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Digitalization impact and evolutionary dynamics in automotive industry: the optimal implementation of explorative and exploitative techniques in business model innovation. Evidences from Citroën Italia from a territorial perspective.

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Introduction

The world is evolving and, together with it, people.

The development and spread of the Internet as well as technological advancements have gone through a period of transformation so sudden that, to this day, it is still in many ways incomprehensible to most people.

While previously the focus was mainly on the product and companies competed with each other to launch the best one on the market in terms of price or quality, over the years there has been a transition towards a "customer-centric" approach. The latter dictated by the growing attention paid to the service to be enjoyed and, at the same time, to the experience derived from it. The uncertainty caused by the instability of the surrounding environment has in fact led the individual to adapt to contingencies coming from outside that have pushed him to change his habits and lifestyles.

The consumer's purchasing behavior has changed thanks to the diffusion of progressively advanced technologies that make it possible to integrate the physical and digital spheres into a set of interconnections between the agents operating in the business ecosystem.

Therefore, in order to survive a highly competitive environment dictated by the increasingly stringent customers' demands, companies must also be able to change their strategic and organizational structure.

In the automotive industry in particular, there are so many organizations operating in it that today it is one of the most competitive and profitable at the same time. Indeed, the issue that I would like to analyze is related to a field which I approached nearly through my internship in a Citroën and Volkswagen dealer started in February and moving on until August. The interest on the topic has been suggested thanks to the characteristics of the automotive industry itself, which represents one of the most dynamic and uncer-

tain environment as we have just stated before. It is a market in continuous evolution whose actors are always in race for innovation: the changes and challenges
are mainly driven by the high level of competition that affect all the strategic decisions of car manufacturers.
In the course of the discussion, therefore, we will define the new trends characterizing the automotive industry and children of the same phenomenon that bears the name of digitization. We will try to find out how car manufacturers, customers and organizations collaborating with each other within the same environment have decided to respond.
It will be interesting to define the strengths on which a company must leverage in order not to oppose the change but to welcome it, in view of a complete renewal of its business model.
At first, this issue will be analyzed by the demand side to explain the reasons that conducted to fluctuation in market demand responsible for the evolution of the industry.
Furthermore, the focus will be on the need to create and sustain competitive advantage thanks to internal resources and capabilities combined with external factors. As companies tend to move in step with the evolution of industry, changes in strategies can be determined by both external and internal components.
The discussion moves to modular designs and product platforms strategies that enable companies to build a broader portfolio of offerings for customers, including niche products at acceptable cost, at less effort. To deliver the promised advantages, platform and modularity concepts must be supported by the right product development operating model and the relevance of partial or complete business integration.
Moreover, ambidextrous organizations will be analyzed to explain exploitative and explorative approaches, consequences of the advent of digitalization, through a description of Citroën brand.
It will be useful to understand the strategic reaction to the different above mentioned trends, customers intentions over the acceptance or rejection of the trend but also about the real evolution of the company's positioning and performance over competitors.
Finally, since there are many studies about the impact of a right combination of external and internal factors over firms performance, other studies focus on the relevance of ex-

ploitative and explorative techniques, addressing them simultaneously as a core topic of the ambidexterity field.

For what concern business models, many researches explain the main reason for their re-definition: creating competitive advantage even if it is not so easy to sustain it over time. Studying the relations between these issue is something just covered in literature, as they are strictly correlated between them.

Nevertheless, the aim of this analysis is to examine the causal combination between internal capabilities and external factors on supporting a firm's exploration and exploitation agendas as complex antecedents of the re-invention of the firm business model. We will take in consideration ambidextrous organizations to explain how they may focus their activities on the exploration and exploitation of new or existing resources and capabilities, both internal and external, requiring to be combined.

The aim is to maintain a significant competitive advantage over the long term through the optimal combination and allocation of resources.

Chapter 1 – Evolution of automotive industry in relation to the advent of digitalization and the new macro trend

1. 1 Changing figure of the customers as a diver of the evolution of industry structure

Significant changes revolutionized society and its equilibria in recent years. The dynamism imposed by the market led to the development of digital technologies of high impact addressing both companies and individuals by making them benefit from technology innovation.

“We refer to digitalization as the way in which many domains of social life are restructured around digital communication and media infrastructures.”[1] In fact we can talk about digitalization as a concept that implies the use of digital technology, concerning to the way through which the society has had to adopt to the progress.

In this context, the figure of the consumer emerges as a fundamental key in the redefinition of the business model as the way of buying has also evolved. It is therefore necessary to take advantage of an offer that fully satisfies in every nuance what is the primary need of the customer: the last ten years have in fact marked the beginning of the so-called "customer era”. The relationship with the client must therefore be mutually evolving: the latter could in fact represent the main stakeholder of the company: its needs change, even the business activity must change.

The current consumer society is the result of these cultural and technological changes that define the individual as an individual emancipated from his or her roots and projected towards progress guaranteed by technological development itself. The Internet has changed the consumer activity of users by making them able to access an increasing number of sources to compare different brands. The consumer, in fact, has become more

[1]Brennen and Kreiss, 2016

and more digital-oriented since he started using the web as a suitable tool to search for information and evaluations among different alternatives to meet his needs in the easiest possible way.

Today the customer has changed: he is attentive, informed and prepared about products even more than the sales consultant himself and, by definition, no longer loyal to the brand. They are constantly looking for the best value for money and are demanding, selective and shrewd: these aspects have contributed to make them autonomous according to their purchase intentions. Not only that, they seem to be more and more attracted by the countless moments of contact with companies, because the ways of involvement contribute to influence them easily: they are hyperconnected. Another source of influence is the constant interaction between customers and the social factor, as individuals often make a mirror purchase[2] because they are guided by the experience of others and hardly make isolated choices or simply prefer a product just to be associated with the "type of consumer of that brand"[3].

Indeed, Internet enabled people to catch information very quickly through several online platforms by reducing the information asymmetry that characterized the traditional brand-customer relationship thanks to a constant interchanging of opinions between community users.

In this approach the brand does not have an objective existence: it is a collection of perceptions instilled in the mind of the consumer[4].

In addition, consumer preferences are oriented towards unique and personalized products and companies must focus on selling products with distinctive characteristics compared to competitors' offerings, as the purchasing decision making process is concluded after a careful evaluation of different proposals: it emerges from the growing awareness of consumers. In this framework, the emotional sphere acquires more emphasis than the rational one because the focus of the company's activity is to create a remarkable propo-

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[2] Escalas and Bettman, 2005; Aaker, 1997

[3] Govers and Schoormans, 2005)

[4] Fournier, 1998

sal of value, taking into account the beliefs, values, feelings and ambitions of individuals.

We have stated that thanks to the new opportunities offered by the technological transformation and the constant connectivity and interaction within the network of consumers people have changed habits, attitudes and expectations, we are witnessing a process that sees people change faster than companies.[5]

Moreover, the shopping experience is evolving to be customer-centric, in a direction towards the integration of these innovations in order to make the purchasing process simple, intuitive and immediate. However, to be truly effective it should create a significant benefit for both companies and customers, as it would be counterproductive if it did not turn out to be the end result of implementing a coherent and holistic strategic plan. In fact, customer travel now includes many more interactions, with many more possibilities, over global distances and in virtual places[6].

With the arrival and the consequent evolution of digital instruments, a process dictated by different external factors of influence has arisen. These have directly affected corporate culture, business activities and purchasing behaviors because online platforms have enabled companies to be connected and ubiquitous. The understanding of the client's path appears to be relevant, being a cognitive and decisional path through which the client interacts with the brand, from the identification of needs to fidelity.

There are four factors that, according to Kotler and Keller (2018), influence the customer's decisional path: cultural, social, personal or situational, and all these aspects have contributed to the transition from the traditional linear funnel to a more organic structure, the so-called Customer decision journey. In fact, traditional channels such as TV, radio, newspapers or events and physical stores have been progressively replaced or, better, completed by the birth of digital channels, mainly driven by the advent of the Internet and the huge offer of products and services.

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[5] Kotler and Stigliano, 2018

[6]David W. Norton and B. Joseph Pine II, Using the customer journey to board test and refine the business model

In this context, the traditional funnel has been characterized by sequential phases such as awareness, familiarity, consideration, purchase and loyalty. Even without explaining each step, we can say that in this evolutionary context it was necessary to develop a tool that would not only improve the current offer but would also guarantee its uniqueness thanks to a redefinition of the entire structure of the business model, starting from the right allocation of resources, until it is really perceived as "customer-oriented[7].

The new approach, a circular and complex model called Customer Decision Journey by McKinsey[8], can be applied to all markets and is represented by:

- Consideration set about different brand and products based on the perceptions that the clients have on them
- Active Evaluation as skimming of the alternatives according to customers' feelings, attitude and preferences
- Buy which represents the effective bran/product selection
- Experience given by the usage of the product and, in this phase, companies actions become really significant to guarantee the retention of customers base and represents an antecedent for the next step
- Bond or the creation of a relationship with the brand.

Moving from the Initial Consideration Set to the Active Evaluation step, the intensity of efficiency and effectiveness at the level of individual touch-points changes. Thus, an inverse proportionality between consumer-driven actions and company-driven actions is established: if the former duplicate, the latter decrease to a complementary extent. This means that the fact that costumer might research for a product through a mobile application, compare prices across websites through a computer, and finally, purchase the product at a physical store became much more relevant rather than the actions implemented by the firm. This is the customers era and we should not be surprised by this.

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[7] David W. Norton and B. Joseph Pine II, Using the customer journey to board test and refine the business model

[8] Court et., al., 2009

We can not move forward if we do not also briefly explain the concept of moments of truth, fundamentals for understanding the following part to better explain the customer-brand or product relationship.

In 2005, A.G. Lafley, CEO of Procter&Gamble, focused the "moments of truth" (MOT) on the moment of consumption, introducing the definition of the first and second moment of truth. The first, also known as Shelf, represents the moment when the customer first comes into contact with the product in a store, both physical and digital, and then decides whether to buy it or not. The second moment of Truth coincides with the phase of use and evaluation of the product by the consumer and provides a pleasant and memorable experience (or not), he feels if he is satisfied or dissatisfied and then decides whether to repurchase. It becomes the point of comparison between expectations and reality and living a positive experience will make customers to buy the same or similar product in the future.

In 2006, Pete Blackshaw (formerly P&G), introduced the Third Moment of Truth or TMOT is "where the product experience catalyzes an emotion, curiosity, passion, or even anger to talk about the brand" and consequently when consumers can provide written and verbal feedback about the product and its use, sharing their experience.

In 2011 Google introduced the Moment Zero of Truth or ZMOT and the concept of "Micromoments: it's "when the consumer does research on a product or is made aware of the product" after stimulating it and "it's the new decision-making moment that takes place one hundred million times a day on cell phones, laptops and wired devices of all kinds". It's a time when marketing happens, when information happens and when consumers make choices that influence the success and failure of almost every brand in the world.

The whole set of digital technologies together with the massive development and diffusion of the Internet has led to the revolution of the system of channels through which a company can reach its customers. Thanks to the digital platforms we have witnessed the birth of a system of interactions and exchanges of information also supported by the Internet of Things paradigm. In this framework, even Big Data become really important.

In reality, an effective customer journey involves an omni-channel approach that should be a continuum between online and offline, assisted by a real mapping of individual points of contact. It should allow to have as much control as possible over almost all the phases of user evaluation and to follow step by step the journey with the user who can move on to the purchase and eventual re-purchase.

In fact, the maximization of customer value is fundamental for the implementation of omni channel strategies and their success as a response to changing demand also supply must change. We are witnessing the evolution from the multichannel perspective to the idea of omni-channel strategies, based on the attempt to break down the boundaries between the digital and physical spheres, which should be perfectly synchronized and communicate with each other. The development of the Internet above mentioned has indirectly caused the emergence of new purchasing practices, through which customers can integrate online and offline channels to get the main information to find the products best suited to their expectations and desires. In this framework some purchasing practices such as showrooming and webrooming have been born: the first is a process that starts from a physical store and ends online while the second is the opposite path[9] and gives us the opportunity to understand the difficulty that companies face to achieve the best consistency between online and offline contact points, whose boundaries are increasingly blurred and perfectly interchangeable.

Companies should implement successful omnichannel strategy to provide a considerable value proposition aiming to increase customer satisfaction, brand loyalty and purchase frequency[10] by enabling consumer ownership of decisions according to their brand path. Consumers have a high level of commitment to organizations and, with respect to the past, the information asymmetries between companies and customers, negatively perceived before, are now overcome in favor of a fair and stable relationship.

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[9] Kotler and Stigliano, 2018

[10] Pauwels and Neslin, 2015

This has been possible thanks to the organic approach analyzed above, which has made it easier to avoid shortcomings linked to specific channels.
By turning to the firms through an expanded range of channels, the same suddenly increase in number collecting growing attention by the organizations: indeed, at the same time there is also significant potential for cost efficiencies and synergistic effects.[11] Efficient information flow across touchpoint becomes a prerequisite since they are points of human, product, service, communication, spatial, and electronic interaction collectively constituting the interface between an enterprise and its customers over the course of customers' experience cycles. The omni-channel experience offers, through synergistic effects across different channels, new business opportunities and a variety of drivers responsible for companies' growth whose base is the changes in habits and in the modes of buying, as we have previously stated.

We just have talked about the necessity to adopt a holistic vision to offer an exclusive customer experience by aligning internal organization, processes and technology; in this framework companies should define strategies that allow them to reach the users anywhere and anytime influencing their decisions or creating new needs and wants. The success of this scenario derives from the wider concept of digitalization, structured around digital communication and media infrastructure: the society had to adapt to progress.

At the basis of digitalization process there are the new interaction modalities among people, no more analogical but digital via chat, mail or social media[12] and this use of digital technologies leads to change a business model by providing new revenues and value-producing opportunities being the process of moving to a digital business (Gartner). Digitalization is not a technological change but a new approach which trough technology changes in a profound way the way of doing business (Braga, 2017). Actually, digitalization is something wider and in that context traditional sectors and industries have had to evolve in a consistent direction.

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[11] Larke,Kilgour and O'Connor, "Build touchpoints and they will come: transitioning to omnichannel retailing". International Journal of Physical Distribution & Logistics Management Vol. 48 No. 4, 2018 pp. 465-483

[12] Brennen J., Kreiss D., "The International Encyclopedia of Communication Theory and Philosophy", October 2016.

1. 1. 2 The evolution of the supply offerings according to the fluctuation of demand. How business should evolve to match the new request?

The automotive industry, although born during the last decade of 1800, has always been characterized by a constant evolution affecting economies and societies at global scale. Nowadays, the automotive sector is a high-technological field and consumers have begun searching even information about cars online: Internet and web practices development contributed to make the customer experience more appreciated. Companies' expectations are related to the profound understanding and satisfaction of the highest numbers of market segments in such digital economy, by being forced to realign new business models and to invest in new technologies with a focus on offering original and connected customer experience to win in a market guided by experience itself. Furthermore, analyze the mechanisms related to costumers' behavior has become a priority for managers competing in such extended virtual market.

Before explain the actions realized by the companies in order to react to digital behavior in the automotive sector, even by analyzing those implemented within the purchase phase and not by a strategical perspective, issue that will be thoroughly examined in next chapters, we can briefly explain which are the main implications of a good studied customer experience.

First of all, we have noticed that this represents the complete expression of what people have heard from initial knowledge of the offer to after-sales service and, for this reason, a good customer experience facilitates the decision making process of customers indirectly generating value for the company, because in the modern network community, a satisfied customer through positive word-of-mouth and without cost can influence the perceptions of others. Thus, the interaction perceived with the brand may occur at both conscious and unconscious level.
Therefore, following the direction of putting clients at the center, it requires a coordinated effort by all areas of business: implementing strategies to meet the quality standards for which clients are looking is one of the key steps for organizations.

The second is to invest and grow in digital, whose drivers are profitability, customer satisfaction and faster market entry. The high competition and uncertainty dictated by the instability of the environment make a collaborative approach necessary. Organizational structure, corporate culture and technology departments must be aligned efficiently: the company must be able to completely satisfy the customer. In this framework, we can understand the high degree of correlation between digital strategy[13] and customer experience strategies as determining factors for business success as a means of differentiating the offer from competitors.

In conclusion, to contain all the considerations made so far, we can report 4 key elements identified by KPMG to achieve a successful Customer Experience:

1. Customer Experience leaders follow an omni-channel strategy

2. A successful Customer Experience requires a high level of service, homogeneous among the various countries

3. There is no customer experience without a deep knowledge of the customer's needs.

4. People: the most important resource for a successful Customer Experience

In turn, we can now discuss the actual role of digitization, which is a complex phenomenon that allows companies to make the most of digital technologies to change business models, increase revenues and optimize the value of the company in terms of changing culture, thinking and organization. However, it differs from digital transformation which, on the other hand, implies the use of digital technology extending it to the entire business. Obviously, the two concepts are perfectly correlated and integrated, since investments and integration of digital innovations affect products, services, business processes, interactions with customers and suppliers, sales, communication channels and much more. The potential benefits are manifold and include increased productivity and sales, customer portfolio and greater accessibility to information. (Accenture, 2014).

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[13] Zwilling M., “Customer Experience is today’s business benchmark”, Forbes, (2015)

In addition, we can summarize the areas that digital change is working on such as production, organization, operations and experience (discussed extensively earlier) and expand the topic to the automotive sector, which is at the core of the entire analysis.

Although car dealers face some price pressure from digital consumers, digital channels enable them increasing sales. All car manufacturers, dealers and automotive service companies are expanding their digital initiatives by defining the transition from traditional product offering to service sales: they have seized the opportunities driven by the promising growth potential of maintenance and real-time information on car usage. Consumers are moving to digital media for information about cars by consulting corporate websites, social networks and internet-related communities as discussion forums or blogs; online practices offer the idea of cheaper purchases and consequently the possibility for companies to increase sales using digital channels. In this sense, just think that compared to the past, only 20%, or only 1 time out of 5, a potential customer turns directly to the dealer, or in general to a dealer, rather than looking at the web first.

Obviously, the technological and digital developed companies have easier control of the customer journey, especially if they have also put in place the online sale of their products and services: aiming to integrate different touchpoint is the key driver for successful performance.

There are three “I” of fundamental relevance in discussing customer journey implications:

integration among different channels, interaction between the firm and the final consumer, almost to create a real relationship with it and finally, interconnection between the points of contact in an organic path.

For example, SAIC Volkswagen that is a joint venture between Volkswagen Group and SAIC Motor established in China has started to sell new vehicles online and redesign the customer experience across different digital touch-points[14]. However, as car manufacturers and dealers have had difficulty distinguishing themselves from online competitors and integrating their customers' online and offline shopping experiences, many so-

[14] McKinsey, 2016

lutions have been found to causally combine the possibilities of exploiting digital technologies. In this case we can mention the service "Audi connect easy delivery", designed in May 2015 in Munich to develop an innovative logistics service: send parcels directly into the trunk of your car. In fact, "Audi was supposed to operate with the connect easy delivery service through temporary authorization for keyless access to the car's trunk: below, you can transform your car into a service device and integrate it even more into your customers' daily life" as Luca de Meo, Member of the Board of Directors for Sales of AUDI AG, said. Among the advantages are time savings, convenience and flexibility, useful in controlling the delivery of their orders. Moreover, efficiency given by by the accuracy of the assigned address to reduce traffic congestion is another traceable advantage.

This background reveals the degree to which processes, including those related to car sales, are evolving, reducing the amount of car sales, promoting the increase of more modern online sales practices.

1.2 Response by car manufacturers through the adoption of the new trends

After the analysis we realized that digitization influences both the purchasing behavior of customers and the activities of organizations, ensuring benefits for both through the need to reconcile supply and demand after providing a general rule on what the trends are. Although the Internet is the basis of positive customer-business interaction, which is a two-way source of stimuli and a driver for successful performance to outperform the competition, it is important not to be dazzled by novelty. Consequently, because digitization is the tools and not the ability for business to truly satisfy consumers, it makes the automotive industry an uncertain environment because not all organizations can be able to exploit these technologies, driven by globalization and the adoption of different production methods[15].

[15] Womack et. ai., 1990)

In this part, we will explain the reasons to transport revolution which led to the development of the main trend characterizing the automotive sector since, at least, more than a decade of years.

Thus, network technologies, social and collaborative software and changing consumer habits have led to a change in demand, which represents an essential variable for the business, is ascertained. Since all the changes affecting mobility today are driven by technological development, we will move on to the analysis of the effective use of digital techniques in the next chapter, to introduce the main current trends in mobility.

At first, it is of fundamental importance to understand the diffusion and adoption of other transport solutions, emphasizing the development of collaborative consumption in order to provide a basis for the revolution.

Collaborative consumption is a phenomenon through which "people coordinate the acquisition and distribution of a paid resource or other compensation"[16].

There are many forms of collaborative consumption with a shorter life cycle that are becoming increasingly common and configure excellent alternatives to traditional markets. In particular, consumer behavior has evolved to such an extent as to influence the new car market, increasingly driven by a greater technological awareness, at the basis of the change in purchasing methods there is the expansion of e-hailing, ride-sharing and other new mobility services.

We are witnessing the transition to a sustainability model that can also be extended to mobility. Indeed, companies can benefit from the trends of collaborative consumption in view of innovating their business model or creating new.[17]

Collaborative consumption takes place in organized systems or networks, affecting varied areas since new startups and websites were born, in which participants conduct sharing activities in the form of renting, lending, trading, bartering, and swapping of goods,

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[16] Belk, 2014

[17]Matzler, Veider and Kathan, 2015

services, transportation solutions, space, or money. Obtaining value from something not entirely exploited by its owner is the basic idea of collaborative consumption.

The more collaborative use continues to be within the renting of room and car or ride sharing, as the website Blablacar in France has raised the ten million of members in 2014[18].

The shared economy is a phenomenon that allows access to durable goods even without a transfer of ownership that can take place between peers (peer-to-peer) or through enterprises (B2C) and that can lead to a promising growth potential for car manufacturers, dealers and automotive service companies driven by further technological advances and a developing social paradigm. For this reason, collaborative consumption is not a niche trend anymore: it has expanded on a large scale at a global level involving millions of users and represents to all intents and purposes a profitable sector in which to invest in[19]. In this new picture, people's attitudes and needs have changed, becoming even more environmentally conscious, making the economy of popular sharing a potentially sustainable low-cost alternative to car ownership: thus, there are very positive attitudes towards the adoption of Mobility as a service solutions.

Companies can also benefit from trends towards Collaborative Consumption, which has three basic directions:

- Cooperative Lifestyle, which involves sharing resources;
- Reshuffling of products, from a place where they are not needed to another place where they are in short supply;
- Product use system (PUS): this is fundamental because it tends to make people change their mindset from owning products to actually using them, at the heart of the new digital economy.

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[18]What is Collaborative Consumption? Platforms and Participation of People in Collaborative Consumption – Impact of the New Technologies Article *in* International Journal of Innovation and Technology Management · December 2018. Benson

[19]Botsman and Rogers, 2010

As a result, it allows members to share multiple products that are owned by companies or individuals[20] even making sure that people gain an advantage from using products even if they are not their own.

Examples of product-service systems are car-sharing services like Zipcar and peer-to-peer sharing platforms such as the website Zilok.com. For instance, a model of established company able to adapt its business to the sharing idea is given by Daimler AG with its Daimler's car2go service. Following the direction to sell the usage of the product, Daimler experienced its structure adaptation to the new sharing system, becoming a leader: even BMW with DriveNow and Peugeot with Mu started to follow their rival. The tendency to adopt sharing mobility solutions will be further analyze in the following section; for now we can only assert that these alternative ways of collaborative consumption are getting common for a lot of people.

In this context, the sharing economy is growing rapidly: Pricewaterhouse Coopers has estimated that by 2025, five major sectors of the sharing economy could account for $335 billion in revenue worldwide. In addition, the trend will drive the increase in automotive revenues by adopting diversification strategies towards on-demand practices or so-called Mobility as a Service: together, these revenues could accelerate annual automotive industry growth to 4.4% in 2030, up 3.6% over the 2010-2015 period. On the other hand, as a result, global car sales will continue to grow, but probably at a lower rate of 2% per year by 2030[21]: this represents a global problem due to the increase in the global middle class of consumers, as we have just stated above.

In addition, it is thanks to the reduction of barriers that the three transport revolutions such as vehicle electrification, automation and widespread shared mobility, separately or together, will radically change urban transport worldwide over the next three decades. All consumer segments will be involved as a result of a common trend towards changing attitudes and preferences, favorable policy and regulation and increasing attention to environmental issues, albeit with little difficulty in rural rather than urban areas.

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[20] Matzler, Veider and Kathan, 2015

[21] Mohr D., Kaas H., Gao P., Wee D., Moller T., "Automotive revolution, perspective towards 2030", 2016.

According to the Revision of World Urbanization Prospects, related in 2018 by the United Nations, there is one assumption behind these developments: the population of major cities around the world is expected to grow from 4.2 billion in 2018 to another 2.5 billion by 2050, an increase from 55% today to 68%.[22] These data are crucial because the type of city is the main indicator of mobility behavior and car sales, in fact "With the continuing urbanization of the world, sustainable development increasingly depends on managing urban growth, especially in low and middle-income countries, where the pace of urbanization is expected to be the fastest," reads the report. Although the level of urbanization is relatively lower, in Asia there is 54% of the world's urban population, followed by Europe and Africa with 13% each. In particular, China represents one of the most profitable markets for the growth of the automotive industry, especially in terms of electrification trends, and this will be further analyzed in the next section.

In addition, together with population growth, we have noted that the transport sector is one of the main sources of pollution at global scale, with CO2 emissions accounting for around 23% of total energy.[23]. The organizations, people and regulation itself have become more attentive to environmental issues due to the overall negative effects that cause social implications.

1. 2. 1 Electric vehicles

As the automotive sector is characterized by a high degree of dynamism, we may have had a rapid growth in vehicle production from 11 million in 1961 to over 95 million for the year 2018, taking into account the total production of both passenger cars and commercial vehicles.
This represents a significant result to examine the degree of willingness of companies to invest and grow within the automotive industry, a breeding ground for new innovative mobility solutions.

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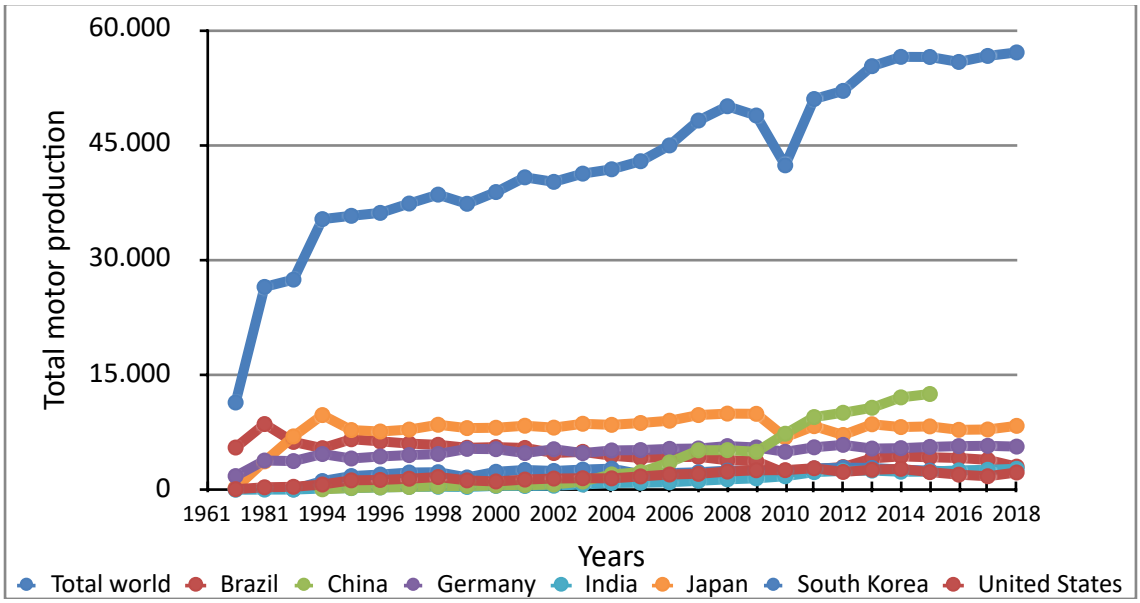
[22]https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html

[23]EPA 2015; Sims et al. 2014

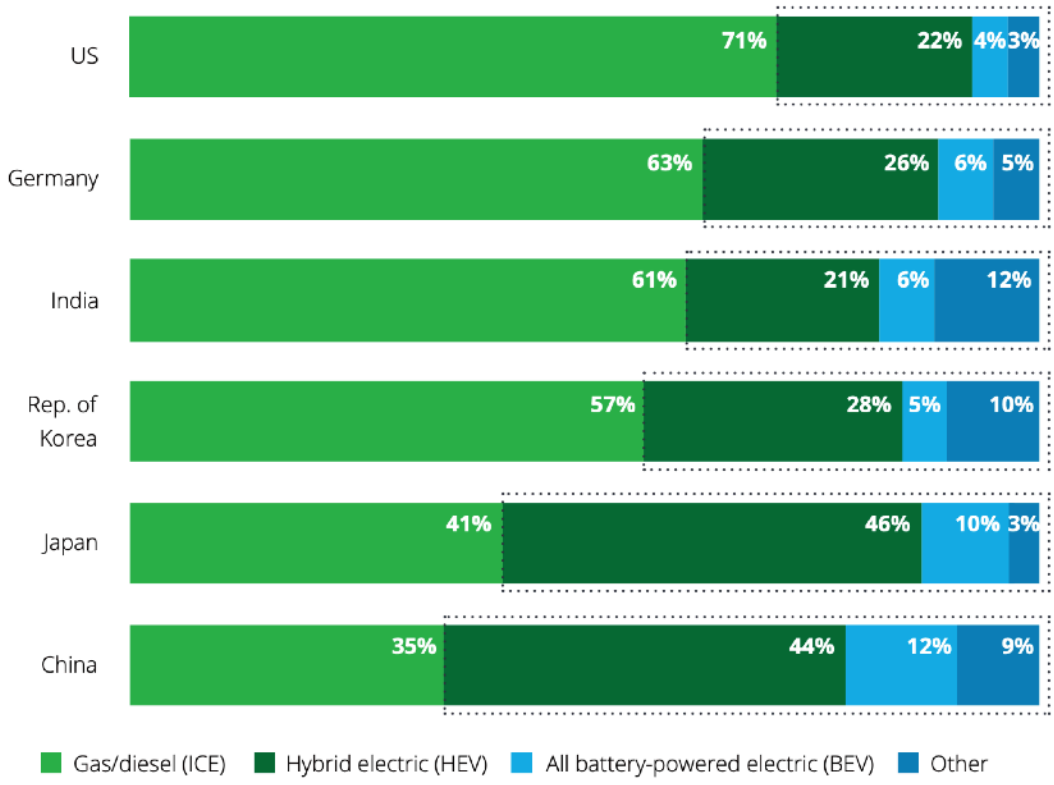
Fig. 1 Total motor vehicle production by country



source: https://www.bts.gov/bts/archive/publications/national_transportation_statistics/table_01_23 (2019)

Although they represent a small fraction of sales, electric vehicles are in fact becoming profitable and competitive, having already entered the global market with more than 100 models available in 2016. In addition, according to an annual McKinsey survey of car consumers, we can report that the number of people involved has shown that interest in electrification has tripled between 2011 and 2016 and interest continues to increase as fewer people want traditional ICE vehicle.

Fig. 2 Consumer powertrain preferences for their next electric vehicle



Source: Global Automotive consumer survey DELOITTE, 2019

In this scenario, to talk about the numbers characterizing the phenomenon, through the analysis of the Global Ev Outlook 2019[24] we may affirm that the trend is expanding at a rapid pace, following the right track towards the maximum adoption. In 2018, the stock of electric passengers cars experienced an increase of 63% from the previous year, reaching 5.1 million units, at global scale; this growth rate is likely the previous years ones, at a level of 60% and 57% respectively in 2016 and 2017.

Additionally, global electric car sales reached 1 million mark in 2017 and were close to 2 million in 2018, (Figure 1.2). This year-on-year growth in electric car sales was noticeable: 68% between 2017 and 2018, a strong rate after two years of weaker growth.

[24]The *Global EV Outlook* is an annual publication that identifies and discusses recent developments in electric mobility across the globe. It is developed with the support of the members of the Electric Vehicles Initiative (EVI).

Since we have talked about the growing expansion of the Asian market, in this analysis it is interesting to understand the extent to which the phenomenon has affected global markets, China being one of them. In fact, it is the largest producer country in the world and, in particular, is the world leader in the electric car market, with about 45% of the electric vehicle fleet in 2018 compared to 39% in 2017.
The stock of electric cars in China almost doubled between 2017 and 2018, reaching 2.3 million. In addition, China remains the largest market for electric light commercial vehicles or LCVs, accounting for 57% of the global stock.
Europe and the United States followed the Chinese market respectively: in 2018, we saw an increase in electric car sales in Europe at a lower growth rate of 31% compared to 41% in the previous year and below the global average. In the same year, Europe accounted for 24% of the global stock of electric cars with 1.2 million vehicles. In addition, Norway represents the world leader in terms of market share of electric cars, which reached 46% in 2018. On the other hand, the United States, with 1.1 million vehicles sold, even reached 22% in the same year, an increase of 82%, faster than the global market rate: +58% over the previous year. This trend was justified mainly by the release of the Tesla Model 3: the additional 134,000 BEV sold in 2018 were fully covered by the car itself[25].

Additionally, we should point out that there are different types of low emission vehicles characterized by electric engines:

[25] Marklines, 2019

Tab. 1:

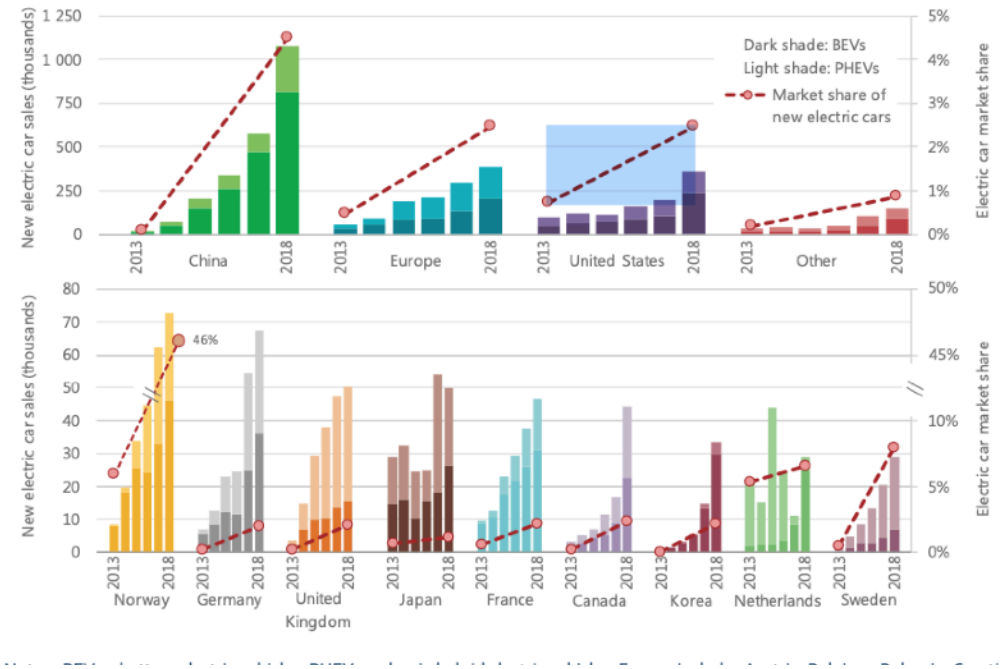
MILD HYBRID (MHEV)	FULL HYBRID (HEV)	PLUG-IN HYBRID (PHEV)	ELECTRIC (BEV)
• thermal engine assisted by a small electric engine (12V or 48V) • consumption and emissions slightly better than the equivalent thermal version (5g/km) • no access to eco-incentives	• first stage of hybridization, adopted by PSA in the past • small battery pack (3/4km autonomy) • -20% less consumption than thermal version • no access to eco-incentives	• bigger electric motor, electric autonomy up to 50km • electrical use similar to BEV • silent, flexible and eco-friendly driving • -40% consumption compared to similar thermal version • access to eco incentives	• presence of the electric motor only • necessary charge at regular intervals • better performance than analogous thermal motor • no limitations applied to thermals • operating economy • access to eco incentives

source: personal processign

Now we simply report data on the entire set of BEV or battery electric vehicles and plug-in or PHEV hybrid electric vehicles.

According to Global Ev Outlook 2019, in 2018 more than two thirds of electric car sales were made by BEV, which increased by 18% between 2012 and 2018 to reach 68%, driven mainly by the rapid growth of the Chinese market, while about 34% of total sales were made by PHEV. The latter dominated the European market, while in the United States it decreased from 47% in 2017 to 34% in 2018, as a result of the explosion of BEV adoption.

Fig. 3 Global electric car sales and market share 2013-2018.



Source: Global Ev Outlook 2019 (2019)

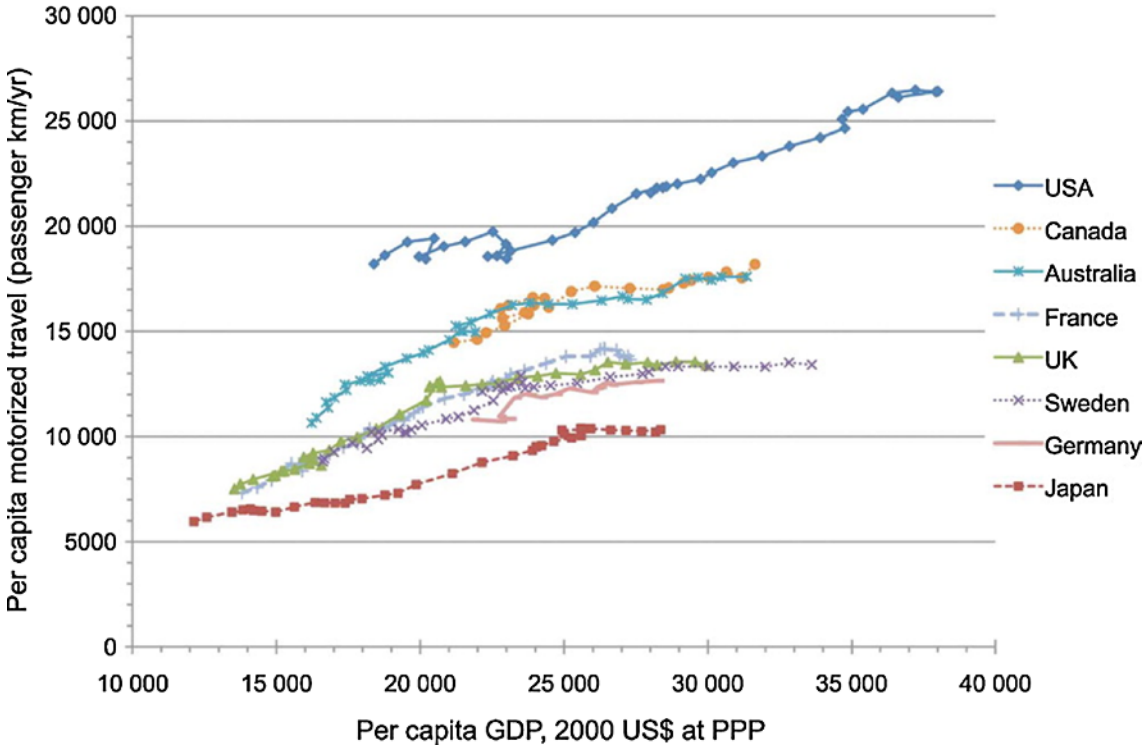
The reasons behind the widespread use of electric vehicles are multiple and driven by factors both external and internal to the organization; we have emphasized how urbanization will increase urban population density, resulting in an increase in the number of people requiring transport in urban areas.

In fact, people need to travel for a variety of reasons and, since the 1950s, car ownership has grown inexorably, with a consequent increase in the distance travelled by motorized transport. However, growth in car ownership has slowed in all countries, although there are several differences between them due to parking restrictions, car ownership taxes, an ageing population and saturation of car ownership among people who do not live in welfare centres[26]. Thus, daily usage of personal owned vehicles remains quite high in

[26]Millard- Bell and Schipper, 2011

some markets even where the usage is lower leading the expectation to approximately maintain the "status quo" in next years[27].

Fig. 4 Per capita motorized travel over per capita GDP by country



Source: Deloitte Global Automotive Consumer Study (2019)

Figure 4 shows how per capita travel moves according to per capita GDP whose growth has been the main driver of increased travel, partly as greater prosperity translates into rising car ownership.

Regulatory actions will vary strongly at territorial level; in particular, adoption rates will be highest in developed cities. To increase the value proposition given by the adoption of electric vehicle in fact, governments should implement policy measures in order to

[27] Deloitte Global Automotive Consumer Study

provide economic incentives as subsidies, tax breaks and lower operating costs. Policy makers and citizens are following the common idea to rethink the way we move.

Example to push citizens to adopt the trend could be the creation of low, ultra-low and zero emissions zones, respectively LEZ, ULEZs and ZEZs that are areas at restricted access in which established thresholds must not be overcome in terms of emissions with the aim to improve air quality[28]. If people need to enter these areas to go to work, go shopping or for any other reason, they cannot do so if they still have ICE vehicles or could enter but only for small specific routes, while if they have electric vehicles they should meet exemptions for access restrictions, tolls or lower parking fees.

Although many cities around the world still exceed the limits imposed by regulations, countries are beginning to have or are preparing to introduce these zones. According to the Global Ev outlook 2019, there are some key policy developments in 2018/2019: in Europe several significant policy instruments have been approved to support the introduction of electric vehicles and chargers, in China they include the use of differentiated incentives for vehicles based on their battery characteristics or the Japanese automotive strategy which aims to reduce 80% of greenhouse gas emissions from vehicles produced by domestic automakers, ensuring a cooperative approach among industry stakeholders.

Policy measures should also stimulate the early development of publicly accessible charging infrastructure, which underpins the best performance of electric vehicles in terms of local air pollution. The scarcity of charging stations is in fact the main obstacle to adoption, together with the high purchase cost, the limited range of kilometers an electric vehicle can afford, the slow battery life and concerns about technical failures, according to customers.

In addition, it is necessary to make high investments in infrastructure to offer sufficient charging points in terms of coverage and capacity: both refueling times (recharging) and

[28]Mounce R., Nelson D. J. D., “On the potential for one-way electric vehicle car-sharing in future mobility systems”, 2019.

the range resulting from a refueling cycle is still substantially worse than that of comparable conventional vehicles[29].

In the next section, we will look specifically at regulatory policies to highlight how external factors affect business activities and the main implications for the behavior of the automotive industry and carmakers, taking environmental attitudes into account.

In conclusion, we can say that electrification is indeed a positive trend that contributes to and will continue to make people aware of the new trend towards sustainability oriented mobility, which means pursuing economic, social and ecological goals in a simulated way and with equal energy.

In particular, by 2020, 5 million electric vehicles are sold worldwide per year compared to 750,000 in 2016, with sales rising sharply thereafter and we will probably see a complete fleet of electric vehicles worldwide by 2050.

1. 2. 2 Car sharing

Car sharing, allowing a more efficient use of vehicles, is rapidly emerging as the most promising solution related to Mobility as a Service, as there are many factors that contribute to its rise and to the growing propensity of individuals.

It represents a car rental model through which customers can rent cars from the protagonists' fleet for short periods of time when they need them: this system is managed by operators responsible for its services and maintenance.

At the basis of the growing success of the trend is the fundamental assumption of a shift of mobility solutions towards an on-demand service, in particular the shift from the concept of product use to the proposal to sell a service in the context of collaborative

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[29] B. Avci, K. Girotra, S. Netessine, Electric vehicles with a battery switching station: adoption and environmental im- pact, Manag. Sci. 61 (2015) 772–794. H.-Y. Mak, Y. Rong, Z.-J.M. Shen, Infrastructure planning for electric vehicles with battery swapping, Manag. Sci. 59 (2013) 1557–1575.

consumption. As we have already said, it is clear that car ownership has begun to grow slowly in many countries around the world, especially among young people and millennials: one of the main reasons contributing to reduce the willingness to own a private car is traffic congestion. The growing popularity and acceptance of shared mobility is linked to the emerging concept of collaborative consumption and the growing rate of smartphone adoption that has been implemented to encapsulate a new mobility distribution model that combines different ways to provide a tailored mobility package to customers.

Another important factor is the underutilization of cars: since on average an individual uses his or her car for one hour a day, the exploitation of vehicles in a shared fleet can significantly increase the rate of car use and thus reduce the cost of traveling the vehicle for both individuals and society.[30] Nevertheless, there are still a lot of cars in circulation especially at peak-hours together with low occupancy causing congestion as the replacement rates can be as high as 15:1[31]; through this way potentially it will be reduced the pressure on parking space because share vehicles require to be much less frequently parked.

In this scenario it is necessary to underline that there are different business models related to car sharing solutions due to the different operators that can implement different pick up and drop-off policies and the fact that the high population density gives a high number of potential users with different needs and desires.

Lift sharing, also called ride-sharing or car pooling, allows travellers with similar itineraries and times to use one car at the same time, allowing them to make recurring trips for a specific purpose. They establish on-site ride-sharing for daily commuters or one-off long-distance trips, and as a result lift sharing can be considered a rival to car sharing even if it is not a direct competitor, as car sharing remains more suitable for shorter trips. The main advantage is related to the reduction of traffic congestion, emissions and pollution together with an effective use of all available seats in an empty car. It differs

[30]Shaheen et al., 1999

[31]Mounce R., Nelson D. J. D., “On the potential for one-way electric vehicle car-sharing in future mobility systems.”, 2019

from dynamic ride-sharing because it gives more flexibility: travelers agree to share the journey in advance even if they are locally dispersed.

In station-based or two-way systems, individuals can only pick up and drop off vehicles at specific stations, while the most significant car-sharing service is called the one-way or free-travel model, through which customers can take the vehicle from one station or some other location and drop it off at their destination, anywhere. It is more flexible, grows faster, is more convenient and more attractive to potential users although it can cause an imbalance of vehicles over time between places where they are needed and not because it increases costs for operators who have to redistribute the fleet to ensure efficient customer allocation. A current trend is to offer combined services that offer both free floating trips and station trips within a single fare such as Zipcar, a subsidiary of Avis Budget Group, which offers several targeted customer plans with a fleet of over 12,000 vehicles in 2019 available in different locations.

Sharing solutions providers are often car manufacturers which can catch advantages as using the fleet to advertise their company: people who are interested in car features may directly experience guide and learn about the quality within those specific vehicles while the others who do not use car sharing still see a huge number of cars around the city center. An example of free-floating car sharing system is car2go, owned by Daimler and founded as the first one-way system in Germany[32] in 2009, with a mixed fleet of both electric and gasoline smart models[33] which experienced a significant expansion only in 2011 or DriveNow founded by BMW through a joint venture with the car rental company Sixt. The latter offers its customers MINI and BMW models, providing brand to increase visibility.

The two groups realized joint venture through which presented officially to the world the app SHARE NOW on 12 of November 2019 with the aim to make individuals able

[32]Car- sharing is particularly thriving in Germany, where there were 1.26 million car-sharing customers registered at the start of 2016.

[33] Finkorn and Muller, 2011

to drive in city with fewer costs continuing to be careful to the environment. The service is available 24 hours at day for 7 days every week with tariffs starting from 0,19 € at minute in eight European countries as Austria, Denmark, France, Germany, Italy, Netherlands, Spain and Hungary.

Moreover, the reasons behind the choice of a car sharing solutions are several but main refer to the fact that it is promoted as a potentially environmental-friendly alternative to car ownership towards a sustainable mobility concept, even if according to different business models adopted, the impact on environment is different.[34] The replacement of private owner cars by car sharing alternatives, as we have just stated, can result in a reduction in parking demand but this may cause a contrary effect since higher parking availability makes it more attractive to a car owner who does not care about environmental issues.

However, for car-sharing to become more widespread, it is necessary to overcome some critical factors such as the need to have an adequate price structure. Since public transport is a complementary service to car-sharing, the latter should be cheaper if there is a good public transport network in the city, being an alternative to car ownership which, moreover, could eliminate the demand for parking and could be an obstacle to the adoption of shared vehicles. In particular, free circulation car sharing offers users a degree of flexibility and cleanliness that public transport often lacks; however, many studies aim to underline the importance of integrating both solutions as it increases the choice of the traveller and can represent a valid alternative to the vehicle ownership[35].

Policy makers play a pivotal role even in this field since high investments in infrastructure are required likely for electric vehicle fleets or by providing stations and on-street parking spaces: it may represent a barrier locate stations significant in size in limited spaces[36] and both operators and regulation have to work on this challenge if they aim to

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[34] Hamari et al. 2016, Münzel, Boon, Frenken, & Vaskelainen, 2017

[35]Mounce R., Nelson D. J. D., “On the potential for one-way electric vehicle car-sharing in future mobility systems.”, 2019

[36]Schwieger et al., 2015

widespread car sharing systems. The same BMW and Daimler group electric fleets operate in cities with a high density of charging infrastructure like Vienna, Amsterdam or Copenhagen

Finally we can state that this revolution towards different mobility solutions, more flexible and convenient than the traditional car ownership may lead to up to one out of ten new car sold in 2030 will be a shared vehicle and one out of three new cars sold could potentially be a shared vehicle as soon as 2050.

1. 2. 3 Autonomous vehicles

The third trend that we will analyze in this section is something that revolutionizes the concept of personal transport, but that continues to evolve in a direction that, if widely accepted, in a few years could even drastically upset the status quo. Projections say that potentially almost all vehicles will become autonomous by the middle of the century[37].

Autonomous vehicles may likely be regarded as disruptive technology capable of radically modify the transport functions[38], but more details in terms of effective implementation of the new technology will be given in the further section.

Since human intervention on safety critical control commands is not or only partial, the technology that enables automation is highly sophisticated because it requires decisions made with algorithms, on-demand assistance and high-speed internet connectivity. The transition from human to machine guidance requires the use of a range of technologies to detect outdoor environments in every direction: an efficient and effective combination of hardware such as ultrasonic and infrared sensors, radar, lidar or cameras, global positioning systems (GPS) and on-board software is required. Autonomous vehicles can refer to both driverless and self-driven cars, which imply the absence of a driver, indeed they aim to create new possibilities with little, limited or no human interaction to allow the vehicle to identify any kind of risk on the roads: this requires high investments.

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[37]Greenblatt J., Shaheen S., “Automated Vehicles, On-Demand Mobility, and Environmental Impacts£, 2015

[38]Department for Transport, 2015

The SAE framework reports the range of levels of autonomous vehicles, widely accepted but inappropriate to explain to a non-technical public because they are often misused and abused for marketing purposes: to streamline the analysis it is sufficient to state that the levels extend from level 0 or full driver control to level 6 or full control of the vehicle[39]. We are in the era of the average, since self-guidance is enabled, in part, through peer-to-peer or vehicle-to-vehicle (V2V) technology and over the years we are witnessing a spread to a huge population size which means that the number of vehicles to be communicated will also increase.
In particular:

level 0: means no automation and the driver has full control of steering, accelerator and braking;

level 1: assisted driving systems assist the driver in his tasks and offer a higher degree of accident prevention, safety and comfort thanks to start&stop functions or warnings about the presence of people or cars (city brake functions) that automatically adjust the distance to the front of the vehicle or maybe prevent a collision through automatic braking. The main feature is that the control functions work exclusively and the active and constant control of the driver is required;

level 2: Partial automation as there are some supporting features such as acceleration and steering to a longitudinal control (adaptive cruise control) or a lateral control as lane guidance that work together and this is the main difference with Level 1. At this level you need the constant commitment of the driver and his ability to regain control at any time due to the temporary possibility of leaving the control functions;

level 3: conditional automation because the driver is able to temporarily divert his attention from the driving task because his monitoring is not necessary because a warning pushes him to take control. The system gives the driver more and more freedom because he can ignore what is happening on the road permanently if certain requirements are met, delegating driving to the car;

[39] www.sae.org, www.nhtsa.gov

level 4: high automation because automated systems completely replace the driver under certain conditions, having the possibility to take control again. There is no need for constant control. The technology for autonomous level 4 driving is in a development phase so that the vehicle is able to handle even very complex urban traffic situations, such as a construction site that appears from scratch, without driver intervention;

level 5: complete automation or the maximum level through which vehicles are able to perform all driving functions in all conditions. The driver only has to set the destination and start the system, without any other intervention: all the people inside the car become passengers. At this stage the complexity and challenges of technical solutions are considerably high: therefore, in the initial period, 100% autonomous cars will move in city traffic at relatively low speed. Although perfectly capable of driving without problems on the highway, their use will initially focus on urban centers and surrounding areas.

In 2013, KPMG has predicted that level 4 autonomy operating within virtual geographical boundaries will be available between 2020 and 2022, while full autonomy with level 5 should be available by 2030, with greater adoption by that date. The reality is that today we are in the era of transition from level 2 to level 3, with ADAS providing guidance at level 2.
ADAS are advanced driver assistance systems that can transfer driving tasks from driver to vehicle and can play a key role in preparing regulators, consumers and companies for the medium-term reality of cars taking control of drivers. The introduction of ADAS to the market has helped the development of technologies and car manufacturers to examine people's reaction to the trend, which focuses more on handling, safety, innovation and confidence than on engine, transmission and style. In the near future, ADAS has the potential to increase profits from self-contained vehicles and the market for ADAS is expected to double by 2021, reaching sales of $35 billion.
Autonomous cars will be the next or perhaps even the last stage in the development of driver assistance technology, based on intelligent hardware and software and extensive vehicle interconnection.

Therefore, public acceptability in terms of safety and reliability of autonomous vehicles or liability issues in the event of an accident are the main challenges preventing faster market penetration that policies, technology companies, customers and OEMs should overcome. However, people are changing their attitudes towards urban mobility, and are generally favorable to autonomous vehicles: this can lead to a high degree of acceptance, conceiving a proposal of significant value for consumers by offering additional economic and social benefits.

The issue of safety is both a challenge and an opportunity when we consider the potential of automated vehicles to save lives and reduce injuries: they have the potential to eliminate human error from the accident equation, which is, for example, responsible for 94% of serious crashes[40] in the United States, where more than 36,560 people died in car accidents in 2018. In 2016, according to the World Health Organization, 1.35 million people died on the world's roads, compared to 1.25 million in 2013.

Eliminating the risk of human error through autonomous vehicles has the potential to decrease accident rates through collision prevention and mitigation systems; autonomous vehicles are more likely to maintain a safe distance from the vehicle in front of them and are better able to react quickly. However, these technologies require continuous improvement to avoid problems resulting from active non-human intervention, such as the first death caused by AV testing, as well as that caused by the use of a partially autonomous vehicle, in 2018[41].

In addition, driverless or autonomous vehicles allow drivers to save time because they are not obliged to always pay the utmost attention to their driving tasks and can increase access to personal transport even for those who have mobility problems or do not have a driving license. As in many countries, employment or independent living is based on the

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[40] www.nhtsa.gov

[41] Uber has pulled its self-driving cars from the roads after an accident which left one of the vehicles on its side.
Uber's self-driving cars always have a human in the driving seat who can take over the controls.The company pulled its self-driving vehicles off the road in Arizona at first, followed by test sites in Pennsylvania and California - all three states where it operated the vehicles.
The incident follows a tumultuous few weeks for the car-hailing app service, after several negative stories about workplace practices and ethics.

ability to drive, automated vehicles could extend employment opportunities to about 2 million people with disabilities in the United States alone.
Another key problem that could be overcome is the availability of parking spaces, especially in urban centers, as a cause of congestion. There are several parking assistance systems that allow vehicles to park in a particular parking area or search and park in a place available by themselves, requiring only one place for passengers to get off. In this way, underground or multi-storey parking can become more attractive than it is today.

Autonomous vehicles also bring the prospect of greater efficiency and a further boost to urban sustainability that leads to optimized traffic flow.
Since they can communicate with other vehicles and elements of the road infrastructure such as wireless controllers at intersections, they can potentially drive to a more regulated traffic network, reducing both congestion and emissions.

However, as we have just said, there are some key challenges to overcome, including type approval due to the legislation required for their legal driving on public roads. This differs from country to country, although we can report decisions relating to the 1968 Vienna Convention on Road Traffic, ratified by 74 countries, including most EU countries and Russia, and the 1949 Geneva Convention on Road Traffic, ratified by 96 countries, including the United States. They require each moving vehicle to have a driver who is always in control of its vehicle. However, in 2014, an amendment to the Vienna Convention was ratified, which states that drivers must be allowed to take their hands off the steering wheel of automatically driven cars.

Then there are liability and ethical issues concerning accidents that can occur, in terms of responsibility between car manufacturer or driver in case of crash or the doubt on which if an accident is unavoidable, the autonomous vehicle should prioritize its passengers or people outside the vehicle as road users[42]. Interaction between the latter and autonomous vehicles is a central issue since human decide their way through the road network according to situational awareness and non verbal communication, which autonomous vehicles lack. This means that it is not enough for vehicles drive solely under

[42] Goldhill, 2015

predictable conditions: they require far more cognitive ability than is available nowadays.

Another critical factor is the high cost both to the user and to the infrastructure system. Many sensors have prohibited costs for the users as which is prohibitive for most users a typical sensor suite for one of Google's autonomous Toyota Prius would cost over $100,000, while other control systems as collision warnings or cruise control are more affordable. Since the trend is driven by more consumers willing to pay for enhanced features, widespread adoption by consumers is not as impossible if we think to scale economies and cost synergies that car manufacturers are exploiting to improve technology. On the other side, the road network requires both physical and communication infrastructure to facilitate operations requiring huge investments to enable vehicle maintain control over the road in continuous interaction with the surrounding environment.

In conclusion we can state that all the potential economic and societal positive implications above analyzed will not be achieved unless the large adoption of these vehicle by a critical mass of drivers. Consumer demand will determine the pace and the scale of market penetration[43] even if today it is difficult to reliably predict future consumer demand due to the fact that full autonomous or self-driving vehicles are not yet present in traffic flow.

Predictions about the adoption vary significant. For example in 2015 KPMG forecasted that level 3 automation will start to pick up around 2020 by stepping back from that stated two years before while we are now going through level 1 and 2 automation. On the other side, more feasible projection is of Greenblatt and Shaheen who predicted, in their "Automated Vehicles, On-Demand Mobility, and Environmental Impacts" of the same year that autonomous vehicles would reach 9% of sales in 2035 and 90% of the vehicle fleet by 2055.

[43]Zmud J., Sner I., " Towards an Understanding of the Travel Behavior Impact of Autonomous Vehicles", 2016

The only certainty is that the adoption rate of autonomous vehicles will depend on how quickly the barriers identified above are overcome.

1. 2. 4 Connected cars:

As analyzed above, we are on the road to moving from human to mechanical driving thanks to an effective combination of a wide range of technologies able to detect the external factors that allow V2V (vehicle-to-vehicle) technology.

The transition from human to machine driving requires the use of a range of technologies capable of detecting outdoor environments in every direction: an efficient and effective combination of hardware such as ultrasonic and infrared sensors.

We are in the era in the middle of the range, as self-guiding is enabled, in part, through peer-to-peer or vehicle-to-vehicle (V2V) technology and over the years we are witnessing a spread to a huge population size which means that the number of vehicles to be communicated will also increase. However connected car innovations are usually introduced step by step supported to the evolution of other sectors in car industry, too; for example, sales of 5G enabled vehicles are expected to reach 16 million in the EU, US and China by 2030[44].

Statista has carried out a comprehensive analysis "Connected Car Report 2019" which provides detailed information on the connected car market which is integrated into the trend of autonomous vehicles but has specific features that we will examine through an overview of current trends in terms of technology development, consumer acceptance and future projections up to 2023.

Initially, connectivity services were mainly focused on security, but thanks to the evolution of mobile internet and the introduction of smartphones, the technological features have been improved to offer a significant digital experience.

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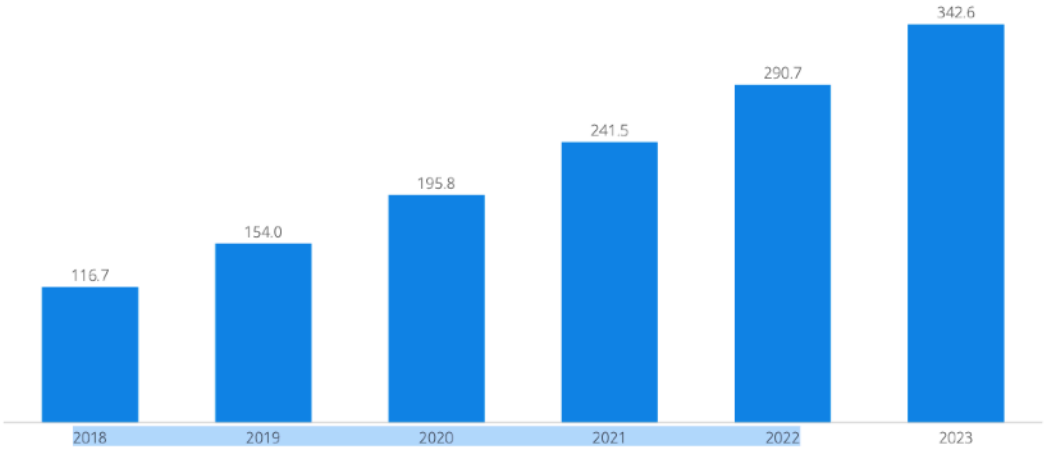
[44] The 2019 Strategy& Digital Auto Report. PwC

The market is growing towards so-called vehicle-to-everything communication (V2X) as it is expected that in the future advanced cars will be equipped with about 200 connected sensors that will allow vehicles to communicate with the external environment of road users and infrastructure. Nevertheless, since there is now a level 1 and 2 automation experience, it is important to underline that the technology only advises the driver with warnings or initiated actions that will be finalized by the driver, whose attention is still needed.

A sufficient digital infrastructure is the necessary basis for the development of digital markets and we can take into account four key factors that determine the degree of expansion of digital trends such as internet penetration, broadband subscription, connection speed and smartphone penetration. These critical issues vary from one country to another, although they are occurring widely in both developed and developing countries.

Fig. 5: Amount of connected cars worldwide in million



Source: Statista Digital Market Outlook 2019 (2019)

The average penetration rate of the Internet and smartphones is 59.7% and 44.9% respectively, showing that China is expanding (counting only half the population that owns a smartphone) but trying to catch up with countries like Europe or the United States, while subscriptions and broadband connection speeds are steadily increasing globally. This has a positive impact on the amount of connected cars worldwide, which is expected to reach 342.6 million by 2023.

The basic factors affecting the connected car market are socio-demographic factors that influence the degree of acceptance by people, as the problem of consumer spending is closely related to the average distance travelled per car.

China has by far the largest population among the countries analyzed, making it the world's largest automobile market with a population of 1,388 million people in 2018 compared to 46 million in Spain. In addition there is the number of cars in relation to the total population and Italy is in the lead with the highest figure being 621 cars per 1,000 inhabitants and the United States which stands out for the distance travelled by car per passenger in 100 km is 126.6.

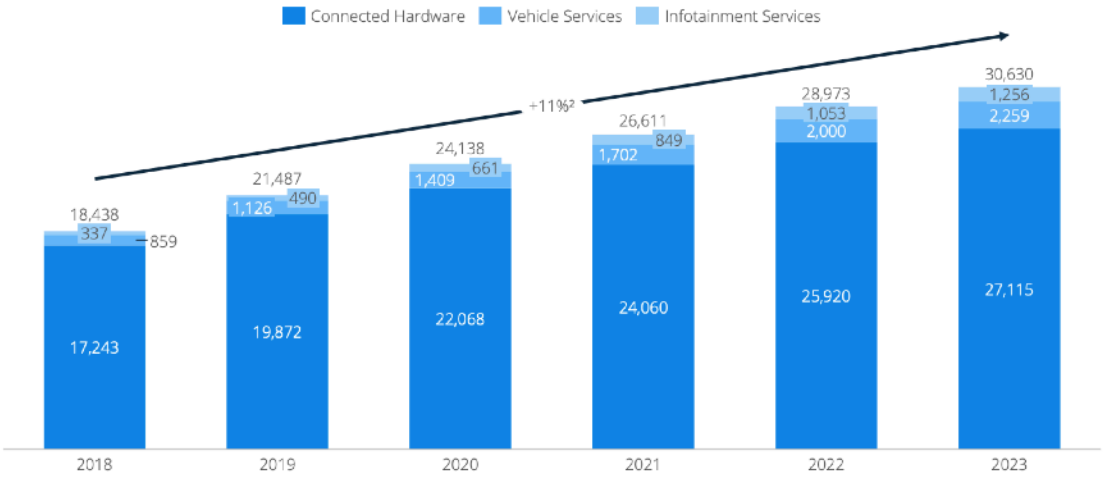
Finally there is the willingness to switch car brands for better connectivity features or simply according to the so-called frequent travelers' (who spend more than 20 hours per week in the car) needs.[45]

The "Connected Car Report 2019" distinguishes three market segments: hardware, infotainment and vehicle services, which are expected to increase by 11% from 2018 to 2023. (fig.)

We are now witnessing various developments that have helped to significantly change the connected car markets since GM released the first generation of connected cars in 1996, from telematics simply focused on security issues to a permanent connection or virtual assistants.

[45]McKinsey Connected car report (2014)

Fig.6: Global revenue forecast in million US$



Source: Statista Digital Market Outlook 2019 (2019)

Connected hardware improve safety, comfort and convenience. When we talk about connected hardware, we must specify that there are two levels:

- Basic telematics for sending and receiving a limited amount of data and are embedded, tethered or hybrid telematics[46]. The integrated telematics is usually used for safety and security functions such as automatic emergency call or roadside assistance. These practices are quite expensive and for this reason they are mainly provided by premium car brands: for example, GM, BMW, Mercedes-Benz and Audi offer in-car connectivity via eSIM or the built-in SIM card permanently installed in the car. The demand for integrated solutions will mainly be driven by legislation, since from 2018, according to the European eCall mandate, every new car will have to be equipped with integrated telematics. Unlike embedded solutions there are external devices connected to the car such as smartphones via Bluetooth or wi-fi connection, which are less expensive than the hybrid form that integrates the two solutions mentioned above. It will probably become a technological standard in the near future, although today the Volkswagen group offers remote assistance and security services through embedded connection and navigation tools via external devices.

[46] Connected car report 2019 statista

- Infotainment and communication systems that provide an extended use of the connected services for an advanced use of the services themselves that facilitate human and digital interaction. It is a more sophisticated tool that includes touch-screen or head-up displays and can lead to completely new business models, favored by an expanding 5G coverage, leading to higher bit rates. These systems facilitate and improve the integration of people and cell phones.

Global revenues in the connected hardware market amounted to $17.2 million in 2018 and is expected to grow 9.5% in 2023, with Europe as the largest market with 5.3 billion revenues in 2018, followed by the US with revenues of $5.9 billion in 2018 and China with 3.0 billion revenues alone.

Vehicle services are further divided into:

- Remote services that allow drivers to access their cars on the road via their smartphones. They are able to control from basic to advanced functionality. (unlock the car, start the air conditioning...)

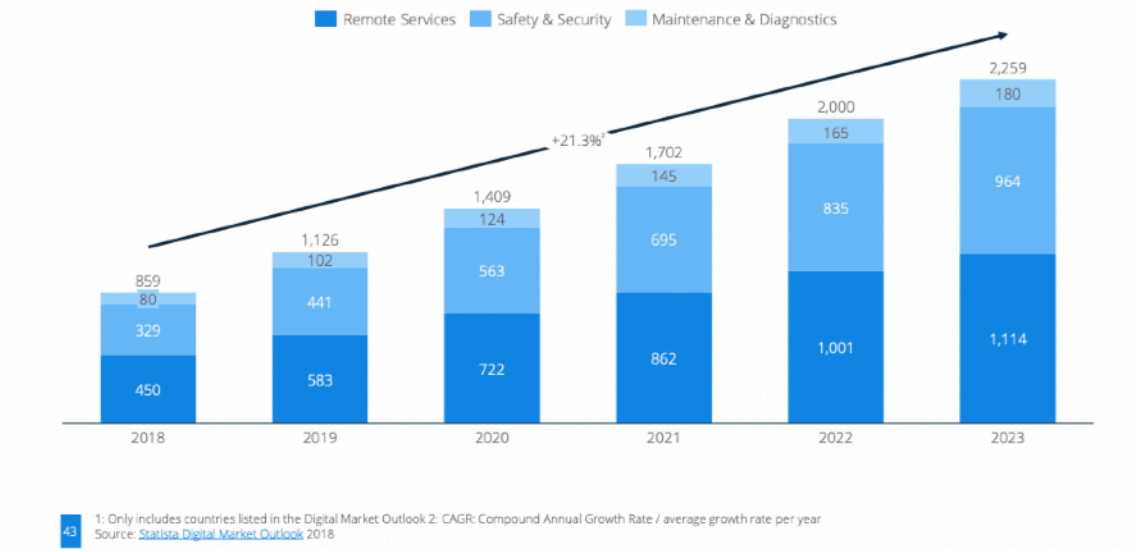
- Safety & security to assist drivers by providing them with additional benefits in case of breakdown. If, for example, damaged tires need to be serviced, a direct process ensures the management of the fault and the continuation of the journey.

- Maintenance & Diagnostics to prevent avoidable failures by sending notifications as soon as damage is expected, allowing customers to avoid expensive repair services. Cost benefits, time savings and prevention.

The size of the global market for Connectivity Based Vehicle Services was $858.8 million in 2018, showing an average growth rate of approximately 21.3% per year until 2023 on a global scale. In this case, the United States stands out with $381.2 million in 2018, followed by China ($191.7 million in revenue) and Europe as the smallest region in terms of market value ($176.3 million in revenue).

By 2023, the total volume of the market in this segment is expected to reach almost US$ 2,258.6 million globally.

Fig. 7: Global revenue forecast in million US$



Source: Statista Digital Market Outlook 2019 (2019)

One of the reasons for the United States' high success in terms of global market share is the fact that it is the domestic market for GM's OnStar, one of the leading providers of Connected Car service subscriptions, while what characterizes the Chinese market is the willingness of customers to pay for security and remote functionality and to switch brands to improve increasing connectivity options. On the other hand, the eCall law was introduced in Europe on March 31, 2018, which has a strong impact especially on Safety & Security subscriptions since four years before the European Parliament started adopting a regulation covering the entire automotive industry to improve road safety. The eCall law established that all new models registered in Europe must be equipped with an automated emergency call system to reduce road fatalities by 10%: to ensure the best and full operation in case of an accident, OEMs must equip all new cars with many different technological components. Since a car equipped with eCall handles a lot of private passenger information, the issue of collecting this huge amount of data will be discussed in the following sections.

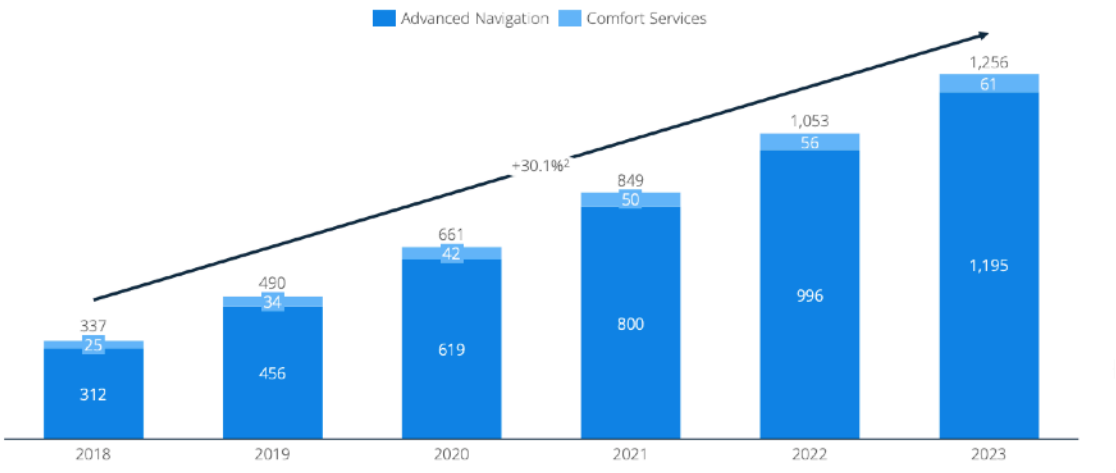
Finally there are infotainment services characterized by advanced navigation and comfort services:

- Advanced navigation is a service that contain map updates on a regular basis with information about traffic jams or real-time traffic information and route optimization.

- Comfort services are primarily focused on personal convenience and productivity, as concierge services or in-car e-mailing for examples.

In this specific case we can talk about media streaming instead of the traditional car radio, virtual assistants that offer services related to productivity to allow different activities of voice control while driving. The prices of these services are destined to decrease despite an overall market still growing.

Fig. 8: Global revenue forecast in million US$



Source: Statista Digital Market Outlook 2019 (2019)

The Infotainment Services market is worth $336.9 million, with the largest segment, Advanced Navigation, with $312.1 million in revenue in 2018. The leading country is still the United States with $141.1 million in revenue, followed by Europe and China with $83.1 million and $65.5 million in revenue in 2018.

Although China is expected to remain the smallest of the three regions, the market is expected to generate $304.8 million in revenue by 2023, an increase of 30.1% over the 6-year period.

In conclusion, we can say that the emerging changes in electric, shared, autonomous and connected mobility are significantly reshaping road transport and will continue to do so in the coming years. This will have significant implications for society, customers, public regulators and car manufacturers who will be able to effectively meet the operational and technical requirements of these sophisticated services, taking advantage of their production and use. In order to enable all parties to make the most of their potential, it is necessary to break down barriers in terms of public acceptability at first, due to different attitudes, needs and preferences, high requirements, policy measures and operational and strategic capabilities of OEMs, with the aim of potentially providing a greater customer experience that offers benefits, comfort and convenience.
In the next sections we will further analyze the problems that automakers face in overcoming these barriers, shaping their business model towards the digital system, being constantly customer oriented.

Chapter 2 - Create and sustain competitive advantage over time

2.1 The Business Model: what is it?

We have stated that the dynamism determining the uncertainty in the automotive industry is primarily driven by changing customers preferences and behaviors since fluctuation in demands affect industry's evolutionary path. There are too many challenges that drive to change a traditional structure no more viable.

Car manufacturers are under pressure due to the fact that they should be able to anticipate market trends in order to differentiate their products or services over competitors. Moreover, to survive in such uncertain and high competitive environment, organizations must face a global market characterized by short life-cycle products and new Information and Communication Technologies (ICT).

In this scenario, to best fit company's structure and strategic orientation in respect to the new mobility solutions, transition towards new forms of business model is required. Collaborative consumption, strengthened by increasing consumers' acceptance, tightening regulation jointly to a proactive attention to environment and technological advancements, is determining a shift from the traditional business model. We may describe the incumbents' business model as product-centric, focused on the notion to sell the product's ownership rather than the related service as we have just seen the rate of private car ownership fall the last years. Thereby, the increasing competition given by the complexity of the MaaS (Mobility as a Service) landscape driven also by the speed of growth of new entrants in the market, force companies to adapt their business model to the new scenario to gain and sustain a competitive position over time.

As it was said before, the main goal for companies is to create value for the customers whose figure has increasing to be at the center of the whole firm's efforts. Moreover is required to deliver a differentiated offer over rivals to make customers much involved than competitors could do: in this framework, the differentiating factor is given by the firm's ability to create and maintain solid and stable relationship with a wide network of customers. The brand-customer relationship is substantially improving in a dynamic

context characterized by intense competition where close relations are required if companies want to survive. This was made possible thanks to the evolution of the customer journey described above and we can once again affirm that this transition was enabled by improvements brought by technological innovation allowing companies to cope with new trends. It emerges how the relations system is crucial for companies to achieve competitive edge by further analyze the relevance to cooperate with external partners as supplier or rivals acting in the automotive industry, too. In this context, in fact, competition is given also by companies that are outside the industry.

However, we before should describe what the business model is and what are the key determinants driven by changes in the external environment that guide its evolution towards a new form, enabling companies to overcome challenges and transform them into growth opportunities.

Even if the term Business Model appeared for the first time during the first 1960s in some academic researches (Bellman, Clark 1957; Jones 1960), the business model concepts began to spread since the last years of the 1990s due to the skepticism inherent in the mind of researchers and scholars about a discipline that departed from traditional issues as organizational behavior, marketing or strategic management.
There were, in fact, generic definitions in economic literature about business model description even if it represents and represented a critical activity through which companies project to deliver and capture value, whose application is fundamental within all the industries and across them.
It found greater following in parallel and as consequence of the dot.com boom[47] era in the late 1990s: all companies were required to change their strategic thinking in response to the incessant changes and revolution resulting from the advent of Internet and the

[47] The dotcom bubble, also known as the internet bubble, was a rapid rise in U.S. technology stock equity valuations fueled by investments in internet-based companies during the bull market in the late 1990s.
During this period, the value of equity markets grew exponentially, with the technology-dominated Nasdaq index rising from under 1,000 to more than 5,000 between the years 1995 and 2000. In 2001 and through 2002 the bubble burst, with equities entering a bear market.
The crash that followed saw the Nasdaq index tumble from a peak of 5,048.62 on March 10, 2000, to 1,139.90 on Oct 4, 2002, a 76.81% fall. By the end of 2001, most dotcom stocks had gone bust. It would take 15 years for the Nasdaq to regain its dotcom peak, which it did on April 23, 2015.

phenomenon of globalization. These aspects radically modified the very structure of economies, initially in the industrialized countries to reach, especially in the last time, even emerging economies. Thereby, the application of business model concepts found broad acceptance as key driver for firms' successful performance.

The literary vein was divided into two schools of thoughts since many authors focused on providing a descriptive definition to business model conceit without establishing standard boundaries and giving freedom of application to the various theoretical concepts. Summarizing their position, we can state that a business model is nothing more than the organizational and financial architecture of an enterprise[48] .On the other side, authors aimed to define the nature of the single principal components belonging to it. According to the general considerations, the business model can be defined as an organic matter since aggregates processes, activities, resources and extensive network of players which enable the company to define and implement its strategy. It represents the whole system of organizational and strategic solutions allowing firms to create and sustain competitive advantage over time.

Osterwalder e Pigneur, two of the main exponents of the matter, described the business model as a conceptual tool which enables to define the basic logic of the organizations, composed by four pillars: product innovation, infrastructure management, customer relationships and financial issues.

In particular, it represents a critical tool through which a firm can create, deliver and capture value by the costumers[49] and defines in a specific way:

- who are the main actors to which the firm interfaces in terms of end consumers, suppliers and key partners
- what are the activities realized by the firm
- the amount of resources needed, in terms of physical and financial ones

[48] Teece, 2010

[49] Osterwalder et al. 2002

- the wide network of relationships and interconnections among the main actors within the firm and across industry borders, unavoidable for the firm's survival (even in terms of distribution channels)
- cost structure, which determines the realization of the whole business activity and the following stream of revenues.

It emerges the dynamic nature of the business model since it concerns elements requiring a constant interaction able to convey opportunities to create new value proposition by anticipating the evolution of the market. This implies a holistic procedure through which managers may be able to modify their strategic approaches whether they are in already mature industries or new businesses. We can affirm that it represents a powerful tool able to highlight synergies among several firm's components, putting them into relation.

Indeed, the business model allows companies to make projections for the future, by analyzing and better defining threats and opportunities coming from the external environment while maintaining its flexibility to better fit new opportunities.

The general mainstream approach establishes three fundamental parts common to all the forms of business model across several industries: managers have to face with challenges coming from internal and external sphere, they have to anticipate changes through the definition of a specific mission and key competences required and finally guarantee consistency among available resources and objectives of the entire business activity[50].

According to which we have previously stated, it is beyond dispute that to survive, managers must be flexible in the managerial organization to ensure a sustainable and profitable performance.

"Hunt or be hunted" is a citation that best summarizes the whole conceit: companies must be always in race for innovating and seeking for new growth opportunities if they

[50] Joao Letitao. "*Open innovation Business Modeling Gamification and Design Thinking Applications, Contribution to Management Science"*, Springer (2019)

want to maintain their presence in the market: on the other side, competition will unavoidably kill them.

2. 1. 1 Business model Canvas

Several authors like Chesbrough and Garman or Simanis and Hart identified two opposite approaches to the description of business model tools, named outside-in or inside-out. The former were based on the use of business model archetypes that are responsible for shaping the company's structure by exploring innovation coming from external environment and providing sources to adapt the current business model to new purely forms. On the other side there was the inside-out approach, through which firms focus on their current assets with the exploration of the possible changes that could affect company's structure just at a later stage.

Before starting with the discussion , in my opinion, it is appropriate to define the concept of open innovation in the perspective of business model evolution.
Coined in 2003 by Henry Chesbrough, the term "open innovation" has since become widely used to the extent that it is relevant today.
There has therefore been growing attention to this issue over the last fourteen years, given the peculiarity of the phenomenon, which initially focused on the collaborative principle that guided the work of individual companies and their external partners.

It defines a new context that, conceptually, allows a full understanding of the industrial and technological innovation that has characterized the automotive industry over the past decades.
In terms of profitability, adopting a collaborative approach of openness to subjects outside the organization implies a significant financial return: many studies have in fact shown how knowledge of one's own, if enriched by external impulses, produces higher levels of performance thanks to the wide availability of resources guaranteed.
Although it is fundamental for innovation to make knowledge flow correctly, the very structure of the business model helps to define the type of knowledge in question and to

understand whether it is really necessary for business continuity or whether it should be shared with other players in the business ecosystem.

Therefore, following an inside-out approach in the business model innovation process, it emerges the need to break the boundaries of the company to allow knowledge, tacit or explicit, to flow quietly within the company business, for monetary or non-monetary reasons".
An example can be provided by Amazon which has hosted external partner sites offering its internal IT infrastructure or by Medtronic which, during the emergency by Covid19 made available the design of its fans by publishing the drawings made for their design, waiving its IP rights to the design. However, the whole open-source sphere treats intellectual property as a barrier for innovating.

Also during the pandemic, many companies converted their production processes in order to make masks or products considered rare/scarcely available as disinfectant gels. This concept based on total or partial openness towards external partners brings with it numerous implications starting from the very role of the business model in the commercialization of technology.In fact, technological evolution has developed in parallel with the innovation of the business structure, with the increasing attention paid to investments in research and development.
In addition to substantial investment in research and development, a further effort is needed to combine and integrate knowledge flows from both internal and external sources in order to introduce a new project to the market . In addition, internal resources must also be managed in the best effective way to avoid seeking them externally at higher cost.
From a design perspective, the same Canvas business model mentioned above, has contributed to define processes and tools to explore and test new functional business schemes also for organizations that do not adopt an open innovation approach for their internal projects, generating value from inside-out knowledge.

A further consequence is the concept of service and its current application, especially in more advanced countries. Most of the world's forty most developed economies in the

OECD achieve half or more of their GDP from the service sector. In the course of the discussion we will in fact analyze the evolutionary process that has led from the so-called product system to the service system: the latter, however ,leads to an imbalance between standardization and personalization that finds harmony in mass customization and modular platforms, concepts that will be discussed in detail in the following chapter. At this point in time, we will simply say that, in order to fully exploit the modular platforms, it is necessary to define a business model that is characterized by openness: towards customers, employees and all the company's stakeholders.

Finally, it should be defined that the situation of the current business ecosystem has changed considerably, with an increase in the number of actors across multiple phases of the innovation process to the point of being defined as open innovation 2.0 by the European Commission in 2016.

In this framework, assuming that the clearest business model definition was given by Osterwalder together with Pigneur, describing it as the rationale through which organizations create, deliver and capture value, in 2010 they invented the so-called Business Model Canvas (BMC), which is based on an inside-out approach.

Business model tools are in fact used to support the comprehension of the matter to better realize strategies built around a well-constructed model while enable to align corporate strategies with the underlying actions in an organization. These interconnections are in fact often tacitly understood and making them represented with a visual tool can contribute to discover hidden opportunities and challenges, enabling managers to implement the model that best suit with external conditions[51].

The Business Model Canvas is one of the most diffused patterns to graphically represent the business system in order to understand the key elements, their relations and the following value creation. It is composed by nine building blocks which represent the key companies' elements and summarize all the considerations we have stated above. (fig.)

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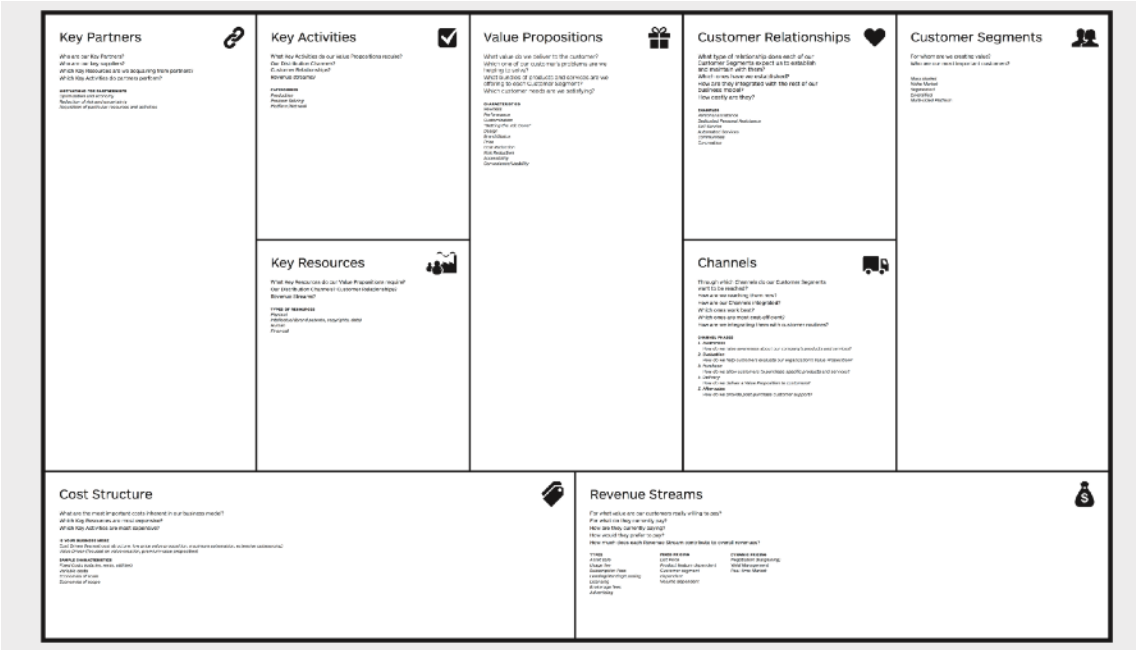
[51] Joice Alexandre, Paquin Raymond L. "*The triple layered business model canvas: a tool to design more sustainable business model".* (2016)

In particular, it follows a precise and clear scheme made by both external and internal factors that combined together lead to build the value proposition.

The latter is at the center of the structure because it represents the ultimate goal towards which the causal combination of external and internal components are oriented: it is the primary aim of the whole business activity.

On the left side, we encounter key activities, key resources and key partners while on the right side there are customer segments, customer relationships and channels; below we can find the cost structure determined by the utilization of the left side components to build activities and the stream of revenues generated by sources and methods implemented, on the other side.

Fig. 9: The Business Model Canvas



Source: strategyzer.com - Alexander Osterwalder (2018)

In particular, we can affirm that even if the primary goal for companies is value proposition, there is the necessity to further analyze each block to better grasp the extent to which single components affect the process leading to create value in a considerable way.

The analysis will be interesting in the following section since my intention is to underline and describe the nature of each block by distinguish them according to elements that may be external or internal to the organization itself; at this time we limit ourselves to providing a generic definition of the components.

Value proposition gives companies freedom to decide on what setting their offer differentiating it from competitors since every firm aims to satisfy its customer base needs and preferences but also to gain market share by engage potential customers. Thereby, it emerges the crucial role of the customers who represent the main source of profit for every organizations in the digital transformation era but the key role will be further analyze since we will focus on the strategic actions implemented by the organizations to better manage their relationships. Consumers are becoming co-creator of value due to their increasing power gained thanks to information availability coming from the digital sphere.

Another relevant block is customer relationships which enable the firm to create profitable and long-lasting relation with current and potential consumers by exploiting CRM techniques in terms of better manage the customer experience that, once again, is at the basis of the realization of a good value proposition.

The dense network of interconnections that has been created between the company and customers was made possible thanks to the presence of channels that, both physical or digital, make a significant contribution to maintaining high consumer control, enabling companies to monitor them continuously in order to meet their requests impeccably.

Being the primary source of profit, these three components are strictly related with the stream of revenues from which organizations may obtain value.

Furthermore, there are key resources internal to the organization that can be tangible or physical like property, plants and equipment or machineries, intangible as know-how or intellectual ones, human or financial. These resources should necessarily be implemented in the so-called key activities that represent all the processes realized within the firm and that are at the core of the whole effort.

On the same side of the latter two elements there are key partners who are external components and represents the vertical or horizontal additional value chain's actors since they are suppliers or partners as other manufacturers, IT providers, service-related companies and many others figures that contribute to enlarge company's network by furnishing it challenges and opportunities to be better accomplished.

To conclude, the last three blocks described are responsible for sustaining cost structure and it represents a critical issue since costs need to be controlled to avoid bad implications over company's structure itself.

2. 1. 2 The need to re-invent the Business Model

"Technology innovations and business model innovations are strongly linked to each other. A business model denoted the way companies can make money out of a technology. No matter how the technology is innovative and sophisticated, it will fail if it is not possible for market players to make profits from it."[52]

I think that this statement may represent an optimal starting point to understand the determinants of a new transport paradigm, unavoidable at date.

After a consistent existing literature review I found interesting what emerged by issues related to technological breakthrough and increasing environment attention, even if they were often analyzed separately while, especially nowadays, there is a strong and real correlation between them. Thereby, if on one side there is the necessity to adapt organi-

[52] Abdelkafi et. al. (2013)

zational structure to new tendencies by innovating the business model, in parallel the transformation should follow a path as sustainable as possible.

One of the main challenges is given by the technological shift itself, which represents both an opportunity and a threat and is critic for a company overcomes the technology shift as such.

Innovate the business model requires a series of attempts and experimentation due to its dynamic nature and progressive refinements to create internal consistency or to adapt to its environment are crucial[53]. To gain competitive advantage companies must focus on developing unique value proposition for end consumers to avoid imitation by rival firms but technological advancements risk generating an obsolete value proposition if they are not followed by business model innovation.
Since in innovation and technology management fields, the business model is primarily seen as the tool through which companies make their technologies and customers' need connect, we can state that business model may be both innovation tool and source of that.

At the date, there are different modalities through which organizations generate value with respect to the past, where the focus was on products and quality. Nowadays, both consumers are hyper informed about offerings and companies have access to a lot of information thanks to digital revolution with Internet that is assuming the role of main distribution channel.

In this context, firms can choose among several markets to positioning at global scale, by serving a large number of customer segments and competition moves organizations to enhance profits mainly through two different strategies:

- enter new markets through geographic expansion and introduction of new products based on investing in R&D, technology and product innovation to radically transform

[53] Demil and Lecocq, 2010

the firm's technological core competence. Indeed, technological innovations need to be employed in a proper business model if they want to succeed as there are evidences from greater return on investment (ROI)[54];

- transform the company's value proposition by moves the product forward along the value chain to expand the value proposition matching it with customers' demand, also known as servitization strategy. This represents a fundamental analysis tool since we have assisted a shift from the necessity to sell a product to sell the use and functionalities of the same, enabled by the combination of product and service at the final stages of the value chain.

This type of strategy may represent a source of differentiation used by traditional companies to gain competitive edge.

The dichotomy between the necessity to react to the trend by evolving strategy and to respond in a quick and effective way to emerging needs is crucial for companies which may overcome this dilemma (that could conduct to failure) only through the creation or the re-definition of a business model able to adjust them into mutual alignment.

In this framework, the consequences related to the introduction of ICTs in traditional industries as the automotive led to the offering of products and services completely different with respect to the past, shaping the traditional structure in a new form, characterized by collaboration and cooperation within and across companies in the context of collaborative consumption. Companies must provide innovation contributing to generate additional value to all the components of the business model as such, involving the entire system of interconnections among these components, too.

Moreover we can state, according to innovation literature and to the analysis above realized that business model innovation is a radical change in the way a company does business and it could be radical or incremental. Thereby, any change in any of the building blocks could be considered as a form of business model innovation which may configu-

[54] Cusumano and Rosenbllom, 1987

re in a simple or more complex innovation. In this context, the strategy consultant Roland Berger affirmed that in the manufacturing industry landscape, the automotive is the most affected by the current digital transformation experiencing greater changes and continuously seeking for new opportunities thanks to the availability of technologies implemented in innovative processes at disposition.

Many scholars developed several business model archetypes in mobility sector, in the attempt to provide a complete description of the magnitude of the phenomenon and the extent to which it has been influenced by the digital revolution. Our aim is not to report the entire list of new or redefined possible application of innovative business model since the trends described in chapter 1 represent a business model evolution as such. Indeed, the mobility as a service conceit is a powerful example of an innovative way to improve urban transportation if we adopt the consumers' point of view while the supply of electric vehicles instead of ICEs represents an innovative solution offered by car manufacturers as product/service providers.

Organizations need to be scaled up to their full potential to fully realize the benefits of sustainable urban development.

The analysis above allow us to understand the aspect of automotive industry has been completely revolutionized : issues as traffic congestion, pollution or access to urban transportation by the majority of the population, climate change and global oil resource limits or overloaded parking spaces are becoming crucial in the attempt to redefine the business model of the traditional car manufacturers.
For instance, population is growing and cities are becoming overcrowded so the investments have to move in a direction that permit to develop smart societies oriented towards a sustainable development.

2. 1. 2. 1 Attention to the environment: regulation over emissions

"Sustainability has always been a tri-polar concept: economic, social and environmental"[55]

Indeed, not only profitability has to be pursued as the ultimate condition for sustainability: environment and social concerns are critical issues and must be integrated into a holistic view of corporate sustainability[56].

Guided by the significant attention to sustainability conceits, developing sustainable technologies represents a powerful tool to reduce harmful emissions and use resources in a more efficient way[57] and, at the same time, would create additional value for customers who are not always interested in resolving environmental degradation. In the following section we will analyze the consequences related to toxic emissions and the actions implemented by policy makers to realign the level of emissions to the acceptable standard but is important to notice that environmental matter has other implications linked with the material consumption, vehicle noise and the disposal of cars[58].

Without going into the merits of production process characterized by all-steel body and internal combustion engine (aspect that we will defined in the third chapter when we talk about disruptive technology at the level of vehicle manufacturers), we only report that raw materials and fossil fuels are scarce and firms need to improve strategies to make the most out of the natural resources in order to minimize the impact on the environment. In addition, raw materials may be recycled even if only a small proportion is ever recycled into car production because most of them are simply thrown away.

Nonetheless, nowadays there are some vehicle producers that are making high investments in a sustainable direction, as Jaguar Land Rover which in 2018 invested more

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[55] Wells Peter. "*Sustainable business models and the automotive industry".*(2013)

[56] Joice Alexandre, Paquin Raymond L. "*The triple layered business model canvas: a tool to design more sustainable business model".* (2016)

[57] Bohnsack, Pinske, Kolk. "*Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles"* (2014)

[58] ibidem

than 3.1$ billion in new facilities and products and used around 38% less energy to make vehicles: the company has oriented to the use of renewable resources, reduction of emissions and the reusing of aluminium and this was made possible thanks to the continuous interaction among all the agents of supply chain.

The main innovative solution to reduce emissions is the introduction of electric vehicles in the industry. In this case, we have to affirm that their diffusion and adoption is easier in theory but require huge effort to be realized by both demand and supply side perspective.

In chapter 1 we have explained that revenues generated by mobility as a service solutions will be accelerate annual automotive industry growth almost by 4,4% in 2030 despite the global car demand is destined to decline or to grow but a lower rate. In particular, China, Europe and U.S are facing this growth deceleration with large contractions in new vehicles registration evidencing a global drop of 3.2% in 2018, the first reduction since 2008 financial crisis. (OICA-International organization for Vehicle Manufacturer) In 2019 the situation seems to does not change, as Philippe Houchoice, analyst at Jefferies, forecasted a 4% decline only in Europe for the current year.

However, we have to underline that the global data above reported do not take into account SUVs that make more profits than traditional cars and whose market share in Europe increased by 6%, moving from 25% to31%. Moreover, it has been noticed that sport utility vehicles or SUVs, "impact on CO2 emissions 10 times that of the decline in diesel", as Julia Poliscanova, director of campaign group Transport & Environment affirmed.
Generally, even if SUVs are related to diesel engine (which releases toxic particles too and on average, emit 121.5 g CO2/km, very close to 123.4g CO1/km of petrol cars, switching to these types of vehicles resulted in a CO2 emission rise since 2017[59] .
Compared to vehicles in similar segment, SUVs are typically heavier and have more powerful engines and larger frontal areas that contribute to increase fuel consumption. In addition, the trend was oriented towards SUVs powered by petrol. Consequently, die-

[59] European Commission

sel cars sales are shrinking, registering a decrease equal to 9% in Europe in 2017[60] with 60% petrol car sold against 36% of diesel.
These concerns undermine the very shape of the diesel engine as core technology of carmakers, too.

In this context, we may justify the decline in global car demand through the tightening regulation over internal combustion engine vehicles and the necessity to a transition towards electric cars to hit the target imposed.
For instance, in Europe the attention focuses to both nitrogen oxide (NOx) emitted by diesel engine cars and carbon dioxide or CO2 which is released by all vehicles.

On 17 April 2019, the European Parliament and the Council adopted Regulation (EU) 2019/631 which came into effect on January, the 1st 2020 and has replaced the Regulation (EC) 443/2009 setting standard equal to 130g/km of CO2 emissions between 2015 and 2019. This EU fleet-wide target was already reached in 2018, one year ahead, by registering average emissions equal to 120,4 g/km, below the target but still increased with respect the year before by 2g CO2/km. The new regulation established carmakers are required to reduce CO2 emissions to 95 grams per km by 2021 if they do not want face huge fines. This emission level corresponds to a fuel consumption of around 4.1 l/100 km of petrol or 3.6 l/100 km of diesel[61].
In particular, for every gram exceeded the target, there are 95 euro penalty per car (that need to be multiplied by the number of total cars sold). Nonetheless, the targets may vary into a range from 91 g/km to just over 100 g/km according to the average weight of the vehicles and this may represent an ulterior threat for mass market carmakers who need to completely reinvent their business model structure. In fact, companies as PSA have to face more stringent goals against group as BMW or Mercedes-Benz.

In 2016, a report called “The Dirty 30” realized by Transport & Environment disclosed that many of Europe’s carmakers would not be able to respect emissions standard, poin-

[60] Financial Times. “PSA Chief demands fairness on emissions penalties”. (March 2018)

[61] ibidem

ted out a number of different cheating techniques used by car manufacturers that significantly increase emissions on the road. British, German, Chinese, Italian and French authorities realized the investigations.
The attention towards the matters come into force since Volkswagen diesel gate which was caused by considerable discrepancy between laboratory tests and true emissions levels at real driving conditions. Almost 630,000 cars were recalled including Mercedes-Benz, Fiat Chrysler, BMW or Volkswagen (among the best selling diesel-cars across the globe) while group as Peugeot Citroen (still not PSA group), Volvo, Toyota or Renault-Nissan were on the track to hit the targets[62] .

Indeed, companies following the right path are those that are furthest ahead in electric and hybrid vehicles; nowadays carmakers cannot further improve efficiencies by downsize the engines or make their vehicles lighter: they need to develop and install hybrid or electric technology. Low emission vehicles represent the most suitable solution to enable carmakers meet the targets.

For instance, China focused the attention on electric vehicles since 2009, being at date the first electric car manufacturer of the world. Notably, the decline in sales does not apply to electric vehicles whose market penetration remained still slow in 2018. However, the combined share of PHEVs and BEVs in all car sales remains low (2% compared to 1.5% in 2017).[63]

The high purchase cost related to a battery vehicle and the poor charging infrastructure available in most of cities all around the world represent significant obstacles that overcome the environmental concern, which lacks to represent the first stimulus to the widespread adoption by customers. In Europe, China and US, McKinsey estimated the cumulative investment required to respect EV charging infrastructure needs to be at $50 billion in 2018 with 150,000 public charging points in Europe against the 2.8 million

[62] Financial times. “Worst diesel polluters go ‘unpunished’, report claims” June 2016

[63] European Commission

will be needed by 2030 (ACEA, 2019). Challenges are also related to the time needed to recharge the battery, problematic for longer trips.
Policies and taxes are required to make consumers interest in EVs raise because prices are too high and this is explained by the large adoption of these vehicles clustered in countries that offer great incentives[64].

Moreover, there is no consistency between regulation and market conditions because profits generated by electric vehicles are lower than those traditional. In the current years rules including concessions as the exclusion of 5% of sales from the calculations with electric vehicles counting as double are planned to move in 2021 to count all sales and make battery vehicles losing some of their weight[65]. Alternative solutions to full electric powered battery are also being implemented by 7 carmakers to significantly reduce cost by respecting the target as Ford which installed small 48v batteries in its vehicles to turn them into mild hybrid.

Every car manufacturer plans to launch a fully electric vehicle within the current year even if this may cause companies suffering since EVs require less parts, representing a threat for small companies' value chain actors.
In conclusion we may affirm that companies are willing to adapt their technology, structure and focus to new trends even if this implies occurring in losses but this represent a challenge that carmakers are on course to face and will require years for both consumers and manufacturers to achieve new emissions impositions.

2.2 New economy in old business: incumbents and new entrants

In this scenario it is interesting to examine the degree of transformation traditional business have to face against new entrants in the market.
We have evidenced the incremental change in transport modalities that cause considerable impact on fuel emissions and costs, but we are obliged to underline that theoretical

[64] Financial Times. *"Can European carmakers accelerate electric transition?".* December 2019

[65] ibidem

assumptions are often difficult to be replicated in the reality. Thereby, there are several concerns that explain the position of incumbents and new entrants in the industry, unearthing opportunities and threats for both the organizations. We will try to describe what are the main issues related to the topic to understand their position in front of new tendencies.

There are several theoretical foundations discussed by scholars to define the position of both incumbents and new entrants with respect to technology advancement related to the difficulty to understand who is more likely to be a suitable candidate for driving a change towards sustainable technologies.

New entrants may seem to be more appropriate since they born to develop a specific activity and are able to focus on their core competence, being free of several factors that make innovation by incumbents more difficult to applicate[66]. They are independent from an existing structure and can shape industry by providing customized products and services to customers, entailing IT as integral part of the traditional physical construction. An example may be Uber which allows people to book a trip through the browser or the App and requires only to have an e-mail address or phone number. It enables to fix a destination by searching a partner driver nearly by allowing to monitor the route and time within the driver will come. It is possible to check if the auto is the right one by verifying driver name, vehicle model and license plate number, to finally pay by cash or credit card.
Uber is an example of companies that reached great success since it is related to the adoption of a completely new business model created ex novo in the mobility as a service context as a consequence of a radical shift in both technology and services provided. In fact, incumbents are "less constrained in the evaluation of alternative models and more flexible in pursuing radical business models"[67] and considering that they are born from new, can therefore adapt perfectly to the new demands of individuals, offering a much stronger and more significant value proposition than the incumbents.

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[66] Remane, Hanelt, Kolbe, Hildebrandt. "*Discovering new digital business model types - a study of technology startups from the mobility sector".* 2016

[67] Chesbrough and Rosenbloom (2002), Sosna (2010)

On the other side, new entrants may lack competencies, technologies, corporate expertise and struggle to enter new markets in evolution where incumbents are still established. The industry may presents entry barriers difficult to overcome in terms of resources or critical partners to deal with, making incumbents reinforce even thanks to their experience.

According to Bohnsack et. al. it is interesting to consider path dependency assumption within business model evolution conceit due to the fact that established firms may act in a better way than that new entrants could do, being guided by past decision making patterns. Furthermore, they are able to adapt new technologies in their established structure by merge competencies and technology in a dynamic environment.
Incumbents have a lot of possibilities because they can choose the way through which allocate the majority of their resources but in this case customers may be reluctant to accept new business models if, perhaps, rooted or attached to a particular product or company. Acceptance by customers therefore assumes an ambivalent role.

In addition, it is also possible to state that on their side established firms have a dense network of partners made up of governments and regulations, too. Through this profitable set of relationships, incumbents are able to respond much more quickly and effectively to external contingencies.

Business model structure can change according to different degree and Cavalcante[68] distinguished several types of shifts:

- business model creation as the realization of business activities ex novo, typical of startups
- business model extension as the raise in number of activities without changing the existing structure and is related to an incremental change.

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[68] Cavalcante S., Kesting P., Ulhoi J., *"Business model dynamics and innovation: Re(establishing) the Missing Linkages."* 2011

- business model revision as a completely redefinition of business activities driven by radical change with respect to original structure
- business model termination means the elimination of business activities.

In this context, we may discuss about the degree through which external factors, also called adaptation factors, influence business activity for both incumbents and new entrants.

It has now been ascertained that the main threat is represented by digitization and new technologies affecting the value chain of car manufacturers.
The automotive industry is one of the main sophisticated mass production sector basically founded on physics assets used in advanced production systems driven by technological innovation[69].

Moreover, by nature the core business of incumbent automotive market is related to physical product as the automobile itself and incumbents need to find a balance between digital innovation and established competences at the production stage, but not only. In fact technological advancements represent adaptation factors that affect industry structure by shaping whole carmakers' business model. Starting from this assumption, we may notice that innovation has just involved the automotive field at the final stage of the value chain since people are now able to completely configure, order and concludes a purchase contract for a new car exclusively by using Internet. In this context, it emerges the extent to which established companies have already incorporated new technologies in their businesses: to date incumbents are perfectly able to manage these processes.

For instance, PSA with Citroën Car Store or Peugeot Webstore, Fiat, Jaguar Land Rover or BMW are some of the car manufacturers which sell their product online by using their specific websites or third resell platforms. This derives from a transition towards a new business model, identified in an archetype defined as manufacturer direct sales[70]

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[69] Tongur S., Engwall M., *"The business model dilemma of technology shifts".* 2014

[70] Remane, Hanelt, Kolbe, Hildebrandt. "*Discovering new digital business model types - a study of technology startups from the mobility sector".* 2016

which enable to produce and sell physical goods directly to the customers online, often allowing customization. This represent a very source of advantage for companies as consumers transform into value co-creator by still enhancing their position in a completely transformed framework.
According to our above analysis we may affirm that this represent the form of business model extension because it does not alter the very structure of activities while enable companies to enhance their value proposition by adding digital interaction with their customers[71].

Another possible application of business model extension, extensively described in chapter 1, is related to connectivity which allow to integrate physical and digital sphere by ensuring consistency between personal data (like phone numbers, preferred road trips, music) and the car. To do this, carmakers have enlarged their competences including software development or service provider capabilities, providing great opportunities to profoundly understand customers' intentions and preferences to offer them personalized offers. The car manufacturers that change business model driven by this type of technology can be defined as manufacturers of connected physical product[72].
Other forms identifiable in the concept of business model revision are those related to the revision of the structure itself. Many technologies are in fact still under development today, such as the autonomous guide, and have the potential to fully replace existing business models.

The success of these technologies requires huge investment in research and development and reaching a leading position is very difficult due to the fact that it provides a radical shift by considerable change value proposition. Customers no longer need to drive the vehicle[73] in the specific case and if on one side incumbents are favoured given

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[71] Hanelt A., Piccinini E., Gregory R., Hildebrandt B., Kolbe L., "*Digital transformation of primarily physical industries- exploring the impact of digital trends on business models of automobile manufacturers".* 2015

[72] Remane, Hanelt, Kolbe, Hildebrandt. "*Discovering new digital business model types - a study of technology startups from the mobility sector".* 2016

the product development expertise that they can exploit, on the other new entrants can leverage the novelty.

For what concern business model creation, the mobility as a service represents a form of purely new creation and we have just analyzed the phenomenon above, to add that new entrants are enabled to find new source of revenues. The value proposition is to offer a new conception of urban transportation by completely changing personal vehicles use, unimaginable in the past.

Finally, the business model termination is still difficult to replicate in the reality because it implies the elimination of physical processes with respect to the digital sphere.
This would lead to the elimination of figures that are essential to date, causing serious problems in terms of employment rates. An example can be virtual and augmented reality who enable customers to replicate the configuration of the vehicle they want in the dealers, making the sales consultant figure obsolete.

I would like to point out that, from my personal experience, I can say that this is a rather remote hypothesis since it is a non-primary good whose purchase requires a path that must necessarily be followed by a real figure. People, often of mid wage, does not feel so confident and require to see and touch the car before complete purchasing process. This means that it will take many more years before digital trends replace figures from the physical sphere that are crucial in an industry of this magnitude.

2. 3 Building a sustainable competitive advantage

2. 3. 1 Internal capabilities

In the previous sections we have highlighted that in order to gain a substantial competitive advantage over competitors, companies must be able to use all the tools at their disposal to respond quickly to contingencies from the external environment. According to

Porter, to analyze the industry's attractiveness and understand how firms reach a competitive position over rival companies, it is critical examine external and internal factors that contribute shaping firm's structure.

Our analysis, however, has focused on the general enterprise-external environment interface, while the intent is to move towards the core of the industry to understand what are, internally, the factors that allow the company to adapt to change. The latter are, in fact, by nature, factors external to the reality of the company itself, but they play an ambivalent role, being the means and the end of the change itself.

To explain better: if technological development forces companies to adapt their offer to the new market needs, it is clear that the company itself will have to reorganize its activities and its structure to make them suitable for the creation of a value proposition based on the new technology that has entered the market, fulcrum of the new needs.

From the point of view of the internal environment, it is therefore the resources and capabilities of the company that play a fundamental role.

Over the years the literature has in fact highlighted how the main sources of profit are not found in the external environment but inside the company, showing how the competitive advantage obtainable from a perfect use of the same, is the primary source of superior profitability[74]. Focusing on internal capabilities from an organization allows to permeate the structure of a changing business model on a much more solid basis than that offered by an unstable and uncertain external environment. In high-tech industries, basing one's strategy on internal capabilities can help companies to be successful in the long term.

Established firms have experienced several difficulties due to their market focus to adjust to disruptive technologies within their own industries: example are Kodak or Olivetti. They both attempted to recreate themselves: the former by shifting to develop digital

[74] Barney et. al. (1991), Grant et. al. (1991)

products, the latter to become supplier of personal computers. They tried to follow market trends without focusing on their own internal capabilities.
Since resources are productive assets owned by the firm and, precisely, can be tangible, intangible or human, they require to be combined in order to create organizational capabilities.

In this framework, great emphasis was on the role of dynamic capabilities, namely those enabling the organization to continuously renew through the integration, building and reconfiguration of its own competencies in order to cope with ongoing changes of the external environment[75].
In fact, we can talk about core capabilities which transform into core rigidities if executives do not have the capacity to manage them in a revolutionary way, to avoid them anchoring to the status quo. Incumbents need to respond in time to external threats by overcoming the rigidity of their core competences if they want to survive against new entrants, as we have just stated before.

According to the Resource Based View which identifies in the resources the source of competitive edge and value creation, it is possible to state that the company's internal capabilities are characterized by a dynamic nature and activities as research and development or product and process innovation are crucial to achieve a leading position. To support a sustainable competitive advantage, resources and capabilities within a specific firm need to be valuable, rare, imperfectly imitable and non-substitutable (VRIN). Once again they require to be combined in an organic way to make business models be successful even if this does not affect the willingness of rivals to copy the company's work, but may still represent a barrier to imitation[76].

According to these considerations, it is interesting to highlight that the Business Model conceit described by Osterwalder is based on a theoretical perspective founded on ontologies, or formal representations whose application was limited to philosophical field in

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[75] Teece et. al. (1997), Teece (2007)

[76] Teece D. "*Business models and dynamic capabilities".* 2018

the past. Nowadays ontologies are used as knowledge illustration and the theoretical foundation at the base of the Business model proposed by Osterwalder is strictly related to the Resource Based View.

Internal resources are the enabler for building solid network of links capable of generate value thanks to all the activities realized within a company: activities are generated by the optimal allocation and combination of resources.
In the automotive industry, the main important internal resources are intangible assets as technology or intellectual property related to patents, copyrights or trade secrets and brand name and reputation, even if human resources in terms of engineers, workers and producers are essential. To be productive resources need to be combined since organizational capabilities represent a firm's ability to deploy resources for a desired end result[77]. There are core competencies, as Prahalad and Hamel defined, which are fundamental to a firm's strategy and performance since make a considerable contribution to customer value and provide a basis for enter new markets.

Following a functional classification of organizational capabilities, I tried to identify the principal organizational capabilities within automotive organizations by function.

Corporate	financial control
	managerial decision-making
	corporate strategies management
	strategic innovation
	multidivisional coordination
	international operations management
Research and development	research
	engineering
	new tech development

[77] Helfat C., Lieberman M., "*The birth of capabilities: Market entry and the importance of prehistory".* 2002

	new product development
Operations	efficiency
	flexibility
	continuous improvement in terms of time and technology
	dematerialization of some operations
	international operations
Product design	design capability (personalized vehicle)
Marketing and distribution	brand name and reputation
	ability to respond to new trends
	customers' relation management
	distribution channels management
	international management and distribution
Customer service	customer relationship management (before/after sales)

Following this scheme it is possible to see how also the capabilities follow a hierarchy but their employment is however strongly oriented to maintain high profitability over the long term. There are different levels: at the basic one there are the operational capabilities that ensure the ordinary performance of business activities and are mainly related to production process, administration or direct relations with the customers, whereas at the top two different types can be found.

The micro-foundations according to Teece, allow to exploit as efficiently as possible the ordinary capabilities at disposal or to develop new ones (related to R&D or partly to corporate functions). Even higher up are the higher-order capabilities, which are those purely developed at the top management level and allow to define the best strategic configuration by leveraging or creating new opportunities always in the perspective of innovating business model.

The importance of dynamic capabilities to support a good reorganization for the company in terms of business models therefore emerges.
The more the company is able to satisfy the needs, even latent ones, of a large part of the market (thus not focusing only on its customer base) thanks to the resources at its disposal, the more dynamic capabilities are strengthened. Talking about strong dynamic capabilities compared to other ones, means to say that a company is able, with its internal resources and the relationships of contacts built within its business environment, to provide a value proposition difficult to replicate by rivals.

In line with the aforementioned, in the automotive industry the main internal resources of organization are those related to know-how, technology used, corporate culture, intellectual property right, managerial organizational skills or to the efficient use of resources to exploit economies of scale and cost synergies (through the modular platforms that we will analyze in the next chapter). Their exploitation aim to avoid competition from rivals by creating an “isolating mechanism” based on VRIN model.

To conclude, we can therefore state that the evolution of the business model is based on dynamic and internal factors such as dynamic capabilities. From the point of view of an integrated and organic governance of the entire organization, it is therefore important to reiterate once again the need for consistency between factors internal and external to the company for the competitive advantage sought.

2. 3. 2 External factors: partners

In this scenario we may notice the different degree of interconnection among an organization and its external partners, being both end consumers or other companies.
For the company a new perspective opens up in a context of ecology of value that as say Pilotti and Ganzaroli (2006): "Value is the product of the complex interaction between a network of subjects that are different between them, but sharing a common decision-making space on which they have a common interest and in which they decide to participate, making their contribution which may be more or less voluntary. The value, in

this perspective, cannot be traced back to the simple sum of the value of the contributions made by individuals, but in part it is contained in the experiential and value network that links the actors who voluntarily and actively participated in its creation. This acts "as a propulsive and reproductive engine of externalities beyond the boundaries of enterprise and network and porous the same competitive boundaries between markets in complex long chains of creativity and innovation "[78].

The modern enterprise belongs to an ecosystem, a multisystem network, which sometimes assumes also the form of hyper-network often connected by multidimensional layers of community which promote coded and tacit coupling and knowledge flows in which relationships are self-produced through the sedimentation in time of the experiences of a multiplicity of actors and institutions. This takes place within a common space of knowledge.

Companies that, in addition to using their internal competences and expertise, look beyond their borders to generate innovation, are those that are grounded on an Open innovation approach, as we have just stated before.[79] The latter can be traced back to the concept of collaborative entrepreneurship defined by Miles and Snow (2006) and fits perfectly into the context of collaborative consumption that frames the new business ecosystem in the automotive industry and beyond.

In this new context, therefore, among the 9 components of a business model, the pillar relative to the company's partners acquires essential significance. Thus, the latter become a crucial figure since the digital revolution undermines the very structure on which a company is founded, as it is not possible to adopt a new technology that is immediately introduced a new one on the market. However, if, on one side, the life cycle of products has been drastically reduced, the diffusion of the internet has allowed a greater availability of information, which circulates much faster. this makes the network created around the company become a crucial vehicle for growth.

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[78] Pilotti and Ganzaroli et. al. (2006)

[79] Chesbrough et. al., 2003

The proactive relationships created in the business environment thereby enable companies to acquire a more in-depth knowledge of the market, being able to anticipate the same trends that undermine its solidity. As a result, enterprises are well placed to meet the most intimate needs of individuals, leveraging both dynamic capabilities as noted above and external factors.

In the automotive industry in particular, firms must be able to provide an offer as integrated as possible and this requires firms to come together through the integration of their activities.
External partners may be outside figures: they are new digital enabled business model as IT-enabled self-service provider such as provider of e-mobility charging infrastructure, must balance benefits among customers, automotive manufacturers, energy utilities and administration[80].

We therefore see not only collaborations between carmakers but also with operators, both public and private, able to provide a mobility service that goes beyond mere transport. Specifically, in mobility as a service context, the variety of actors operating there, quite often with different strategic objectives, renders the business ecosystem very complex. This complexity increases when stakeholders are diversified, i.e., we can include public authorities, public and private transport operators, infrastructure providers, data providers, IT companies, ticketing and payment providers, financing companies, passengers associations or institutions[81].

An influential role is played by public transport authorities and municipalities, since all integrated services in the framework of mobility as a service are born with the intention to complete the offer of urban transport solutions. The former enable to provide consistency between the desired trust in consumers, mostly anchored to old business systems, and the minimized risk compared to a private company, while the latter provide incenti-

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[80] Remane, Hanelt, Kolbe, Hildebrandt. "*Discovering new digital business model types - a study of technology startups from the mobility sector".* 2016

[81] Karmagianni and Matyas (2017)

ves for shift from ownership to user-ship[82]. The European Commission itself defines public-private partnerships (PPP) as "forms of collaboration between public authorities and businesses, with the aim of developing infrastructure projects or providing services to the public"[83]. Hence the crucial role of the public sector, which needs to be supported by private investment for the large funds and resources needed. The same involvement of the public sector is variable, depending on the level of responsibility it assumes for the investments and operations of a project.

Moreover, the innovative PPP includes the involvement of NGOs which, in addition to private investment and expertise, contribute by being in close contact with the user base (bottom-up approach).

Moving then to the level of car companies as manufacturers, governments intervene through the formulation of general policies and regulatory framework for transport rules[84] by fostering end-user adoption. This is to the advantage of incumbents, notably in an industry such as the automotive one where governments have always been heavily involved due to its economic implications and influences on environmental or health factors. Not only that, but established firms' business models are much less subject to contingent events which, on the other hand, can have a more damaging impact on new entrants (not having sufficient resources or capacity to cope).

Other key partners are companies which may often be outside the industry like large IT companies as Google have recently introduced in the mobility sector, the much faster and harder among manufacturing industries, by providing maps for navigation Google maps), developing autonomous cars (Google Self-driving car project) or intermediating vehicle insurances (Google compare).[85]

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[82] Pagoni I, Tsirimpa A. "*Prototype business models for Mobility-as-a-Service",* 2020

[83]European Commission

[84] Wong et. Al., 2019

[85] ibidem

Another illustrative example could be the U.S. car manufacturer Fisker Automotive, which produced the Karma, a plug-in hybrid car assembled in Finland by Valmet Automotive from 2011 to 2012. The company designed the car though purchasing the technology from external partners.

The propulsion unit of the vehicle consisted of two more expensive but safer A123 electric motors, the chassis was made of aluminium and the braking system was supplied by Brembo.
Despite this, a few months after it went on sale, defects were discovered that led to various recalls of the cars produced due to defects in the assembly of the accumulators. Added to this were the difficulties of the battery supplier who declared bankruptcy in August 2012, resulting in the Karma stopping production before the end of the same year.
After the closure of the manufacturing company in 2013, the technologies were acquired by the Chinese company Wanxiang; the latter, after several postponements, announced the return to production of the car, with few updates compared to the original, simply renamed Karma Revero, for 2017.
This suggests that the spread of risk is one of the greatest limits deriving from dependence on outside partners' expertise; nevertheless, it is undeniable that for the sustainability of the ecosystem outlined above, the previous distinct systems can no longer maintain borders or barriers raised between them.

2. 3. 2 External factors: consumers, channels and relationships

In conclusion, it is worth emphasizing once again the centrality of the figure of the consumer, which has radically changed compared to the past. Currently, the prevailing mission for all companies, especially those operating in very competitive sectors, is to put users at the centre of mobility services. To satisfy the needs of individuals, trying to create offers that best suit what they are looking for, is the focus on which the big brands are working. Develop a value proposition that is independent of the underlying

technology, even though this is the main external source of innovation. The driving force is the customer base, which are the main figures that understand innovation as such.

Technological advancement, the main driver of this development, has made it possible to lower, if not almost totally remove, the barriers between supply and demand of products. 85% of e-commerce consumers conduct online research before buying even in industries, as we have previously analyzed, where the core business is centered on physical products such as cars.

This has led us to provide a customized offer according to the needs of each buyer, being able to leverage the countless possibilities offered by new technologies. Indeed, the latter are not only applied in the realization of the car, but act as intermediaries between brand and customer, combining and integrating the physical and digital sphere in the new purchasing process. The companies aim to achieve the highest degree of consistency between the individual touch-points, so that the customer can live a shopping experience as comprehensive and satisfying as possible.
The new digital enabled business models have therefore evolved in this direction, such that today we can affirm that the company is customer-centric and no longer product-centric as in the past. The offer is extremely varied and allows companies to include all market segments, enabling to position themselves even in lower segments with products that offer innovative features while being accessible to everyone. In this direction, nobody is excluded, both companies and final consumers

Moreover, a new way of doing business is driven by the exploitation of customers' relationship in order to translate the core competence in the knowledge of customers' behaviors and preferences, delivering a value proposition that would allow to differentiate from rivals in the industry, as we have just stated before. Since there was a transition from product-oriented to customer oriented marketing due to the increasing relevance of the figure of the customer, companies have had to focus on activities to increase customers' engagement and satisfaction to drive customer loyalty.

A network of stable and profitable relationships is now achievable thanks to managerial techniques which, as analyzed in chapter 1, make it possible to establish a long-lasting relationship based on consumer loyalty. Not only, digital touchpoints have allowed companies to be more flexible and boost profitability, even if the primary objective in order to generate extra profits remains to maximize the shopping experience in terms of quality.

The concept of CRM, is very broad as it aims to create value through a management as personalized as possible of customers' relations[86]; it is a customer-oriented strategic tool useful to analyze and understand an experience from the user point of view, disclosing issues and hurdles as well as opportunities for improvement and innovation[87].
It is a strategic and integrated approach to the management and development of relationships with the aim of building customer loyalty: it is a process that combines people, data and technology with the ultimate goal of optimizing current and future customer value for the company[88].
CRM mainly takes the form of useful software for collecting contact information, studying functional needs and measuring transactions and enables companies to have a system for collecting consumer information.

CRM techniques are based on technology, although its effective functioning depends on the existence of a customer-focused culture and the presence of organizational structures, professional skills and operational mechanisms inspired by the same principles.
Therefore, in recent years CRM software has adapted to the evolution of the market considering the need to disconnect from traditional channels to focus on social ones[89], leading to the birth of Social CRM with the aim of involving customers more closely through collaborative communication.

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[86] Munari et., al, (2001)

[87] Buttle et., al., (2003)

[88] Kumar and Reinartz et., al., (2018)

[89] Choudhury and Harrigan et., al., (2014)

CRM processes are set and implemented by companies in different ways but, after the first stages of identification and data collection (with techniques whose purpose is to exploit the large amount of data coming from users but that we will analyze in the next chapter), there is the planning. In addition to monitoring traditional interactions, SCRM software then examines information from social channels such as Twitter, Facebook, YouTube or online review platforms.

By collecting a large amount of data, campaigns and business plans are designed to support defined customer management strategies. In order to avoid a waste of costs and to increase satisfaction and loyalty, it is necessary to identify the customers who can guarantee the highest return on investment based on the available data.
Although the discipline in question represents a turning point from a theoretical point of view, on a practical level it leads to confusion and stress for customers who do not agree with the enthusiasm with which the company promotes this approach. Consumers feel manipulated and sometimes forced into a long-term relationship with the brand, even if they are not willing to do so.

Subsequently, we move on to the implementation of the actions foreseen in the previous phase addressed to selected customers through all available channels.

Finally there is the verification and measurement of results, based on the outcome of the actions, reactions or behavioral anomalies that have occurred in customers. It aims to refine its products and services to meet the needs of the most profitable segments with the purpose of acquiring new customers, retaining and cross-selling with current ones and building solid customer loyalty[90].

Other techniques include customer experience management, which enables to provide a more personalized shopping experience. The ultimate goal is to provide as consistently as possible an experience at each touchpoint, aiming at the complete integration of the physical and digital sphere. Every touchpoint, from advertising campaigns to after-sales support, can influence customer perceptions and loyalty.

[90] Cosma et., al., (2003)

In particular "CEM is the practice of designing and reacting to customer interactions to meet or exceed customer expectations and, thus, increase customer satisfaction, loyalty and advocacy. It is a strategy that requires process change and many technologies to accomplish." [91]
It is a real discipline that aims to optimize and understand the experiential aspect of every purchasing process and to increase customer satisfaction and loyalty. This approach allows to offer an unparalleled experience generating greater differentiation for companies and greater involvement for consumers.

At the end of the analysis we have just carried out we have therefore been able to notice that the whole reality of the company itself revolves around its business model and, in particular, its individual components. The latter, both linked to external and internal factors, contribute in equal measure to the creation of a value proposition as satisfactory and profitable as possible for customers and the company.
It is therefore interesting to note that external and internal factors are not considered separately and independently of each other, but are required together to form homogeneous blocks to compose what is by nature something heterogeneous: the business model. The complexity of the structure depends in fact on the countless actors that make up the business ecosystem and for the development, in whatever direction it is, of an organization, it is fundamental the right contrast and the proper balance between internal and external resources of the company.

It was, from my perspective, very interesting to analyze this aspect as it emerged the need to study the causal combination of factors, especially at a time like this, where in the evolutionary shift towards new digital technologies, the centrality of the customer figure has emerged. It could therefore be said that the weight of external factors, see customers, channels and relationships, is considerably more impacting than internal factors, but this is not the case. The company must evolve and, in order to respond efficiently to the various outside world changes, it must necessarily leverage its capabilities and

[91] Gartner et., al.

therefore internal resources. If these are unable to respond to change, they lead the company to bankruptcy.

In conclusion, the causal combination makes us understand how internal and external resources, although impacting differently depending on whether we are talking about strategy or the actual implementation of activities, play a fundamental role. On one hand the focus is on the outside, hence the strategic approach is oriented towards what happens around the company whereas on the other hand the focus is on inside and on the capacity of the company itself to adapt to changes.

Therefore, in accordance with the existing literature, it has once again emerged that the business model innovation and evolution strongly depends, almost equally, on internal and external factors. If, indeed, on the one hand, it is clear how, by focusing solely and exclusively on the figure of the client and their relationships, we give primary emphasis to an external element of the organization, on the other hand, it emerges how, above all, incumbents leverage their internal capacities to make the best use of the resources they already possess and handle them in the most appropriate way in order to obtain a consistent and significant competitive advantage.

Chapter 3 - How companies react to gain and sustain competitive advantage over time: exploitation and exploration techniques

3.1 Ambidextrous organizations: exploration vs exploitation in automotive industry

In the first two chapters we have carefully analyzed the automotive industry and what are the reasons that have led it to undertake a path of renewal, dictated first of all by the evolution of the times, then by the needs that have emerged. We have described, focusing mainly on the theoretical construct, the very evolution of the industry from traditional business models to the archetypes born thanks to the development of ICT and then innovation extended to all areas of the company.
It is therefore my intention now to deepen the theme by introducing what, in concrete terms, the car manufacturers are implementing, in an obstacle course that sees those who treasure innovation.
Before proceeding with the discussion, however, it is appropriate to analyze, albeit briefly, what is defined as the dilemma exploration/exploitation, core topic of the ambidexterity field.
Our discourse is in fact centered on the need to search for consistency between internal and external factors in order to achieve efficiency in the short term and maintain a solid competitive position in the long term.

The first to talk about explored and exploited was March in 1991, who started a series of studies and researches on the subject that have given a remarkable contribution to the literature on the subject, defining the paradigm in different ways depending on the context analyzed. Nevertheless, the common vision states that both are necessary techniques to improve company performance as they allow the knowledge of the external world in its variants through the exploitation of new or already available resources.
If, on the one hand, exploration means creating variety through a series of experiments and programmed attempts that allow to clearly learn the surrounding environment, exploitation means exploiting the knowledge already available to expand and refine it.
Exploration is therefore synchronous to the concept of innovation, thus it refers to something new that comes from a non-direct experiential basis and favors the develop-

ment of new knowledge even if its application does not guarantee certain and positive returns. Exploitation, on the other hand, allows to widen the knowledge base that one has, exploiting the available resources in a totally new and pure combination that leads to a positive, predictable and verifiable result in the short term.
As said above, both are to be considered as a source of learning, although one in different ways than the other.
Choosing one of the two undoubtedly entails different decisions on strategy, investment, and the very structure of the organization and its work. However, there is still much ambiguity about the relationship between exploration and exploitation.

Gupta et al. (2006) in their reflection on the relationship between exploration and exploitation identify two possibilities, namely the interpretation of the two concepts as two ends of a continuum or as orthogonal elements. In the first perspective, truly supported by March, exploration and exploitation are fundamentally incompatible so that the interaction between the two takes place essentially as a zero-sum game[92]: the development of an approach more oriented to experimentation, flexibility and therefore exploration takes place at the expense of the other, in the sense that the organization will reduce activities aimed at efficiency and incremental improvement, i.e., exploitation.
The organization must, in fact, make choices in view of the fact that, firstly, organizational mentalities and routines are different if the activities are aimed at exploration or exploitation and, secondly, because of the limited resources and attention it has. Gupta et al. admits that it is impossible to contradict March's logic but they believe, in any case, that it is possible to question and discuss some of his assumptions. For example, if once again we assume that dependence on resources is vital to business success, we can reflect on the fact that certain resources, such as technology or information, are easily available externally and, as a result, scarcity encourages exploration at the expense of exploitation, making them mutually exclusive.
Despite this, March affirms the need to reconcile them because focusing on only one of the two would lead to a disadvantage: on the one hand high R&D costs whose return is not certain, on the other hand the risk of collapsing on themselves, not being able to

[92] Grupta et., al., 2006

adapt to external changes with the sole use of resources already possessed. The company must therefore be able to manage the two simultaneously in search of the right balance and it is in this context that the concept of ambidextrous organization is inserted.

In particular, in the automotive industry, the main car manufacturers are organizations that have long ago, and more intensively in recent times, begun to approach both with a view to growth. Again, companies operating on both fronts differ from each other in the degree to which they apply the techniques in question.
A first theoretical result can be seen from the previous chapters in which the work of established firms and new entrants, rivals in the industry, is described: the first are undoubtedly the organizations that have taken the path of ambidextrousness from the moment they knew and are still knowing how to balance the exploitation of available resources to re-invent them while respecting the new demands of demand and the search for new opportunities in the new digitalized world.

"Ambidexterity is the ability to both use and refine existing knowledge (exploitation) while also creating new knowledge to overcome knowledge deficiencies or absences identified within the execution of the work (exploration)[93]".

Tushman and O'Reilly define ambidexterity as the ability to implement both incremental and revolutionary changes; not only, they define three different organizational schemes to explain the different intensity of application of the above mentioned techniques.

It also highlights the fundamental importance that for an ambidextrous organization has a manager who is able to understand and be sensitive to the different needs to be met in order to simultaneously pursue efficiency and flexibility. The entrepreneur must be rigorous about costs but, at the same time, must be sufficiently open-minded to be able to experience creativity and develop new innovative products and processes. The same O'Reilly and Tushman (2004) declare that, through the harmonization of separation and

[93] Turner 2012

integration activities, all organizations can pursue ambidestrism, ambidexterity although it may represent a difficult and not without obstacles.
Therefore, the organization must simultaneously pursue adaptability and alignment[94]. The term adaptability is intended to indicate the ability to move rapidly towards new opportunities, to adapt to changes in the market and to look to the future while avoiding complacency. The alignment refers instead to the ability to know how to exploit the assets in possession, to quickly implement the existing business model and increase the efficiency of the activities reducing the costs; this ability is connected with the short-term value. The ambidexterity consists therefore in being able to master both adaptability and alignment in search of the right balance. Managers and shareholders are sometimes short-sighted because they are too focused on the immediate results, neglect emerging consumer needs, and do not appear to be forward-looking and attentive to the change that will happen sooner or later.

So let's distinguish between:

- Temporal ambidexterity: it configures exploration and exploitation as sequential, therefore dictated by the needs coming from the uncertain external environment;
- Structural ambidexterity: in this case the authors speak of differentiation because they create business units independent from the parent company which are responsible for research and development of new opportunities and for which it would not be possible to benefit from the resources of the core business. The units dealing with the core business will focus on alignment, while the research and development department will pay particular attention to interpreting emerging market trends and developing new innovative products and technologies. Separation is necessary because alignment and adaptability activities are profoundly different so that they cannot, in practice, coexist[95];

[94]Birkinshaw and Gibson, 2004

[95]Birkinshaw and Gibson, 2004

- Contextual ambidexterity: this approach involves the simultaneous implementation of both techniques through exploitative structures and teams that incorporate exploration efforts. Letting people who are used to exploit spend part of their time exploring breakthrough ideas is critical to leverage their expertise and give new collective projects a chance to emerge[96]. Hence, this is made possible by dividing the working time available to them every day by alternating the different types of operations.

In addition, having talked about open innovation in the second section, it is appropriate to state that, looking outside the company, there are organizations that are able to open their innovation process to external partners: in this case we talk about ambidexerity network. In this case we are talking about an extension of the concept of structural ambidexterity in favor of open innovation and therefore to a broadening of the scope of the individual business units used instead as a basis on which to invest to grow start-ups or create joint ventures.

It is easy to understand how the model in question is easily applied and reflected in reality from the moment one finds oneself within a business ecosystem where relational dynamics contribute abundantly to business success. Not only that, companies have the choice between internalizing the resources necessary for their evolution in the desired direction, creating alliances with other companies or working with those already available, with the risk of not being able to complete the appropriate technological and organizational transition process.

In fact, in parallel with a transition of business models from a product-centric to a customer-oriented approach, there has been a technological transition that has led to the birth of the electric motorization, connectivity systems and artificial intelligence at the expense of design technology of the internal combustion engines.

3.2 Innovation and disruptive technologies: EVs against ICE

[96] Burgelman and Sayles, 1986

The innovation we are talking about therefore concerns not only products and services, but also new consumption habits, the use of any kind of content, the same tools used. We are therefore talking about innovation that, depending on its intensity, can be defined radical or incremental, leading to a phenomenon called disruption that identifies an innovation of such a wide scope that it has the power to bring to its knees already established companies that do not have the necessary tools to compete in the new scenario.

In fact, in theory the distinction between incremental and radical innovation is based on the fact that the former is competence enhancing and aligned with the progress of the current technological paradigm allows learning and continuous improvement, the latter tends to be destroy competence and leads to a shift in the paradigm. In this case we see technological discontinuities that could make the existing technology obsolete, significantly affecting the firm's existing investments in technical skills, knowledge, design, production techniques or plant and equipment.

In particular, technology becomes the main driver for many businesses as it is crucial for the survival of the companies themselves: reacting and imposing themselves in new competitive scenarios trying to leverage the latest generation of digital technologies, which are then introduced on the market by novels, has become the primary objective of all large organizations.

Christensen defines disruptive innovation for the first time in an attempt to identify the effect that an innovation generates on its customers and the organizational structure itself.

Disruptive innovation is not well seen by those who are already customers of the company as not as ready and prepared as the wave of innovators who embrace the new technology more quickly than they do today. This is explained by the fact that new features are not always considered interesting by the consumer: in an era where the centre of everything is the final consumer, user-based innovation becomes crucial.

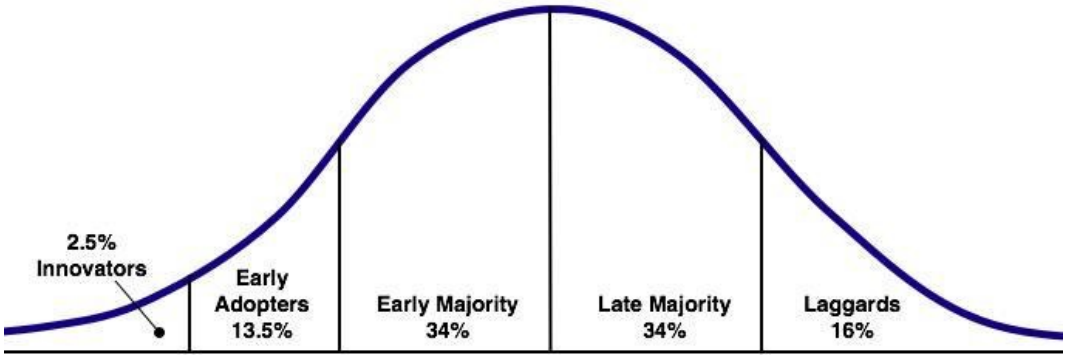
Companies, in a new context where the figure of the consumer plays a different and largely more relevant role than in the past, must not only interpret latent needs but create new ones. To do so, they must necessarily base their core business around innovation.

Since in the previous chapters the concept of innovation expressed in terms of the evolution of business models towards alternative and more efficient forms has been abundantly analyzed, in this section we will briefly explain how disruptive innovation can be found within the automotive industry, with the transition from traditional mechanical engines to electric batteries.

Crucial, in my opinion, is to report in a few lines what Rogers defines in his book "Diffusion of Innovations" that allows us to outline the profile of the user/consumer who is best able to accommodate innovation.

The author identifies 5 different groups that represent sequential steps in a scheme characterized by an S-curve that follows that of the product life cycle and makes us understand the behavior of consumers in the face of the introduction of a new technology, while providing a useful and functional tool for companies to understand how best to intervene in the market.

Fig. 10 - Rogers bell's curve



source: http://rickwilsondmd.typepad.com/rick_wilson_dmds_blog/2010/03/the-rogers-diffusion-of- innovation-curve.html (2010)

- Innovators: they are those who immediately embrace innovation because they are prone to risk. There is uncertainty about the new product or the new technology adopted but they are prepared figures, who show real interest and have a good spending capacity that allows them to invest even in conditions of maximum uncertainty.
- Early adopters: they are those who intervene immediately after the innovators because they welcome innovation with a different awareness than the former. They have the ability to influence other users.
- Early majority: this segment represents almost the majority and therefore the average segment of the population and, in relation to this, they are more cautious in their choice. When they decide to buy a new product, the innovation introduced has already given its results, so the effects are visible to most people and it is possible to make a more truthful evaluation compared to previous segments.
- Late majority: here are those who begin to be interested in the product only because the price is no longer at the levels of when it was launched on the market. They are the ones who purchase by reflex and who do not show any particular interest in using the new product features, therefore they purchase when the introduction of a new technology has already been planned. They are characterized by the fact that they belong to the lower-middle segment of the population.
- Leggards: the latter represent the conservatives, i.e. those who do not show the slightest interest in innovation and remain anchored to the original product because of their low propensity to change.

It is worth remembering, however, that this scheme has lost its value at the moment, in a context where demand preferences suddenly change and products follow a very short life cycle. In the following years, other schemes have also been introduced that base their structure on the S-curve mentioned above and, without going into detail, we can however state that it does not follow a linear and symmetrical profile. As mentioned above, we need to understand the way in which the new innovation is adopted by companies, different between incumbents and new entrants.

The commitment to the search for the perfect product or service is undoubtedly considerable and sometimes it happens to observe offers from innovators of super-performing products compared to the needs of the average market, giving the opportunity to companies that decide to enter at a later time to offer solutions that perfectly match the demands of the market served. There are many examples of established firms that tend to focus too much on their existing customers and consequently do not allocate the available resources in the development of new technologies because they perceive them as less profitable and underperforming.

In the case of new business models, however, the original intention of the innovator is to enter new markets not treated with existing products and services but re-invented through the reuse of data, technological expertise and infrastructure to create value. In particular, in the automotive industry, the shift in technology in the production phase has taken place with the transition from traditional motorization to electrical. In fact, scientific and industrial progress in battery production has allowed the development and production of electric batteries with increasingly efficient performance in terms of cost, charging time, number of charging cycles, mass and volume. In the automotive industry, there has therefore been a transition to vehicles equipped only with an electric motor which, compared to the traditional internal combustion engine, has distinctive features that qualify it as more advanced.

Today the main value-added technology of OEMs is related to components such as internal combustion engine which together with the transmission technology defines vehicle performance and is the technical core component of the automobile. In fact, engines have different performances, they pollute the air and the environment in different ways and have a useful life cycle or consumption significantly different from each other. Over the years, improvements and corrections have been made to engines and this is demonstrated by the fact that, to date, petrol engines in medium-high displacement cars have a fuel consumption of between 4.3l/100km and 5.8l/100km compared to the average 4l/km of diesel. Improvements have been made necessary for all of the discussion dealt with in the previous section, taking into account production costs as well as the environmental issue of limiting emissions. Therefore, with increasing oil prices and conti-

nuously increasing political pressure to reduce greenhouse gas emissions, fuel efficiency has long been the primary driver of innovation in the industry.

The introduction of the EVs has brought with it many benefits and advantages, which is why their adoption is increasingly recommended and numerous actions are being taken, including at the regulatory level, to incentivize purchasing.

In itself, EV is a disruptive technology that has a major impact on the way the car works and the driving experience itself. In fact, the battery-powered engine is quiet, does not disturb and guarantees comfort, reliability and safety, as well as immediate acceleration due to the release of electricity in a very short time. In terms of pollution, a fully electric car can emit up to a maximum of 20g of CO2 per kilometer travelled, while a hybrid car can even reach 60. These figures are really irrelevant if you think that there are still cars in circulation euro 0,1,2, 3 or 4 that far exceed the set standards. Which we talked about in the previous chapter.

However, since this is a technology whose introduction can be said to be taking place, there are disadvantages on which organizations are working to improve. The main flaw is the lack of autonomy of these lithium-ion batteries that limit the possibilities of travel by reducing the capacity of driving in full electric to 140/150km per day, which is further aggravated if you think of the structure of the car itself. The body of a traditional car is in fact much heavier if compared to the electric battery and the weight of the structure weighs heavily on performance.

Not only that, as far as noise and environmental pollution are concerned, it is clear that the advantage of EVs is evident compared to ICEs. The former are part of the LEV or Low Emission Vehicles universe and are particularly attractive for urban use although the production of electricity in many cases requires the use of fossil fuels such as coal, oil or natural gas. This issue is much debated since it is not yet clear whether electric cars actually pollute less than cars with internal combustion engines. If we consider the life cycle of the car as a whole, the real nature of the phenomenon emerges, considering the CO2 emitted by the extraction, refining and distribution of the fuels needed for power supply, energy production and transmission up to the production of vehicle components, including battery and disposal or reuse. In fact, battery life varies depending on

many factors: Hawkins et., al., (2013) assumes that the 24kWh lithium-ion battery lasts 150,000 km. Since the state of knowledge on the subject is at the level of experimentation, there are no assumptions shared by most, but, in practice, electric vehicles are emerging on the market with much larger battery sizes, up to 100kWh to ensure greater autonomy and charging mode up to 400kW to reduce charging times. More recently, Dunn (2015) said that there is a relationship between production volume and CO2 emissions from lithium-ion batteries so the larger the scale, the lower the emissions. Finally, if it is true that to produce the battery you emit more CO2 than ICEs, it is equally true that after 25,000 km of travel this is offset.

Although there is still a heated debate on the subject, the main result is that BEVs help to reduce CO2 emissions by 19%, 18% and 9% respectively compared to conventional petrol, diesel or hybrid.

At the bottom of it all, however, it should be remembered that the range of BEV and ICE cars is very different in size and weight, so a more correct comparison should be made at segment level and we must take into account that the BEVs themselves differ in battery size in relation to the required range levels. A more detailed analysis, however, would have moved us away from the main focus, we now limit ourselves to stating that the choice to go down the electric road is, without a shadow of a doubt, the springboard for a future (now not too far away) characterized by the electric product in question.

3.3 Mass customization - the client at the centre

Automotive groups such as Volkswagen not only plan to completely revolutionize the fleet by transforming it into full electric by 2025, but also aim to offer a completely new and attractive shopping and product experience, without losing sight of climate and environmental protection, in order to make "the car can continue to be a cornerstone of contemporary, individual and affordable mobility in the future"[97].

In this context, as emerged from the previous chapter, it is clear that without collaboration and cooperation with external partners it is not possible to achieve a leadership po-

[97] Kotha, 1995

sition and that is why in this section we will deal with what are modular platforms and their implications when it comes to meeting the specific demands and needs of a small group of consumers.

Through a careful analysis of the literature and thanks to the empirical validity that has emerged from the observation of real cases, it is possible to deduce that there is a dichotomy between the interest that companies have in consumers, who are now co-creators of value and require variety and customization of the offer and the attention to economies of scale and cost savings. These strengths need to be balanced against each other.

Recent years in particular have seen an increase in strategic alliances and partnerships with the unique aim of developing core competencies and entering new markets, although we have seen how some countries have been more adapt than others at implementing such strategies. For example, from what has already emerged in previous chapters, the position of Japan is interesting, ahead of its Western competitors, which has been able to distinguish itself by adopting lean production. The Japanese automotive industry is in fact one of the most advanced in terms of product realization (manufacturing), especially thanks to the production methods adopted based on a flexible and non-rigid structure. Nevertheless, we have stated that there is no one best way in production because according with different contingencies, some solutions are preferred to others.

In particular, many Western automakers have begun, in recent years, to forge strategic alliances with Eastern countries in order to consolidate their position in the global market.

Moreover, at a time when the consumer is the king, it is essential for companies to be customer oriented, therefore to be able to respond to all types of requests and specific needs of individuals, offering a wide range of customized products that can satisfy everyone. The turning point in today's market has led to the introduction of the concepts of variety and customization replacing standardized products: firms cannot longer be competitive if they just offer standardized products.

Thanks to the adoption of lean production methods, it has therefore been possible to start talking about mass customization, a strategy that allows to achieve this goal by of-

fering an almost unlimited variety of products and services, in any place and at any price, so as to fully cover the market. Once again, this practice is made possible thanks to the development and use of increasingly advanced technologies that allow a correct and timely flow of information. (perhaps in the data management part).

In the largely competitive context described so far, it should be remembered that the current market is characterized by products with a short life cycle, therefore easily replaceable and requiring rapid delivery, especially when an updated version is launched. It is in this circumstance that the only ones who really manage to distinguish themselves in terms of performance from their rivals are the time-based manufacturers, companies that are skilled and specialized in lean production and the introduction of new products on the market, responding to the increasingly changing needs of consumers. Car manufacturers must have a very strong reaction speed.

These companies seek to protect turnover through offering sophisticated products tailored to individual customer demands and this leads to mass customization. In particular, it can be seen how this strategy has become a real trend in recent years, as it represents the ability to produce varieties of customized products quickly, on a large scale and at a cost comparable to mass production, through technical and managerial innovations. The adoption of this strategy allows to achieve responsiveness reacting to new customer demand and flexibility. Pine defines mass customizers as those who develop, produce, market and distribute goods and services with such variety that nearly everyone finds exactly what they want at a price they can afford.

Car manufacturers must therefore put themselves in a position to implement effective strategies able to fit/to be suitable to customer requirements, guaranteeing a good quality/price ratio and fast delivery. Without a shadow of a doubt, customization leads to a truly broad product portfolio, with numerous alternatives available to the consumer.

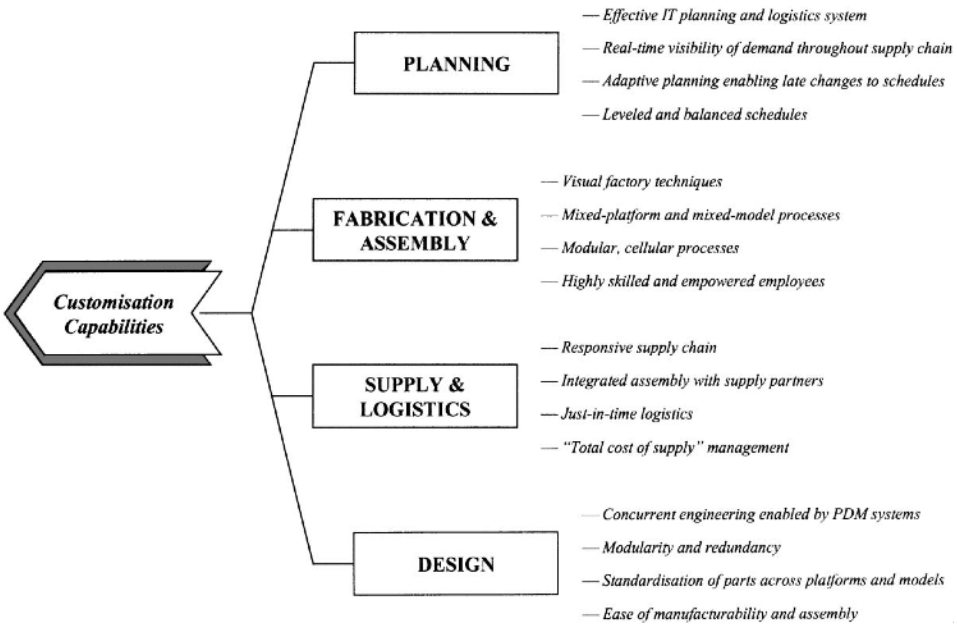
Of course, this strategy implies an increase in production costs as well as time and complexity of management in the operational field, but the huge investment provides a high return guaranteed by the high price that consumers are willing to pay for the product offered, which best summarizes their specific needs.

According to Alford we can therefore conclude this first part by stating that, although the benefits of adopting mass customization are evident, there are constraints that affect the different areas of the production chain, exerting pressure on planning, fabrication and assembly, supply and logistic or design.

The close network of interrelationships that are created between the product assembly process and the supply chain that acts as a superstructure: thanks to the careful understanding of this relationship, it is possible to understand performance and cost trends and to provide support for investment decisions. In this context, the capabilities and, once again, the system of relationships that are created play a fundamental role.

Assuming that the resource based view is at the basis of our theoretical discussion, as previously emerged, we can say that the set of issues that mass customization brings with it are also linked together by a structural co-dependence that does not allow the elimination of a single constraint in isolation.

Fig. 11: Capabilities for mass customization



Source: D. Alford et al. / Int. J. Production Economics 65 (2000) 99}110

3.3.1 Product platform commonality and modular architecture of car producers

Many researchers and theorists therefore suggest to exploit product modularity, which is one of the techniques of possible application in product platforms, a source of success for the achievement of mass customization. Also in this case, there are many definitions to attribute to the concept even if there is a common element to the various strategies: to control the complexity of product lines increased as a result of the proliferation of available models, in any manufacturing industry.
Technologies, skills, resources have evolved in parallel with this development thanks to a proactive and positive demand response. Therefore, product platforms are defined as a set of common assets or components whose use is intentionally planned and developed to form a common basic structure, especially at the core technology level, from which derives a flow of products whose launch takes place as efficiently as possible.

The usefulness and effectiveness of using modular platforms emerges from the moment complex product lines are created that need to be quickly replaced when a new technology or innovation takes over the market. Finding a solution to avoid a heavy burden on production costs and not leaving unsold stock in order to become skilled in applying new technologies to the next members of each product family.
The most significant approach remains, once again, the exploitation of a common basic architecture from which to build the entire product range, allowing components to be easily replaced when the technology on which they are based is overtaken by a new one introduced to the market. In this context, therefore, research and development activities become very important as the platforms promote a better understanding of the product and a reduction in testing and certification, especially for more complex products.
Not only, in the automotive industry, platforms guarantee flexibility between plants, increase their utilization rate and contribute to reduce product lead time, since plants and equipment are shared through intra-industrial relations. It is estimated that the companies that use platforms cover a market share increased by + 3% compared to those who

do not, which shows that the success of mass customization also depends on the factor in question.

A careful analysis of the literature shows that there are numerous product platform strategies that allow manufacturers to expand their offer through the implementation of design strategies aimed at overcoming the complexity dictated by the entire system. By creating platforms, there is a significant reduction in investment in the vehicle body manufacturing process, which has a significant impact on the cost of the new vehicle.

Therefore, sharing the same substructure means that various strategies can be defined that can be grouped into specific categories:

- commonality or standardization through which standardized components are used, which are combined and shared to the maximum extent possible;
- modularity specifically refers to the interaction between structure and functions and allows to decompose the basic architecture of a product, in our case car, into many modules in order to configure different end products or belonging to the same family.
- module interface involves the use of external components within the platform so that the modular interfaces are kept constant within the family of car models.
- scalability or mutability in this case it is possible to convert the capacity of the system according to the changes coming from the external environment without modifying its function. In this way, if there are changes in the desired shape or structure, the platform's ability to perform all functions is not undermined.
- postponement or delayed differentiation specifically, this strategy allows to modify the product at later stages of the assembly process but requires a marked correspondence between attributes and modules, in reference to the product.
- robusteness in this case the small variations needed by the platform do not affect the shape of the platform and this also facilitates the assembly process of the products that can take place without interruption.

3.3.2 Product modularity and exploitation of synergies

Among the various applications of the product platform concept, product modularity is undoubtedly the one that is most adopted in the automotive industry.
Product modularity allows you to create products that, while having the same basic structure, have specific characteristics thanks to the combination of platform components. In this way, a company can achieve economies of scale by taking advantage of the similarity between products in manufacturing techniques, from design to actual production, starting from a standard base. In this way, it is possible both to satisfy the new needs of increasingly demanding consumers and for the company to support strategies that guarantee a high ROI without diverting the focus from its core business.

Product modularity, specifically, represents the practice of using standardized product modules so they can be easily reassembled/rearranged into different functional forms or shared across different product lines and is characterized by a one-to-one correspondence between physical and functional architecture. In fact, high volume and cost efficiency are the primary characteristics of this approach, which makes it difficult and almost counterproductive for manufacturers to create products that specifically meet the demands of individual consumers. As a result, there is a conflict between the intention to satisfy their target customers with targeted solutions that cause a significant increase in costs and complexity and the possibility to save on production costs through the exploitation of economies of scale. The compromise can only be reached when the optimum combination of components is able to meet the customer's requirements, otherwise difficulties can arise if these go beyond the scope of the existing module products.

Specifically, Clark and Carliss (1999) defined two different steps characterizing product modularity which correspond to different degree of control exercised by the actors within the supply chain:

- Modular in design: suppliers have the control to decompose and combine product components together.

- Modular in use: customers have the control to mix and realize a completely new product through the combination of components causing conflicts since the basic product architecture requires to be modified.

Modularity was defined by Pine (1993) as the product design method that make firms able to offer a large variety of products by reducing the product line complexity (caused by mass customization) though may limit firm's ability to discover new market opportunities. In fact, if some extraordinary changes modifying the existing architecture occur, the whole system could collapse because it does not still able to guarantee consistency and maintain low costs.
In addition, modularity may not be able to satisfy all the customers' requests since every single client has specific needs and, in particular, the customer perceived customization (CPC) underlines the differences. It represents the degree through which customers perceive the product in order to be suitable to their specific needs.
This concept becomes very important in the moment in which we analyze the relationships that are created between customers and suppliers and the game of power and control that are exercised because the greater the influence exercised by the client, the greater the differentiation of the offer.

Specifically, from the moment the consumer becomes a co-creator of value and is placed at the center of all business strategies, logically your role begins to take on importance from the product itself. There is no longer a separation between roles, on the contrary, there is complete integration between the work of the manufacturers and the customer.
Mintzberg and Lampel have the continuum of strategies model through which they analyze the supply chain and the various phases that make it up, in particular by defining four processes:

- Design
- Fabrication
- Assembly
- Distribution

Along the value chain, the involvement of the consumer can be more or less intense and, consequently, the three customization strategies described above are defined: core, form, optional.

Not only that, the figure of the customer is also crucial when adopting postponement strategies, an approach that allows to reach mass customization because it delays the assembly or packaging phase to the next moment in which the order is received. In this way the customer has ample freedom to make changes to the product without affecting the production or assembly phase and it has emerged as a source of success. It can happen both at different times and in different places and it can be implemented both by the companies and by the suppliers themselves: the latter in fact tend to make different modules to be inserted in the various models available in order to satisfy more than one manufacturer with different requests.
Postponement is very useful when it allows a wide involvement of suppliers within the supply chain and helps in risk mitigation under certain conditions.

An important aspect of the automotive industry has also been achieved at the present time: since the focus is purely oriented towards mass customization, the manufacturers themselves are trying to stimulate demand as much as possible. Strategies called pull, i.e. those stimulated from below, are getting the better of the push, as we have seen a reduction in ready-to-deliver and km0 offers, especially in recent periods.
One example is provided by Citroen itself, which was planning to launch a new, updated version of Citroen C3 in September 2020. In fact, the situation has not been handled in the best possible way since all dealers have run out of stock of the old version of C3 and it has not been possible to meet the demands of all customers. The idea was in fact to provide dealers with a few examples of the new updated model just to show it off and give customers the opportunity to understand what changes could be made to meet their needs at a later stage of production. This strategy aimed at stimulating demand on the one hand, however, had negative consequences, as the model in question covers about 70% market share in Citroen and was not able to satisfy those who needed to buy the vehicle that, although available, did not have the required features. Pushing products

onto the market, trying to saturate it with the intention of satisfying as many consumers as possible, can only be done if the manufacturer is able to anticipate market trends by offering the product even before it is asked for it. Once again, in order to maintain this advantage, it is appropriate to make substantial investments in R&D and push for innovation.

Thanks to the modularity of the product, as described above, the consumer is able to modify it through a different combination of components even in the post-production phase.

This dense network of relationships that is created within the value chain leads to a continuous and stimulating dialogue between the parties and allows us to talk about collaborative customization.

This is just one of the possible strategies that a manufacturer can adopt and reflects the progressive integration of the consumer within the value chain, but at the same time it reflects the growing importance of other players in the supply chain to the detriment of manufacturers. In fact, there are operations called "after market" because they are managed directly at distributor level, which allow to adapt the offer to the specific requests for additional options or accessories, without affecting the production phase.
Not only that, an analysis of the literature shows that the concept of service relationship, which was abundantly dealt with in the initial phase, is also current in this context.

The modularity of the product has led to a new concept of purchasing experience and use of the product since it is the manufacturers themselves who have understood the importance of being close to the customer. Therefore, it is essential for companies to provide a local service with specialized staff: proximity not only for current operations but also and above all for the future. Therefore, suppliers need a territorial proximity with the parent company which, in turn, will have to organize itself in a capillary way on the territory, so that it can guarantee an efficient service in a short time. Finally, proximity is fundamental since it involves a considerable reduction in costs if all the com-

pany's operating divisions are located in neighboring areas for the exploitation of production platforms, almost forming consortia.

3.4 Exploitative techniques: Internet of things

In the ICT field, we are witnessing a marked technological progress, accompanied and made possible by the implementation of new infrastructures. This technological expansion is the real catalyst for a series of phenomena such as: the global spread of Smartphones and Tablets; the possibility to use the Internet on the move; the opportunity to offer an extraordinarily high variety of functionalities interacting with other ecosystems, thanks to the Apps; the low investment needed to launch these Apps; the ever increasing availability of broadband; the spasmodic attitude of people to be always connected37.

The innovations we are talking about do not only concern new products or services, but also, and above all, new habits of consumption and fruition of contents of any kind. This is because the focus is mainly on the fruition of a service that is as satisfactory as possible in terms of experience on the part of companies.

Therefore, it emerges the structural need to adopt a holistic vision when talking about digitalization, being aware of the extent of the phenomenon. In this context, therefore, it has emerged and we can now affirm that it is also the unifying feature of the entire discourse, the figure of the consumer as a co-creator of value and around which the success of business performance depends. Starting from the customer because it is he or she who reveals his or her own expectations through his or her behavior.

In the previous paragraphs I have described customer-company interaction as a bidirectional source of stimuli: to support the analysis we will explain what are the main benefits starting from the development of strategies based on the customer experience. The measurement of it favors the company itself, which is now able to exploit the enormous amount of data related to individual customers. You become part of a virtuous circle in which the knowledge of customers is exploited and thanks to the collected information

you offer the product that best summarizes their needs, in a uniform and personalized way.

The data resulting from customer experience processes can be used for various purposes: to identify what can be improved, to set objectives for future improvements, to intervene if corrective action is necessary, but also to identify the dynamics that lead to loyalty.

The rapid access to millions of data and the high frequency of data updates also reduces costs and resources.
Behavioral data are fundamental to the creation of specific messages, which can be received at the right time by the consumer, aiming to stimulate and activate a latent need. The aim is to ensure that consumer interest never fades away with respect to a specific brand or product; the loss of a customer implies higher costs. (Santorelli, 2009).

Knowledge of one's customers and their past purchases, habits and preferences is a primary factor in the design of unforgettable experiences and often guarantees real anticipation of market demand. Steve Jobs said "Get closer than ever to your customers. So close that you tell them what they need well before they realize it themselves". Conscious of the fact that the best way to create value was the right combination of creativity and technology, Jobs represents the emblem of think different. Its strong point, in fact, has always been its great intuitive capacity: to imagine what the customer wants, even before they realize it themselves. The technology tycoon has managed to induce and nurture new needs in the world by offering products such as the iPhone, iPod and iPad, devices that, by transforming themselves into icons, have entered people's lives with strength.

Over the years, in fact, companies have created intelligent products, better known as smart products, which are at the basis of the IoT phenomenon and represent a revolution also in terms of customer experience.

How they are used, user preferences, customer satisfaction, become key constants for the customization of offers, thanks also to the regular monitoring of customer experience and feedback. In previous years, the data came from exchanges made on the mar-

ket, then order processing, interactions with suppliers or salespeople or through feedback following contact with customer service. Companies then integrated this information with surveys and research and by combining the data sets collected they began to define their customers' profiles and needs. However, it was still unknown to them how their product really worked. The information derived from traditional sources, thanks to smart products, is thus integrated by data generated by the product itself. The data of these new products are valuable in themselves, but their value increases exponentially when integrated with others. By using this data, it is possible to bridge the gap that companies often face between the expectations of their customers and what they actually offer them.

In particular, the automotive industry itself has been able to benefit, especially in recent years, from digital platforms and Bug Data in the management of business operations so that Yet, traditional OEMs are facing fierce competition from digital players which are also attracted by these opportunities.

For now, connected cars, e-commerce, autonomous driving and the Industrial Internet have emerged as major driving forces of automotive digitalization. Connected car and autonomous driving are pushing for digitalization: the connected car market for passenger vehicles alone is expected to grow enormously in the next years. New consumers are looking for online functionality and OEMs are forced to expand their digital core competences as consumers' demand for seamless car-smartphone integration requires them to cooperate.

Therefore, a major challenge lies in effectively extending their business scope into digital products and services. These new digital business models require some considerations since digitalization affect all the activities across horizontal and vertical value chain between business partners, incumbents and new entrants. Europe is lagging behind for digital platforms: it is estimated that in the long run, between 30% and 40% of the added value deriving from the production chain will be related only to digital services through online platforms, described in the previous sections.

Therefore, the success of all operations within the integrated supply chain is due to the correct use and management of the data and information collected, although all compa-

nies already have a number of cutting-edge tools at their disposal, which are ineffective if not used in an optimal way. In fact, data and floods have a different nature to form a heterogeneous system since we are talking about personal data related to consumers, data generated by the cars themselves and mutually exchanged (autonomous driving) or from the surrounding environment. Industry players in the automotive field need digital platform providers to be able to effectively manage data and maintain competitive.

First of all, digital players that represent companies outside the automotive sector but whose support is of fundamental importance in the collection of consumer data have also taken part in the activities. These can be customer preference data, health data, insurance data or simple remote vehicle management. Therefore, everything revolves around the consumer and we are witnessing the birth of new channels or touchpoints that allow to connect business and customers through the digital platform. In particular, in order to guarantee high performance, the main players are trying to take control of the most important communication channel inside the car: Human-Machine-Interface. A greater involvement of the consumer in the relationship with the device is based on an open system of interactions and information exchange supported by Internet of Things systems.

The latter is a phenomenon of a fairly wide scope, a complex paradigm, not so much because it is difficult to understand but because it consists of numerous elements. In itself it does not represent a technology but the extension of the Internet as a network, to things and people in order to extend to the digital world what you touch and recognize by hand. It was already talked about 50 years ago but the word began to circulate only in 1999.

The internet has played a fundamental role because it has allowed to attribute to objects the ability to process data through:

- The miniaturization of electronic components
- Pervasiveness of the network (acceleration to date also desired by 5G)

Good data management is a major advantage for businesses and consumers: the revolution is not so much in communication itself but in the integration of the physical and digital spheres into a single reality.

The Internet of Things opens up countless possibilities but just as many risks in terms of cybersecurity, security, data protection and proper data management. Just think, for example, of a company with plants and machinery connected to each other and to man: a cyber attack could target these machines causing a series of wide repercussions. It is the task of a good manager to analyze the risks and opportunities, safeguarding the improper use of data: a frugal innovation that can benefit something that already exists without revolutionizing it must be realized. For example, in mass production, quality control is done by sampling: an optical sensor on the production line could speed up the processes without distorting them, guaranteeing an enormous benefit, without having 2 separate processes and without one being able to affect the other.

It can be said that IoT is not exclusively something technological, on the contrary, it is interpreted as a necessary and vital phenomenon for growth in a smart world: strong integration and consumer acceptance favor development. Italy has very quickly welcomed smart devices, robots even if we are not prepared for the increasing level of automation that we will have when the close relationship will no longer be between man and machine but between machine and machine. Social repercussions that we cannot ignore. Today the IoT attracts a wide range of devices, equipment and electronic components that are incorporated into machines or different objects allowing an active communication, an exchange of information with others or a change of device settings.

According to an analysis conducted by Accenture (Daughtery and Berthon, 2015), in 2030 the IoT could have an impact on global production of $14.2 trillion (14.2 trillion) dollars. In Italy, this growth could be worth up to 1.1% of national GDP. Paul Daugherty, Chief Technology & Innovation Officer Accenture said at the World Economic Forum Annual Meeting 2015, Davos, "The Industrial Internet of Things is a reality today and can help improve productivity and reduce costs. However, its full economic potential will only be achieved if companies are able to move beyond the use of digital technology solely to improve efficiency and recognize the value that data has in creating

new markets and revenue streams. This calls for a drastic change in the business model: which also includes working with competitors, forming partnerships with other industries, redesigning organizational structures and investing in new skills and capabilities".

A good example is augmented reality, which considers a series of technologies capable of altering and multiplying the reality perceived by the senses. These are wearable devices or objects that, by superimposing information and exploiting the images of what is around them, increase users' perception. It has also had a great impact in the world of commerce where many companies use this technology with the aim of making the sales experience even more exciting.

3.4.1 Exploitative techniques: Big Data management

The growth of the IoT phenomenon, the digitalization of processes and the increasing use of social media and social networks has contributed to the continuous generation of digital information leading to the birth of another phenomenon called Big Data.

Big data are so called because they differ from regulars and are divided into 4 dimensions: volume, speed, variety and truthfulness. They can be conceptualized as a firehouse of unstructured and potentially heterogeneous information from various sources with different levels of integrity.

A second important attribute of big data is that it overcomes limitations of traditional sampling. Often, with big data the entire population is too vast to be handle even with high-powered computers, and a sample is preferred[98], but in general, big data enables less inference, inclusion of more heterogeneous perspectives, automatized collection of information, and more certainty. Because pattern is paramount, big data venerates correlation and eschews causality, with some proponents going so far as to suggest that big data renders theory obsolete.

[98] Varian, 2014

As a consequence, "the developments with which big data is associated establish a new and distinctive context for data generation and use[99]".

As previously stated, harnessing the power of individual customer data can help companies to provide themselves with very valuable and detailed information to deliver the experience consumers want. In fact, the web is not just a channel for transmitting information, it can also store it, allowing companies to use it to their advantage. The perfect knowledge of the profile of the new consumer becomes necessary in order to obtain a greater competitive advantage.

One of the trends of recent times is the propensity of companies to generate codes such as QR codes to be provided to the customer in order, for example, to track the position of a product purchased online, to create a quick access to the website or a social page. Another popular option has been the creation of stores capable of collecting as much consumer data (leads or prospects that are) through surveys, interviews, etc.. Here then is a new scenario perfectly in line with the subject of this thesis, that is the importance of collecting data and information on consumers (potential and actual). Such data collection is fundamental in order to provide the client with the highest possible quality of service and to reach a hyper-segmentation of the client bands as much desired as difficult to reach, as the client has much more possibilities to change offer than in the past, is hyper-informed and is the subject that, in the negotiation, operates in a position of advantage. Companies that want to achieve sustainable competitive advantage in this new ecosystem must take full advantage of the opportunities arising from data (of any form, size, and content). They must be managed and made available to management, which in turn must be capable of directing its every strategic move from reactive to proactive.

Although the motivations related to customer experience and increasingly simplified and tailored driving styles are interesting, the reasons why, within the automotive sector, we are increasingly witnessing the introduction of digital technologies, are the need to collect, study and analyze driver data. The phenomenon of connected cars, in fact, is a clear example. The collection, monitoring and analysis of vehicle performance and consumer needs is made possible through the extraordinary variety of sensors that modern

[99] Constantiou and Kallinikos, 2015

cars are supplied with. In this way, the connection between individuals and the car is made possible in a constant, uninterrupted manner.

The large amount of data a company has at its disposal can be used as a source of competitive advantage: many well-known and successful companies such as Netflix, Uber or Facebook and Google leverage big data to consolidate their competitive advantage.

There are data collection and management tools, many times provided by specialized external partners such as software provided by SAP and its competitors in the enterprise planning space, which manage vast information flows for increasing operational efficiencies. These tools provide SAP clients direct sustainability benefits in terms of energy efficiency, risk management, and sustainability reporting, all of which are modules that SAP offers its clients.

In conclusion, we can summarize the benefits of exploiting big data:

1. smart sensors and the seamless communication between them enable real time adjustments of systems to maximize efficiency, by optimizing the delivery of components only to when and where they are needed.

2. in addition to these real-time applications, big data can be mined to align our resource usage with the multidimensional forces of our behaviors, markets, and resources.

3. perhaps more tenuous link between supply, demand, and sustainability afforded by big data is the notion of mass customization, or the production of individually tailored goods and services to consumers, at scale.

Finally, as highlighted above, the “big data revolution” was born not only digital but also “environmentally conscious” since big data offer a wider set of opportunities to business innovation created around sustainability conceit. Renting a car when you need it rather than owning one, for example, means fewer cars are required and fewer resources must be devoted to making them. Car-sharing companies are successful to the extent they can understand the patterns in vehicle usage and availability that big data provides, allowing them to cost-effectively manage their stock, schedule maintenance, and deal

with disruptions while providing high-quality service that their customers demand and expectations.

However, many new companies have emerged by basing their value proposition on the concept of big data and sustainability: researchers may want to pay particular attention to the effects of these offers in the business portfolio. Case studies can celebrate the fascinating insights that big data practitioners generate and that can produce great benefits in terms of sustainability, often in unexpected places and with surprisingly little effort. More generally, researchers in the field of organizations and the natural environment will have the opportunity to analyze how certain sustainable business activities can gain or strengthen their competitiveness when combined with large data opportunities.

The optimal management of the available data volume is once again facilitated by cooperation with external partners, OEMs need to find the right strategy to differentiate their products and services, which largely means evolving their value proposition from "hardware provider" to "integrated mobility service provider". Product differentiation should be pursued through an end-to-end digital user experience with a customer focus similar to that of software companies, keeping products attractive throughout their lifecycle. For this to happen, state intervention with policies that guarantee security and data protection for citizens is also necessary.

For example, Fleet management Automotive OEMs are increasingly offering connectivity-based solutions for fleet management and business customers. With real-time information about their fleet at their fingertips, fleet managers can make database-driven decisions to reduce costs or fallout times caused by technical issues, as well as simplify fleet management. With detailed information on geolocation, planned routes and vehicle availability, orders can be managed more efficiently.

Connected Trade It is very likely that the connected car will become the next big eCommerce platform that will impact online shopping in various ways. First, ordering online will become increasingly easy on the road as voice assistants like Alexa from Amazon are getting into the car. But not only will online ordering have an impact, but daily shopping habits are likely to change as well.

Because cars are able to collect and analyze daily habits data or synchronize a shopping list from a mobile phone, the car can anticipate the owner's needs and upload offers and discounts to the dashboard, provide recommendations or automatically navigate to the nearest gas station. With the owner's payment information stored, payments can be processed automatically. In addition, with services such as BMW's ParkNow, parking lots and garages can also automatically charge their rates, which means not only convenience for the customer, but also money and energy savings. For example, Tesla and its EVE Connect bring intelligent home control to the car. When you leave the house, EVE automatically turns off the lights, reduces the room temperature, closes the garage and closes the front door and vice versa when you return home. With enhanced integration of the intelligent assistant, similar features will be available for a wide range of drivers for each control.

3.5 Redefinition of the supply chain: matching internal capabilities and external factors to reinvent the business model

In creating competitive advantage, companies must be able to design and implement activities in such a way that internal consistency is ensured but also consistency between the company and the context in which it operates (Siggelkow and Levinthal, 2003). This means being able to respond effectively to environmental changes that can profoundly change the competitive landscape in which the organization operates.

Not only that, mass customization therefore involves the application of different strategies, particularly in the automotive industry, which revolve around a common element: a continuum of suppliers' involvement in the product assembly process. Involvement in both directions within the supply chain, which must, however, also result in territorial proximity, in order to ensure just-in-time deliveries and optimal warehouse management. In this context an exchange of roles is therefore created, with the devolution of some tasks from the manufacturer to the supplier: it is the latter who manages the supply of materials and components in sync with the orders to be managed. The higher the level of involvement in operations, the greater the power of suppliers within the supply

chain and that is why OEMs are aware that it is appropriate to balance the benefits of outsourcing assembly activities with the risk of losing their core competence.

However, when the supplier's involvement in the supply chain increases, it is necessary for the supplier to acquire an overview as organic as possible because it is difficult for companies to balance supply and demand coherently and correctly. The holistic vision is made necessary by the fact that it is necessary to satisfy, perhaps in equal measure, suppliers and customers belonging to the same alliance within the production chain, aiming at the proactive participation of both. Through collaboration it is indeed possible to eliminate the uncertainty coming from the external environment: priority to cooperation in the long term rather than competition.

Recently, studies have shown that the orientation towards openness and new partners and innovation leads to improve the quality of the relationship between buyers and suppliers by ensuring a better flow of information, and therefore more knowledge, within the alliance. This is perhaps one of the greatest benefits of working closely with external partners as it is possible to make decisions jointly, to carry out certain stages of the production process simultaneously.

Therefore, the reasons behind these choices emerge, which lead to an excellent balance in terms of total manufacturing costs, better management of supply chain control and the possibility to share risks and responsibilities. Particularly when it comes to the production of complex products, the involvement of suppliers in the assembly process increases and consequently also their power. It is in these cases that the OEM sees the focus move away from its core business but, at the same time, perceives the potential to expand into global markets, establishing its presence and consolidating its position.

Mergers and acquisitions are therefore widespread within the automotive industry, especially in recent years when there has been a growth in mergers and agreements between companies.

But why?

The answer is not difficult to understand from the moment we talked about how crucial it is to collaborate in order to carry out all the operations in an optimal way in order to

provide security and growth in the long term in such a competitive and turbulent market. Not only that, the range of products with model and feature variants is very wide as manufacturers extend their market coverage globally, leveraging global platforms and collaborating on modular design methods initiatives.

In conclusion it is therefore possible to state how the core objective for a manufacturer is to become skilled in defining and redefining its value chain with the ultimate aim of trying to achieve a competitive advantage over its rivals. In order to do this, the solution is to balance push and pull strategies, i.e. what is put on the market by the manufacturers and realized in a consistent way with the intent to reduce costs and avoid duplication and what the demand actually requires.

Satisfying all its target customers with the possibilities available, therefore saving money thanks to the exploitation of platforms and a good level of internal cooperation is the primary objective for companies. Starting to collaborate also with external partners remains a luxury that today only large manufacturers can afford and unless you are incorporated, acquired or become part of a partnership with an established firm, with the risk of permanently losing control but great benefits and advantages in the medium-long term in terms of performance.

consistency between external and internal factors is fundamental to be able to optimally manage operations. in order to be able to offer a significant experience, a good data management is also necessary. the technological advancement and the expansion of the digital sphere to integrate the physical world have favored the phenomenon. it has therefore been understood that in order to establish and maintain a solid relationship in the long term, it is necessary to exploit all the resources available on one's own, together with the search for cooperation with third parties.

This is made possible by a common thread: to guarantee the customer the best experience in terms of effective use of the product thanks to the collaborative effort made within the supply chain.

Chapter 4 - Case study: Citroën as leading car manufacturer and provider of mobility solutions

4. 1 Research objectives

The primary purpose of this chapter is therefore to investigate how the actual causal combination of external and internal factors in the company leads to competitive advantage.
Throughout the whole process we followed a logical path that led us to analyze the evolution of the consumer figure in parallel with the development of alternative business models compared to traditional ones. This in virtue of a new era for mobility, now distorted from its essence and now understood as sustainable, shared, electric and even autonomous.
In following this evolutionary path it was interesting, on a theoretical level, to understand how factors that represent contingencies can affect the company's operations and can be internal or external to it. In this section we will see how, in concrete terms, the causal combination between key resources and key activities and clients, relations and channels, leads to the creation of an optimal value proposition, to which all the company's efforts are directed.

Therefore, the aim of the analysis is to examine such combination between internal capabilities and external factors on supporting a firm's exploration and exploitation agendas as complex antecedents of the re-invention of the business model. We take into account ambidextrous organizations to explain how they may focus their activities on the exploration and exploitation of new or existing resources and capabilities, both internal and external, required to be combined between them to redefine firms' business model.
The research question tells:
"How ambidextrous organizations may react to industry evolution by exploiting internal and external resources to sustain their competitive advantage over time in the automotive sector? ".

Moreover, through a cross analysis of the results obtained from the questionnaire, the interviews with the dealer and the external partner as well as the amount of data collected , an attempt was made to find an answer to the above question following an approach that was equally affected by pressure from both sides, i.e. supply and demand.
The data collection platforms have been:

- Citroën “Espresso" portal used in operational management, through which estimates and printouts of vehicle purchase contracts are made.The portal also manages all current and potential customers' data, grouped by code, while MADAC, the portal's internal section , makes it possible to track and trace orders for vehicles in stock and on arrival, with the relevant invoice date and arrival at the fleet. This allows the operators to track the stock trend so as to easily manage the offer of prompt delivery, trying to satisfy the customer in an abrupt manner;

- C-You digital platform with news about new launches or performance trends, product insights, functional tools for the correct management of customers, useful tools for training and price lists always updated with prices and models. During the lockdown period this tool was used for meetings with managers;

- UNRAE portal or Unione Nazionale Rappresentanti Autoveicoli Esteri which offers a portal through which the dealer can use tools to monitor all the vehicles registrations in the area where it operates, jointly to the whole national territory. It also includes data about vehicle registered by some companies and entities which operate in the whole territory.

4. 1. 1 Research Methodology

I used a mixed research method, characterized by a case study approach combined with a qualitative analysis.
In fact I will go to examine some real examples about the themes above mentioned, referring to Citroën with some comparisons to Volkswagen brand, since there is a great

availability of sources to be analyzed and commented to find results for my analysis, both primary and secondary data.

The latter will be use to support the discussion while the primary data collection is realized according to information that I accessed during my internship within Nicola Prezioso dealer of Citroën since 1970 and Volkswagen since few months. They are about company positioning over competitors, the effect on the performance driven by changes in technologies and features of the products, the situation after Coronavirus in terms of vehicles' registered and the relation between dealer and costumers.

In addition, I realized one survey on a sample of population to understand the propensity of the average consumer to adopt new trends. The survey, filled online by the dealer's customers, is declined for the different arguments covered and counts 32 questions. The sample collected is equal to a small percentage of the market, around 60 respondents, but it is still significant if combined with the other data available and therefore allows us to obtain representative feedback from the target market interested in the automotive sector. The survey period runs from 24 June to 24 July 2020. This part of the analysis was useful in order to offer insights from the demand side, to be compared and integrated with the results related to the supply side.

Then, using a qualitative approach, I contributed through interviews to get insight from supply side by firms' external partners, in order to explain the relevance of external factors on companies performance and get information about the influence of digitalization on both companies sales and customers. In particular, the interviews were conducted in person, with subsequent telephone conversations for clarification on the subject, with Professor Fabio Massimo Frattale Mascioli, director of the “Polo per La Mobilità Sostenibile della Regione Lazio” and brand manager Massimiliano Prezioso of Nicola Prezioso SRL.

In the first case, the meeting with Professor Mascioli was very interesting as it allowed me to analyze and actually understand the relevance of external factors in order to create solid and profitable relationships with partners outside the company, such as energy providers. Not only that, it was useful to understand at a technical level the actual functioning of an electric motor, allowing me to fully understand the concept.

In the case of confrontation with the reality of the dealer, on the other hand, what was stimulating for me was the fact that I found myself working and confronting a reality that lies in the middle between customer and company. This has therefore allowed me to catch insights from the bottom, being able to obtain feedback from the market demand in an abrupt manner by having direct contact with customers and to understand the strategic orientation on the supply side, trying to adapt in an optimal way to the evolution of the external environment.

The questions in the interviews are mainly divided into different sections according to the macro area dealt with, as I tried to get a complete overview of the whole topic, focusing mainly on issues that are still changing at the time of writing.

4. 1. 2 Managerial contributions and implications

In literature the above mentioned arguments have always been widely treated as there are many studies about the impact of a right combination of external and internal factors over firms performance, other studies focus on the relevance of exploitative and explorative techniques, addressing them simultaneously as a core topic of the ambidexterity field. For what concern business models, many researches explain the main reason for their re-definition: creating competitive advantage even if it is not so easy to sustain it over time. Studying the relations between these issues is something just covered in literature, as they are strictly correlated between them.
Nevertheless, the aim of the analysis is to understand the extent to which each factor impacts on the company's performance because there is no theoretical contribution to explain what kind of influence each factor exerts, whether one is functional to the other or why a company should focus primarily on its own capabilities or those available externally. The intention of my analysis is therefore to provide a valid alternative capable of explaining how internal and external factors are closely dependent on each other and

how, in reality , it is not possible to achieve a position of competitive advantage if they are not combined harmoniously .
What emerged from the discussion is the fact that a virtuous and vicious circle is created at the same time, in which external factors that impose change are determined by internal factors that in turn have changed to meet the needs of the surrounding environment. Evident therefore is that, even if a play of force between the two elements can be created, the dynamics of an uncertain environment such as the automotive industry will still lead to balance.
The results obtained are therefore also useful for the implementation of actions aimed at converting the traditional client.
The limits that I may notice from the results of my analysis are related to the fact that I only take into consideration opinions from few individuals involved in the context but that cannot represent the perception of the whole sector. Indeed, surveys collection data, refer only to a specific target segment. Finally, a second issue may be the choice of a single OEM instead of multiple firms, whose positioning refers to medium-low car segment even if this may be a game changer since we are talking about concepts as collaborative consumption and a brand like Citroën might be suitable for the purpose.

4.2 Citroën INSPIRED BY YOU: brief analysis of firm's current position

Citroën, at the heart of the automotive market, has been a popular brand in the noble sense of the word since 1919, drawing inspiration from people and their lifestyles.
The brand has always accompanied social developments and established itself as attentive to people's needs, considering them and their lifestyles as the main source of inspiration: for 100 years Citroën has made the car accessible to everyone.
Its distinctive trait translates into the international signature which, since 2017, has been at the centre of all its daily actions: "INSIPIRED BY YOU" which has enabled the company to stand out among generalist brands for the unique experience it offers its customers, placing them at the centre of its operations.

As of today, Citroën's objective is to make electricity available to everyone, including the lower-middle segment of the population, which is the brand's target audience, preci-

sely because the PSA group is following this line of thinking aimed at promoting and creating increasingly innovative solutions.

So far, there have been very few electric cars in the company's car fleet, but to date, and in order to mark the transition to electrification, Citroën has launched a new version of its brand name, adding ALL in the INSPIRED BY YOU claim to reinforce the group's desire to offer electrics to everyone.

In 2019, Citroën Italy consolidated excellent commercial results, closing the year with over 101,000 registrations registered on the total market between cars and commercial vehicles, for a market share of 4.8%.

In a substantially stable market environment (+0.5%), Citroën recorded growth in Italy compared to the previous year both in terms of sales volumes (+3.5%) and share (+0.1 percentage points).
In September 2020, on the other hand, with excellent commercial results, the carmaker reached almost 45 thousand registrations, between cars and commercial vehicles, which bring it to a market share of 5.0%, a very significant value despite the 5.7% decrease compared to 2019

In the passenger car market alone, which grew by only 0.3% compared to the previous year, Citroën achieved a total of over 86,400 registrations in Italy, registering a percentage increase of 4.4%. The market share, amounting to 4.5%, was also up compared to the same period in 2018, in a market that, despite growing by 12.5% in December, remained stable overall in 2019, recording a slight growth of 0.3% compared to the previous year.

To date, demand compared to 2019 decreased by 5.9%, but in the first eight months of the year the French manufacturer achieved a total of over 38,000 registrations compared to 68,000 in the same period of 2019, for a market share of 4.7%, unchanged compared to the share recorded in the same period of the previous year.

The result is undoubtedly positive, given the period we are experiencing and, from what have emerged, we can therefore say that Citroën is among the generalist brands the one that continues to be most appreciated for initiatives aimed at favoring the client.

In the tables we find data on registrations made during the year up to September for the current and previous years.
The first table shows data relating to the total market, the second to the passenger car market alone.

Fig. 12: Registrations relative to the brand - total market

Immatricolato per marca
Periodo temporale selezionato: dati al mese di 'Settembre' - Mercato Totale -

Gli archivi sono aggiornati al 02/09/2020

marca	Mtd 20	%	Ytd 20	%	Mtd 19	%	Ytd 19	%	Fy 19	%
FIAT	909	17,2%	148.061	16,4%	124	8,5%	237.523	16,4%	337.213	16,0%
VOLKSWAGEN	304	5,7%	81.692	9,0%	56	3,8%	125.998	8,7%	185.103	8,8%
FORD	523	9,9%	65.037	7,2%	100	6,8%	95.908	6,6%	144.418	6,9%
PEUGEOT	139	2,6%	55.124	6,1%	51	3,5%	86.031	5,9%	124.493	5,9%
RENAULT	335	6,3%	54.696	6,1%	60	4,1%	92.598	6,4%	130.803	6,2%
CITROEN	93	1,8%	44.902	5,0%	53	3,6%	70.785	4,9%	101.259	4,8%
TOYOTA	85	1,6%	39.516	4,4%	34	2,3%	61.591	4,3%	91.974	4,4%
OPEL	65	1,2%	37.886	4,2%	59	4,0%	78.859	5,4%	105.621	5,0%
JEEP	117	2,2%	34.249	3,8%	20	1,4%	58.743	4,1%	81.605	3,9%
DACIA	208	3,9%	32.809	3,6%	97	6,6%	65.429	4,5%	88.538	4,2%
MERCEDES	427	8,1%	31.455	3,5%	117	8,0%	46.138	3,2%	71.369	3,4%
AUDI	131	2,5%	31.124	3,4%	155	10,6%	44.164	3,0%	64.463	3,1%

Elaborazioni Unrae su dati del CED del Ministero delle Infrastutture e dei Trasporti
presenti in archivio al 02/09/2020 (Aut. Min. D09420/H4)

Source: www.dealerplus.unraeservizi.com - August, September 2020

Fig. 13: Registration relative to the brand - passenger car market

Immatricolato per marca
Periodo temporale selezionato: dati al mese di 'Settembre' - Autovetture - Metodo Ministero -

Gli archivi sono aggiornati al 02/09/2020

marca	Mtd 20	%	Ytd 20	%	Mtd 19	%	Ytd 19	%	Fy 19	%
FIAT	809	16,7%	120.676	14,8%	47	3,8%	200.268	15,1%	280.852	14,7%
VOLKSWAGEN	278	5,7%	77.576	9,5%	48	3,9%	120.881	9,1%	176.859	9,2%
FORD	470	9,7%	53.967	6,6%	78	6,3%	82.948	6,3%	122.569	6,4%
PEUGEOT	125	2,6%	49.040	6,0%	38	3,1%	76.738	5,8%	110.050	5,7%
RENAULT	310	6,4%	48.078	5,9%	41	3,3%	81.172	6,1%	113.953	5,9%
TOYOTA	52	1,1%	38.126	4,7%	33	2,7%	60.617	4,6%	90.168	4,7%
CITROEN	71	1,5%	38.059	4,7%	33	2,7%	61.875	4,7%	86.481	4,5%
OPEL	56	1,2%	34.409	4,2%	53	4,3%	73.254	5,5%	96.581	5,0%
JEEP	117	2,4%	33.860	4,2%	20	1,6%	58.708	4,4%	81.526	4,3%
DACIA	206	4,2%	31.265	3,8%	90	7,2%	62.138	4,7%	84.103	4,4%
AUDI	131	2,7%	31.124	3,8%	155	12,5%	44.162	3,3%	64.461	3,4%
MERCEDES	374	7,7%	27.562	3,4%	106	8,5%	40.919	3,1%	62.902	3,3%

Elaborazioni Unrae su dati del CED del Ministero delle Infrastutture e dei Trasporti
presenti in archivio al 02/09/2020 (Aut. Min. D09420/H4)

LEGENDA
-Mtd = Month to date. Nella colonna compaiono i volumi immatricolati durante il solo mese di Settembre, selezionato nel menu;
-Ytd = Year to date. Nella colonna compaiono i volumi immatricolati da Gennaio fino al mese di Settembre;
-Fy = Full Year. Nella colonna compaiono i volumi immatricolati durante tutto l'anno precedente (2019);
% = quota di mercato (volumi/mercato totale);
CITR = Volumi immatricolati da CITROEN
%CITR = Quota di penetrazione del marchio CITROEN (volumi CITROEN/mercato territoriale o su segmento)

Source: www.dealerplus.unraeservizi.com - August, September 2020

The best results come from the private channel, which accounts for about 57% of the total car market in Italy: Citroën Italia 's sales increase in the first nine months of the year compared to the same period in 2018 is more than 15%. A result in contrast to the market trend where sales in this channel have maintained only a slight increase (2.4%) in cumulation since the beginning of the year. In total, cars sold in 2019 were almost

13% higher than in 2018. Also in the first nine months of 2020 ,more than 50% of Citroën Italia 's sales were recorded in the private individuals channel , still showing the brand's countertrend compared to the market, where demand decreased by almost 14% compared to 2019.

The growth in Citroën Italia registrations is particularly significant also within the Company channel, in a substantially stable market, where there was an increase in sales compared to 2018.
Finally, in the Long Term Rental channel, where the Italian market grew by 8%, Citroën Italia increased car registrations by 60% compared to 2018.

The brand continues to strengthen its position in the B saloon segment with the brand's best-seller, Citroën C3, which remains in second place overall as the best-selling foreign car in Italy, in third place overall. In 2019, it has exceeded 40,700 registrations since the beginning of the year and, among the B-segment saloons, it remains in second place overall while, in the private sale channel , it is first among petrol-powered saloons.

In particular, the Citroën SUV range, consisting of C3 Aircross SUVs and C5 Aircross SUVs, was very well received by Italian customers, with a 5.5% share in the total of the respective segments at the beginning of 2020.
The CitroënC3 Aircross SUV is the second best-selling car of the brand in Italy and has increased sales by 4% compared to 2018, remaining in the TOP10 of its segment. In particular, in the private sector, the increase in sales exceeded almost 6%.

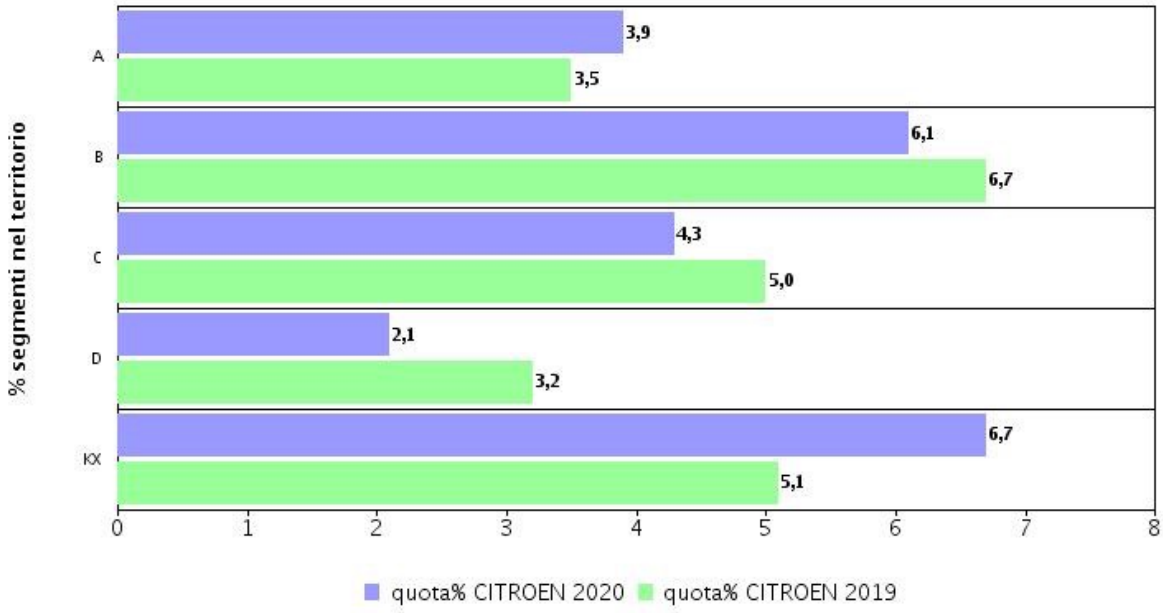
The New CitroënC5 Aircross SUV is also highly appreciated by Italian customers as it exceeded 6,800 contracts in the first nine months of the year thanks to its unique design, cutting-edge technology and its modularity and comfort features, positioning itself in the TOP5 of its segment.

Positive results also in the field of light commercial vehicles, where Citroën Italia exceeds 1,000 registrations and confirms its fourth position in the ranking of the Brands.

In December 2019, Citroën Italia recorded double-digit growth of almost 15% compared to December 2018, thanks mainly to the excellent monthly results of Berlingo Van and Jumper.

The chart shows Citroën's share of the total market by segment:

Fig. 14: Citroën share % over total market



Source: www.dealerplus.unraeservizi.com - August, September 2020

Therefore, given the excellent commercial results, the Citroën brand is an excellent benchmark for our analysis, given the efforts made together with the PSA group to establish itself as a leading car manufacturer and provider of mobility solutions.

4. 2. 1 The new digital enabled customer

The questionnaire that we carried out and which was submitted to clients who came to visit the dealership, led to significant results that were useful for understanding the work.
The main target group for our analysis are clients between the ages of 24 and 65, so it is such a large segment that it is heterogeneous. The primary purpose of the survey is to identify the reasons behind the adoption of new trends in the automotive sector and, consequently, to analyze how consumer purchasing behavior has really changed. However, the target group is so large that differences can be seen at a microscopic level. Citroën Italia's brand manager for Nicola Prezioso was asked which segments of the population were most affected by digitization.

The truth is that in recent years everyone, from millennials to older people, has adapted to the new way of buying. It is true, there are still many people who require brochures to view models and fittings, but it's also true that the automotive industry is a pioneer in manufacturing, so it is very often difficult to accept that the dynamics are no longer the same as traditional. The age group that has suffered most is undoubtedly the X generation ,but it has been able to embrace a new vein of thought as it has experienced the change on its own skin.
While the youngsters, more practical and accustomed to living with digital, come to the dealership to be able to touch what they have seen on the site, constantly looking for integration between physical and digital, the older ones are the ones who very often decide to do without it.

It is therefore clear that the consumer's purchasing behavior has clearly changed compared to the past. In fact, the customer has a large number of tools that allow him to find all the information he needs about a product or service. Knowledge of the specifications of a product very often leads the consumer to prevail in the relationship with the dealer, even if the latter appears essential for the conclusion of negotiations.
Digitization, which has an impact also and above all on the relationship mentioned above, is therefore a virtuous tool from which companies and consumers benefit. In fact, the development of the Internet has not only allowed customers to prefer quotes and online trading itself, but has also provided companies with the tools to expand their customer

base, finding new customers and guaranteeing privacy and security when they make their first digital contact.
In recent times, we have witnessed the birth of a new figure: the digital consumer, who is no longer the only millennial, born in an already digitalized context, but also the adult individual who has witnessed and experienced the digital transformation first-hand. Therefore, we have witnessed the transition from the customer who discovers the car in the show room to the customer who arrives at the dealership with the sole intention of touching the product and having confirmation of the price.

The results of the survey show the propensity of consumers to buy in a new way that also takes into account the digital as well as the physical sphere.
Regardless of the age group or other socio-demographic characteristics that may show differences at group level, the interviewees reflect what the average consumer is today, in step with the times and as innovative as the offer of products and services dedicated to him.
More than 56% of respondents shop online, 33% buy digitally only on certain occasions and a small minority,8%, prefer to do the whole in-store process.
Purchasing on digital platforms is therefore beginning to be preferred to traditional purchasing thanks to the numerous advantages that this brings: the factors most appreciated by respondents are the convenience of the operation (54%) and optimization of time (35%), followed by savings and customization of the service (both 6%).

Most purchases are for clothing, footwear or electronics. Only1% buy luxury goods online, in fact the same percentage of those who consider it slightly inappropriate (for 15.38%). 25% moderately appropriate, 5.77% extremely appropriate, 23.08%neither , 15.59% inappropriate.
These results show that the consumer is not yet ready to accept, or better yet has yet to fully understand the extent of the phenomenon, the possibility of buying luxury goods online. People don't trust people and for products of this type they prefer to go to the store for the test, so promotional policies or targeted marketing actions, mainly inbound marketing, are necessary to better understand what the consumer needs and try to satisfy him not using traditional channels anymore .Therefore, use communication and adverti-

sing to raise awareness of the current consumer on the issue, guaranteeing safety in operations even if they are luxury goods.
For example, respondents were asked if they would ever buy a good like a car without visiting the dealership in advance but doing the whole negotiation online and most respondents, about 48%, said no, 35% probably no while only 12% are intrigued by the purchase in question .
Companies, in this respect, are facilitated by the fact that customers have all the information they need, relating to product specifications and technical characteristics, independent of the type of industry in which they operate. So this is a strong game for the company, which can leverage its websites or social platforms and create targeted content to promote the purchase of luxury goods online, given the growing importance that the internet has taken on as a vehicle for transmitting information, valuable for customers and business.
Of the respondents, more than 52% believe that the use of online platforms for collecting information is extremely useful, 33% consider it moderately useful, 13% are not convinced that it is actually that useful and only a small minority believe it is not.

In the light of these results, respondents were asked whether, when purchasing a new vehicle, they should contact the dealer directly or do a brief search on the Internet to find out and compare prices and models. 82.35% said that they only go to the dealership for further clarification in addition to those they had already had when visiting the car manufacturer's website, while the remaining 17.65% prefer to go directly to the dealership, without consulting websites.

These results also revealed the nature of the research that clients do: hasty and careless. You only visit the website to see car models, to find out about the latest trends, to find out what the company 's next launches will be or to compare prices and versions: 52% of respondents have never configured a vehicle on the car manufacturers' websites, but it could easily fall within the above percentage among those who go to the dealership just for further clarification.
The remaining 48%, on the other hand, tried to configure an entire vehicle on the house website at least once. Among the most accredited are websites of Mercedes, BMW and

some brands of the Volkswagen group such as Porche, Audi, Volkswagen and Ducati, while we find websites of generalists less easily .
Despite this, the percentage of those who have never received a reply after having requested information or a quote is very high, around 47.5%, compared to 22.5% who have been contacted within a week and the remaining 30% within two days .
Moreover, it has emerged that the client still feels the need for contact with the physical world, especially in an industry such as the automotive one: 70% of respondents are satisfied with the type of advice received on digital, but believe it is essential to interface with a natural person such as the seller, 17.5% immediately prefer the advice made in person and only 12.5% say they do not need the seller.

4. 3 Digital transformation: operational advantages

In the light of the survey results, there is also empirical feedback at dealer level. In fact, the number of people in the dealership has not been reduced; on the contrary, the fact that they are already prepared means that the time from which customers and the dealership benefit is optimized.
As of today, a vehicle purchase consultancy takes, on average, about 30 minutes less if the customer has already visited the car manufacturer's website. This, without a doubt, remains one of the most significant ad vantages in favor of the dealer, as it makes it possible to manage several customers within the same day. Not only that, the dealer is made easier because the analysis of needs, which is fundamental for the offer of the most suitable product, is simplified.

Around 70% of customers who visit the dealership already know the product and its specific features, compare models and versions, configure the cars entirely on the digital platform and arrive at the dealership showing their favorite car on their smartphone. We can therefore say that the consultancy focuses more on the commercial aspect, devoting most of the time to offering the most suitable financial product, in an integrated perspective of customer experience management. The dealer does not have to be good at selling

the product, which almost to this day sells itself, but must be able to provide the best possible shopping experience: creating the relationship with the customer is the primary objective for us.

The operational advantage, as mentioned above, involves the optimization of time in the consultancy phase, i.e reducing the time taken to:

1. Fully understand the customer's needs to offer the product that best meets their needs
2. Explain the specific characteristics of the product at the level of motorization, fittings or standard equipment.

Not only that, another benefit that the dealer can enjoy is that digital has provided the opportunity to significantly expand the customer base.
Lead management is now essential for the company's growth and it is precisely digital evolution and consumption algorithms that have led car manufacturers and dealers to equip themselves with increasingly sophisticated tools for management and lead generation.
For each lead or potential customer, the parent companies guarantee a percentage for the dealer and in the specific case of Citroën, around 10%. On average, 20 to 25 leads are managed in one day, and these leads have a very varied nature.
In fact, we distinguish between requests for information, requests for quotations, appointments for test drives, appointments for used car evaluation, requests for advice on the correct functioning of the car.
Initially, each of these requests was handled by BDC operators, but today it is very often the sales consultant who deals with them. In this way the contact between physical and digital takes place immediately, in the initial phase of knowledge, so that the seller is prepared for the client's arrival.
Once again, therefore, it emerges how much the figure of the sales consultant, despite the intense technological development, is fundamental as it represents the glue between physical and digital. The lead must be managed on the same day that the request arrives, so you need timeliness and correctness; it is the customer who then chooses the me-

thod of contact (if phone or email). Not only that, if at the first attempt the client is not reachable, the date of the contact must be included in the planning, which must not be later than 48 hours from the first one. This is a boast of which I am proud, having in fact tried many times to ask for information on the websites of other car manufacturers and having never received a reply.
The attention that is placed behind these practices makes it clear that this is now the direction taken and that therefore it is no longer possible to make a distinction between physical and digital experience, since they are already integrated with each other at the time of the first brand-customer contact. All this is, without a shadow of a doubt, linked to the resulting image advantage. A careful, precise and above all quick response to a request made on the digital platform means good advertising for the company, which appears credible and reliable in the eyes of consumers.
On the contrary, if the consultant is not well prepared, he risks knowing less about the client and this has obvious repercussions on the company's image and reputation.

A further operational advantage from which the dealer and the company itself can benefit refers to the possibility of having contents that favor the knowledge of the product or some peculiarities of it to be supplied to the customer. There are, for example, mini-spots to be sent via whatsapp on technical contents that are difficult to show in the show room, such as ADAS, which are useful and functional in explaining the operation of driving safety systems. How else could we demonstrate the braking system in the event of a sudden pedestrian crossing? Or the "sleep shot" warning ?
Once again the peculiarity of the encounter between the physical and digital spheres emerges, since the possibility of accessing digital content only reinforces the customer experience if accompanied by the test drive, which remains a fundamental moment to ignite the emotions of the customer, who has real contact with the product.

4. 3. 1 Citroën Carstore and future orientation

In terms of profitability, the use of online sales platforms has certainly had a positive impact on several factors.
First of all, the possibility to reach potential customers outside their own territory, even choosing geographical areas where to promote a specific product, much sought after for its particular characteristics: just think of 4x4s in rural or mountain areas or electric vehicles in islands or municipalities with more attention to sustainable mobility .
Another advantage is the timeliness: you can promote a vehicle in 5 minutes, the time for a photo and the technical data sheet is immediately on display on your territory as well as all over Europe.
This (digital) market does not allow wide margins on the single frame because the offer ends up in a highly competitive market where all the main operators are present but the lower profit of the individual is compensated by the speed of sales, therefore significant financial advantages.

In particular, Citroën has renewed its range of online services to discover all new models, ready for delivery and at the sales network.
Always attentive to the needs of its customers, Citroën is inspired by people and their lifestyles, accompanying the evolution of society with products and services in line with the needs of the moment. To respond to modern consumption styles that increasingly involve the use of digital channels, Citroën offers an online service that can be used at any time, making life easier for customers interested in purchasing a model of the brand, whether a car or a commercial vehicle, and booking it from the comfort of their own home.

These are Citroën Carstore and Citroën Carstore Business, two platforms that allow private and business customers to check the real-time availability of the models they are interested in at any time, guaranteeing proximity to the brand. The ease of use and ergonomics of the screens make it extremely easy for users to find the model that meets their needs, precisely because they need to guarantee the best possible experience without hindrance of any kind.

In particular, Citroën Carstore makes it possible to discover all the new car offers available immediately from the Citroën Network and offers the user the possibility of setting his or her search according to the dealer chosen or by directly entering the model of the desired car. In both cases, you can also limit your selection by entering a budget of your choice.

The system returns a list of all the cars available at the moment, selected from over 10,000 new vehicles in stock; after identifying the car that meets one's needs, the user can view the exterior and interior in detail, thanks to a 360°view, as well as all its equipment, both standard and optional. The final price is displayed on the car's card, as well as the financing proposal that the user can eventually customize (online or by phone) by modifying the services included. If the Customer so wishes, he can request to be contacted by the Dealer for any further information. Once the online steps have been completed, the Customer may finalize the purchase at the dealer.

Finally, Citroën Carstore Business offers the same functionality but is aimed at professionals and companies looking for a commercial or corporate vehicle,

Finally, with a view to continuing the business, the company has long since undertaken and will continue to follow this path with the intention of continuous innovation.
For example, they have moved on to managing contract signatures remotely through digital signature. Carmakers are investing heavily in dealer training to manage the dealer's web and social media. The digital is crucial across all areas of the dealership: in the top ten we find four Volkswagen group brands, with Audi in first place, followed by SEAT, Porche in fourth and Volkswagen in eighth .
From a dealer perspective there is no going back, and by taking advantage of the client's open-mindedness to new technologies and lockdown training, the company wants to continue on this path by implementing the digital services offered and extending them to after-sales and administration.
Therefore, the Nicola Prezioso dealer is working on three channels: the first is the increase in digital content easily accessible by the customer, the second is the activation of administrative services that facilitate the customer experience, such as telematic visits on stamps, changes of ownership or warranty extensions and the third - dedicated to

post-sales - is the implementation of the online appointment for routine maintenance work with a just-in-time estimate, which varies according to the saturation of appointments in the workshop, copying the algorithm for the allocation of airline seats or hotel rooms that publish lower rates in periods of lower attendance.

4. 4 Covid-19 emergency and digital exploitation: new digital enabled business model

One of the most serious contingencies affecting the automotive industry in 2020 was undoubtedly the crisis caused by the Coronavirus, which had an alarming effect in terms of declining turnover, resource expenditures and blocked launch projects.
This section will then report on the actions taken by Citroën Italia and, in particular, by the Prezioso dealership during the emergency, also using a study carried out by Quintegia[100] at national level.

DealerSTAT, an annual, independent study carried out with the aim of investigating the satisfaction of Italian dealers, identified the most significant implications of the phenomenon between 15 April and 23 May 2020 and is therefore very useful for understanding the Italian situation during theCovid-19 emergency .
The sample collected is equal to 52% of dealers on the Italian territory, therefore a significant pool of users.

At the Italian territory level, the situation raises some concerns: in terms of turnover, as far as new products are concerned, a decrease of 38% is expected compared to 2019, while only 18% of respondents expect a decrease of less than 30% and only 38% assume a decrease of more than 40%. For second-hand goods, the estimates are less pessimistic, as a fall of 27%is expected, as well as for the after-sales area, i.e. maintenance and spare parts, which is instead the least affected with a fall of 18% compared to the previous year.

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[100] Quintegia is an Italian company that defines itself as *the point of reference for the business ecosystem of the automotive sector through a series of activities aimed at the main players in the distribution chain.*

The majority of respondents are satisfied with the timeliness of the countermeasures implemented to deal with the contingency, 21 out of 29 marks have in fact obtained at least a sufficient evaluation (more than 3 on a scale from 1 to 5). At the same time, they are not satisfied with the overall effectiveness of the countermeasures adopted, requiring greater incisiveness on the part of the houses.

On the other hand, as far as remote customer management is concerned, at the average Italian level, dealers' opinion is quite positive with some brands that have particularly distinguished themselves by providing the network with the appropriate support to manage both sales and service. Not only in the lockdown phase, but also and above all in subsequent phases due to the need for social distancing, it was necessary to have the tools and processes available for remote customer management. Of course, being in an experimental phase, there are still some aspects to work on, such as understanding what are all the other phases of the sales process that can be carried out remotely, simplifying purchasing procedures, making ad hoc promotions on remote purchasing, providing tools and advanced training to sellers and content for local dealer communication. Specifically, Nicola Prezioso SRL did not find any difficulties in the management of customers who were very willing to turn the visit and personal meetings into digital content and video call links. Obviously, the company was immediately ready to expand its offer of digital information and product presentation content which, stimulated by the current situation, have become more complete and appealing, becoming infotainment rather than cold description of a car .

Going into detail, the consultancy/sales process has been modified as follows:

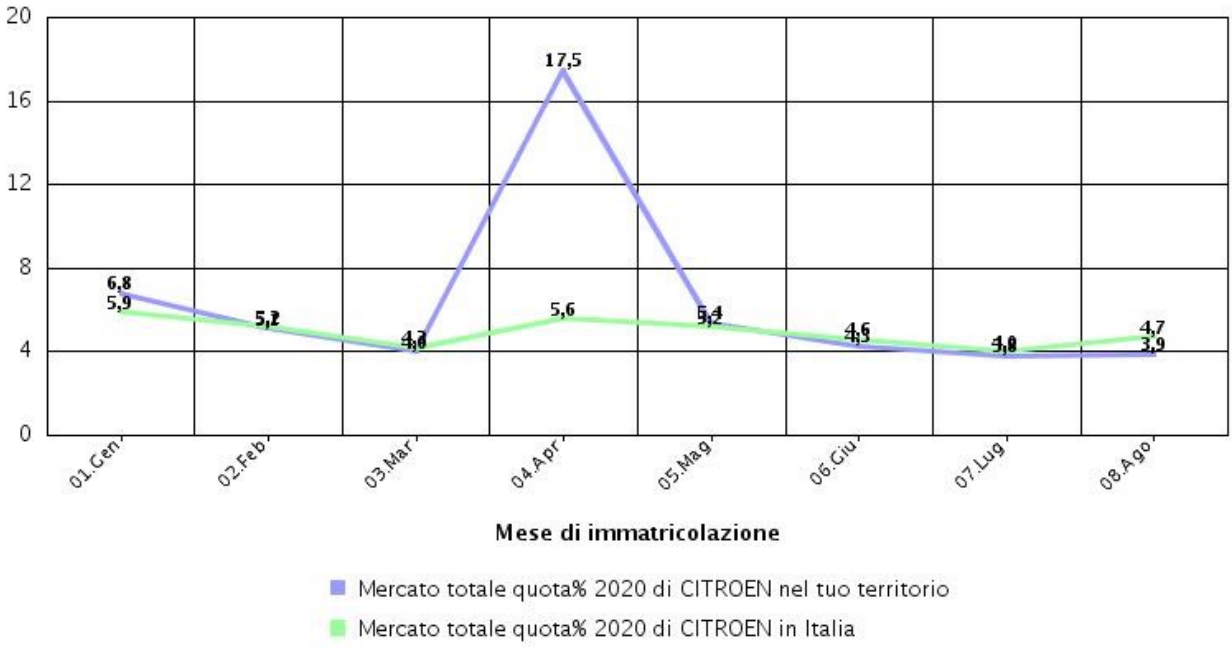
FIRST	DURING LOCKDOWN
RECEPTION IN THE SHOW ROOM	EMAIL or LEAD from SOCIAL
NEEDS ANALYSIS	WHATSAPP VIDEO CALL
PRODUCT PRESENTATION	DIGITAL CONTENT PROVIDED BY PARENT COMPANY MARKETING

PAPER CONTRACT AND PERSONAL SIGNATURE	DIGITAL CONTRACT AND SIGNATURE
CAR COLLECTION AT THE DEALERSHIP	HOME DELIVERY

source: personal processing

This activity was therefore continued during the lockdown thanks to the availability of digital sales platforms such as the aforementioned Citroën Carstore.
Considering only the month of April, the only month in which it was closed having worked the first half of March and reopened on 4 May, the French brand has positioned itself well against the competition in the private market. In fact, it has doubled its market share, while Nicola Prezioso, thanks to its ability to exploit the potential of digital technology, has been able to quadruple its deliveries by 25% of the total number of cars registered in its territory.
Finally, although quotas must be weighed on a virtually non-existent market that has seen, compared to the same month of the previous year, the loss of 92,000 out of 95,000 registrations, this represents a significant achievement for the company, which has shown that it can compete on a hitherto unknown and ambiguous terrain.

Fig. 15: Citroën share % 2020 in Italy compared to the Nicola Prezioso territory



Source: www.dealerplus.unraeservizi.com - August, September 2020

A detailed analysis of the operations implemented by companies to combat the dizzying drop in registrations recorded in Italy in March 2020 of 85%, reveals a different approach followed by car manufacturers.

In fact, research conducted by Deloitte shows that there will probably be a reduction in vehicle stock in order to promote a transition from a PUSH approach with km0 and prompt delivery to a PULL approach, thus aiming at customization to stimulate market demand.

And certainly the lockdown contributed to the reduction of the planned orders requested monthly by the parent company, but it did not help the disposal of the stock in the warehouse because it could not be registered and delivered.

Therefore, at the level of corporate policies, there are differences in the approaches adopted by the Citroën brand and its Volkswagen competitor in terms of post-lockdown management.

In the Citroën case, a PUSH approach has been followed with action plans and extra promotions dedicated exclusively to vehicles in stock. This was because there was a need to sell what had already been produced and in stock, made on a large scale with a view to pure mass customization.
Volkswagen, on the other hand, has adopted a PULL method, directing production to the demands of demand and transforming prompt delivery from a problem to a resource. Previously, in fact, the car manufacturer offered the possibility of customizing models, unlike the French manufacturer.
These two situations are the result of precise industrial choices made by the networks: Citroën contractually asks for a stock with a 4 coefficient, i .e . 4 times the monthly target, while VW asks for a 1.5 coefficient.
It can therefore be seen that this mandatory contractual rule generates distortions in daily sales actions and in the financial cost of stocks.
The latter cost that the dealer corresponds to the group's bank and therefore leads to a vicious circle from which you can only get out by investing your own capital.

4. 5 Propensity to adopt new trends by new customers with a view to sustainability

On the other hand, as regards the propensity to adopt new trends, it was necessary to analyze current driving habits and styles in order to better understand how these can evolve from a sustainability model perspective.

The questionnaire showed that more than 55% of those surveyed had a petrol engine, 27% diesel and the rest divided between those who preferred methane, LPG or the hybrid/electric solution.
47% of those surveyed consume an average of 4/5 liters per 100km, which means that the difference compared to engines in the past is obvious, while only 27% consume less than 4l. Despite this , there is still a small percentage of the population of 6.9% who consume more than 6 liters of fuel per 100km.
On the question side, this data, although simple to understand, is of fundamental importance as it corroborates what has been extensively described in the first chapter. The au-

tomotive industry customer, to date, has not yet fully learned the potential of a new concept of mobility and, specifically, of driving, being anchored to old business models, not yet but almost transformed into obsolete.

The concept of sustainability also touches the interest of most, but not so deeply, since half of the respondents have more than 2 cars in their families, increasing the problem of pollution and congestion caused by traffic. In fact, the same half of respondents do between 10 and 15 thousand km a year, which means that even though they use a car more than once a day, they spend an average of 1 and a half hours in the vehicle.
Not only that, 85% of respondents use the car 1 to 4 times a day for their daily trips and, according to chapter 1, we have seen that if there are 38 cars in circulation at peak-hours together with low occupancy, they cause congestion as the replacement rates can be as high as 15:1. It therefore emerges that the use of one's own vehicle is not so necessary and this implies the need to offer a portfolio of alternative solutions capable of guaranteeing good sustainability in everyday life, such as, for example, the car sharing preferred to public transport, which is little appreciated: only 3.4% of those surveyed use it.

4. 5. 1 Car sharing:

Of the respondents, a minority use it very often, around 4%. 55% consider the tool functional if necessary, distributing the variant evenly between those who use it and those who do not. The majority however (36%) prefer to use their own car. Although opting for a shared mobility solution is a targeted and intelligent choice with a view to protecting the environment to which we are increasingly sensitive, there are opinions for and against which seem to converge .
Among those in favor of the adoption of shared mobility solutions are those who use the car little on a daily basis, those who believe that it represents a valid alternative to their own car in terms of cost containment, those who would use it while traveling if they were in other cities for a few days, those who cannot afford to buy their own car and at the same time are concerned about the environment. Not only that, it also shows how to achieve better management of a vehicle's useful life. At the same time, although we know it is important to aim at multimodality of transport systems, there are those who

personally would never replace their own car: there are cities like Rome, for example ,which do not allow, in the opinion of those interviewed, to use a similar service in a correct way .
Others consider car sharing useful in case of need, although in general they would not recommend it for everyday use as the vehicle is not always nearby, while there are also those who do not accept having to share the car space with strangers because it is unhygienic.

Among those who use or are inclined to adopt this type of mobility solution, it was found that 42% use car sharing for leisure, 31% as an alternative to public transport but not as a complementary tool and, a small percentage, for work needs.
These results are once again significant because they suggest that people are mentally inclined to embrace this new vein but, at the same time, they remain wary because they have not yet fully understood the scope of the phenomenon. The difference therefore emerges with other European countries, and not only that they have been ahead on the subject for several years.
Despite this, 59% of those surveyed are in favor of adopting micro-mobility solutions such as scooters or bikes, 32% are uncertain and 9% do not accept the idea.

The advantages of using shared cars include:

- Reduction in vehicle purchase and maintenance costs 29.63%.
- Flexibility12.96%
- Use of the vehicle only when strictly necessary, thus reducing congestion due to traffic 20.37%.
- Easy parking (no LTZ, no blue stripes...) 24.07%.
- I am not aware of this, but I would like to know more about5.56% .
- I am not aware of it and I am not interested 7.41%.

4. 5. 2 Connected cars:

As part of the development of increasingly sophisticated technological and IT systems, ADAS or integrated driving security systems seem to be the most popular with custo-

mers (39%), followed by smartphone-automobile direct connection systems such as CarPlay (28%) and bluetooth (24%).

Remote car management is a practice that is not yet of interest as there is not too much information about it, while manufacturers have already been working on the subject for years. In fact, new generation cars allow you to manage settings relating to climate, routes to travel, music to listen to directly from your smartphone while sitting on the sofa at home and not everyone knows it. This represents a significant milestone for the automotive industry, which once again proves that it has all the appropriate tools to keep up with the times; in this specific case, in fact, we find ourselves talking about automation levels 2 or 3 that guarantee interaction no longer between man-machine but machine-machine. It must therefore be stressed that this type of interaction benefits the company as much as its customers, 90% of whom consider immediate intervention in the event of a collision or accident through a system of direct connection from the car to the workshop.

4. 5. 3 Electric vehicles:

Of the respondents, 51% thought at least once about buying an electric power driven by the convenience of city traffic and interest in the environment. 19% are undecided because they have not yet fully understood the benefits of using electricity, while the remaining 30% do not welcome the idea.
Among the main obstacles to the acquisition of an electric vehicle are, once again, the lack of recharging infrastructure (52% of respondents), the purchase cost (23%), the low battery autonomy (20%), slow recharging (4%) and the absence of adequate government incentives (2%).

These results are significant because they show how far we still have to go to talk about electrified vehicles as we talk about traditional ones today, but everyone's effort is needed. Sustainable mobility is an important issue and it is necessary to make the population aware of it: our target audience has been very wide, despite this, the majority,

71%, although they consider the environmental factor important or very important, are not aware of the standards set by the European Parliament regarding CO2 emissions below 100g/km. It must therefore be said that, in order to raise awareness among the population, state intervention is necessary through incentives and promotions aimed primarily at bringing to light the importance of the sustainability phenomenon even in the eyes of those who still appear skeptical and, consequently, at encouraging adoption by demand. In addition, manufacturers are beginning to use a push approach and, in light of the growing attention to environmental issues, it has emerged that promotional messages in favor of electricity have increased significantly lately. Of respondents, 57% said they are exposed to advertising on electric vehicles at least once a day, 36% two or three times a day and only a small minority say they listen to or watch promotional messages about it more than three times a day.

UNRAE data from 2019 to 2020 show that the electric car market in Italy is also a market segment in great growth: year-on-year relatively to the first nine months comparison shows an increase from 78.749 to 118.824 electric or hybrid vehicles registered. Certainly it is still too early to give an univocal interpretation to this increase in sales, which in terms of absolute values are much lower than those recorded in other European countries; what is certain, however, is that interest in electrics is finally starting to awaken, also thanks to the progressive abandonment of diesel.

The interest in alternative energy sources and in particular in electric mobility projects, the real key to the creation of sustainable metropolises for man and the environment, is therefore becoming increasingly strong. In this context, new solutions for improving the efficiency of electric motors have been developed.

Fig. 16: Registrations according to fuel in 2019 and comparison with 2020 data

Immatricolato per alimentazione
Periodo temporale selezionato: dati al mese di 'Agosto' - Mercato Totale -

Gli archivi sono aggiornati al 10/09/2020

alimentazione	Mtd 20	%	CITR	Ytd 20	%	CITR	Mtd 19	%	CITR	Ytd 19	%	CITR	Fy 19	%	CITR
Diesel	39.498	40,2 %	5,8%	363.358	40,5 %	5,6%	42.391	43,0 %	5,1%	659.547	45,6 %	5,1%	929.571	44,2 %	5,2%
Benzina	32.599	33,2 %	8,1%	340.568	37,9 %	7,1%	39.512	40,1 %	5,0%	583.046	40,3 %	6,3%	861.204	40,9 %	6,1%
Altre	17.196	17,5 %	0,0%	118.824	13,2 %	0,1%	5.017	5,1 %	0,3%	78.749	5,4 %	0,1%	129.481	6,2 %	0,1%
Gpl	6.144	6,3 %	0,0%	52.909	5,9 %	0,0%	9.182	9,3 %	0,0%	98.064	6,8 %	0,0%	140.043	6,7 %	0,0%
Metano	2.796	2,8 %	0,0%	22.568	2,5 %	0,0%	2.488	2,5 %	0,0%	27.314	1,9 %	0,0%	44.930	2,1 %	0,0%
	0	0,0 %	0,0%	0	0,0 %	0,0%	0	0,0 %	0,0%	7	0,0 %	0,0%	17	0,0 %	0,0%
Totale	98.233		5,1%	898.227		5,0%	98.590		4,2%	1.446.727		4,9%	2.105.246		4,8%

Elaborazioni Unrae su dati del CED del Ministero delle Infrastutture e dei Trasporti
presenti in archivio al 10/09/2020 (Aut. Min. D09420/H4)

LEGENDA
-Mtd = Month to date. Nella colonna compaiono i volumi immatricolati durante il solo mese di Agosto, selezionato nel menu;
-Ytd = Year to date. Nella colonna compaiono i volumi immatricolati da Gennaio fino al mese di Agosto;
-Fy = Full Year. Nella colonna compaiono i volumi immatricolati durante tutto l'anno precedente (2019);
% = quota di mercato (volumi/mercato totale);
CITR = Volumi immatricolati da CITROEN
%CITR = Quota di penetrazione del marchio CITROEN (volumi CITROEN/mercato territoriale o su segmento)

N.B. In caso di aggiornamento giornaliero o settimanale, se nel menu viene selezionato il mese corrente, nelle colonne Mtd20, Mtd19, Ytd20 Ytd19,
si confrontano i volumi immatricolati fino al giorno 10 Settembre;

Source: www.dealerplus.unraeservizi.com - August, September 2020

The interest in alternative energy sources and in particular in electric mobility projects, the real key to the creation of sustainable metropolises for man and the environment, is therefore becoming increasingly strong. In this context, new solutions for improving the efficiency of electric motors have been developed.

4. 5. 3. 1 The electric engine: evolution of batteries to current technology

Whereas in the past, until about 10 years ago, there was no real motivation for the adoption of electrics and no car manufacturer produced electric cars except for thermal vehicles that were then electrified.

Today the demand for electric vehicles goes hand in hand with the increased attention paid by carmakers to the development of increasingly high-performance vehicles within this segment. In addition, electric cars enjoy special attention precisely because of a different sensitivity to environmental issues. From private citizens to large companies, everyone now feels the responsibility of achieving new forms of mobility that are healthier for people and the planet.

In spite of this, the weak point of the electric car, and the greatest deterrent to its purchase, has so far been the battery autonomy; on this particular element, the engineering departments have spent time optimizing the new models and trying to improve also those aspects that make electric cars so attractive: quietness, absence of vibrations and exhaust gases, comfort in refueling and consumption.
In accordance with what Professor Mascioli, head of the Polo per La Mobilità Sostenibile della Regione Lazio, said, things are getting better because batteries today are increasingly performing, and, with the same energy content, are smaller, lighter and quicker to charge. This makes the machines more and more usable, from a range of 100 km to 500 km of the new generation models.

The first electric cars ever built in Italy date back to the late 19th century. Affected, from the very beginning, by the battery life problems already mentioned, they were soon overcome in the market. In the years of the energy crisis of the 20th century, the urgency to develop more functional electric prototypes, also suitable for private mobility ,returned with renewed vigor.
First of all, attempts were made to use the electric motor in combination with the combustion engine to reduce emissions from the latter, while at a later stage research was directed towards the construction of batteries and thus increasingly autonomous electric vehicles: first with nickel-metal hydride (NiMH) batteries and then with lithium-ion (Li-ion) batteries. This last type of battery also made it possible to obtain a significant reduction in the weight of the battery itself and, at the same time, in its overall dimensions, one of the major deterrents to the purchase of an electric car for those who entered this market at the beginning of 2000.

Today we can say that research has been further refined, gradually moving away from first generation hybrid electric vehicles (HEVs) mobility needs, covering much greater distances than in the past and thus allowing them to move around with an electric vehicle without having to plan places and times of rest in detail.

Initially, the cost of lithium batteries also represented an obstacle given the economic outlay they required: it has now been reduced to around 1/5 of what it was ten years ago. There has therefore been a considerable reduction in costs, but this is not yet fully reflected in the purchase cost of the vehicle.

The client is still skeptical and it is difficult to convince an audience that they are not already change-oriented despite the economic benefits they can enjoy. With the same performance, the electric vehicle can recover its purchase cost over the following years thanks to:

- Third party liability insurance: lower cost because insurance companies expect a smoother driving experience from the driver
- Car stamp: for electric vehicles, in many regions, it is free of charge in the first 5 years
- Maintenance: electric vehicles incur lower maintenance costs due to the absence of certain components (oil, belts, filters, etc.) and slower brake deterioration.
- Incentives: in Italy there are national incentives of up to €6,000 for the purchase of electric vehicles. In many regions there are additional local incentives
- Fuel: an EV consumes about €2.7 compared to about €7.66 for a thermal vehicle (every 100km).
- LTZ Permits: electric vehicles do not pay access to restricted traffic zones
- Alternate Tags And Traffic Block: electric vehicles are not restricted by traffic blocking measures

- Blue stripes Payment: an annual subscription for the payment of the blue stripes costs on average €1,044, for EV parking is free of charge.

A further limitation is given by the infrastructure system, although the situation varies from country to country and is mainly affected by political and regulatory implications that are not conducive to development.
In fact, Italy is lagging behind other European countries that are seeing an increase in the number of public charging stations on the territory.With reference to Europe, it is estimated that these have increased from around 8,000 in 2011 to 180,000 in 2018. This has been accompanied by the development of numerous services in support of consumers that make it possible to identify the station closes or to demand the type of recharging offered by it; in this way, the mobility of electric vehicle owners has seen an important leap in quality, also in daily logistics management, at the basis of which obviously remains the increasing capillarization of the infrastructure and service network.

In fact, spatial planning is necessary because it is necessary to take into account the energy requirements required for traction in order to position the right number of charging columns at strategic points.

Professor Mascioli speaks of the electric mobility model and the energy model as the same thing in a context that he defines as of energy transition: therefore, since the electric car is nothing more than a battery on wheels, the constituent factor of the energy system must be taken into account in order to increase or decrease the requirements as needed.

Energy storage becomes a very important functional factor, from the research point of view, to conceive energy models according to mobility. Renewable sources are in fact discontinuous: how to operate a shovel alone without wind or a solar panel in the evening light? It is necessary to have energy storage and therefore battery power, which is why research continues to invest and develop increasingly innovative solutions.

Not only that, the batteries and their performance depend on the technology used. As mentioned above, the current trend is lithium-ion batteries: they have no "memory ef-

fect" as they can be charged, even partially, at any time without causing a premature drop in performance. Lithium-ion technology is currently the most efficient on the market: its high energy density makes it possible to maximize the Wh available per kg of battery for an optimized electrical range.

Nevertheless, lithium itself is a critical element which, together with other materials such as cobalt or rare earths to make permanent magnets for electric motors, has economic and environmental implications.

Such materials are in fact difficult to find and extract and present only in some countries of the world, which can lead to the same geopolitical problem arising from oil. In addition to the geopolitical problem, there is also an environmental problem due to the extraction of materials, which is very often harmful to territories, and the disposal of batteries.

In fact, a new front has opened up that research is focusing on, which involves making lithium-free batteries, soon to be more and more expensive and complex to extract, and permanent magnets, perhaps synthetic and not obtained by working with rare earths. The most futuristic of the options, difficult to implement at the moment due to the high cost of technology, is the hydrogen car (FCV) which would, however, make it possible to obtain an autonomy equal to that of cars with an internal combustion system. In this case it is always an electric car that instead of batteries has fuel cells that transform hydrogen into electricity.
A brief comparison between thermal and electrical motorization is useful for understanding the phenomenon.
We have seen how the components of the battery cost the environment to produce and dispose of at the end of their useful life, so when we talk about electric mobility we must also think about how it will be managed.
Therefore, the disposal circuit is already used for previous generations of PSA group electric vehicles: the batteries are recovered for recycling or reconditioning by an authorized service provider.
The PSA group is fully compliant with the regulations and even exceeds the current regulations on battery disposal (ex. Regulatory expectations = 50% recycling rate).

However, only life cycle analysis can help us understand whether from the point of view of energy and emissions the road taken is a winning one or not.
In fact, if we consider the vehicle as an end in itself, the diesel-powered machine is more performing but, if we consider the car as a general component of a new energy concept, we will see that it does not that' s how it is . In fact, the mobility system provides for local production of energy from renewable sources that do not need the old, large coal-fired or multi-fuel power stations that were therein the past: as today there is ample freedom of movement in energy production - photovoltaics, wave motion, wind power, hydroelectric.

There is no killer application but the will to put together a mix of solutions in order to consider the environment as a whole. The key to winning interpretation is the intelligence through which the systems are managed: it is true that building batteries can be harmful, but there are countless other solutions that offer greater possibilities than the alternative to the combustion engine given by biofuels.

To conclude, it must be said that there is nothing that has zero impact on the planet, but there is the possibility of having greater degrees of freedom in the choice of the optimal solution, so as to range in various sectors even with new proposals: for our country in particular there is the possibility of integration but an adequate industrial plan is necessary.

4. 5. 3. 2 State intervention to incentivize the adoption of electric vehicles

On 1 August 2020, with the Decreto Rilancio, state incentives for the purchase of an electric or internal combustion vehicle came into force. Through this initiative, 50 million euros were made available, to be added to the funds already allocated under the 2019 Legge di Bilancio, to be divided up in the territory to provide the possibility for most people to obtain facilities for scrapping their old used car, in compliance with current regulations on emissions of harmful substances.

Especially in Italy there is a very large and old car fleet, with cars that are 20 years old. The Government, in the light of recent developments, has therefore decided to take action to reduce the number of cars to 0, 1, 2, 3 or 4 euros and to encourage the acquisition of new sustainable and affordable solutions from many points of view. With the August legislative decree, a further 400 million euros were allocated: specifically, 100 million euros for the original ecobonus introduced with the 2019 Legge Di Bilancio for the purchase of cars in the 0-60 g/km CO2 bands and 50 million euros for the additional contributions introduced with the relaunch decree for the same bands. A further 250 million is earmarked for higher-end cars.

The plan provides for different discounts depending on the new vehicle to be purchased, taking into account the level of CO2 emissions of each car model and taking into account the fact that the car to be scrapped may be more or less 10 years old or not at all.

Since this is a supplementary measure to the ecobonus already in force from 2019, the primary objective has been to intervene in order to encourage the purchase of an electric or hybrid vehicle, trying to make even the most skeptical aware of the problem of the high purchase cost and aiming to modernize the Italian car fleet.

A table has therefore been created with four bands, each of which corresponds to a different discount:

	WITH SCRAPPING	WITHOUT SCRAPPING
0-20 g/km CO2	6.000	4.000
21-60 g/km CO2	2.500	1.500
61-90 g/km CO2	1.750	1.000
91-110 g/km CO2	1.500	750

Source: personal processing

In addition, to the two bands 0-20 and 21-60 g/km CO2 can be added 2,000 with scrapping and 1,000€ without scrapping until 31 December 2020, while the two new bands 61-90 and 91-110 g/km CO2 are related only to vehicles registered from 15 August 2020: in the first two weeks of the month in fact only one contribution of 1,500€and 750€respectively with and without scrapping was guaranteed.

4.6 Citroën moves to electrification in 2020 - TheCitroën electric and electrified offensive

The PSA Group remains strongly oriented towards the adoption of new technologies. Not only that, according to an assessment by CDP, a non-profit organization that evaluates companies on the basis of their environmental risk management, PSA distinguished itself in 2019 for its actions to reduce emissions.
In light of this, as Citroën defines itself as the "Inspired by You" brand , we will try to position ourselves in every segment and in most markets with anICE petrol or diesel offer and a LEV or Low Emission Vehicles in order to meet the needs of the entire user base.
The intention is to strengthen itself in the central part of the market in order to be an active player in the energy transition while remaining strongly customer-oriented.
The brand therefore intends to have the entire fleet electrified by 2025.

In the light of this, within the PSA group, the launch of a Citroën brand product remains conditioned by the alternation of outputs of other group products such as DS, Opel or Peugeot and, in line with the company's very specific business choices, the release of models with the highest demand on the market, such as the C3 or the Aircross range, has been favored as the above data shown.
Therefore, for the current year there are no targets for the ZEV market with only two full electric models in the house, C-Zero and E-Mehari of which production is now finished and there are only MY2019 inventories, but the company is focusing mainly on the electrification of the endothermic range, making available the future ZEV first on the market with diesel or petrol engines.

The Citroën brand offers plug-in hybrids that provide more power and torque than the competitor, in the direction of achieving the following objectives:

1. Allowing customers to continue to have access to major cities, regardless of restrictions on polluting vehicles;
2. Supporting customers in the energy transition process
3. Guaranteeing customers a new and unprecedented experience of use and comfort

Once again it is useful for understanding purposes to note a different approach in the field of policies between theFrench and German automotive industries. While the former focus on electrification of the range, the Germans have taken a different path by choosing to produce a range of vehicles designed to be exclusively full electric from the very first line of the project.
There will not be a full electric Golf, at most a mild hybrid or plug-in.
Full electric will be just the ID range that will see the first two new products this autumn, ID3 and ID4 a sedan and a SUV with doubled autonomy (up to 500km) and which will be joined in 2021 by 3 other models between which a commercial vehicle and a leisure vehicle.
The release of ID3 will represent the brand's biggest investment during the year in terms of both communication and training of personnel and distribution networks. Specifically, they have provided for new role, the E-mobility manager and the Product Genius, which each dealer must train within the year, and will become the reference figure for clients and colleagues in the field of electric mobility .
The same commercial policies have been rethought to make the zero-emission car"popular" :we are no longer talking about the purchase cost but the cost of use: there will only be 24/36 month installments tailored to the annual mileage and the insurance services required. In practice, a renting dedicated to private individuals.

4. 6. 1 The CitroënAdvanced Comfort program

Citroen has always been at the forefront of comfort thanks to innovative technologies and still maintains the leadership in comfort that has distinguished and characterized the brand since its creation in 1919.

This distinguishing feature of the brand makes it recognizable compared to its rivals and has proved to be a tool through which the company has been able to increase the engagement rate of its potential customers and correct, effectively responding to the new expectations of consumers which, especially in terms of comfort and driving pleasure, have evolved over the last few years.

To guarantee the brand's supremacy, the CitroënAdvanced Comfort program is applied at every stage of the creation of Citroën cars, guiding the design approach, technological choices and specifications of each product, to offer an integrated and unique response to the customer's expectations.

Specifically, the program consists of providing innovative, high-tech and intelligent solutions aimed at the overall well-being of all occupants of Citroën vehicles. It is based on four pillars:

1. Attenuate all vibrations through suspension, seats and acoustic systems
2. Provide a bright, generous and practical interior space with easy-to-use controls and numerous storage compartments, all to make life on board easier
3. Welcoming all passengers with the same intensity, offering more and more wellness and displaying only the really useful information
4. Intuitive technology, with useful driving aids in everyday life, so as to ensure continuity with the user's digital universe.

This is a demonstration of the PSA group's commitment to ensuring the best possible driving experience by putting the customer's figure and satisfaction in using the services offered at the centre of the entire system.

4. 6. 2 New C5 SUV Aircross Hybrid Plug-in

In 2020, Citroën launched the new SUV C5 AIRCROSS HYBRID PLUG-IN, its high-tech flagship model, produced in France at the Rennes factory and through which it decided to extend the Advanced Comfort program to electrics.
The model in question represents Citroën's first rechargeable hybrid vehicle and the description that follows therefore helps us to understand how the company has embraced and adopted the new trends in the sector, with the aim of once again guaranteeing the possibility of competing in a now highly competitive market.

First of all, it has to be said that there are 2 distinguishing factors of the vehicle that put it at the centre of the Advanced Comfort program and that guarantee the company a world record in terms of attention to the client that translates in optimal comfort:

1. Suspension with progressive hydraulic cushions (PHC), technology available as standard on the entire range. The suspension works in two different modes depending on the road surface encountered:

- on small compressions and roughness, the springs and dampers control the vertical movement without the need to stress the exclusive hydraulic dampers. The suspensions therefore have greater freedom of movement to offer a "flying carpet"effect , as if the car were flying over the imperfections of the road surface.
- on significant compressions and roughness, springs and dampers work in combination with hydraulic dampers to gradually slow down the car's movements and avoid abrupt end stops.

2. Advanced Comfort seats in front and rear row. The innovative design consists of a high-density layer and thick foam, visually structured on all seats. The innovative design is ensured by a 15 mm thick, textured polyurethane foam on the surface, which is present on all seats.
The driver and passengers therefore enjoy visual, seating, dynamic and postural comfort provided by the seats, which offer enhanced support, driver lumbar adjustment and massage function.

Advanced Comfort seats are also designed to maximize boot volume and space for second row passengers to ensure the same level of comfort in the centre seat.

The vehicle, in order to respond even more precisely to the needs of individuals, offers 39 exterior customisation possibilities through 7 body colours, the black two-colour roof as standard on each model and 4 colour packs that allow to reinforce the personality of the car and adapt it, with the finishes of the headlights or handles, to the tastes of the customer.
The new SUV also features a panoramic sunroof for a better light for an unprecedented feeling of well-being.

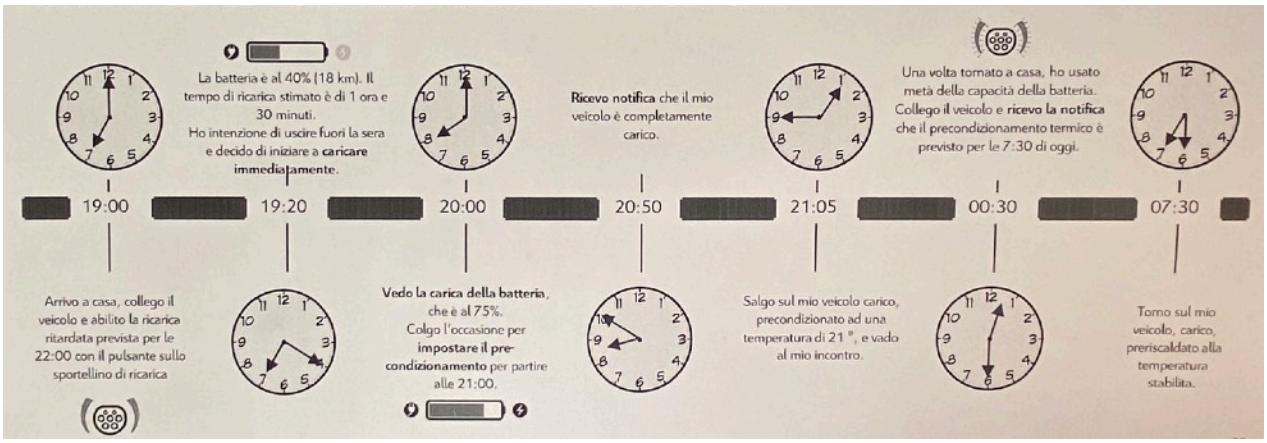
Technically, PLUG-IN hybrid technology consists of a 180hp petrol or PureTech engine with Start&Stop system to reduce consumption and gas emission when the vehicle is stationary, combined with an 80kW electric motor, eight-speed electrified gearbox with a maximum torque of 320 Nm and a 13.2 kWh lithium ion battery. The combined power is 225 HP while the level of carbon dioxide emitted is less than 39 g (this is , however, a provisional WLTP data in the course of homologation). Despite this, the technology is innovating and the 50km autonomy guaranteed by the use in full electric is a disadvantage for the company since there are already on the market models that guarantee longer life.

The electrified gearbox with regenerative braking mode known as "Brake" which allows users to partially recharge the battery and increase the100% electric autonomy.
As far as battery operation is concerned, when the vehicle is connected to the socket, charging starts immediately by default. The interior lights on the charging base change colour from nil to flashing green.
If the customer has programmed a delayed charging via the vehicle touchscreen, confirmation is required by pressing the delayed charging button located in the charging flap. The light around the charging base changes from blue to flashing green when charging starts.

As far as the impact of digital technology in the sector is concerned, once again we find a contribution that confirms our thesis and therefore helps us to better understand how everything that is most innovative today will automatically be used in production, in order to guarantee an increasingly integrated and up-to-date offer.
The artificial intelligence that drives the devices simplifies human-machine interaction to such an extent that it no longer even requires direct driver input. For example, the simple interior rear-view mirror has a blue LED that only lights up when the vehicle moves inZEV (Zero Emission Vehicle)mode, to make the car recognisable from the outside as 100% electric.
Human-machine interaction is achieved thanks to the 12.3" digital instrumentation with specific hybrid graphics, which, in addition to the usual information on autonomy and charging levels or driving modes, provide the user with new information related to the charging process. In particular:
-electrical autonomy (in km)
-charging the battery (in &)
-speed of recharging the battery (number of km recovered for each hour of recharging)
-remaining charging time for full charge (h/min)
What's more , inside the vehicle there is a direct access button to the Hybrid screens that provides access to four pages of information and settings for energy flow, consumption statistics, charging settings or the "Ë-SAVE" function that allows the customer to save some or all of the electricity that can be used for future use during the journey.

As far as the trend connected cars is concerned, not only for the model in question since it has already been introduced previously, it is possible to manage car settings remotely via the MyCitroën app. For example, the cockpit preconditioning can be set either via the back touchscreen or via the app: among the various functions, there is the fact that it acts before and after entering the vehicle, it works regardless of whether or not the vehicle is connected to the mains power supply and, when the vehicle is charging , charging the battery takes precedence over preconditioning, while when the vehicle is not charging the energy is given directly by the battery. In fact , it is not enabled when the battery is below a 30% charge threshold.

Fig. 17: Charging time for a battery vehicle



Source: confidential document (2020)

The new C5 Aircross Hybrid Plug-in SUV also features three driving modes :

- ELECTRIC (ZEV) for 100% electric movements;
- HYBRID for main use of the electric motor, supported if necessary by a combustion engine and represents an excellent compromise to optimize efficiency and driving versatility;
- SPORT for main use with electric motor support in order to maximize the performance of the car

As far as the technical specifications of the battery are concerned, the following discussion helps us better understand the operation of the electric motor and the types of charging infrastructure it needs.

First of all, recharging can be immediate or deferred: in the first case when the vehicle is connected to the socket, recharging by default starts immediately and the lights around the charging base change from white to flashing green. In the second case if the user has programmed deferred charging via the vehicle's touchscreen, the delayed charging button must be pressed and the lights will change from blue to flashing green when charging starts .

The same delayed charging settings can be managed and monitored remotely via the-MyCitroën app.

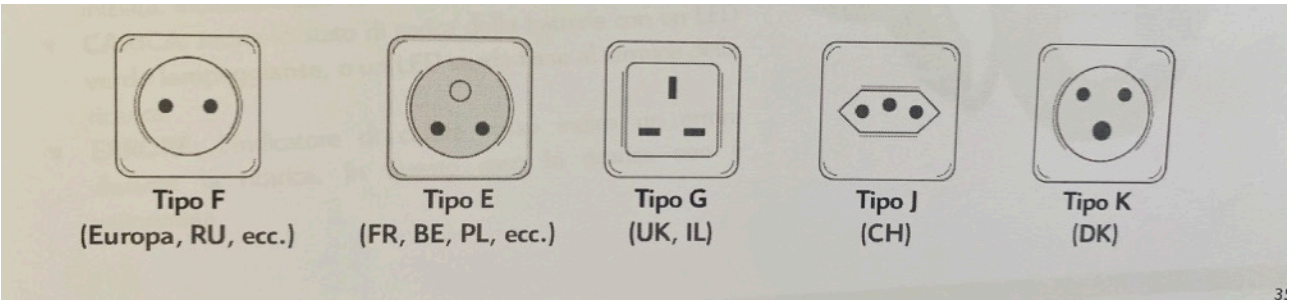
Depending on the type of socket through which you intend to charge the vehicle battery, three different types of situations are created, which we will summarize in the table below:

TYPE OF CHARGING CABLE	EQUIPMENT	CHARGE-MODE	RECHARGE TIME	POWER	RECHARGE COST
TYPE 2	STANDARD	HOME SOCKET	7 HOURS	3.3 KW - 8A	2 €
TYPE 2	OPTIONAL	GREEN UP PRESS	4 HOURS	3.3 KW - 14A	2 €
TYPE 3	OPTIONAL	WALLBOX	LESS THAN 2 HOURS	6.6 KW - 32 A	2 €

*estimated recharge costs with a charge of €0.15 / kWh

Specifically, domestic charging with a standard socket can be carried out with the 8A Type 2 cable available as standard on the vehicle, and depending on the country in which it is marketed, the socket can be of type E/F (most present in Europe) or type G/J/K (in other European countries).

Fig. 18: Types of cable



Source: confidential document (2020)

Domestic charging can also be done with a Green Up socket and 14A type 2 cable available as an accessory.
In this case, the installation must be carried out by an authorized service provider, after an inspection of the customer's home electricity network.
Since the 14A type 2 cable compatible with the Green Up socket is only available as an accessory, in order to offer a complete and integrated service, PSA has created a commercial offer that includes the cable, the 14A socket, the installation and adaptation of the customer's electrical network to ensure compliance.

Finally ,the device that guarantees maximum security of recharging is undoubtedly the Wall-box , which requires installation by authorized service personnel. The same type 3 cable that allows charging in less than two hours has a simpler design than the type 2 cable, as the control functions are integrated directly into the Wall-box.

There are many questions about it as people still do not know the full benefits of installing a wall-box at home. A charging socket can in fact be installed whenever you have access to an appropriate source of electricity. It is also possible to install a charging socket in personal and/or shared boxes (subject to approval). According to the European

directive currently in force, the consumer has the right to install its own private recharging solution. Prices vary according to requirements.

As far as the installation of the Wall-box is concerned, the PSA group in Italy has developed agreements with a reference partner Enel X, which will carry outa physical or digital technical visit to issue a quote. The installation of the Wall-box is not included in the price of the vehicle.
The safety of recharging operations is in fact guaranteed by a box located on the recharging cable which
In the event of a power failure, it interrupts charging: there are 3 LEDs for start, charging and error information.

As far as the "autonomous vehicles" trend is concerned, Citroën's response was quick and effective: the new SUV is in fact equipped with 20 ADAS or driving aids for an advanced semi-autonomous driving experience. To name but a few:

- Coffee break alert: the system alerts the driver when it is time to take a break by means of an audible and visual warning issued after two hours of driving at over 65km/h and repeated for each additional hour of driving without a break;
- 360° view: through the use of cameras integrated into the bodywork that allow the driver to enjoy a bird’s eye view of the car on the interior display and provide significant visual aid.
- Park assist: which is an active support for any type of parking and, at the driver's request, automatically detects a space and activates the steering to park safely. Simply engage reverse gear, accelerate and brake. The driver can regain control at any time.
- Active warning of unintentional overtaking of the roadway: thanks to a camera on the windscreen and by means of an acoustic and visual warning corrects the trajectory in the event that overtaking takes place without the direction indicator being switched on. It is activated from 65 km/h.
- Active safety brake: or automatic emergency braking system that works from 5km/h with fixed and moving obstacles and pedestrians up to a certain speed. From 5km/h to

85 km/h the radar sensor at the top of the windscreen automatically brakes when a collision risk is detected.

Continuing the discussion towards what are the connectivity technologies we can outline 6 that characterize the New SUV C5 Aircross Hybrid Plug-in that is:

- Citroën connect Nav: is a 3D navigation system combined with connection services such as TOMTOM TRAFFIC
- Citroën connect Box: which allows you to make emergency calls and assistance 24 hours a day, 7 days a week wherever you are, even in Europe.
- Mirror Screen: compatible with Android Auto and Apple CarPlay allows you to use all compatible smartphone applications directly on the touchpad, in total safety.
- Wireless Recharge For Smartphone: compatible with latest generation smartphones with QI standard
- Connected Cam Citroën: a camera integrated in the base of the interior rear-view mirror, useful for taking, saving and sharing photos and videos, as well as recording automatically in the event of an accident.
- Customizable12”3 Digital Instrumentation: offering 3 graphical universes for displaying selected information in the driver's field of view and, in this case, specific information related to hybrid technology.

What's more , Citroën offers the possibility of managing vehicle settings remotely via the MyCitroën app, which allows the customer to check the fuel level, plan delayed recharging, check the battery charge level, total mileage, preconditioning and vehicle location. It is also thought, but this is to be confirmed at the time of product launch, to offer the possibility of closing and opening the vehicle remotely.

Finally, it is useful to report a brief comparative analysis with competitors in the segment in question in terms of performance in order to highlight the strengths of the model.

	BATTERY and RECHARGE	100% ELECTRIC AUTONOMY	COMBINED POWER	CO2 EMISSIONS	LOAD VOLUME	TRACTION
SUV C5 AIRCROSS HYBRID PLUG-IN	13.2 kWh < 2h (fast) 7h (domestic socket)	50 km (WLTP)**	225 HP	39 g (WLTP)**	460 > 600L	2-WHEEL DRIVE
FORD KUGA HYBRID PLUG-IN	14.4 kWh 3h (fast) 5h 30 (domestic socket)	55 km (WLTP)	225 HP	26 g (WLTP)	435L	2-WHEEL DRIVE
HYUNDAI TUCSON MILD HYBRID	0.46 kWh no	0 km (MILD HYBRID)	185HP	173 g (WLTP)	513L	4 WHEEL DRIVE
TOYOTA RAV4 HYBRID	ND	ND	Up to 222HP	105 g (4WD)	580L	2-WHEEL DRIVE 4 WHEEL DRIVE
PEUGEOT SUV 3008 HYBRID PLUG-IN	13.2 kWh	Up to 59km (WLTP)	Up to 300HP	36 g (WLTP)	395L	2-WHEEL DRIVE 4 WHEEL DRIVE

*personal processing

**temporary data in the course of homologation

The Suv C5 Aircross strengths found are therefore:

- possibility of customization
- 3 individual rear seats
- Advanced Comfort seats
- PHC suspensions
- Larger load volume
- Remarkable modularity

4.7 Citroën and Enel X: a partnership to make electric mobility available to all

In preparation for the launch of six electrified models in 2020 and the arrival on the market of new Full Electric and RechargeableHybrid versions of Citroën vehicles star-

ting with C5 Aircross Hybrid Plug-in SUVs, the brand's electrification path marks an important step thanks to the partnership signed with ENEL X .

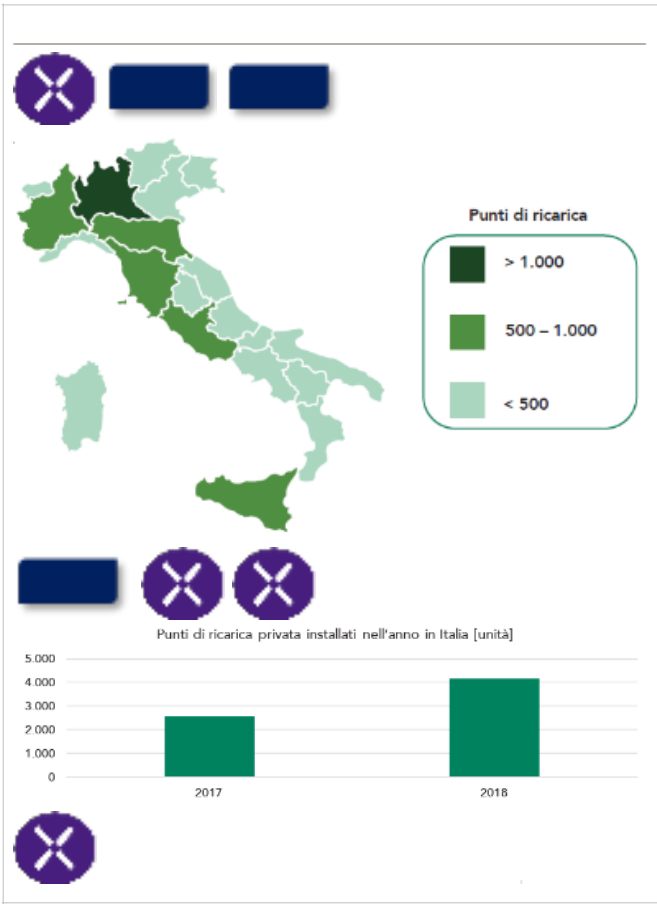
The agreement with ENEL X, an Enel Group company involved in the development, promotion and sale of innovative products and services for the development of an electric mobility system, represents an important tool to support the sale of an electrified vehicle and is preparatory to the reduction of barriers to the purchase of BEV and PHEV vehicles.

Citroën Italia, together with ENEL X, will thus become an active player in the development of an infrastructure charging network that will cover the entire territory, to actively support the introduction of a 100% electrified range on the market - entirely made up of vehicles also offered in electric or hybrid versions - by 2025.

Doubts about vehicle autonomy and the spread of charging infrastructure are today the main obstacles to the spread of electric mobility : where Citroën's PHEV (Plug-In Hybrid) and BEV (100% electric) technologies guarantee sufficient mileage to cover the daily journeys of 95% of customers, the agreement with ENEL X moves in the direction of ensuring more extensive coverage for daily recharging and/or long-haul journeys.

To accompany the client throughout the entire electrification process and offer a quality service, packages have been developed that include the installation of a private Wallbox, with ENEL X taking care of all the electrification phases at home, from the inspection to the installation and subsequent maintenance. The solutions developed for customers who wish to recharge their electrified vehicle in public areas with public access, on the other hand, include subscriptions to charging services on the ENEL X network.

Fig. 19: Number of private charging points installed in Italy during the years 2017-2018



Source: confidential document (2020)

As of July 2019, it is estimated that in Italy there are almost 8,200 public and private charging points with public access. The distribution of these charging points among the different Regions is rather uneven. Northern Italy shows the level of diffusion of the highest charging points, both in terms of total (51%) and with specific reference to "fast charge" charging points (53%). As far as private infrastructure is concerned, in 2018 it is estimated that around 4 thousand private charging points were installed, an increase of around 60% compared to the previous year.

This leads us to estimate that the total stock of private recharging points installed in Italy is in the order of 11,000 - 13,000.

Specifically, the charging infrastructure for electric vehicles can have public or private access. In the first case we distinguish between:

- recharging station in public area with public access: installed in locations chosen by the supplier with the local administration, giving anyone access to the station for recharging;
- recharging station in private area with public access: installed in private car parks in shopping centers where the customer is expected to stay for more than a few hours;
- recharging station in private area with private access: present in the private car parks of the company fleets. Access is allowed only to authorized persons;
- private recharging point: installed in the garage or private car park (with private access) of the individual customer.

As far as private recharging is concerned, Enel X will provide the customer with a Juice-box with or without cable, which will be ordered as an accessory. Very often, in order to reduce charging times, the customer may increase the electrical power. Using the 3 kW power as a reference, a one-off cost increase has been estimated as follows:

POWER	***One-off* PAYMENT FOR PRACTICAL EXPENDITURE**	***One-off* PAYMENT PER kW ADDED**	**TOTALOne-off**
3 kW	/	/	/
5 kW	23 €	140 €	163 €
8 kW	23 €	350 €	373 €

*Source: personal processing

Therefore, an increase in power can cost the customer around €70per additional kW. To encourage the customer, the PSA group in agreement with EnelX offers a home package including juice-box, inspection to verify the adequacy of the electrical system, installation and consequent technical assistance and routine maintenance.

4. 7. 1 Strategic evolution towards a customer - driven transformation

There are several tools available to companies to ensure continuity in the relationship with the client if the direction followed is customer-driven. Therefore, among the various company policies, there are actions aimed at maintaining a profitable relationship with the client in the long term: one of these is loyalty renewal.

The loyalty-building renewal is an action practiced by companies to allow those who are already customers to have access to economic and other advantages over traditional customers.
Rewarding brand loyalty is of fundamental importance for the company, which must aim to enhance the figure of the consumers that it feels at the centre of the company's operations. The creation of strong and profitable relationships with customers is an essential prerequisite for beating competitors. The reality of the dealer is in fact limited and limited to the territory of reference only, which means that the customer has the possibility of finding the same product in different dealers, but will always choose the one that offers the best shopping experience.
The primary purpose of the loyalty program is to increase the retention rate, a metric functional to monitor company performance to attract and retain clients, a practice that is very often underestimated in favor of excessive investment in strategies and techniques for acquiring new contacts.

Specifically, Citroen has been moving in this direction for years, promoting actions aimed at customer loyalty. For example, those who are already a customer will be entitled to an extra exchange of between €500 and €1,000at the time of repurchase, which can be combined with the discount to be applied. Not only that, what is actually implemented by the dealer is the contact of the customer in the after-sales phase: this always with a view to creating a lasting relationship that allows you to keep in constant contact with users. After the purchase of the new vehicle, the seller must, in the week immediately following delivery of the car, contact the customer by phone or email in order to receive feedback on the purchase experience and measure satisfaction .

The percentage of commission due to the seller therefore depends on the evaluation made by the customer: if the latter has had a positive experience, evaluated qualitatively good, the return in economic terms for the dealer will be greater. On the contrary, an experience evaluated negatively will result in limitations to the achievement of the company's objectives.
In fact ,the dealer receives an award from the parent company, which depends on the "quality questionnaires" submitted to customers and so called because they measure the quality of the experience and are a fundamental tool for corporate planning purposes. In fact, if, out of 100 questionnaires submitted, 80 on average offer positive feedback, it means that the company is doing well in terms of customer experience management. At the same time, the remaining 20 represent a significant and influential set as they could represent a boomerang for the company: in fact, they have bought the product but are not satisfied with how the purchase was made and, as a result, they will speak badly of it with friends and acquaintances .
The word of mouth that is created could therefore have a much more significant impact on company performance, so it is essential to have the appropriate tools to manage the dense network of relationships created, with a view to mutual benefit.

In the case of Volkswagen, on the other hand, the loyalty policy adopted began years ago and provides, in addition to the renewal discount called the "Volkswagen value project", prizes dedicated to the dealer to stimulate his activities in order to keep the customer connected. If the customer who buys the new car has been in the workshop twice in the last 4 years, the company takes a 0.5% premium, if the customer had already bought another VW takes another premium, if the customer has expressed a high level of satisfaction in the CS there is another premium again.

Nicola Prezioso, on the other hand, has devised a further type of loyalty activity that is integrated with that which follows the policies of the parent company from the moment it was established as a workshop in Aprilia in 1970 and, after 50 years, remains one of the leading companies in the area. The owner has ,in fact ,always favored policies that reward customers who regularly return to the workshop: each customer 2 extra trips a year.

In addition to the property's guidelines, Nicola Prezioso provides that the day of delivery does not represent the closing of a contract but the beginning of a loyalty relationship that always offers the possibility of a replacement car, labour rates discounted by 20% compared to the public price list, free "hotel for tyres"service, home delivery or pick up and delivery service at the train station.
All this puts the dealer in a position to implement as many activities as possible to maintain the customer.
It is also essential to know how to manage the after-sales phase well, however , and therefore, in order to guarantee adequate quality and satisfaction with the work carried out, an email survey (carried out by a third-party agency)is planned in the week following the collection of the car. The results are divided by operator and generate a variable bonus extra salary absolutely meritocratic:the higher the CS is above the national average, the higher will be the variable bonus received by the individual mechanic. The rework is also measured (i .e .the customer who returns to the workshop because the problem for which he left the car has not been solved), in this case an attempt is made to alleviate the discomfort by using the replacement car .

4. 7. 2 CRM and customer experience management with digital tools - CITROËN ADVISOR

Faced with social distancing measures, maintaining contact while preserving the bond of trust with its clients is a winning challenge. In this context, Citroen has used Citroën Advisor, a real resource represented by an interactive online review site.

Enriched with new features since its launch, such as product and vendor reviews, it is an important tool for the brand and the network in terms of transparency, sharing experiences and remaining close to its customers.

Launched at the end of 2014, Citroën Advisor is now available in 58 countries and has over 400,000 reviews.

Building on its success, this pioneering tool in the automotive world has been enriched over time with various features that enable Citroën to be one step ahead in terms of transparency and proximity its customers.

Specifically, Citroën Advisor now covers various aspects of the client experience through various modules:

- Citroën Advisor Point of Sale: offered from the moment of launch, this function allows customers to evaluate and share their experience of service quality at the Dealer, both in the workshop and in the Sales department (New and Used). In the event of a negative evaluation, the point of sale receives a notice. It can then contact the customer again and can in turn enter its response in the platform, after which the customer can readjust its assessment. Guaranteed trust and loyalty, this win-win tool has earned an average rating of 4.8/5.
- CitroënVehicle Advisor: since 2016, this additional module has enabled customers to evaluate and share their views on their new Citroën after delivery. As a result, it is no longer the Dealer but the brand itself that is being evaluated. For each model, opinions can be viewed directly in the virtual showroom on the Citroën website in the country, with an average rating of 4.7/5 for the entire range.
- Citroën AdvisorVendor: implemented since 2019, this latest Citroën Advisor feature allows customers to leave a comment on their experience with their vendor. Offered to Citroën vendors on a voluntary basis, it is also a useful tool for everyone in the service of trust and loyalty.

4. 7. 3 Relevance of external collaboration

One of the results we have reached, even if it had already been discussed extensively in the literature, is the need for cooperation between the company and the surrounding area, the latter being understood as a set of partners with whom to cooperate, in order to be competitive.

The thesis is supported by the interesting contribution of Professor Fabio Massimo Frattale Mascioli, director of the Polo per la mobilità Sostenibile della Regione Lazio. The body, established in 2008 as an international hub, aims to nurture and extend its network, placing innovation and research as engines of growth and competitiveness. One of the key activities of the hub is industrial research oriented towards iCT technologies for sustainable mobility , of which the professor is a pioneer.

In fact, the pole was born from an intuition driven by the desire to have a personal and autonomous line of research. At that time, the professor, an electronic engineer in the electrical engineering sector, had started working in the Sapienza branch office in Latina: giving life to research thanks to colleagues and skills was the focus of everyone's attention. The topic of electrical engineering and sustainability had already begun to circulate previously, as we know that at a commercial level, from design to production and sales, decades can pass. From the very beginning, therefore, the professor sought contact with those who were already dealing with these issues but needed the right tools: research costs money in human, physical and economic terms.

Right from the start, cooperation proved to be the winning weapon . The Lazio region was making a sustainable table to activate research poles capable of laying the foundations for the creation of a lasting and strong relationship with the business world in order to carry out research oriented towards technology transfer to industries. Thanks to contacts with ENEL and a subsidiary of the Finmeccanica Group with which he had collaborated, the professor brought with him 20 letters of interest from company interlocutors interested in the activities of the Cluster.

Specifically, in order to be able to conduct research on issues with a focus on sustainable mobility ,it was necessary to increase the number of private stakeholders such as companies and interlocutors in order to cooperate and collaborate. There are therefore three components, a regional one that includes the Pole in its policy of technology transfer to the benefit first of all of SMEs and then of the territory, a territorial one with the municipality that donates space to carry out the activity and finally the university component with tools, training and human resources. The three components in question act

as the glue for the superstructure of the HUB itself so that we can have an organized understanding of everything that concerns energy as such.

The relational and involvement of different sectors was the key to the success of the project. If you intend to invest in research and development, you must still be able to capture other funds, promoting other projects and including other stakeholders. There are few constraints, so economic management can be autonomous, with the risk that opportunistic attitudes may arise. Over the years, the pole has greatly increased its catchment area with productive bodies to over 100 protocols of understanding and implementing projects with partners known at national and international level.

One of the projects that the pole still follows today concerns the electrification of the boats at theArgentario, which should already be active next year. The idea had already been born seven or eight years earlier with the Pianura Blu project, which involved the navigation of the canals and the Pontine rivers but never came to fruition.

To date we have acquired a whole series of experience, skills and strength, able to deal with a range of sectors that seem to be different but are united by paradigms, from electrical machinery to the entire support infrastructure system and then the energy part. On the latter we are experts in the smart grid: a new energy transition concept that was born as a need for mobility but has now become an autonomous sector in all respects.

At the same time, the funds continue to enter but the real quibble is to be able to keep the whole structure standing. The university, however, is limited to its areas of expertise, so it needs other business and regulatory partners in order to be able to continue its research and development activities while enjoying all the tools it needs. It is advisable to preserve the institutionally of the university through the creation of profitable relations with the most valuable business partners in order to find new outlets, including cultural ones, in an overall organized and integrated perspective. We are not entrepreneurs but researchers, so we decided to create start-ups in order to have not only the entrepreneurial vision that is needed, but also help in management. However, these are micro enterprises.

The concept behind the Pole's work is think global but act local, which has made it possible to directly manage several million euros and, indirectly, tens of millions. Even more significantly, dozens of engineers and experts in the sector have entered and left the organization, but their contribution has been of fundamental importance in order to have an overall, integrated, open and curious vision, never losing sight of the main focus, as sustainable mobility, now understood as an autonomous item but part of the larger surrounding system that is energy.

Conclusions

The advent of the Internet and the development of increasingly sophisticated technologies, has had considerable implications on the work of companies in every sector. The digital transformation has in fact affected transversally all sectors of the economy, involving from small and medium enterprises to large multinationals and forcing them to compete in a new market: the digital.

Given the scale of the phenomenon and its possible extension to all business areas, the exploitation of digital has allowed businesses and consumers to benefit from a virtual platform where they can exchange products and information. Therefore, it emerges the centrality of relationships with external partners, be they other organizations or institutions, suppliers or distributors, end customers or consumers.

The dense network of interconnections that is created is therefore based on the adoption of digital solutions that involve the exploitation of resources that the company already has at its disposal and allow to find very quickly, outside the boundaries of industry, those that it does not have.

The collaborative spirit must therefore guide the work of all players operating in the market, in order to achieve a competitive advantage but only thanks to the concept of sharing. Sharing economy means new possibilities, it allows to enter in new markets and to satisfy the needs of the almost totality of the demand in a completely new and original way, that previews the sale of the service and the use rather than the physical product.

In this perspective of renewal of the strategic and organizational structure, necessary to adapt to sudden changes in an uncertain and unstable environment, it is necessary to combine in a causal way all the components of the Canvas Business model, theoretical construct that has allowed us to define the path followed in the development. In fact, I tried to follow a logical line that best summarized the functionality of each of the nine components of the above scheme, never losing sight of the focus around which the entire business operation revolves: the customer.

In the so-called "customer-era" the customer is in fact the one to whom all the company's efforts are addressed, and it is here that companies must make the best use of their skills to provide the best possible shopping experience. Given the heterogeneity dictated

by the preferences of the consumers, due to an almost complete access to the information dictated to the diffusion of the smart devices and the whole world of ICT, the enterprises must engage themselves in the integrated management of their activities in order to reach a position of competitive advantage.

As an initial cue for analysis, in addition to the new trends in the automotive sector that fully embrace everything we discussed above, there are these months that have seen me engaged in deepening these issues. In fact, I have matured the awareness that it is true that the consumer represents the fulcrum around which all business activities revolve, from upstream to downstream of the value chain, but without a real commitment on the part of the same, you are not always able to really cover the needs of market demand. Therefore, the only really effective way to respond to external changes is to know how to innovate and be able to completely revolutionize its own structure in order to overcome competitors and dominate the market. This, however, can only be achieved through the right and harmonious balance between change-oriented internal capabilities and external components that offer collaboration, tools and long-term profitability.

Appendix

Interview with Massimiliano Prezioso, brand manager for Citroën Italia at Nicola Prezioso SRL:

1. Digitization is a phenomenon that is not limited to the brand at the level of the parent company, but also has a direct impact downstream of the production chain, therefore the reality of the dealer. Specifically, for a dealer, it means increasing the rates of acquisition and customer loyalty. In light of the development of increasingly sophisticated technologies and the spread of the Internet as a primary tool for data research, how has consumer behavior changed in the pre and during the purchase phase?

2. What have been and what are, to date, the major repercussions of the digitization phenomenon?
Could the availability of information on websites that are accessible to everyone have contributed to greater flexibility in terms of reducing the time needed for consulting or, even, for the management of operations?

3. What kind of operational advantage can be gained from the exploitation of digital? And of image (advantage) ?

4. What are the segments of the population that have been most affected by the influence of digitization? Have you noticed differences between age groups, for example, or is it possible to say that everyone, even the oldest, has adapted to the new way of purchasing?
One example would be that brochures are no longer issued to the customer because everything about a vehicle in terms of standard equipment, engines or colors can be viewed on websites.

5 In terms of profitability, has the use of online sales platforms contributed to increased sales? To the expansion of the customer base? If so, how?

6. The Coronavirus had, logically, consequences both on the supply and demand side. Upstream of the supply chain, production was initially stopped and then resumed at a very slow pace, leaving orders pending. During the emergency, Citroën continued to operate through the online CarStore platform. How was the remote consulting and sales process managed?
What kind of difficulties did you encounter?

7. The number of sales made remotely during the lockdown period? How did Citroën position itself compared to its competitors?

8. How does the loyalty renewal work? Are there other active loyalty programs? In concrete terms, what is implemented by the dealer to ensure customer loyalty in the long term? What advantages does a consumer who is already a customer of the same company, for example, have when repurchasing?

9. The after-sales phase is also of fundamental importance. How is it managed? How often do customers call you back?

10. It must be said that the volume of business that derives from it (from the exploitation of the digital sphere) is of a really consistent scope. It is estimated that about 85% of the interactions with customers, even potential ones, will be managed by AI, while only 15% related to more complex situations will be managed by BDC operators. How has the customer management evolved in this perspective? Have employees been or are they expected to be provided with the necessary tools as automation platforms for the realization of such practices?

11. It is important to have the appropriate tools available for the management of a large amount of data: what kind of added value does the collection of data through these digital platforms involve? How, for example, has the management of a customer's personal data changed compared to the past? And how are leads managed today and how were they managed before?

12. With respect to new trends, it has emerged that the PSA group is strongly oriented towards the adoption of new technologies. Not only that, according to an assessment by CDP, a non-profit organization that evaluates companies based on their environmental risk management, PSA distinguished itself in 2019 for its actions to reduce emissions. In light of this, it plans to have its entire fleet electrified by 2025.
In your opinion, is this feasible?
Are there company policies that aim to promote the sale of electric vehicles?

13. Despite the increasing attention to the matter, the availability of electric vehicles remains limited, and Citroën is the brand that offers fewer electric or hybrid models than others within PSA group. What are the goals to be achieved? Those already achieved?

• Interview with professor Fabio Massimo Frattale Mascioli - director of Polo per la Mobilità Sostenibile della Regione Lazio

1. The pole for sustainable mobility Po.Mo. S was born in 2008 as an international HUB as Professor Mascioli, we can say that you and your team have anticipated the times by far, focusing on issues that today are more current than ever.
How has the path taken by the Pole from its birth to the present day evolved? How has the concept of sustainable mobility stimulated your interest more than ten years ago now, when it was in its infancy and you could not yet predict the diffusion that it has had to date?

2. For a company that intends to change its business model, evolving towards a new and leaner form, how important is the investment in research and development? Of course, cooperation with external partners is crucial in this perspective, as we know the importance of creating a good network of relationships not only with customers. Therefore, downstream of the supply chain it is essential to involve the entire territory.
Can you describe the extent with which, from a strategic point of view, such cooperation and communication initiatives contribute to promote the brand?

For the growth and the effective realization of certain activities by the company, how important is the creation of profitable relationships between public and private?

3. Turning to the concept of vehicle electrification, we know that the major automotive players have already taken the right path, promising an entire fleet of electric vehicles within the next few years. Despite the emphasis placed on the subject, in general, one of the major limitations to the spread of electrics is the lack of charging infrastructure.
How can this obstacle be overcome?
Why are there few charging stations in Italy?
Are structural constraints really so difficult to overcome?
Are there other limitations to the creation of an electric fleet?

4. As for the state incentives to purchase electrics, we know that these vary from 1500€ to 6000€ if you buy a hybrid or full electric vehicle. Not everyone, however, is aware of this or other advantages that may arise from the transition to electric. In your opinion, how could you promote adoption?

5. Can you explain in detail the difference between an electric and an internal combustion engine?
Does the production of an electric vehicle lead to an optimization of production time?
And for its maintenance?
How long does a battery last on average?

6. What kind of batteries can we find inside an EV?
Does the type of battery affect the level of emissions?
What, on a technical level, changes between a ZEV or a BEV?

- Automotive trend

  Survey structured in three blocks: the first to identify the target group, the second to underline the relevance of new automotive trend and the latter to examine the digital purchasing behavior.

1. How old are you?
2. Do you own a car and what kind of motorization do you have?
3. How many cars do you have in your family?
4. How many kilometers do you cover, on average, in a year?
5. The average consumption of your car?
6. . How many times a day do you use your car for daily travel?

7. Have you ever thought about buying an electric vehicle?
8. Are you aware of the standards set against C02 emissions below 99g/km?
9. In light of the growing attention to environmental issues, lately the promotional messages in favor of electricity have increased. How many times a day do you watch or listen to advertisements on electric vehicles?
10. How important do you consider the environmental factor and how much attention you pay to environmental issues related to harmful emissions or global warming?
11. Would you buy an electric vehicle for your daily commute?
12. What do you think are the main obstacles to the acquisition of an electric vehicle?
13. Regarding the new connectivity systems in a car, what do you think are needed?
14. Would you consider immediate intervention in the event of a collision or accident for your vehicle via a direct connection system from the car to the workshop?
15. Regarding the new trends of sharing mobility, also called shared mobility, do you consider yourself a user of the service, even occasionally, or not?
16. What do you think about the adoption of shared mobility solutions? Would you recommend them as an alternative to using your own car and why?
17. What are the main advantages of using shared cars?

18. What kind of trips do you use car sharing for? (if you do not use it, answer for what you would potentially do)
19. You are in favor of the adoption of micro-mobility solutions as scooter or bike (sharing) ?

20. How many purchases do you make online?
21. Generally, what kind of products do you buy online?
22. How do you consider the online purchase of a luxury good?
23. What do you think are the advantages of buying online?
24. Do you think it is useful to use online platforms to collect information about a particular product?
25. If you need to buy a new vehicle, please contact the dealer directly or do a short search on the Internet to find out and compare prices and models?
26. Would you ever buy an asset like a car without visiting, in advance, in a dealership but making the entire negotiation online?
27. Have you ever configured a vehicle on car manufacturers' websites?
28. If yes, which car manufacturers' sites have you visited?
29. Have you received an immediate response?
30. What kind of response did you receive?
31. Have you received all the information you needed while surfing the net or do you think you need the intervention of the seller?
32. In light of what has been said so far, do you think that the figure of the seller is to be considered obsolete?

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Digitalization impact and evolutionary dynamics in automotive industry: the optimal implementation of explorative and exploitative techniques in business model innovation. Evidences from Citroën Italia from a territorial perspective.

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Abstract

The strategic and organizational structure of the companies as well as the balance of numerous sectors in which they operate has been upset and revolutionized in recent years following the advent of the Internet.
This last one represents in fact a phenomenon of such a wide scope to generate repercussions on the whole business ecosystem in which multiple actors operate and interact forming a network of interconnections really widespread.
The development of increasingly advanced technologies, or new concepts of sale and purchase, tools that allow to connect the physical with the digital and have access to an infinite amount of data, have led to the removal of barriers between one industry and another, allowing large organizations to redefine their entire structure.
As a result, a completely new scenario has been defined, characterized by a high degree of competitiveness, given the accessibility by all to the most innovative solutions, and uncertainty, caused by the growing attention to the demands of a market demand that is constantly changing.
Therefore, the purpose of my thesis paper, developed on four main chapters, is to define and analyze the trends that are impacting the automotive industry, studying how the repercussions of the digitalization phenomenon have impacted the work of car manufacturers and all the players operating in their own business ecosystem.
Through a careful analysis of the main phenomena that have been affecting the industry for over fifteen years, we have tried to demonstrate how a company can react in order not to succumb given the high competitiveness due to the causal combination of internal and external factors. In fact, in order to respond to the changes in the external environment, given the high dynamism of the same, it is necessary, from a strategic point of view, to redefine its business model also in light of the appearance of new players in the market. Furthermore, the growing attention to environmental issues has pushed organizations in the direction of sustainable development, which has also made it possible to raise consumer awareness about this issue.

It was therefore concluded that only the effective balance between the proper use and exploitation of resources that the company already possesses and those to be found ex-

ternally, with a view to renewing its strategic and organizational structure, leads to a competitive advantage over competitors.
Not only that, the new concept of doing business involves opening up to all the agents that are emerging with increasing strength in the automotive industry, demonstrating that companies want to maintain their competitive position in the long term. In order to survive, it is necessary to innovate and it requires a collaborative approach to reach all areas of the industry, in a perspective of integrated process management, now closely linked to each other.

Chapter1

The first chapter wants to be an overview to describe the main trends that have been impacting the automotive industry for over fifteen years: electrical, connected, autonomous and shared. Not only that, we will analyze the reasons that have led to the birth of these new mobility solutions, their current position in terms of acceptance or rejection by businesses and consumers and the limits resulting in the adoption of one of the alternatives mentioned above.
During the discussion, therefore, the figure of the consumer will be initially described, with its mutation and the emergence of a new strategic approach of openness towards what is defined as the omni-channel experience, with the intention to introduce the new industrial scenario.
The growing attention to the customer derives from the fact that companies, to react to digital behaviors, have understood that they must base their competitive advantage on a good studied customer experience that facilitates the decision making process of customers indirectly generating value for the company. Even the emotional sphere acquires more emphasis than the rational one because the focus of the company's activity is to create a remarkable proposal of value, taking into account the beliefs, values, feelings and ambitions of individuals.
The last ten years have in fact marked the beginning of the so-called "customer era": in the modern network community, a satisfied customer through positive word-of-mouth and without cost can influence the perceptions of others, affecting companies' performance.

The consumer is therefore considered a driver of the industry evolution as its figure emerges as a fundamental key in the redefinition of the business model as the way of buying has also evolved. Not only, if customers' needs change, even the business activity must change: the brand-client relationship must therefore be mutually evolving. People catch information very quickly through several online platforms thanks to Internet, that contributed to reduce the information asymmetry that characterized the traditional brand-customer relationship thanks to a constant interchanging of opinions between community users. They have become more digital-oriented, attentive and informed about products and are changing faster than companies.

Moreover, the shopping experience is evolving to be customer-centric but to be truly effective, it should create a significant benefit for both companies and customers, as it would be counterproductive if it did not turn out to be the end result of implementing a coherent and holistic strategic plan. The understanding of the client's path appears to be relevant, being a cognitive and decisional path through which the client interacts with the brand and subject to cultural, social, personal or situational factors that have contributed to the transition from the traditional linear funnel to a more organic structure, the so-called Customer decision journey.

Continuing the discussion, it was interesting to describe how the whole set of digital technologies together with the massive development and diffusion of the Internet has led to the revolution of the system of channels through which a company can reach its customers. Traditional channels have been progressively replaced or, better, completed by the birth of digital channels e we have therefore assisted to an increase in the number of touch-points that link brand and clients. We are witnessing the evolution from the multichannel perspective to the idea of omni-channel strategies, based on the attempt to break down the boundaries between digital and physical spheres, which should be perfectly synchronized and communicate with each other.

Companies should implement successful omni-channel strategies to exploit new business and growth opportunities thanks to synergistic effects across several channels by having as much control as possible over almost all the phases of user evaluation aiming to increase customer satisfaction, brand loyalty and re-purchase. To do this, the high competition and uncertainty dictated by the instability of the environment make a colla-

borative approach necessary. Organizational structure, corporate culture and technology departments must be aligned efficiently to completely satisfy the customer.

To conclude we can therefore say that there are three “I” of fundamental relevance in discussing customer journey implications: integration among different channels, interaction between the firm and the final consumer and finally, interconnection between the points of contact in an organic path.

In this perspective of integrated management of the activities, it has come to define the concept of collaborative consumption in the great whole of the sharing economy, through which "people coordinate the acquisition and distribution of a paid resource or other compensation” and allows organizations to benefit from it with a view to renewing their business model or creating new ones.

Collaborative consumption takes place in organized systems or networks, affecting varied areas since new startups and websites were born, enabling to obtain value from something not entirely exploited by its owner. It is estimated that by 2025 five major sectors of sharing economy could account for $335 billion in revenue worldwide, leading to a promising growth potential for car manufacturers, dealers and automotive service companies. The trend will drive the increase in automotive revenues by adopting diversification strategies towards Mobility as a Service solutions to the extent to accelerate annual automotive industry growth.

In addition, it is thanks to the reduction of barriers that the three transport revolutions such as vehicle electrification, automation and widespread shared mobility, separately or together, will radically change urban transport worldwide over the next three decades.

All consumer segments will be involved as a result of a common trend towards changing attitudes and preferences, favorable policy and regulation and increasing attention to environmental issues, albeit with little difficulty in rural rather than urban areas.

Not only that, the increasing growth of the population, the level of urbanization and the new concept of sustainability, have made it necessary to take a different approach to enjoy an increasingly varied offer.

The second part of the chapter therefore carefully describes what are the new automotive trends, born and developed as a result of a complex industrial transformation process that has made it necessary to create new models.

The first trend analyzed concerns the world of electrics and a first conclusion we came to is that we have not yet reached a full understanding of the phenomenon, given that today, electric vehicles still cover a truly insignificant market share. Nonetheless, they are becoming profitable and competitive, as the interest in electrification has tripled between 2011 and 2016 and continues to increase as fewer people want traditional ICE vehicles. During the last years the growth in the stock of electric passenger cars has been really significant but the situation is not homogeneous if we move from country to country. In fact, China remains the largest producer in the world, with about 2.3 million of electric cars, and together with the Asian market is expected to grow more while many Western manufacturers have and are still creating collaborations with Asian partners. The reason lies in the fact that Europe and United States followed the Chinese market respectively with 1.2 and 1.1million vehicles sold.

We therefore define what are the different types of vehicles characterized by electric motors, depending on their specific characteristics we distinguish between MHEV or mild-hybrid, HEV or Full hybrid, PHEV or plug-in hybrid and full electric BEV. In 2018 more than two thirds of electric car sales were made by BEV, while about 34% of total sales were made by PHEV. The latter dominated the European market, while in the United States there was the explosion of BEV adoption.

The different results recorded at country level derive from regulatory actions that vary strongly at territorial level as governments should implement policy measures in order to provide economic incentives as subsidies, tax breaks and lower operating costs. Policy measures should also stimulate the early development of publicly accessible charging infrastructure, which underpins the best performance of electric vehicles in terms of local air pollution. The scarcity of charging stations is in fact the main obstacle to adoption, together with the high purchase cost, the limited range of kilometers an electric vehicle can afford, the slow battery life and concerns about technical failures, according to customers.

Despite the limitations resulting from the adoption of such a solution, we can say that electrification is indeed a positive trend that contributes to and will continue to make people aware of the new trend towards sustainable oriented mobility, which means pursuing economic, social and ecological goals in a simultaneous way and with equal energy.

Then we talk about car sharing, which is rapidly emerging as the most promising solution related to Mobility as a Service, and that fits perfectly into the context of collaborative consumption.
It represents a car rental model through which customers can rent cars from the protagonists' fleet for short periods of time when they need them: this system is managed by operators responsible for its services and maintenance. At the basis of the growing success of the trend the shift from the concept of product use to the proposal to sell a service, then there is the problem of the underutilization of cars even there are still a lot of cars in circulation: through this way potentially it will be reduced the pressure on parking space because share vehicles require to be much less frequently parked. Moreover, it is promoted as a potentially environmental-friendly alternative to car ownership towards a sustainable mobility concept, even if different business model impacting on environment are adopted. However, for car-sharing to become more widespread, it is necessary to overcome some critical factors such as the need to have an adequate price structure and the need to make huge investments in infrastructure, according to the pivotal role of policy makers.

The third trend that we will analyze, if widely accepted, in a few years could even drastically upset the status quo: projections say that potentially almost all vehicles will become autonomous by the middle of the century. Since human intervention on safety critical control commands is not or only partial, the technology that enables automation is highly sophisticated because it requires decisions made with algorithms, on-demand assistance and high-speed internet connectivity. The transition from human to machine guidance requires to use ADAS or advanced driver assistance systems that can transfer driving tasks from driver to vehicle and can play a key role in preparing regulators, consumers and companies for the medium-term reality of cars taking control of drivers. Today ADAS provide guidance at level 2, even if we are in the era of transition from level 2 to level 3.
ADAS has the potential to increase profits from self-contained vehicles and their market is expected to double by 2021, reaching sales of $35 billion.
The trend is definitely growing thanks to the many advantages it brings: elimination of risk of human error to decrease accident rates through collision prevention and mitiga-

tion systems, saving times for parking, reduction of congestion, great efficiency and boost to urban sustainability.
Nevertheless there are some key challenges to overcome to benefit from all the potential economic and societal positive implications related to the high cost both to the user and to the infrastructure system, regulatory implications and liability and ethical issues.
Consumer demand will determine the pace and the scale of market penetration even if today it is difficult to reliably predict future demand due to the fact that full autonomous or self-driving vehicles are not yet present in traffic flow.

Finally, the latest trend is that of connected cars that thanks to an effective combination of a wide range of technologies able to detect the external factors allowing V2V (vehicle-to-vehicle) connection. Connected car innovations are usually introduced step by step supported to the evolution of other sectors in car industry according to the idea that market is growing towards the vehicle-to-everything (V2X) communication. Thus, internet penetration, broadband subscription, connection speed and smartphone penetration are critical factors for the development of digital markets and vary from country to country. Within the sector we can distingue three market segments: hardware, infotainment and vehicle services expected to increase by 11% from 2018 to 2023. It is then explained at a technical level the functioning of each, highlighting the role that the United States plays, followed by China and Europe.

Chapter 2

In the second chapter is explained in detail, from a purely theoretical point of view, the business model for a better understanding of the evolutionary phenomenon. In this scenario, to best fit company's structure and strategic orientation in respect to the new mobility solutions, transition towards new forms of business model is required. Therefore, if you do not know the organizational structure of the company, it is not possible, from a strategic point of view, to move in a very precise direction. Through a careful literature review the business model is defined in its most dynamic nature since it concerns elements requiring a constant interaction able to convey opportunities to create new value proposition by anticipating the evolution of the market. We can affirm that it represents a powerful tool able to highlight synergies among several firm's components, putting

them into relation. Indeed, the business model allows companies to make projections for the future, by analyzing and better defining threats and opportunities coming from the external environment while maintaining its flexibility to better fit new opportunities. Therefore, the Canvas business model is brought as example in order to provide a graphical representation that allows you to understand what the key elements are and how they can be combined to generate value: the tool defines nine blocks. The focus of the chapter in question is precisely the dynamism of the markets that leads to the mutation of business structures, for this reason the theoretical approach adopted is based on the concept of openness towards external agents in a context of Open innovation, introduced for the first time by Chesbrugh in 2003. We will talk about outside-in e inside-out approach in the business model innovation process to understand how knowledge, tacit or explicit, may flow within the company business or across the industry. In fact, the current business ecosystem requires to take into account an increasing number of actors across multiple phases of the innovation process and for this reason the BMC follows a precise and clear scheme made by both external and internal factors that combined together lead to build the value proposition.

We therefore continue with paragraph 2. 1. 2 "The need to reinvent the Business Model" which identifies among the reasons for the necessary transformation required the technology shift. The latter represents both an opportunity and a threat and is critic for a company to overcome. At the date, in fact, there are different modalities through which organizations generate value with respect to the past, where the focus was on products and quality. Nowadays, Internet is assuming the role of main distribution channel enabling firms to choose among several markets to positioning at global scale, by serving a large number of customer segments. In this context, competition moves organizations to enhance profits mainly through two different strategies:

- enter new markets through geographic expansion and introduction of new products based on investing in R&D, technology and product innovation to radically transform the firm's technological core competence.

- transform the company's value proposition by moves the product forward along the value chain to expand the value proposition matching it with customers' demand,

also known as servitization strategy. This represents a fundamental analysis tool since we talk about selling the use and functionalities, enabled by the combination of product and service at the final stages of the value chain.

In particular, for the automotive industry, many scholars have created several business model archetypes, in the attempt to provide a complete description of the magnitude of the phenomenon and the extent to which it has been influenced by the digital revolution. Not only, issues as traffic congestion, pollution or access to urban transportation by the majority of the population, climate change and global oil resource limits or overloaded parking spaces are becoming crucial in the attempt to redefine the business model of the traditional car manufacturers. Therefore emerges the necessity to move in a direction that permit to develop smart societies oriented towards a sustainable development.
The next paragraph instead offers a brief overview on the topic of emissions and sustainability, bringing for example data on the increasingly stringent standards adopted by the European Parliament and the Council in very recent times and in force since January 1, 2020.
In the course of the discussion it was interesting to analyze the different responses that companies have provided to the incremental change in transport modalities crossed. The analysis led to separate incumbents and new entrants even if there are conflicting opinions on the subject, related to the difficulty to understand who is more likely to be a suitable candidate for driving a change towards sustainable technologies.

On one side there are new entrants, indipendente from an existing structure and who can shape industry by providing customized products and services to customers, entailing IT as integral part of the traditional physical construction. Seeming to be more appropriate since they born to develop a specific activity and are able to focus on their core competence, they may lack competencies, technologies, corporate expertise and struggle to enter new markets in evolution where incumbents are still established. On the other side incumbents are, who should be able to adapt new technologies in their established structure by merge competencies and technology in a dynamic environment thanks also the the dense network of partners made up of governments and regulations, too. In this context, it emerges that established companies have already incorporated new technologies

in their businesses and are perfectly able to manage these processes. Even if the nature of the core business of incumbent automotive market is related to physical product as the automobile itself, they need to find a balance between digital innovation and established competences both at the production stage and the final stage of the value chain. People are just now able to completely configure, order and concludes a purchase contract for a new car exclusively by using Internet as technological advancements represent adaptation factors that affect industry structure and actors by shaping whole carmakers' business model.

Finally, after providing an overview of the structure of the business model and the implications arising from the digitization phenomenon, with the last paragraph 2.3 "Building a sustainable competitive advantage" we try to analyze each of the nine blocks of BMC individually.
So far our analysis has focused on the general enterprise-external environment interface, while the intent is to move towards the core of the industry to understand what are, internally, the factors that allow the company to adapt to change. The latter are, in fact, by nature, factors external to the reality of the company itself, but they play an ambivalent role, being the means and the end of the change itself. To explain better: if technological development forces companies to adapt their offer to the new market needs, it is clear that the company itself will have to reorganize its activities and its structure to make them suitable for the creation of a value proposition based on the new technology that has entered the market, fulcrum of the new needs. The explanatory intent is therefore aimed at demonstrating how the whole reality of the company itself revolves around its business model and, in particular, its individual components.

In conclusion, the causal combination makes us understand how internal and external resources, although impacting differently depending on whether we are talking about strategy or the actual implementation of activities, play a fundamental role. On one hand the focus is on the outside, hence the strategic approach is oriented towards what happens around the company at partners level whereas on the other hand the focus is on inside and on the capacity of the company itself to adapt to changes. In the first case there are external partners as companies that, in addition to using their internal competences and expertise, look beyond their borders to generate innovation, acquiring a more

in-depth knowledge of the market and being able to anticipate the same trends that undermine its solidity. Other external actors are the customers who are crucial and together with channels and relationships enable companies to adopt CRM (customer relationship management) and CEM (customer experience management) techniques in a perspective of integrated customer management aimed at creating profitable and stable long-term reactions. In the second case we can speak instead of internal dynamic capabilities, that enable the organization to continuously renew through the integration, building and reconfiguration of its own competencies as according to the Resource Based View.

Therefore, in accordance with the existing literature, it has once again emerged that the business model innovation and evolution strongly depends, almost equally, on internal and external factors. If, indeed, on the one hand, it is clear how, by focusing solely and exclusively on the figure of the client and their relationships, we give primary emphasis to an external element of the organization, on the other hand, it emerges how, above all, incumbents leverage their internal capacities to make the best use of the resources they already possess and handle them in the most appropriate way in order to obtain a consistent and significant competitive advantage.

Chapter 3

With the third chapter we get into the heart of the analysis, once defined the components inside and outside the company itself, focusing mainly on the theoretical construct, and the very evolution of the industry from traditional business models to the archetypes born thanks to the development of ICT. It is therefore my intention now to deepen the theme by introducing what, in concrete terms, the car manufacturers are implementing, in an obstacle course that sees those who treasure innovation. After a brief analysis aimed at defining, from a theoretical point of view, the dilemma exploration vs exploitation techniques, core topic of the ambidexterity field as our discourse is centered on the need to search for consistency between internal and external factors, the different types of ambidexterity are described. The cruciality of the theme lies in the fact that it is aimed at confirming the thesis of the necessary causal combination of elements within a

business ecosystem where relational dynamics contribute abundantly to business success. Thus, companies may choose between internalizing the resources necessary for their evolution in the desired direction, creating alliances with other companies or working with those already available, with the risk of not being able to complete the appropriate technological and organizational transition process. In fact, in parallel with a transition of business models from a product-centric to a customer-oriented approach, there has emerged a technological transition. The latter has led to the birth of the electric motorization, connectivity systems and artificial intelligence at the expense of design technology of the internal combustion engines.

The central theme of this section therefore remains innovation not expressed in terms of the evolution of business models towards alternative efficient new forms, but with a practical approach to the automotive industry, understood as transition from traditional mechanical engines to electric batteries. As we need to understand the way in which the new innovation is adopted by companies, different between incumbents and new entrants, I made use of the Rogers bell's curve. This is a scheme characterized by an S-curve that follows that of the product life cycle and makes us understand the behavior of consumers in the face of the introduction of a new technology, while providing a useful and functional tool for companies to understand how best to intervene in the market.

The introduction of the EVs has brought with it many benefits and advantages, which is why their adoption is increasingly recommended and numerous actions are being taken, including at the regulatory level, to incentivize purchasing. EVs represent a disruptive technology that has a major impact on the way the car works and the driving experience itself. In fact, the battery-powered engine is quiet, does not disturb and guarantees comfort, reliability and safety, as well as immediate acceleration due to the release of electricity in a very short time. In terms of pollution, a fully electric car can emit up to a maximum of 20g of CO2 per kilometer travelled, while a hybrid car can even reach 60. These figures are really irrelevant if you think that there are still cars in circulation euro 0, 1, 2, 3 or 4 that far exceed the set standards. However, since this is a technology whose introduction can be said to be taking place, there are disadvantages on which organizations are working to improve. The main flaw is the lack of autonomy of these lithium-ion batteries that limit the possibilities of travel by reducing the capacity of driving in

full electric to 140/150km per day and which is further aggravated if you think of the structure of the car itself. The body of a traditional car is in fact much heavier if compared to the electric battery and the weight of the structure weighs heavily on performance. Another issue much debated refers to the fact that it is not yet clear whether electric cars actually pollute less than cars with internal combustion engines. If we consider the life cycle of the car as a whole, the real nature of the phenomenon emerges, considering the CO2 emitted by the extraction, refining and distribution of the fuels needed for power supply, energy production and transmission up to the production of vehicle components, including battery and disposal or reuse, as battery life varies depending on many factors. Finally, if it is true that to produce the battery you emit more CO2 than ICEs, it is equally true that after 25,000 km of travel this is offset. Nevertheless, the main result is that BEVs help to reduce CO2 emissions by 19%, 18% and 9% respectively compared to conventional petrol, diesel or hybrid.

Proceeding in the treatment it is now ascertained that without collaboration and cooperation with external partners it is not possible to achieve a leadership position and that is why in this section we will deal with what are modular platforms and their implications when it comes to meeting the specific demands and needs of a small group of consumers. It is possible to deduce that there is a dichotomy between the interest that companies have in consumers, who are now co-creators of value and require variety and customization of the offer and the attention to economies of scale and cost savings. These strengths need to be balanced against each other.

Western automakers have begun, in recent years, to forge strategic alliances and partnerships with Eastern countries with the unique aim of developing core competencies and consolidating their position in the global market, for the reasons above mentioned. Moreover, at a time when the consumer is the king, it is essential for companies to embrace new trends. For example, I found interesting to report evidences from mass customization approach, as a strategy that allows to fully cover the market by offering an almost unlimited variety of customized products and services quickly, in any place, at any price and at a cost comparable to mass production, through technical and managerial innovations. Customization leads to a truly broad product portfolio, with numerous alternatives available to the consumer even if implies an increase in production costs,

partially or totally covered by high return guaranteed. Arrived to the paragraph 3.3.1 “Product platform commonality and modular architecture of car producers” it is pointed out that to achieve mass customization, it is necessary to exploit product modularity, one of the techniques of possible application in product platforms, to control the complexity of product lines increased resulting from the proliferation of available models, in any manufacturing industry. Technologies, skills, resources have evolved in parallel with this development thanks to a proactive and positive demand response. Therefore, product platforms are defined as a set of common assets or components whose use is intentionally planned and developed to form a common basic structure, especially at the core technology level, from which derives a flow of products whose launch takes place as efficiently as possible. The most significant approach remains, once again, the exploitation of a common basic architecture from which to build the entire product range, allowing components to be easily replaced when the technology on which they are based is overtaken by a new one introduced to the market. In this context, therefore, research and development activities become very important. Always in this view, analyzing the different application of product platform concept, it is clear the cruciality of the latter, as the practice of using standardized product modules to be easily reassembled/rearranged into different functional forms or shared across different product lines and is characterized by a one-to-one correspondence between physical and functional architecture. In addition, modularity may not be able to satisfy all the customers' requests and, in this game power between firm and client, the greater the influence exercised by the client, the greater the differentiation of the offer. In fact, we must not forget our mantra: the customer is always at the center. Along the value chain, the involvement of the consumer can be more or less intense and, consequently, three customization strategies are defined: core, form, optional.

This is just one of the possible strategies that a manufacturer can adopt and reflects the progressive integration of the consumer within the value chain, but at the same time it reflects the growing importance of other players in the supply chain to the detriment of manufacturers. Indeed, unless there is not complete vertical integration, there are other partners involved in the various phases within the value chain. The modularity conceit

has led manufacturers to understand the importance of being close to the customer, requiring proximity not only for current operations but also and above all for the future.

In the last part of chapter three emerges the structural need to adopt a holistic vision when talking about digitalization, being aware of the extent of the phenomenon. Yet, traditional OEMs are facing fierce competition from digital players attracted by the countless possibilities offered by the Internet of Things as the major challenge lies in effectively extending their business scope into digital products and services. Since data and floods have a different nature to form a heterogeneous system of data related to customers, generated by cars and mutually exchanged, industry players in the automotive field need digital platform providers to be able to effectively manage them and maintain competitive, we can define an explorative approach aimed at exploiting new tools and resources available externally. Finally, it should be said that technological development in its entirety has led to the birth of the so-called Big Data whose management, in this paper, is based on an exploitative approach. The basic idea is in fact to manage the same data available to the organization, albeit in larger volumes, in a novel way to be used as a source of competitiva edge, too.

Finally, it is therefore possible to state how the core objective for a manufacturer is to become skilled in defining and redefining its value chain with the ultimate aim of trying to achieve a competitive advantage over its rival. But, again, only the consistency between orientation towards openness and new partners and exploitation of internal resources as the whole set of data, leads to the optimal management of the whole set of operations.

Chapter 4

The fourth and final chapter of the thesis is dedicated to the analysis of the Citroën Italia case study, aimed at highlighting the proactive response of an actor in the sector to the trends of change described above. The intent is to bring out the strategic profile of the choices made by the company, also highlighting the innovative impact, in light of the results obtained from the analysis.

Citroën defines itself as the "Inspired by You" brand that will try, in the next years, to position in every segment and in most markets with an ICE petrol or engine offer and a

LEV or Low Emission Vehicles, in order to meet the needs of the entire user base. In addition, the brand has promoting actions aimed at build customers loyalty because it is following a customer-driven transformation.

The research method I used was a mixed method characterized by a case study approach combined with a qualitative analysis. The primary data collection will be realized according to information that I accessed during my internship within Nicola Prezioso dealer of Citroën since 1970 and Volkswagen since few months. They are about company positioning over competitors, the effect on the performance driven by changes in technologies and features of the products, the situation after Coronavirus in terms of vehicles' registered and the relation between dealer and costumers.

In addition, I realized one survey on a sample of population to understand the propensity of the average consumer to adopt new trends. The questionnaire, filled in online by the dealer's customers, is declined for the different arguments covered and counts 32 questions. The survey period runs from 24 June to 24 July 2020. This part of the analysis was useful in order to offer insights from the demand side, to be compared and integrated with the results related to the supply side.

Then, using a qualitative approach, I contributed through interviews to get insight from supply side by firms' external partners, in order to explain the relevance of external factors on companies performance and get information about the influence of digitalization on both companies sales and customers. In particular, the interviews were conducted in person, with subsequent telephone conversations for clarification on the subject, with Professor Fabio Massimo Frattale Mascioli, director of the “Polo per la Mobilità Sostenibile della Regione Lazio” and brand manager Massimiliano Prezioso of Nicola Prezioso SRL. In the first case, the meeting with Professor Mascioli was very interesting as it allowed me to analyze and actually understand the relevance of external factors in order to create solid and profitable relationships with partners outside the company, such as energy providers. Not only that, it was useful to understand at a technical level the actual functioning of an electric motor, allowing me to fully understand the concept.

In the case of confrontation with the reality of the dealer, on the other hand, what was stimulating for me was the fact that I found myself working and confronting a reality that lies in the middle between customer and company. This has therefore allowed me to catch insights from the bottom, being able to obtain feedback from the market demand

in an abrupt manner by having direct contact with customers and to understand the strategic orientation on the supply side, trying to adapt in an optimal way to the evolution of the external environment.
Thus the aim of the analysis is to understand the extent to which each factor impacts on the company's performance because there is no theoretical contribution to explain what kind of influence each factor exerts, whether one is functional to the other or why a company should focus primarily on its own capabilities or those available externally.
The intention of my analysis is therefore to provide a valid alternative capable of explaining how internal and external factors are closely dependent on each other and how, in reality , it is not possible to achieve a position of competitive advantage if they are not combined harmoniously .
What emerged from the discussion is the fact that a virtuous and vicious circle is created at the same time, in which external factors that impose change are determined by internal factors that in turn have changed to meet the needs of the surrounding environment.
Evident therefore is that, even if a play of force between the two elements can be created, the dynamics of an uncertain environment such as the automotive industry will still lead to balance.
The results obtained are therefore also useful for the implementation of actions aimed at converting the traditional client.
The limits that I may notice from the results of my analysis are related to the fact that I only take into consideration opinions from few individuals involved in the context but that cannot represent the perception of the whole sector. Indeed, surveys collection data, refer only to a specific target segment.
Finally, a second issue may be the choice of a single OEM instead of multiple firms, whose positioning refers to medium-low car segment even if this may be a game changer since we are talking about concepts as collaborative consumption and a brand like Citroën might be suitable for the purpose.
After a brief overview to describe Citroën Italia's current position in terms of truly positive commercial results, we return once again to exalt the figure of the consumer. Results have emerged regarding the propensity to adopt new solutions in terms of both new urban mobility and purchasing behaviors, confirming the positive trend of all the trends described above. It is true that the consumer has changed with respect to the past and

with it his buying habits, even in an industry such as the automotive one where the transition from physical to digital will never be complete, as there is a need to concretely benefit from a product like the automobile. However, as we have just stated before, digitization has affected all branches of the company, innovating the processes upstream of the supply chain.

Subsequently, the operational advantages deriving from the exploitation of digital at dealer level are reported, once again finding positive implications in terms of:

- optimization of time in the consulting phase for the purchase of a vehicle within the dealer;
- improvement in customer data management;
- possibility of having digital contents that favour the knowledge of the product or some peculiarities of it to be supplied to the customer;
- possibility to reach potential customer outside its own territory;

An example is given by Citroën Carstore, a platform that offers the user the possibility of setting his or her search according to the Dealer chosen or by directly entering the model of the desired car, allowing you also limit your selection by entering a budget of your choice.

The same dealer Nicola Prezioso, having learned the potential arising from the exploitation of the new strands, with a view to continuing the business, has long since undertaken and will continue to follow this path by implementing the digital services offered and extending them to after-sales and administration.

Subsequently, a brief analysis was carried out on the situation generated by the Covid 19 emergency, which led to the redefinition of the strategic and organizational structure of most companies. In fact, the automotive industry has been one of the sectors that have been most affected by the crisis, count drop in registrations recorded in Italy in March 2020 equal to 85%. Therefore, the different strategic orientations followed by companies emerge, with Citroën preferring to follow a Push approach according to the need to sell what had already been produced and in stock, made on a large scale with a view to pure mass customization.

The focus then focuses on electric vehicles and, thanks to the contribution of Professor Mascioli, it was interesting to study at a technical level the operation and everything

related to the electric motor, also introducing what were the state interventions aimed at encouraging the adoption of electric in our country.

Finally, to conclude, we report as example Citroën's electric and electrified offensive aimed at strengthen itself in the central part of the market in order to be an active player in the energy transition while remaining strongly customer-oriented, with a paragraph on the new SUV C5 Aircross Hybrid Plug-in that encompasses everything that has been the theoretical path so far described.
Once again the nine blocks of the business model are analyzed individually and the need to collaborate with external partners, be they energy providers (Enel X), other companies or institutions like university, customers or relationships among them, is further highlighted.

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