boillat and Legner 2013)

<p><i>Key Partners</i> </p> <ul style="list-style-type: none"> <li>• Who are our key partners?</li> <li>• Who are our key suppliers?</li> <li>• Which key resources are we acquiring from partners?</li> <li>• Which key activities do partners perform?</li> </ul>	<p><i>Key Activities</i> </p> <ul style="list-style-type: none"> <li>• What key activities do our value proposition require?</li> <li>• Our distribution channels?</li> <li>• Customer relationships?</li> <li>• Revenue streams?</li> </ul>	<p><i>Value Propositions</i> </p> <ul style="list-style-type: none"> <li>• What value do we deliver to the customers?</li> <li>• Which one of our customer's problems are we helping to solve?</li> <li>• What bundles of products and services are we offering to each customer segment?</li> <li>• Which customer needs are we satisfying?</li> </ul>	<p><i>Customer Relationships</i> </p> <ul style="list-style-type: none"> <li>• What type of relationship does each of our customer segment expect us to establish and maintain with them?</li> <li>• Which ones have we established?</li> </ul>	<p><i>Customer Segments</i> </p> <ul style="list-style-type: none"> <li>• For whom are we creating values?</li> <li>• Who are our most important customers?</li> </ul>
<p><i>Key Resources</i> </p> <ul style="list-style-type: none"> <li>• What key resources do our value proposition require?</li> <li>• Our distribution channels?</li> <li>• Customer relationships?</li> <li>• Revenue streams?</li> </ul>		<p><i>Channels</i> </p> <ul style="list-style-type: none"> <li>• Through which channels do our customer segments want to be reached?</li> <li>• How are we reaching them now?</li> <li>• How are our channels integrated?</li> </ul>		<p><i>Cost Structure</i> </p> <ul style="list-style-type: none"> <li>• What are the most important costs inherent in our business model?</li> <li>• Which key resources are most expensive?</li> <li>• Which key activities are most expensive?</li> </ul>
		<p><i>Revenue Streams</i> </p> <ul style="list-style-type: none"> <li>• For what value are our customers really willing to pay?</li> <li>• For what do they currently pay?</li> <li>• How are they currently pay?</li> <li>• How would they prefer to pay?</li> <li>• How much does each revenue stream contribute to overall revenues?</li> </ul>		

**Appendix II – Front Stage Business Model in the ATI**

**Figure 2:** Traditional Business Model in the Automotive Industry, Front Stage Elements.

<p><b>Value Proposition</b> </p> <p>Attracting customers when providing excellent cars and innovative mobility services</p>	<p><b>Customer Relationships</b> </p> <p>Diversification by brands and products (from luxury to economy segment)          Brand image          Brand awareness          Test drives          Customer events          Mast customization</p>	<p><b>Customer Segments</b> </p> <p>Mass market</p> <p>Private customers:          Mobilty solutions for the mainstream          Loyal customers</p> <p>Corporate customers:          Car dealers          Fleet customers          Car rental</p> <p>Niche markets:          Wealthy customers          Passion for premium/luxury products</p>
<p></p>	<p><b>Channels</b> </p> <p>Exhibition rooms          Dealer network          Website, Apps, Print Media, Events          Museums at production sites          Live streams          Distribution partners</p>	<p><b>Revenue Streams</b> </p> <p>Selling new cars: Leasing, Purchase, Rental          Selling spare parts for used cars          After sales service: maintenance of used cars          Funding and insurance services          Fleet management</p>

**Appendix III – Figure 3: Daimler VS Car2go’s BM (Osterwalder and Pigneur 2010)**

Daimler

KP  CAR PARTS MANUFACTURERS	KA  MANUFACTURING DESIGN	VP  CARS, TRUCKS, VANS, BUSES, FINANCIAL SERVICES (E.G. MERCEDES BRANDS)	CR  MAINLY HIGH-END BRANDS	CS  MASS MARKET
	KR  VEHICLE PLANTS  INTELLECTUAL PROPERTY BRANDS		CH  DEALERS SALES FORCE	
C\$  MARKETING & SALES MANUFACTURING R&D			R\$  VEHICLE SALES VEHICLE FINANCING	

car2go

KP  CITY MANAGEMENT	KA  FLEET MANAGEMENT TELEMATICS MANAGEMENT CLEANING	VP  INDIVIDUAL URBAN MOBILITY WITHOUT CAR OWNERSHIP	CR  ONE-OFF SIGN-UP	CS  CITY DWELLERS
	KR  SERVICE TEAM TELEMATIC SYSTEMS SMART FORTWO CAR FLEET		CH  CAR2GO.COM MOBILE PHONE CAR2GO PARKING LOTS CAR2GO SHOPS PICK-UP/DROP-OFF ANYWHERE	
C\$  SYSTEMS MANAGEMENT FLEET MANAGEMENT		R\$  PAY PER MINUTE—\$0.27 (ALL INCLUSIVE)		

## Appendix IV – Questionnaire

how old are you

- less than 15
- 15-24
- 25-34
- 35-53
- 55-74
- more than 75

where do you live?

- big city
- small town
- non-urban area

do you have a driving licence?

- No
- Yes

what is your gender

- Male
- Female
- Non-binary gender / Third gender
- I prefer not to say it

how important is it for you to own a car?

0 1 2 3 4 5 5 6 7 8 9

Click to write choice 1

how important these factors are to you when buying a car, renting it or leasing it

0 1 2 3 4 5 5 6 7 8 9

cost

brand

additional services included (coupon, insurance, assistance)

eco-sustainability

what are the disadvantages of owning a car

- maintenance and fuel costs
- repair costs
- search for parking
- pollution
- driving and traffic stress

how important these factors are to you when choosing an alternative mobility system

0 1 2 3 4 5 5 6 7 8 9

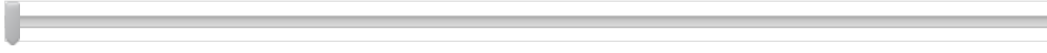
cost



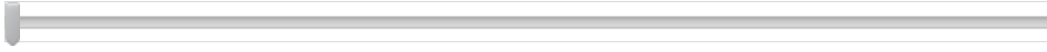
quality of service



eco-sustainability



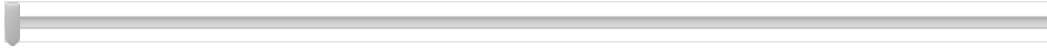
immediate availability (service proximity)



ease of payment



service safety



real time traceability



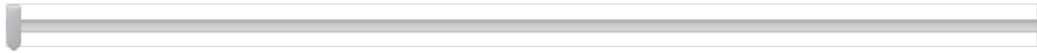
how important are the alternative mobility services to you (carpooling, Subscribe, ride sharing)

0 1 2 3 4 5 5 6 7 8 9

Carsharing (car 2 go, Drive now, Enjoy)



subscription (Care by Volvo)



ride sharing (Uber, Lyft, Bolt ...)

