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Decarbonizing Luxury: Assessing the Effect on Consumer Willingness to Pay in the Luxury Sports Car Industry

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Abstract

This thesis explores the interplay between luxury status, electric propulsion, and consumers' Willingness to Pay (WTP) in the automotive market. The study utilizes a 2x2 experimental design to assess the impact of car type (luxury vs. non-luxury) and propulsion type (electric vs. non-electric) on WTP. Data were collected from 242 respondents in Italy, and statistical analysis was performed to examine the effects of these variables, with controls for age and gender.

The findings confirm that luxury vehicles significantly increase WTP compared to non-luxury cars. However, when it comes to propulsion, electric luxury vehicles generally attract lower WTP than their internal combustion counterparts, indicating that traditional values such as performance and engine sound remain essential to luxury consumers. In contrast, electric models are associated with higher WTP for non-luxury vehicles, particularly among younger and environmentally conscious consumers.

These results suggest that luxury brands face a challenge in integrating sustainability without compromising core brand values. The study provides valuable insights for automakers, recommending a gradual transition to electric mobility that balances innovation with the luxury and driving experience. Additionally, it offers a foundation for future research on consumer behavior in the evolving luxury market.

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Ch.1 Introduction

Context and Motivation of the Research

The automotive industry is undergoing a significant transformation driven by growing attention to environmental sustainability, technological innovation, and changing consumer preferences. Electric vehicles (EVs) are emerging as one of the most promising solutions to reduce the sector's environmental impact, thanks to their potential to lower CO2 emissions and decrease dependence on fossil fuels. In Italy, as in many other European countries, the shift towards electric mobility is supported by stringent regulations and government incentives to meet the ambitious emission reduction targets set by the European Union.

The luxury car segment, however, presents unique dynamics that make the transition to electric vehicles less straightforward compared to the mass market. Historically, luxury cars have been associated with powerful internal combustion engines, exceptional performance, and a brand identity strongly tied to the sound and driving experience of traditional engines. This raises concerns that introducing electric models could compromise the perception of luxury and consumers' willingness to pay (WTP) for these cars.

While the non-luxury market shows an increasing WTP for electric vehicles driven by sustainability, economic efficiency, and technological innovation, the situation in the luxury segment is more complex. Despite their environmental and technological benefits, luxury car consumers may perceive electric vehicles as less desirable than their internal combustion counterparts. This research explores whether the WTP for luxury electric cars is lower than for combustion models and how this contrast manifests compared to the non-luxury market.

Research Objectives

This thesis explores the relationship between propulsion type and WTP in the luxury and non-luxury car segments. Specifically, the objective is to investigate whether the production of luxury electric cars negatively affects consumers' WTP, leading them to prefer internal combustion models. It also aims to determine whether this relationship is moderated by the perception of luxury, unlike in the non-luxury market, where consumers show a higher WTP for electric vehicles compared to combustion ones.

The main research questions include:

How does the production of electric cars influence consumers' WTP in the luxury car segment compared to the non-luxury segment?

Is there a moderation effect of propulsion type on WTP in the luxury segment compared to the non-luxury segment?

Overview of the Italian Automotive Market

The Italian automotive market reflects the global shift towards greater sustainability, although the transition is ongoing. The Italian vehicle fleet is dominated by internal combustion vehicles, with gasoline and diesel cars representing the largest share. However, in recent years, there has been significant growth in hybrid and electric vehicles, supported by incentive policies and increasing consumer awareness of environmental issues.

According to the latest data, gasoline and diesel cars account for 43.3% and 41.0% of the total vehicle fleet. Alternative propulsion vehicles, including hybrids (HEV), gas-powered vehicles (LPG and CNG), and pure electric vehicles (BEV), are gaining ground but still represent a minority. Pure electric cars, for instance, account for only 0.5% of the total, but their growth is accelerating due to improved charging infrastructure and consumer tax incentives.

The Italian automotive market is segmented into various categories that reflect consumer needs and preferences. The main categories include city cars, mid-sized vehicles, SUVs, multipurpose vehicles (MPVs), luxury cars, and sports cars. In recent years, SUVs have seen the most significant growth, with a 25% increase in registrations between 2022 and 2023. This segment has benefited from growing consumer interest in more spacious and versatile vehicles that offer comfort and off-road capabilities.

In the luxury car segment, major Italian brands such as Ferrari, Lamborghini, and Maserati continue to dominate, although other international brands like Porsche and Mercedes-Benz also have a strong presence. Despite the growing focus on sustainability, internal combustion luxury cars maintain a higher perception of prestige compared to electric models due to the unique sound and driving feel of traditional engines.

The distribution of registrations by propulsion type highlights a growing adoption of more sustainable technologies. In 2023, hybrid cars accounted for 36.3% of new registrations, followed by plug-in vehicles (BEV and PHEV) with an 8.6% share. Although gasoline and

diesel cars continue to dominate the market, their share is declining, gradually being replaced by alternative propulsion vehicles. This transition is supported by a mix of European regulations, government incentives, and changes in consumer preferences, which show increasing interest in sustainability and technological innovation.

Literature Review

The literature on luxury car purchases and electric vehicles provides a clear picture of consumer motivations in these two segments. In the context of luxury cars, consumers are often motivated by factors such as social status, high performance, and design aesthetics, which are strongly linked to the brands and traditions of luxury car manufacturers. For many buyers, luxury cars represent not just a means of transportation but also a symbol of success and sophistication.

In contrast, the motivating factors for electric vehicles include environmental sustainability, operational cost savings, and access to innovative technologies such as autonomous driving and advanced connectivity. However, specific challenges emerge regarding luxury electric vehicles: consumers may perceive a disconnect between traditional luxury and electric propulsion, which could lead to a lower WTP than internal combustion models.

Furthermore, the literature review highlights how the shift to electric can be seen as a compromise between performance and ecology, with luxury brands facing the difficult task of integrating green technologies without sacrificing brand identity and consumer expectations regarding driving experience.

Structure of the Thesis

The thesis is structured into five chapters; chapter 2 overviews the Italian automotive market, analyzing the various segments and propulsion distribution dynamics. Chapter 3 reviews existing literature on the motivations for luxury car and electric vehicle consumption, exploring the differences in purchase drivers between the two segments. Chapter 4 presents the empirical analysis, which assesses consumers' WTP for luxury and non-luxury cars and how this is influenced by propulsion type. Chapter 5 concludes with a general discussion of the results and theoretical and managerial implications and suggests areas for future research.

Ch. 2 The Italian Car Market

2.1 Introduction

This chapter analyzes the Italian automotive market, specifically the passenger car segment, to understand its composition (segmentation and types of propulsion) from both the demand and supply sides. Since Italy is influenced by the regulations and market dynamics of the European Union, each topic will first present a European overview, followed by a more detailed analysis of the Italian context.

The chapter starts by describing developments regarding vehicle electrification in Europe, and based on available data, it analyses the spread of public charging infrastructure in Europe, the number of battery electric vehicles (BEVs) on the roads (again by average per capita, and then comparing shares on a country basis), and future projections regarding the number of BEVs in the streets under different scenarios. Furthermore, it analyses the gap that needs to be covered in the roll-out of the charging infrastructure to meet the growing demand for plug-in cars and the geographical imbalances in the distribution of the publicly available charging infrastructure.

Secondly, the discussion deals with the Italian automotive market. It provides insights regarding what kinds of propulsion technologies are used, the fleet currently circulating, and the number of registrations. The discussion also focuses on market segmentation, looking at the typologies of passenger cars given by ANFIA.

Furthermore, some of the European and Italian legislation that drives the automotive market are presented: the latest emission regulations, safety standards, and incentives to stimulate electric mobility uptake.

Moreover, there is a focus on sustainability strategies of the European and Italian automotive industries and how they deal with compliance regarding ESG (Environmental, Social, and Governance) and the technological innovations involved in more sustainable materials production – additive manufacturing and the company partnerships aimed at the development of hydrogen and CO2-neutral fuels – as well as the vehicle sharing trends and the adoption of digital technologies that make production processes greener and faster are discussed.

In the last part of the chapter, there is an overview of the competitive landscape of the passenger market. Here, I investigate both the national production and vehicle registrations by brand. It analyses and discusses the stakes of major Italian carmakers with a deep evaluation of the

historical trends and market shares of Ferrari, Lamborghini, Maserati, Alfa Romeo, Fiat, and Jeep, the leading players in the luxury and sports car industry. The relevance of luxury and sports car brands within a sustainability-oriented market will be primarily focused on.

The final part examines the luxury car market worldwide. It identifies the main growth trends and luxury car consumers' preferences. It provides insights into luxury brands' typical strategies for balancing a traditional focus on performance and comfort with new, demanding requirements for eco-friendly and smart innovation. It also reviews how the shift to electric vehicles changes the current scenario for luxury and sports cars.

2.2 European Car Market Overview

Vehicle electrification is changing the automotive landscape in Europe, and tighter legislation is helping to achieve this goal. The European Union aims to cut car carbon emissions by 55% by 2030. In Europe, there are currently around 632.423 public charging points, serving three million battery-electric vehicles (BEVs) on the road by the end of 2023. This is a milestone for infrastructure, but it also shows the growing gap that needs to be bridged to meet future demand.

In 2023, 153.000 new public charging points were installed, showing a very healthy but still needs to be adequate installation rate. The European Commission projects that 3,5 million charging points will be required by 2030 to provide a proper supply of the electric vehicle fleet to achieve the planned CO2 reductions. That works out to almost 410.000 charging points a year.

According to the European Automobile Manufacturers Association (ACEA)[1], that number might still be shy of the demand; ACEA estimates that around 8.8 million charging points could be needed by the end of the decade, which requires an average of 1.4 million chargers per year. The real challenge with this synchronization is that, during the past seven years, the growth rate in BEV sales has far outpaced the development of the charging network. While overall electric car sales have grown more than 18 times, the number of public chargers has grown less than six-fold.

A geographic imbalance is furthermore evident within Europe. The Netherlands, France, and Germany are the frontrunners, accounting for almost two-thirds (61%) of all EU charging points. These three nations occupy over 20% of the EU's surface area. In stark contrast, the

[1] ACEA: is the main lobbying and standards group of the automobile industry in the European Union.

remaining 39% of chargers are located across the other 24 member states, which account for virtually 80 % of the area of the EU – a remarkable imbalance in infrastructure distribution that could hamper the overall uptake of the electric vehicle.

The relationship between public charging point availability and BEV sales is striking. The countries with the highest number of chargers, Germany, France, the Netherlands, and Italy, also have the highest BEV sales, suggesting that infrastructure is a prime driver of electric vehicle uptake. The problem is the charging speed. Only around 13.5% of all chargers across the continent are fast chargers (defined as having a charging capacity of over 50kW). The vast majority are 'normal' chargers (22kW or less).

By the end of 2023, the ratio of BEVs per fast charger in the EU stood at 29:1, while the combined ratio of 53 BEVs and Plug-in Hybrid Electric Vehicles (PHEVs) per fast charger highlighted the need for more effective and widespread charging infrastructure.

Meanwhile, governments across the EU are under pressure to scale up investment in charging infrastructure and implement the Alternative Fuels Infrastructure Regulation (AFIR)[2] in earnest, which sets minimum requirements and – with robust monitoring by the European Alternative Fuels Observatory (EAFO)[3] – is intended to incentivize member states to install infrastructure faster and more effectively.

This critical point in automotive history will also be a turning point full of difficulties and opportunities. The achievement of the EU's Green Deal[4] will be possible if there is a synchronization of the advancement of vehicle technology and the corresponding transformation of the infrastructure to transform cars.

[2]AFIR is part of a broader initiative to reduce greenhouse gas emissions by 55% by 2030, in line with the European Union's climate targets.
[3] EAFO: is the European Commission's key reference portal for alternative fuels, infrastructure and vehicles in Europe.
[4] European Green Deal: Approved in 2020, the European Commission's set of policy initiatives aims to make the European Union (EU) climate-neutral by 2050.

2.3 Italian Passenger Cars Industry

2.3.1 Market Propulsion

Figure 1 reports that in the Italian circulating fleet (2023), most vehicles (84,3%) are traditional gasoline and diesel, which are still the most used even though worldwide consumption is falling.

Alternative fuel technologies, however, are making huge improvements. The mobility of the last 10 years is powering through to our automotive landscape, with 5,4% for Hybrid Electric Vehicles (HEVs) and 7,4% for gas-liquid petroleum.

BEVs and Compressed Natural Gas (CNG) vehicles, at 0.5% and 2.3%, respectively, are minor factions but have the potential to rise with the eco-agenda and the advancement of technology.

Figure 2.1: Circulating fleet of passenger cars by fuel type (2023)

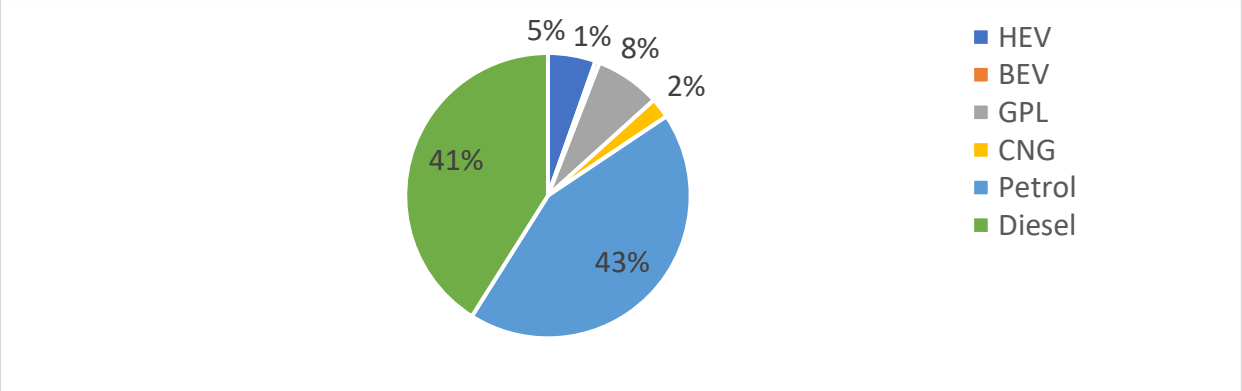


Table 2.1: Circulating fleet of passenger cars by fuel type (2023)

Propulsion	MS (%)	MS (Volume, k units)
HEV	5,4%	2.214
BEV	0,5%	205
GPL	7,4%	3.034
CNG	2,3%	943
Petrol	43,3%	17.753
Diesel	41,0%	16.810
Others	0,1%	41
Total	100,0%	41.000

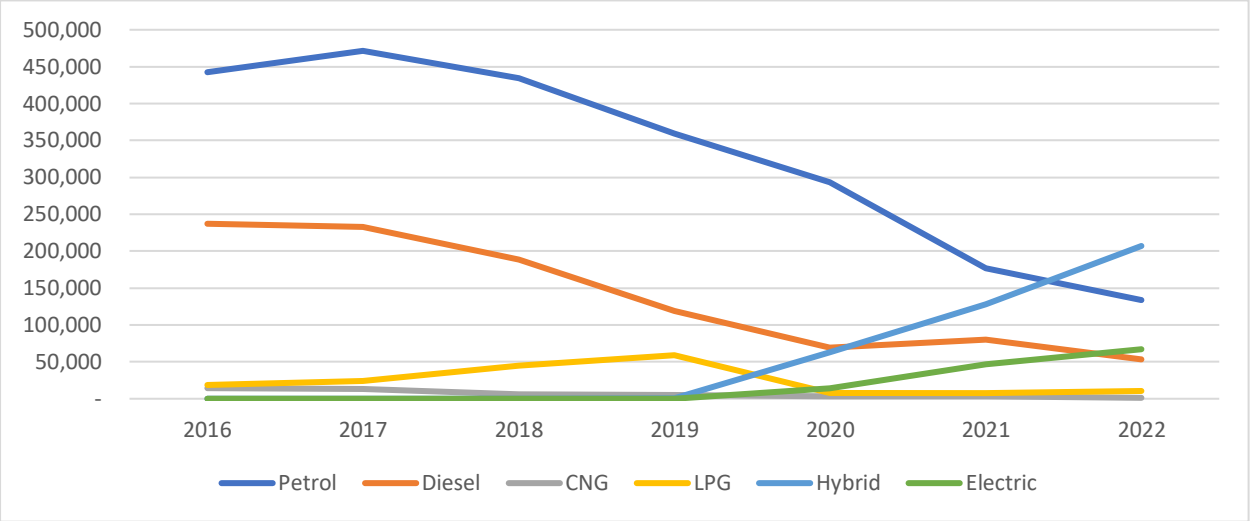
Source: ACI[5]

[5] Automobile Club Italia: a non-profit public body representing and protecting the general interests of Italian motoring, the development of which it promotes and encourages

Considering that typical internal combustion engine (ICE) cars are still the prevailing solution, the Italian automobile industry is moving towards a more diverse market and adopting greener propulsion technologies. These technologies represent a paradigm shift towards cleaner and more energy-saving production.

Figure 2 reports the national manufacture of vehicles by type of power through 2016 – 2022. The data illustrates some significant trends and implications of the changes in consumer preference and technological transformation in the automotive sector.

Figure 2.2: Yearly Production by Propulsion type (ANFIA 2016 – 2022)



Source: data ANFIA[6]

Table 2.2: Yearly Production by Propulsion Type (ANFIA 2016 - 2022)

Years	Petrol	Diesel	CNG	LPG	Hybrid	Electric	Total
2016	442.740	237.145	14.365	18.721	-	-	712.971
2017	471.424	233.015	13.682	24.521	-	-	742.642
2018	433.942	188.945	5.763	44.546	-	-	673.196
2019	359.050	118.567	5.529	59.012	314	-	542.472
2020	293.508	69.086	3.352	7.994	63.335	14.551	451.826
2021	176.424	80.405	3.344	7.647	128.338	46.249	442.407
2022	133.703	53.319	1.237	10.802	207.019	67.114	473.194

Source: ANFIA

[6] ANFIA: is one of the largest trade associations in Italy. Its aim is to represent the interests of its members vis-à-vis public and private, national and international institutions and to provide for the study and resolution of technical, economic, fiscal, legislative, statistical and quality issues in the automotive sector.

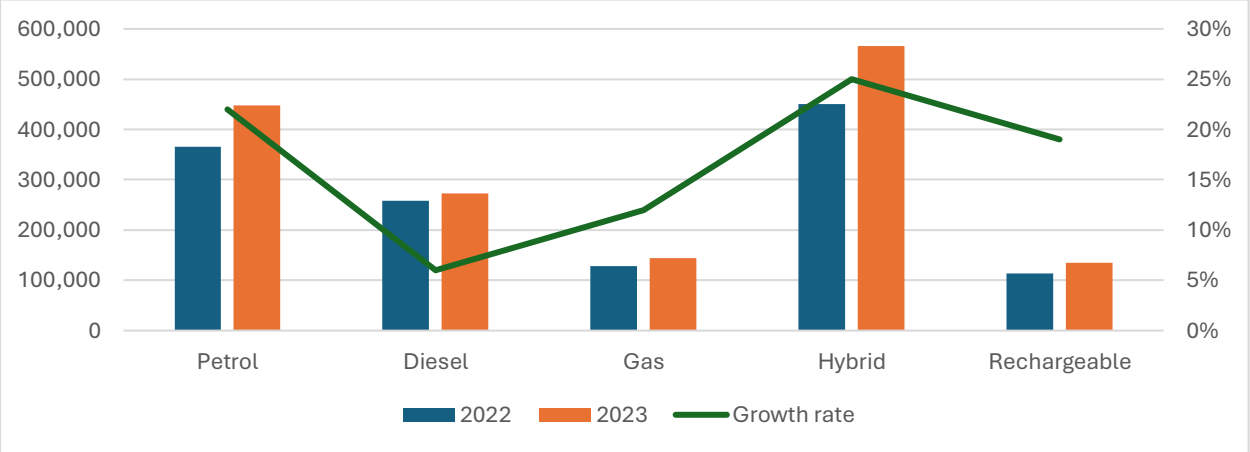
There has been a significant decline in the production of petrol and diesel vehicles. Production of petrol-powered vehicles decreased from 442.740 units in 2016 to 133.703 units in 2022, approximately 70%. In the same way, diesel vehicles decreased from 237.145 units in 2016 to 53.319 units in 2022, around 78%. The trend shows that revolutions are slowly moving from traditional engines with combustion to more sustainable approaches.

The production data of hybrids and electric vehicles shows significant growth. Hybrids grew from 314 units in 2019 to 207.019 units in 2022, while electric cars, on the other hand, grew from 14.551 units in 2020 (the first year these were reported) to 67.114 units in 2022. The data show that this market could increase significantly due to new trends and needs.

Total vehicle production shows a mixed trend. It increased to the biggest market in 2017 with 742.642 units and then suffered a significant downfall in 2019 with 542.472 units due to COVID-19. After that, there was a recovery from this year, and it increased to 473.194 units in 2022; this phase indicates a positive trend in the industry and a reshaping of market dynamics and consumer preferences.

Italian vehicles are diversifying as consumer behavior, fuel technologies, and regulations respond to the challenges posed by climate change. Consumers are fighting the complex task of meeting the new requirements while facing new restrictions.

Figure 2.3: Registration by Fuel (2022-2023)*



Source: ANFIA

Table 2.3: Registration by Fuel (2022-2023)*

Volume	2022	2023	Growth rate	M. Share
Petrol	365.465	447.298	22%	28,58%
DIESEL	257.968	273.295	6%	17,46%
GAS**	128.743	143.879	12%	9,19%
Hybrid	450.938	565.551	25%	36,13%
Rechargeable	113.801	135.273	19%	8,64%
TOTAL	1.316.915	1.565.329	19%	100%

**Biodiesel and Hydrogen vehicles are not considered in this graph because of the irrelevance of their data, respectively (From 0 to 33 for Biodiesel, from 11 to 2 for Hydrogen)*

***Considers both LPG and CNG*

Source: ANFIA

Table 3 shows a robust growth of petrol-powered car registration in terms of the absolute number of registered cars in Italy and market share. From 2022 to 2023, registered vehicles grew from 365.465 to 447.298, depicting an enormous growth rate of 22,39%. Indeed, the fact that petrol cars can rise at such a rate and capture even more (28,58%) of market share during 2023 reflects that petrol vehicles are still popular and enjoy good data in petrol vehicle consumption for Italy. Awareness of the environment and the growing availability of alternative "green" fuel makes no difference to the goods sold by petrol vehicles in Italy.

Figure 3 shows that more vehicles are powered by petrol than diesel, an increase of 6 times. Diesel registrations rose from 257.968 to 273.295, which is 5,94%. Diesel's market share (the diesel market's percentage of the entire market) fell from 19,59% to 17,46%. Diesel-powered vehicles have been gradually shifting for reasons of concern for the environment and mandatory emissions reductions after the effects of diesel on cities' air pollution became well-known, but also for the rise in diesel prices.

There was an overall increase in the number of LPG registrations. It increased from 118.023 to 141.989, with a growth of 20,31%. This shows that LPG still has a place and value in the transport sector since it emits fewer pollutants than gasoline. Compared to previous years, CNG experienced a downturn in registrations, which decreased from 10.720 to 1.890 and a growth rate of -82,37%. This type of product has a tiny market anyway, and from the numbers, it seems that no one will want to buy this type of vehicle soon.

The hybrid segment, categorizing mild and full hybrids that combine internal combustion engines and partially electrified systems – registered 565.551 cars, up 25,42%, due to growing consumer interest in hybridization. Growth was registered by both petrol-electric and diesel-electric hybrids of 24,27 % and 33,11 % respectively. 'This is the key segment highlighting the industry's change of direction towards lower carbon, and increasingly electrified, means of transport.' Registrations for rechargeable vehicles, including electric vehicles (EVs) and plug-in hybrids (PHEVs), also showed positive momentum with a trend line growth rate of 18,87% from 113.801 to 135.273. EV registrations specifically enjoyed growth levels of 34,77%, from 49.169 to 66.265. This growth in EV registrations indicates a surge in the understanding of climate change issues, policies, and incentives towards electric mobility, as well as increased affordability and superior EV technology.

Petrol cars dominate the market because cleaner and more fuel-efficient vehicles are coming up. However, the primary trend determined by the ever-increasing use of electric and hybrid cars reflects the positive trend for more sustainable mobility due to environmental issues and legislation mandates from Europe. The trend of hybrid and rechargeable vehicles has increased in the last few years. After petrol, the consumption in the automotive industry has shifted towards electric vehicles, and it has been growing fast in the previous period for many advantageous reasons, including environmental, legislation demands, and technology.

This industry has seen many changes and will see some in the future. The automotive market is also changing rapidly to be more sustainable, using less fuel and creating a cleaner environment.

2.3.2 Market Segmentation

The automotive market is structured into various segments that reflect consumers' diverse needs and preferences. This includes City cars for urban driving connoisseurs, Midsize vehicles for those who love traveling and growing family, SUVs for both travel lovers and personalities, MPV-multi vans for a high-class space and flexibility, Luxury cars for those who deserve more than feelings, and Sports cars for lovers of performance and speed; all these segments together create the whole picture of Italian automotive market.

City Cars have an overall length of less than 3 meters and an engine capacity below 1 liter. They prioritize fuel economy over power and are best suited for the urban environment, where space is limited and efficiency is key. These city cars cost between € 10,000 and € 15,000.

Subcompact Cars straddle the line between micro and compact cars, with 3,7-4,1 meter lengths and engine capacities of 1,0-1,6 liters. They combine fuel efficiency with responsiveness and are a good choice for driving in urban and suburban settings. The price of these compact cars is between €12.000 and €20.000.

Compact cars, aimed at small families, reach 4,5 meters in length and have engines of at least 1.2 liters and 2.0 liters. This type compromises efficiency and performance, with prices between €15.000 and €25.000. The selection of models is based on sedans and hatchbacks.

Mid-size Cars: The mid-size car range suits family and business use. Its dimensions range between 4.5 and 4.8 meters, and its engines between 1.8 and 2.5 liters. These cars have diesel and gasoline engines, costing from €20.000 to €30.000.

Upper Medium cars are considered the most spacious; they must be more than 4,8 meters long, and their engines must be at least 2,0 liters. Many of these models incorporate high-displacement diesel and are known for their comfort, advanced technology, and powerful performance, which makes them quite expensive, from €25.000 to €40.000.

Luxury Cars are the same size as executive cars but with higher-quality materials and more powerful engines over 3 liters. Prices could range between €40.000 and more than €150.000.

Sports Cars, while not uniform in their construction, emphasize aerodynamic and compact body shapes, with engines specifically tuned for power and a minimum of 200 HP. These exhilarating machines start at €30.000 and can reach far above €100.000 in price, designed for enthusiasts who enjoy the driving experience.

SUVs/Crossovers are equally well-suited to everyday driving in the city and off-road action in the country. They come in small and large, with the small SUVs under 4.5 meters and the larger ones above this number. Engines start at 1,6 liters, with 4x4 often offered, and prices from €20.000 to €50.000 or more.

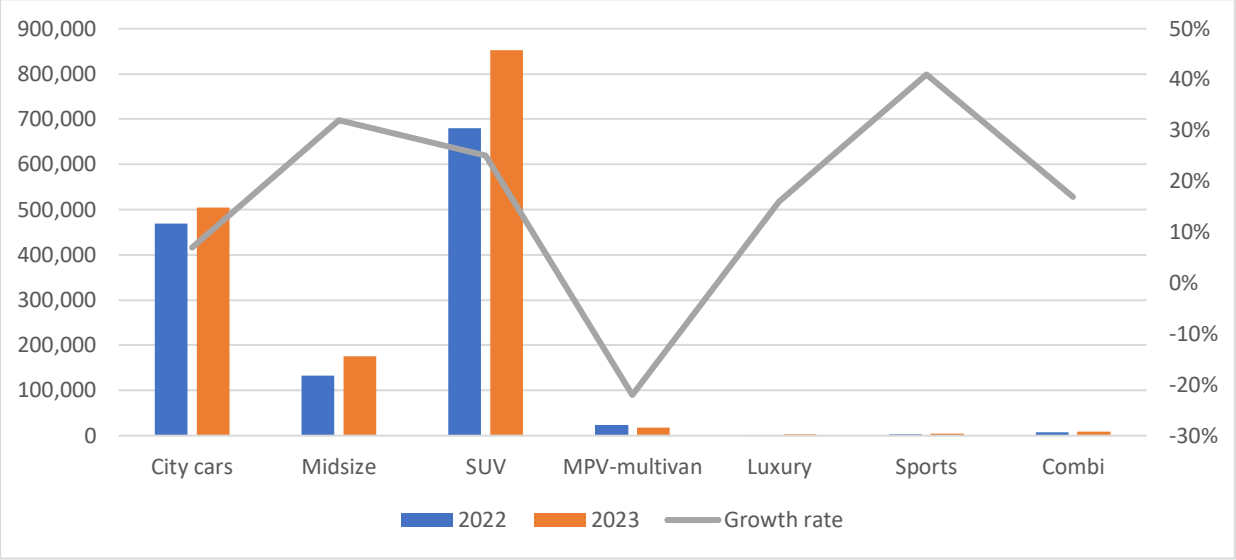
Minivans/Multi-Purpose Vehicles focus on interior space, and they are usually taller and broader than sedans. They are equipped with an engine of 1.5 to 2.5 liters. They mainly transport many people, especially families with many children. Their price range is €20.000 to €35.000.

Combi: Combining the comfort of a sedan with the space of an SUV, they fit all families. The price range starts at around €25.000 for the most basic models. It goes up to more than €100.000

for the swankiest of cars, with various engines, including efficient four-cylinders, more powerful V8s, and sometimes even hybrid and electric variants.

Figure 4 shows how the Italian automotive sector experienced massive growth, with increased registrations from 2022 to 2023. Total registrations increased from 1.316.926 to 1.565.331 units (19% growth rate).

Figure 2.4: Registration by segment (2022-2023)



Source: ANFIA

Table 2.4: Registration by segment (2022-2023)

Segment	2022	2023	Growth rate	MS (2023)
City cars	468.691	503.794	7%	32,2%
Midsize	132.442	175.370	32%	11,2%
SUV	679.359	851.840	25%	54,4%
MPV-Multivan	23.355	18.168	- 22%	1,2%
Luxury	2.239	2.602	16%	0,5%
Sports	3.612	5.082	41%	0,2%
Combi	7.228	8.475	17%	0,3%
TOTAL	1.316.926	1.565.331	19%	100,00

Source: ANFIA

Table 4 provides a more detailed overview of volumes and market shares, revealing that:

City cars(A+B): Italian consumers opted for these compact cars even more in 2023, by 7 %, after having already bought more in 2022 compared with the preceding year; in 2023, city cars posted 503.794 registrations, compared with the lower total of 468.691 in 2022.

Midsize Vehicles (C+D+E): This vehicle class's growth was substantial, from 132.442 to 175.370 units (32%, the second-highest growth among all segments after sports cars) and second to SUVs in actual development.

SUVs: Registrations of SUVs also underwent an unprecedented 25% growth, from 679.359 to 851.840. This shows that the demand for vehicles that are more agile in versatile terrain and more comfortable for passengers continues unabated.

MPV-Multivan: The MPV-multivan segment dropped 22%, from 23.355 registrations in 2022 to 18.168 in 2023.

Luxury cars: The top-performing volume category was the prestige sector, which again showed an increase of 16%. There were 2.239 prestige registrations in 2022 before reaching 2.602 in 2023. These vehicles will remain an increasingly stable niche, unaffected by fluctuations in the national economy. The wealthy consumers of such vehicles are relatively unaffected by economic fluctuations.

Sports Cars: The sports car class was the fastest growing segment, around 41 % growth, from 3.612 to 5.82 registrations. This is likely a combination of recession recovery, pent-up demand, and a heightened consumer search for a high-performance, image-laden machine as far as luxury expenditures can go.

Combi: The Combi segment saw a 17% increase from 7.228 to 8.475, as the utility products (often part-time passenger, part-time cargo vans) and the popularity of which works for both private drivers and commercial operators.

Figure 4 gives a view of a shifting Italian automotive market. There is a clear dynamic in all the segments, excluding MPVs. It shows the decreasing demand for this type of vehicle, suggesting some typical needs and consumer preferences have changed. Significant growth in both luxury and sports cars indicates the existence of a market segment immune to significant economic fluctuations if those cars are not cheap. Moreover, the most registered kinds of

vehicles are SUVs, and the mid-size segment follows the footsteps of the USA trend, suggesting an everlasting need for large spaces and overall versatility.

2.4 Legislation in the automotive industry

2.4.1 European Legislation

The European Union is introducing a robust framework for the European automotive industry to continuously improve environmental performance, safety, and innovation throughout the entire life cycle of cars, further decarbonizing road transport and improving citizens' health and safety.

EU governance has set strict emission targets for vehicles relating to CO2, NO2, and particulate matter emissions. Euro Standards started in 1992 with Euro 1 and have now reached Euro 6, which are performance standards reducing harmful emissions of gas and particles by 90-96 %. Regulation (EU) 2019/631 lays down global performance standards for CO2 emissions from new passenger cars and light commercial vehicles, introducing ambitious targets (95 grams per kilometer in 2020, 80 in 2025, and 60 in 2030). This is just one part of the broader picture, demonstrated by other regulations such as (EU) No 540/2014 on vehicle noise, the directive on mobile air-conditioning systems that phased fluorinated greenhouse gases, and other measures.

Alongside environmental measures, safety regulations have been a significant focus. Regulation (EU) 2018/858 of 30 May 2018, which repealed Directive 2007/46/EC, strengthens the ‘homologation standards for motor vehicles’: The regulation stipulated that all modern vehicle types across the European Union will be safer, greener, and better performers.

In addition to environmental policy, safety has been a significant element of regulation. Regulation (EU) 2015/758 required the installation of eCall, which improves emergency call-out times. Regarding advanced driver assistance systems (ADAS) and the move to driverless cars, various measures regulate the necessary tests and technicalities, including Commission Delegated Regulation (EU) 2023/2590, which sets out technical regulations regarding driver distraction warning systems.

With the European Green Deal, one of the three pillars of the EU environment strategy that aspires Europe to be climate-neutral by 2050, the move to electric mobility is crucial: the EU promotes purchasing electric vehicles and installing more charging points to have lower dependence on fossil fuels. Integrated into the European Green Deal, the European Strategy for Low-Emission Mobility envisions a clean, competitive, and integrated transport system

with high energy and environmental efficiency, low external costs, and greenhouse-gas-neutral road transport, in line with our ambitious objectives.

The EU imagines a coordinated whole-of-economy transition to a low-emission future, and the automotive sector will be radically transformed in line with Europe's most ambitious environmental ambitions. They will help reduce emissions, improve road safety, and promote technological innovation.

2.4.2 Italian Legislation

At the national level, in Italy, attention to sustainability in the automotive field is expressed through a series of laws and ordinances aimed at reducing the environmental impact of vehicles in circulation and ensuring their compliance through homologation and periodic inspections, as well as the development of related infrastructures, focusing on the growing popularity of electric mobility.

The eco-driving attitude is encouraged through fiscal incentives or local regulations, promoting eco-innovation in the automotive sector. Significant discounts for purchasing low-emission vehicles are provided through Ecobonus 7, which applies to electric, hybrid, and gas vehicles, with more substantial benefits if the latter replaces old polluting cars. Electric mobility is encouraged by further IRPEF[7]. Deductions for those who install the electric vehicle charging system in the home, fostering the advent of domestic facilities and infrastructures. Finally, at the local level, the so-called Low Traffic Zones (LTZ), set up by many Italian cities, limit access to more pollutant vehicles, enhancing the air quality and encouraging the use of alternative cleaner means of transport through benefits of access to LTZs free or reduced, free or reduced parking, internal use of preferential tracks for electric vehicles. Also, the installation of charging infrastructure is encouraged using tax breaks or loans provided to facilitate the access to and use of electric cars through public and private installations.

These instruments demonstrate how national and local interests dialectically intertwine to create a more sustainable automotive future, strengthen the adoption of green technologies, and contaminate people with a green attitude toward life.

[7] IRPEF (Imposta sul reddito delle persone fisiche): is a progressive, personal and direct tax. It is paid on income from employment, assimilated employment and business income, and the taxable persons are individuals.

The National Integrated Plan for Energy and Climate (PNIEC)[8] establishes Italy's intention to develop the necessary infrastructure that will enable electric mobility and sees State and regional interventions to make charging infrastructure available in all public and car parks and further incentives to private citizens so that everyone can install electric charging stations at home or in the business premises, with tax breaks and direct contributions to the cost of installation. Such actions are further evidence of Italy's efforts to take up the European and national contributions to a more sustainable automotive sector to reduce emissions, improve road safety, and make new technological options available.

2.5 Market Trends: Sustainability and Innovation

2.5.1 Driving Green: European and Italian Strategies in Automotive Sustainability

The European automotive industry is in a much more complex environment than before the COVID-19 pandemic. The war in Ukraine is still on, and the prices of logistics, raw materials, and energy are rising, the latter partly offset by special governmental incentives. The situation regarding the semiconductor shortage remains unseen, but it is improving.

Europe has confirmed stricter targets and new standards for CO2 emissions, marking a significant step in its climate agenda. The European Parliament finally approved this approach on 14 February 2022 in a final vote, by which the Regulation Proposal on CO2 emissions from cars and light commercial vehicles has binding, across-the-board reduction targets consistent with Europe's decarbonization goals for 2050: in short, phase out internal combustion engines by 2035. From that year, new cars must have a 100% reduction in CO2 emissions. From 2025, there will be a 55 % reduction in CO2 emissions for cars and a 50 % reduction for light commercial vehicles. From 31 December 2025, the European Commission must report on progress to date every two years and if further action needs to be taken.

In late 2022, the Commission submitted the Regulation Proposal for the new Euro 7 emission standards (substituting for the current Euro 6 and Euro VI regulations). These standards include new emission limits for all vehicle types and, for the first time, limits on emissions from tyres and brakes. The latest Euro 7 standards are scheduled to enter into force on 1 July 2025 for cars and light commercial vehicles and on 1 July 2027 for heavy vehicles.

[8]PNIEC it is the framework of measures for national implementation of European emission reduction commitments

In the first half of 2023, the European market for alternative-fuel vehicles (AFVs) grew by 26,5 % (a total of 3.281.845 units, or 49,8 % of total sales, which was an increase of 3,6 percentage points over the first half of 2022). After a slight increase from 2017 to 2019, the average CO2 emissions of new cars registered in Europe decreased 12% in 2020, the most significant annual reduction since 2010. The EU's target for all new vehicles to be emission-free by 2035 will require even greater efforts, with continued reductions over the coming years.

With 443.107 new AFV registrations in the first six months of 2023, Italy ranked fourth in the European market (EU27-EFTA-UK), after Germany (632.000 units), the UK (515.000 units) and France (458.000 units). The share of AFVs on the Italian market totaled 52,7% (of which 35,2% were traditional hybrids, 8,9% were LPG/Methane cars, and 8,5% were rechargeable ECVs). In the first six months of 2023, Italy maintained its leadership in the EU-EFTA-UK market for gas vehicles, with almost 45% of European sales (an increase of 11,9% in the first half of 2021) and ranked third in the European market for traditional hybrid cars, with 17,4% (a rise of 30,3%).

At the end of 2022, AFVs registered in the Public Vehicle Registry (PRA) accounted for 12,7 % of the circulating fleet. Battery electric vehicles accounted for 0,4 % of the total fleet, up from 0,3 % in 2021. The hybrid vehicle fleet (including PHEVs) totaled 1,6 million units (1,4 million with petrol engines and 172.000 diesel). In the case of gaseous vehicles, at the end of 2022, 2,970,000 LPG vehicles were in circulation in Italy, of which 2.900.000 were cars, accounting for 6,5 % of the total circulating fleet, while 1.082.779 CNG vehicles, of which 971.000 cars, which makes up just under 9% of the total circulating fleet. Gas cars continue, at least in the Italian context, to function as a 'bridge solution' towards electric vehicles. The gas crisis sparked by the Russo-Ukrainian conflict, rising prices, and banning the sale of new internal combustion engine vehicles have led to sharp declines in gas vehicle sales in Europe and a corresponding reduction in dealers.

Electric car sales rose 14.6% in Europe, the second-largest market, representing over one-fifth of all new cars. In the United States, the third-largest market, electric vehicle sales rose 55 % in 2022 to reach an 8% market share.

Italy is also becoming more electrified, thanks partly to recent purchase support measures. The €8,7 billion Automotive Fund will promote the private purchase of electric and plug-in hybrid vehicles and support firms converting their businesses through 2030.

The Italian automotive sector is undergoing a complete transformation. In 2022, over one-third of component companies were highly involved in electrifying powertrains. Although the car market in Italy decreased by 9.7% compared with 2021, traditional fuel vehicles declined even more, while mild and full hybrids saw their sales increase by 6.4%.

Stellantis is accelerating towards zero-emission mobility and leading in several countries through its electrified trajectory. Since 2020, Stellantis has more than tripled its 24 BEV models, with nine added in 2022 to nearly double its 24 BEV models by the end of 2024. The Peugeot e-208 and Fiat 500e are leaders in Europe in the electrified market. In March 2023, Stellantis announced that its Cassino plant in Italy would extend its production activities to manufacture vehicles based on the flexible BEV platform STLA Large – the core electric vehicle architecture developed for a broad family of future models with a range of approximately 800 km.

According to the latest report by the European Automobile Manufacturers' Association published in January 2023, the number of public charging points in the EU increased in 2022 by 49 %, reaching 450.478 by the end of the year, with more than 60 % concentrated in the Netherlands, Germany, and France. Italy currently boasts around 37.000 public chargers. This distribution indicates the need for a smoother distribution of different charging speeds across Europe. Recent Italian initiatives include government-backed projects to add more electric charging stations on highways and urban centers by 2026, with at least 13,755 100 kW chargers planned for urban areas and 7,500 150 kW chargers in provincial roads.

Development is pressing for domestic and condominium charging infrastructure, and public incentives will be essential. For example, Italy's Industrial Vehicle Automotive Fund will allocate €40 million for enormous subsidies for charger installations as part of a new network to improve coverage.

Fueled by ever-higher requirements on CO_2 emissions targets, production capacity in the EU-27 member states is booming. Production capacity for lithium-ion batteries for the components that are presently the best on the market for powering cars was 44 GWh in 2020, 70 GWh in 2022, and could reach 520 GWh by 2025. The EU Commission estimates that this increase in production capacity would generate 800,000 new jobs, which amounts to 'conservative' estimates of around 250 billion euros in annual economic activity.

Large amounts of finance have been directed to the development of the future battery, from the extraction of raw materials to its end-of-life processes, using two IPCEI (Important Projects of Common European Interest), where many Italian companies in the sector are actively involved.

In January 2023, Stellantis and Terrafame[9] signed an agreement for nickel sulfate supply (from 2025) for producing electric vehicle (EV) batteries. The deal is part of Stellantis' electrification strategy, which will cover a large part of its sustainable nickel needs (produced in the region of Finland where Terrafame operates). It is a significant step towards establishing a well-structured, transparent, and sustainable European battery cluster to meet the group's needs.

In addition, in 2023, Stellantis Ventures (the venture capital fund of the group Stellantis) invested in Lyten to accelerate the commercialization of Lyten 3D Graphene applications for the mobility sector.

Furthermore, collaborative projects are likewise pushing the greening of automotive manufacturing. For example, TISMEN, an industry consortium involving enterprises such as Asso Werke, is developing technologies for using hydrogen and CO2-neutral fuels in internal combustion engines.

2.5.2 Innovation toward a more sustainable scenario

The Italian industry landscape is slowly turning towards a more sustainable energy efficiency and eco-sustainability model by employing new technologies and rethinking processes, production methods, and systems to reduce carbon footprint and energy consumption. Here's a summary focused on data, statistics, and results:

1. In collaboration with Zerynth and the University of Pisa, Asso Werke developed the "Energetically Optimized Production of High-Performance Engine Components through Artificial Intelligence and Machine Learning" (EPICMAP) project to energetically optimize the production of high-performance engine components using artificial intelligence and machine learning to minimize production waste and energy consumption, to reduce the CO2 footprint per finished product unit.

2. *Sustainability Initiatives by Eltek:* In 2022, Eltek Inc. took additional measures to increase energy efficiency, such as installing heat pump systems, LED lighting, and new windows. This helped reduce the CO2 indicator by 6.99% compared to 2021 and 10% compared to 2018.

[9] Terrafame Oy is a Finnish metallurgical company that owns the Talvivaara mine and the Sotkamo metallurgical plant

3. *SKF and the Decarbonization Agenda*: Over the past two years, SKF has spent close to 12 million euros on investments in photovoltaics and used oil recovery, alongside fixed-price contracts for renewable electricity. It is also committed to decarbonizing production over the coming years to render the environmental impact of emissions neutral by 2050.

4. *Giletta and Green Innovations*: Giletta adopted green technologies, including a new-generation hybrid bending machine with lower energy consumption, replacing the old heating systems with highly efficient systems, and replacing the lamps with LED lights. These measures have drastically reduced energy consumption.

5. Persico and SMART Technology: Persico introduced SMART technology, which uses direct tool heating for quick component production, less energy and material consumption, and faster production rates.

These efforts represent a further development of energy efficiency and sustainability for the industrial sector, introducing new technologies and redesigning processes to reduce the environmental impact and improve efficiency.

The following data briefly evaluates the Italian vehicle-sharing sector in 2022. In particular, the carsharing segment did not perform well. 2022 was a very positive year for developing the Italian vehicle-sharing industry, although there were some drawbacks for the carsharing segment.

Carsharing is still the most widely used sharing service regarding kilometers traveled, although specific rentals also saw modest growth. Station-based car-sharing rentals rose by 3% over the previous year and by 15% in terms of kilometers traveled, while free-floating carsharing recorded a 7% increase in the number of rentals and a 33.5 % increase in distance covered, thanks to the expansion of use following the growth of micro-mobility services.

The fleet's electrification continued: 60% of the 1,300 carsharing vehicles were fully electric, up 6 percentage points over 2021, with free-floating carsharing showing an even more significant increase (15% compared with the previous year).

The ecological quality of the carsharing fleet was further improved: in 2022, 97% of the carsharing vehicles running on Italian roads were zero-emission, compared with 5,5% (or 3%) in 2021 of fossil-fueled cars.

These figures show a positive trend towards mobility sustainability and the use of green technologies for vehicle sharing in Italy, as well as an increasing commitment to providing more ecological and accessible services for the public.

As digital technologies such as virtual and mixed reality become more integral to the automotive industry, vehicle design, and production processes are becoming more cost-effective and time-effective. Meanwhile, the way cars are conceived in a new digital age, with sophisticated human-machine interactivity, is undergoing significant change.

Most automotive OEMs today are increasing their R&D efforts focused on autonomous driving and ADAS (Advanced Driver-Assistance Systems), intelligent vehicles, infotainment, mobility services, and smart cities. Many automation features, such as blind spot detection, emergency braking, and lane keeping, are commonplace in today's vehicles. These systems will continue to evolve to improve safety and meet customer expectations for ADAS functionality. Longer-term benefits of autonomous cars include increased accessibility, especially for people with limited mobility, and significant environmental benefits.

Nonetheless, moving from today's experimental automation trials to the large-scale road deployment of driverless cars would require far more legislative adjustments to enable the technical verification of its performance and integrate it into existing road traffic regulations. The Vienna Convention on Road Traffic has been amended to introduce the 'automated driving systems' concept from Level 3 ADS upwards to facilitate legal recognition. Once these guidelines are enacted, individual countries will implement and activate them. In Italy, for example, it will be up to the Ministry of Infrastructure and Sustainable Mobility to decide whether to revise the Road Code or clarify how the rules are applied.

Connected cars are one of the most important trends within the automotive sector. Targa Telematics, based in Treviso, is a leader in managing data from onboard units (OBU) supplied by vehicle manufacturers (OEM). This allows for data to be collected quickly and efficiently with real-time access to fleet information and offers the customer next-level solutions in digital mobility through a world of services and apps. The advantages of this service include the speed of service activation and the avoidance of having to install a device post-sale, avoiding technical downtime. Vehicles can be connected without installing further hardware by using OEM data streams. Everything needed is already embedded in the car, from production to disposal, thus reducing companies' environmental impact and carbon footprint. Through connectivity, fleet maintenance can be optimized. New intelligent mobility products can be

developed to reduce the number of vehicles in use and their use in general, such as corporate car sharing.

The company is Danisi Engineering, part of the Danisi Group, which has an offline activity in vehicle design and prototyping solutions for the automotive sector and an online activity providing simulation methodologies to reduce the number of physical prototypes and the amount of time spent on road and track testing. Danisi Engineering's latest project is on driving simulation for scenarios to develop and test ADAS control logic, either internally created or of interest to its customers. An example could be creating a specific scenario for tire friction standardization. In this way, OEMs can carry out some control calibrations before putting vehicles on the road, which cuts the development time and, in turn, emissions.

The need for environmental, social, and economic sustainability causes the challenges. In all their interactions with the accelerated digital dynamics, the automotive industry is experiencing a complex path of evolution. The Italian manufacturing chain can face a 'rupture' of the status quo and profound geopolitical instability by relying on innovation, flexibility, and the ability to reinvent itself to maintain its competitiveness in the international markets.

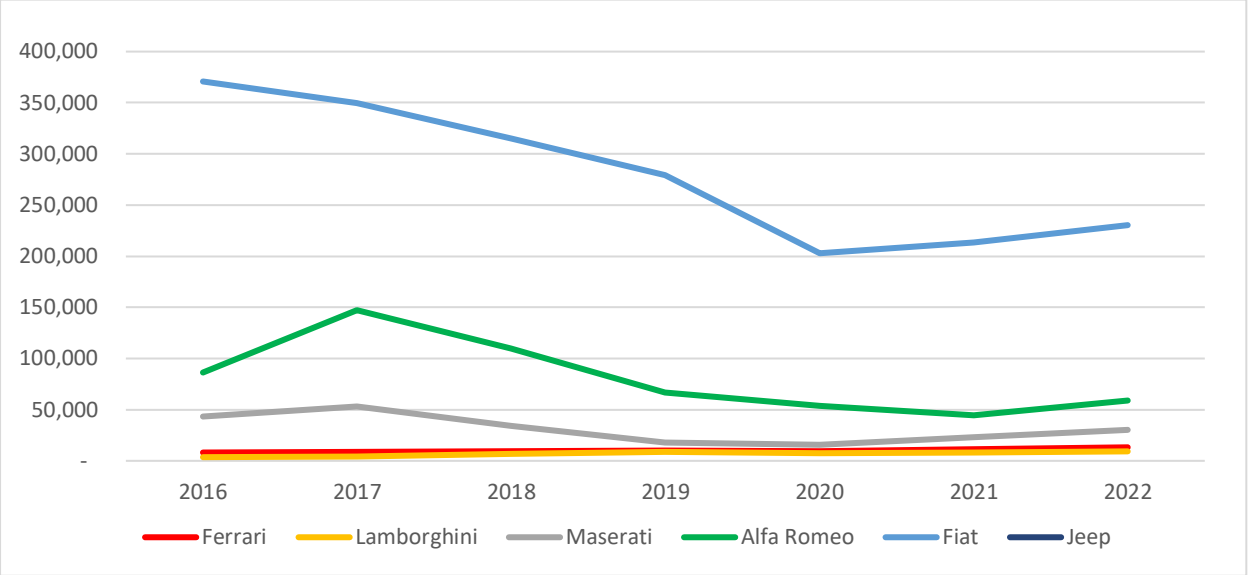
2.6 Competitive Landscape

2.6.1 National Production

The production of the Italian automotive brands presents quite different levels of performance. On the one hand, niche carmakers like Ferrari and Lamborghini (luxury sports car manufacturers) are growing. On the other hand, traditional mass-market brands like Fiat and Alfa Romeo perform poorly. Such a result represents a broader "global" trend, where consumers are moving toward more high-end and luxury products when purchasing a vehicle, and where carmakers belonging to a more traditional history are struggling more to adapt themselves to the rapidly changing consumer trends and the technically innovative services that they are used to.

Figure 5 shows a decline from peak years, and this could also be due to the general economic downturns and an increase in the production level of more sustainable and electric vehicles, which is in line with the global policies connected to environmental and market needs.

Figure 2.5 : National Production (2016 – 2022)



Source: ANFIA

Table 2.5: National Production (2016 – 2022)

Players	2016	2017	2018	2019	2020	2021	2022	MS 2022
Ferrari	8.125	8.956	9.416	10.131	9.119	11.156	13.221	3%
Lamborghini	3.579	3.934	6.577	8.659	7.358	8.405	9.233	2%
Maserati	43.272	53.125	34.312	17.582	15.698	23.360	30.246	6%
Alfa Romeo	86.186	147.245	109.814	66.552	53.791	44.483	59.213	13%
Fiat	370.802	349.499	315.011	279.020	202.893	213.632	230.379	49%
Jeep	201.007	179.883	198.066	160.528	162.967	141.371	130.052	27%
Total	712.971	742.642	673.196	542.472	451.826	442.407	473.194	

Source: ANFIA

From *Table 5,* the production scenario can be outlined, in particular:

Ferrari: From 2016 to 2022, production numbers have steadily increased from 8.125 to 13.221. This rate of 63% outlines a strong brand image in the media and a steady demand for purchasing luxury sports vehicles even in a broader economic crisis.

Lamborghini: Like Ferrari, Lamborghini has also shown steady growth, tripling its production from 3.579 vehicles in 2016 to 9.233 in 2022. This reflects the rising demand for high-performance luxury vehicles and the rise of the brand's model array.

Maserati: Maserati's numbers were the highest, at 53.125 in 2017, but they have been variable since then, dropping drastically to 30.246 in 2022.

Alfa Romeo: The company's sales have dramatically fallen, from a high of 147.245 units in 2017 to just 59.213 in 2022.

Fiat: a leading volume brand in the Italian automotive market, Fiat's production decreased from 370.802 in 2016 to 230.379 in 2022. As a mass-market brand, Fiat's performance is likely responding to how well Italy and Europe are doing economically and how confident consumers feel.

Dodge: In 2022, Dodge accounted for only 850 units in Italy. They just started selling Dodge here.

Jeep: Production numbers peaked in 2018, with 198.066 cars, before declining to 130.052 by 2022. Consumer preferences for SUVs and crossovers could explain The Total Market Size, which can be read vertically. The peak is in 2017, after which there was a steady decline, with small recoveries occurring in 2020 and 2021. Overall, the trends of Five-Car Firms and Small Car Firms indicate that car sales in Italy have been negatively affected by external economic factors.

Looking at the sales numbers, the luxury segment exhibits a certain degree of resilience, and this may depend on the fact that the people who buy this type of car belong to a group with a high disposable income, which is not easily affected by downturns.

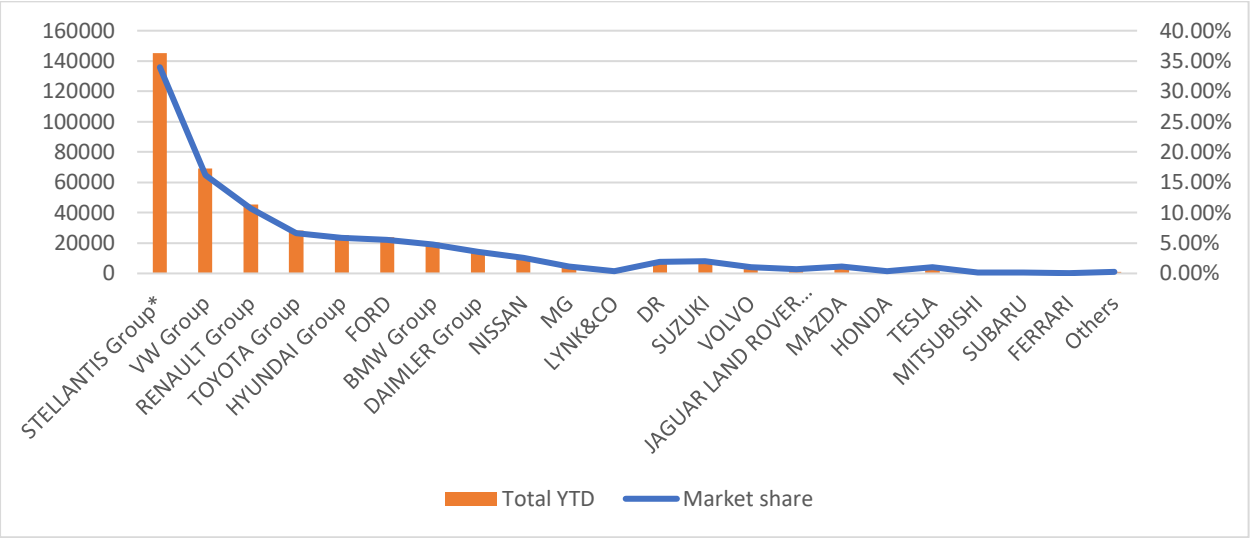
Italy is gradually following the example of the rest of Europe, where electrification of the automotive sector is progressing slowly owing to EU regulations to reduce carbon emissions. Italian luxury carmakers are incorporating hybrid and electric technology into their new models to conform to these CO2 targets while maintaining the vehicle's traditional handling characteristics. Ferrari has reportedly announced that it will increase its hybrid options and develop its first fully electric car by 2025, heralding a seismic shift in its approach to the art of supercar engineering.

2.6.1 National Registrations

Figure 6 provides a detailed overview of the Italian automotive industry's competitive landscape. It highlights how the market is dominated by a few major automotive groups that maintain strong positions through targeted segmentation strategies and a diverse product range. Stellantis Group stands out as the undisputed leader, with its broad portfolio appealing to

consumers across all segments. Volkswagen Group and Renault Group are significant competitors, each with a unique strategy to meet diverse customer needs.

Figure 2.6: Registrations by brand (2023)



Source: ANFIA

Marker share Stellantis Group is at the top of the Italian automotive market with a market share of 33,97%, selling 145.089 vehicles YTD. This shows a solid brand impact in the market and across different segments, reflecting the brand's strong position as a leader in a highly competitive market.

VW Group takes a share of 16,16% with 69.030 vehicles registered YTD; the broad range, including the more affordable to premium segments, maintains a stronghold in the market.

Renault Group follows with a 10,68% market share and 45.631 vehicles registered YTD. Their sustained strength in utility and electric vehicle segments indicates a stable demand for their models.

The middle market consists of Toyota Group, Hyundai Group, and Ford, with total figures ranging from 5,55% to 6,66%. In YTD, 28.421 cars were made from 517.601, 25.070 out of 498.684, and 23.700 copies out of 573.919, respectively. The market's dependence, economics, and recent hybrid and electric concentrations have won it a huge mass market.

BMW Group and Daimler Group hold significant positions in the premium segment with market shares of 4,79% and 3,52% and YTD totals of 20.437 and 15.018, respectively. This suggests that there remains a potential for luxury cars in Italy.

Tesla has gained traction with a market share of 1,07% and 4.550 vehicles registered YTD. As a brand exclusively focusing on electric cars, its increasing market presence underscores a growing consumer interest in environmentally friendly vehicles.

MG, Lynk & Co, and DR have smaller market shares of 1,2%, 1,1%, and 0,9% with YTD totals of 4.799, 1.441, and 8.110, respectively, indicating their presence in niche markets or signs of emerging opportunities.

Ferrari and Subaru, serving more specific market segments, have lower overall market shares, with YTD totals of only 202 and 755, respectively. They target luxury sports car enthusiasts and all-wheel-drive aficionados.

There are plenty of players, including Toyota (well-known for the hybrid) and Hyundai (expanding its electric-vehicle division), with numbers showing an increasing trend in going electric/hybrid. This phenomenon is likely brought on by greater awareness of environmental issues and fueled by environmental rebates/tax incentives from governments, as well as growing personal awareness of the benefits of 'green' transportation.

Notably, Stellantis's local importance can potentially explain the automotive company's significant lead: strategic mergers plus Italian-brand familiarity make for a formidable blend.

Tight competition between major global firms such as VW Group, Toyota, and Hyundai (highlighted by sharp price wars, ad spending, and national subsidies) signals the competitive landscape in traditional and alternative fuel vehicle markets.

The trend is that premium and luxury producers, despite their decline in the number of vehicles produced, manage to maintain a stable, though lesser, market share, showing that the Italian consumer still wants the utmost quality in terms of materials and performance. In 2023, the Italian car market will be influenced by prominent leading firms that still have substantial positions in the market compared with others. However, technological updates and changes in consumer mentality tend to impact market share progressively, especially in green, sustainable, and technologically innovative aspects.

Italian consumers feel a sense of belonging to cars, often expressed as a statement of personal style and status. This condition impacts their purchase decisions. Consequently, customers prefer luxury cars with performance, elegance, and style. For manufacturers, the challenge is posed by the need to relocate the new EVs towards the traditional values and emotional characteristics that Italian consumers attribute to luxury cars.

Despite this growing enthusiasm for sustainability and the recent explosion in the uptake of electric vehicles globally, Italian consumers have yet to be willing to embrace fully electric models. Concerns about range, availability of charging infrastructure, and the perceived loss of the sensory feedback typically experienced in an ICE vehicle reportedly block Italians' transition to eco-driving. Consequently, Italian manufacturers are concentrating their focus where they have traditionally excelled most, debuting a wave of high-performance hybrids that will bridge the desire to lower one's carbon footprint and the characteristic driving dynamics of traditional Italian sports cars.

Today, the Italian luxury automotive sector is facing a double challenge. Not only must it modernize in terms of technology and sustainability, but it must also prepare for radical changes in mobility and the demands of a new, hyper-digitized generation of consumers. If the automotive past of Italy were shaped primarily by the cult of design and performance, the automotive future would have to accommodate new technologies that must still comply with stringent norms and constraining environmental standards while creating the same emotional 'chills' for customers. The next step for Italy's automakers will be to develop design and technology that pays tribute to the past while boldly moving into the future of mobility.

2.7 The Luxury Car Market

2.7.1 Global overview

The world luxury car market was worth USD 617.36 billion in 2022, and the growth over the years has been substantial, propelling a CAGR of 6,9% between 2023 and 2030. The increasing worldwide pool of upper- and upper-middle-class people with soaring disposable income is a significant driver for such growth, combined with the explosion of the number of ultra-high-net-worth individuals. Since successful careers and more time for hobbies will give consumers increasing leisure time, governments are incentivized to cut work time and boost an already bloated service sector. However, tempting customers to spend their free time in cars will require government support, as cash subsidies and tax relief on EVs are crucial as long as not enough 'clean' energy is available to recharge them (which will only be achieved at far too high a cost to generate profits with mass-market cars). Luxury OEMs focus heavily on cutting-edge smart mobility functionalities, especially 'autonomous driving' and 'personal voice assistance,' to drive sales.

Meanwhile, customer requirements across the market shift towards personalized experiences. This is especially true in the luxury segment, which strives for 'authentic and unique

experiences. These customers favor online visual shopping experiences and expect an exclusive sales experience with website personalization and a chauffeur-driven car for visits. On the service side, they demand stylish and personalized chats, rooms, and a coach who provides handholding and support.

SUVs have the highest share of the overall market, at 57,6%, followed by hatchbacks and sedans. SUVs are gaining popularity because of their convenient driving experience, safety, and, to some extent, practicality and styling.

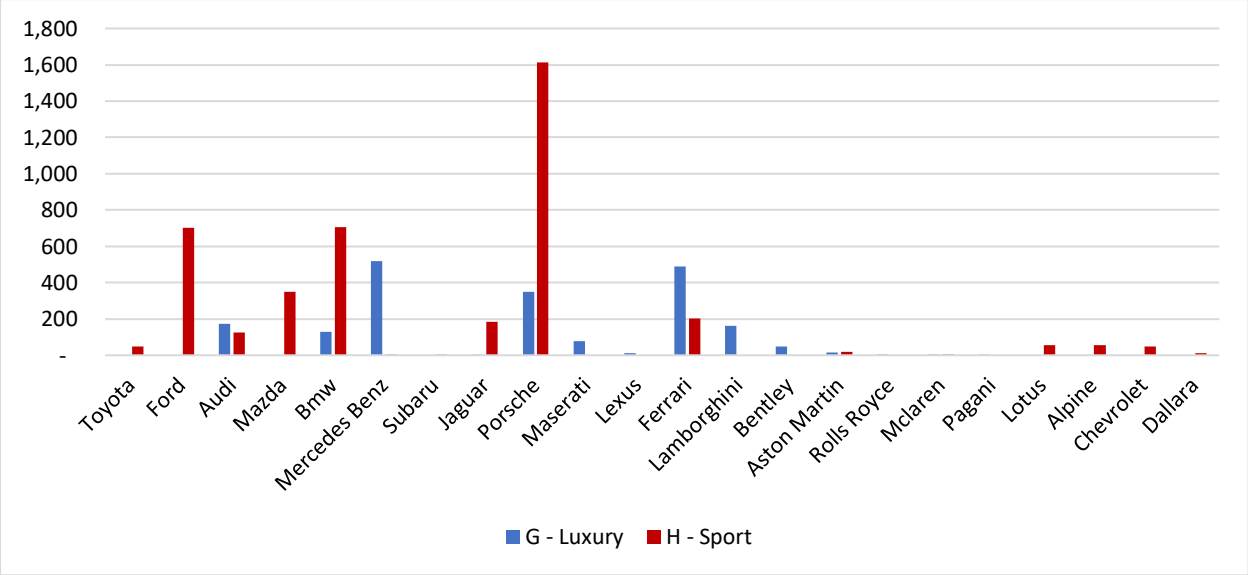
The forecast period indicates that Hatchbacks are projected to have the highest CAGR of 6.8% due to the rise in consumer income, increased number of new models launched, and easy availability of loans.

Based on propulsion type, the market is divided into two parts: Internal combustion engines (ICE) and Electric vehicles. Internal Combustion Engine caters to a market portion of 70,2% in 2022 with a CAGR of 6,5%. In contrast, electric cars are projected to have the highest CAGR of 7,8% because of government support towards the decarbonization of transport.

By geography, in 2022, the market for luxury cars in Europe accounted for 39,3%. Europe is also expected to remain the largest market with a CAGR of over 6,1%. Due to the significant rise, Asia-Pacific is expected to record the highest CAGR of 8,2% during the forecast period.

2.7.2 Italian Overview

Figure 2.7: Registration in Italian luxury and sports segments by brand (2022



Source ANFIA

Table 2.6: Registration in Luxury and sports segments by brand (2022)

Brand	G - Luxury	H - Sport
Toyota	-	49
Ford	-	702
Audi	174	124
Mazda	-	350
Bmw	130	704
Mercedes Benz	520	1
Subaru	-	1
Jaguar	2	183
Porsche	350	1,612
Maserati	79	-
Lexus	13	-
Ferrari	490	202
Lamborghini	161	-
Bentley	49	-
Aston Martin	16	18
Rolls Royce	5	-
McLaren	4	4
Pagani	3	-
Lotus	-	57
Alpine	-	55
Chevrolet	-	47
Dallara	-	13
Total	1,996	4,122

Brands can be divided into three categories: those that produce exclusively luxury vehicles, those that produce exclusively sports vehicles, and those that deliver both, and in particular:

Luxury-only brands (Maserati, Lexus, Rolls Royce, Bentley, Lamborghini, Pagani) focus solely on the luxury segment, which suggests a strong positioning regarding premium features, exclusivity, and potentially higher price points. Their market strategy likely emphasizes quality over quantity, aiming to attract consumers seeking prestige and status.

Sport-only brands (Subaru, Lotus, Alpine, Chevrolet, Dallara) concentrate exclusively on sports models. This specialization might allow them to focus on performance, speed, handling, and lightweight construction innovation. These brands attract enthusiasts and are likely associated with racing and high-performance capabilities.

Brands producing Luxury and Sport (Audi, BMW, Mercedes Benz, Jaguar, Porsche, Ferrari, Aston Martin, McLaren) serve both luxury and sports segments. This dual focus allows them to cater to a broader market, appealing to high-end luxury buyers and performance enthusiasts. This approach can provide a competitive advantage regarding market reach and brand prestige.

Porsche and Ferrari show a solid presence in both segments but with a significant emphasis on sports models, indicating a robust performance image coupled with luxury.

Mercedes Benz and Audi show a solid footing in the luxury category but also maintain a notable presence in the sports segment, demonstrating their versatility and broad appeal.

Brands that effectively bridge luxury and sports models can tap into two lucrative markets simultaneously, but they require significant investment in technology and design to meet the high standards of both segments.

While more niche, exclusive luxury or sports brands can capitalize on their specialization to cultivate brand loyalty and a distinct identity, which can be particularly effective in maintaining high-profit margins and brand value.

The higher numbers in the sports category suggest a vibrant market for high-performance vehicles, possibly driven by younger demographics and emerging markets that prefer sportier designs and capabilities.

2.8 Conclusion

Luxury car brands go beyond just getting where you need to go. They represent a combination of sparkling performance, unmatched comfort, leading-edge engineering, and, most importantly, exclusivity. Along with being status markers, the automotive luxury elite generally have been cutting edge in the technology department. Mercedes-Benz, BMW, Audi, and Ferrari are not just car companies. They are century-old institutions that define how the West perceives success and status.

Originally, owning any car was a luxury, but as automobile ownership became democratized, a discrete market segment formed at the top of the spectrum. Over the century, almost ceaseless innovation has shaped the luxury car market. Every manufacturer sought to make the next car better than the last in terms of power, safety, and luxury.

Interestingly, technological disruption and growing consumer expectations in recent times have affected the sentiment of the luxury car market and driven its growth. Cars today are no longer just about their leather interiors or powerful engines; they must also include some or all of the sophisticated display and tech systems that enable autonomous driving, an assortment of infotainment and connectivity options, and extensively upgraded user interface experiences. Moreover, driven by immense consumer awareness of the ecological damage caused by fossil-fuel combustion engines, automakers are redefining luxury for themselves and increasingly emphasizing green technology. One notable reflection of this trend is the growth of luxury EVs, which promise to deliver the brand image of luxury cars with the added environmental advantage offered by EVs.

As the luxury automotive sector grows and produces increasingly high-tech and trendsetting vehicles, it's not resting on its laurels—it's innovating and adapting to its customers. Eyeing the future, the mash-up between luxury, technology, and 'green' criteria will create new benchmarks for what constitutes the sportscar of the future.

Addressing the present-day conversation about the future of the luxury automotive market, the electrification of cars symbolizes an existential issue for high-performance car manufacturers such as Lamborghini. Lamborghini's CEO Stephan Winkelmann alluded at a recent press conference to a hybridization strategy as an interim, stop-off solution that gradually allows the ICE to prepare for the inescapable electrification process. In his explanation of future Lamborghini models, Winkelmann's remarks epitomize a growing trend of niche manufacturers (luxury and super-sportscars) that try to achieve a balance between two forces:

the push for near-to-zero emissions by regulatory authorities on one hand and the cherished values displayed by these brands, such as sound and mechanical emotions fueling the car-buying choice, on the other.

With the carmaker's senior executive admitting that there is 'no real alternative to an all-electric vehicle to ensure zero emissions,' Winkelmann's comments also identify the plain trend established by our legislative bodies around the CEO's comments: he accepts electrification can never be a reality so long as on a global scale.

The analysis of the Italian automotive market reveals a rapidly evolving landscape. The transition towards electrification is gaining momentum, although traditional internal combustion engine (ICE) vehicles still have a strong presence.

In 2023, battery electric vehicles (BEVs) accounted for only 0.5% of the circulating fleet in Italy, approximately 205,000 units, a relatively low figure compared to the European average. However, the registrations of electric vehicles are growing at 34.77% from 2022 to 2023, indicating increasing consumer interest and acceptance of these technologies. Hybrid cars, including mild and full hybrids, represent 5.4% of the circulating fleet and are showing a rise in sales, with a growth rate of 25.42% over the same period.

ICE vehicles, including petrol and diesel, still dominate the Italian market, making up 43.3% and 41% of the circulating fleet, accounting for over 84% combined. Despite a slight growth in petrol vehicle registrations (+22% from 2022 to 2023), diesel vehicles have seen only a modest increase (+6%) with a reduction in their overall market share. The decrease in production and sales of ICE vehicles aligns with regulatory pressures to reduce CO2 emissions and the increasing restrictions on polluting vehicles.

The luxury car market, which includes brands like Ferrari, Lamborghini, Maserati, and Porsche, shows resilience despite global economic challenges. In 2022, Ferrari produced 13,221 units, growing by 63% since 2016, while Lamborghini tripled its production in the same period, reaching 9,233 units. Registrations of sports and luxury cars continue to grow, with sports cars experiencing a 41% increase in registrations between 2022 and 2023. This segment benefits from a wealthy consumer base less affected by economic fluctuations.

Historically renowned for their performance and high-quality craftsmanship, Italian luxury brands are facing a significant challenge: adapting their offerings to meet the increasing demands for sustainability and emission reductions. Ferrari, for instance, has announced the

launch of its first fully electric car by 2025, marking a significant shift for a brand traditionally focused on performance and the distinctive sound of combustion engines. With its "Direzione Cor Tauri", Lamborghini is introducing hybrid models as an intermediate step towards full electrification, striving to retain the distinctive characteristics of its sports cars while complying with environmental regulations.

These efforts represent a delicate balance between the technological innovation required to meet regulations and sustainability expectations and preserving the core values of luxury brands, such as driving excitement and exclusivity. Adopting synthetic fuels and exploring new technologies, like additive manufacturing, are examples of how luxury car manufacturers seek solutions to maintain their brand identity in an increasingly electric market.

Ch. 3 Literature review

3.1 Willingness to Pay (WTP)

Willingness to Pay is rooted in consumer theory, representing a monetary expression of the utility derived from a product or service (Hanemann, 1991). It is widely applied in economics to measure consumer preferences, estimate market size, and set prices. It measures consumer surplus, the difference between a consumer's willingness to pay and the amount they spend, and the measure of subjective value over the market price (Marshall, 1890). It follows the theoretical underpinning of utility maximization, where consumers seek the most satisfaction they can afford.

The theoretical underpinnings of WTP align with the utility maximization principle, where consumers aim to achieve the highest level of satisfaction within their budget constraints. In this context, WTP is not merely a function of financial capacity but also the perceived benefits and costs associated with the purchase (Lancaster, 1966). The utility derived from a product can be multifaceted, including functional benefits, emotional satisfaction, and social value, all of which contribute to a consumer's WTP.

Brandenburger and Stuart (1996) introduced a value-based strategy framework emphasizing the dual aspects of value creation and capture in understanding WTP. In this model, creating value translates to making more benefits for the company's product relative to alternatives, which will, in turn, raise the WTP of consumers. Conversely, value capture involves setting prices so the firm retains some of the value created. This approach suggests that companies must develop a better product (creating value) and know how much consumers are willing to pay for their product relative to alternatives. The Brandenburger and Stuart framework also highlights the importance of competitive positioning in value capture. Pricing power, and thus profits, depend significantly not just on the WTP of consumers in absolute terms but on how the firm's offering compares to the alternatives. This relative WTP becomes a key determinant of pricing power and profitability, guiding firms in their strategic decisions regarding product differentiation, branding, and innovation (Brandenburger & Stuart, 1996).

Determinants of WTP

WTP is affected by several factors that fall into two groups: intrinsic and external to the product but part of its context (external contextual variables).

1. *Perceived value*: It is the consumer's overall assessment of the product's utility based on perceptions of what is received (benefits) and what is given (costs) (Zeithaml, 1988). Perceived value can be related to multiple dimensions: quality, utility, emotional satisfaction, and status. Dodds, Monroe, and Grewal (1991) reported a positive relationship between perceived quality and WTP; consumers are willing to pay more for products they believe to provide superior performance or duration.

Moreover, marketing and branding significantly impact both perceived value and WTP. Effective branding can increase perceived value by creating a robust and meaningful image that appeals to the consumer's self-concept or social aspirations (Aaker, 1996). For instance, this explains the higher WTP observed for premium brands: consumers pay for products that convey luxury, exclusivity, and high social status (Kapferer & Bastien, 2009). Perceived value represents not only a product's functional benefits but also its psychological and symbolic value.

2. *Brand equity*: emphasize that strong brands build customer trust, reduce perceived risk, and create emotional connections that drive higher WTP. Firms charge premium prices for branded products thanks to consumers' positive associations and loyalty towards well-known brands (Aaker, 1996; Keller, 1993). Netemeyer et al. (2004) provide evidence by showing that brand equity elements (e.g., perceived quality and brand loyalty) are positively related to WTP. A study by Erdem, Swait, and Valenzuela (2006) found that brands with a strong reputation (closely tied to brand equity) for quality and reliability could command higher prices because consumers perceive them as lower-risk options. Furthermore, the effect of brand reputation on WTP is not limited to luxury brands; it extends to everyday goods where trust and consistency in performance are valued (Chaudhuri & Holbrook, 2001).

3. *Income levels and demographic factors*: Higher-income consumers typically exhibit a greater WTP due to less budgetary constraint, allowing them to focus more on product benefits and less on price (Hanemann, 1984). Demographics such as age, gender, and education also play roles in shaping consumer preferences and WTP. For instance, younger consumers may value innovation and technology more, leading to higher WTP for cutting-edge products (Statista, 2021).

4. *Cultural and regional differences*: Cross-cultural dimensions, such as individualism versus collectivism, impact how much value people perceive in a product or service and how much they are willing to pay for it (De Mooij & Hofstede, 2011). This means that in more collectivist cultures, WTP can be significantly influenced by social approval and brand loyalty, while in more individualist cultures, personal enjoyment or the specific unique properties of a product or service might be more critical.

5. Differentiation: Premium products, such as those that offer attributes with differentiation, should be able to command relatively higher WTP. Indeed, Tellis and Gaeth (1990) claimed that attribute-based differentiation (based on product attributes valued by consumers) can justify premium pricing. Innovation is significant in technology-driven markets where consumers would be willing to pay more to own the latest must-have attributes or functioning (Rogers, 2003).

Pine and Gilmore (1998) said that differentiation does not depend exclusively on dimensions of the physical good; creating a memorable experience (storytelling) can add to the perceived value and thus increase the WTP. This is reflected in industries that rely strongly on the brand narrative and the customer experience, such as luxury goods and cars.

Alongside overt rationale, the feelings or emotions/psychology attached to a product are also factors in WTP. Emotional connection with a good, such as joy, pride, or nostalgia relating to a product, can further elevate WTP (Lichtenstein et al., 1993). Emotional branding, which creates a strong bond between the consumer and the brand, is particularly effective in increasing WTP (Morrison & Crane, 2007).

6. *Psychological factors*: Psychological factors such as the desire for status, the need for uniqueness, or ethical considerations (e.g., environmental sustainability) also influence WTP. For instance, Heffetz and Frank (2011) found that status-seeking behavior can drive higher WTP for luxury goods, while ethical consumerism leads to higher WTP for products that are perceived as socially responsible or eco-friendly (Auger et al., 2008).

7. *Market conditions*: Contextual variables, such as competitive pricing, economic environment, and availability of substitutes, also shape WTP. Consumers' WTP can fluctuate based on external factors like economic downturns, which increase price sensitivity, or the presence of solid substitutes that lower WTP for the original product (Breidert et al., 2006). Additionally, situational factors, such as the urgency of need or the purchasing context (e.g., in-store vs. online), can lead to variations in WTP (Grewal et al., 2003). Online environments,

for example, often see lower WTP due to easier price comparisons and reduced perceived value of physical interactions (Degeratu et al., 2000).

3.2 Purchase Motivations for Automobiles

The automotive market is dynamic and highly competitive, driven by diverse consumer motivations that shape purchasing decisions. Understanding these motivations is crucial for automotive manufacturers, marketers, and policymakers seeking to align their strategies with consumer preferences. The literature identifies various factors influencing automobile purchase decisions, including economic considerations, brand perceptions, technological features, environmental concerns, social and psychological influences, demographic differences, and cultural factors.

1. *Economic considerations* are among the most critical factors influencing automobile purchases. Price sensitivity, fuel efficiency, and overall cost of ownership significantly impact consumer decisions (Smith & Chang, 2017; Turrentine & Kurani, 2007). According to Nica (2020), consumers perform a cost-benefit analysis weighing upfront costs against long-term savings, such as reduced fuel spending and maintenance costs. The total cost of ownership that account for insurance fees, taxes, and depreciation is also fundamental to the decision, according to Wang et al. (2019), who state that they figure prominently in shaping purchase decisions.

2. *Brand perception* is crucial in purchasing a vehicle, influencing its quality, reliability, and social status (Bansal & Taylor, 2015; Keller & Lehmann, 2019). Reliable, safe cars built by branded companies like Toyota and Honda are more likely to receive repeat purchases and higher loyalty than those built by less secure or less reliable companies (Steenkamp et al., 2003). Luxury brands like Mercedes-Benz, BMW, and Audi are bought because customers aspire to prestige and social recognition (Kapferer & Valette-Florence, 2016). Brand loyalty is nurtured by past positive experiences, a strong brand identity, and successful marketing strategies (Aaker, 1996). Brand equity is more than recognition; it includes emotional attachment and customer trust (Kotler Keller, 2015). According to Ha Perks (2005), brand image and trust are the core factors in enhancing customer satisfaction and loyalty that can make or break the car market.

3. *Technological innovations* that automotive manufacturers increasingly rely on to differentiate themselves. Automation and incremental improvements in safety, connectivity, and convenience features are now essential to consumers who have come to expect the latest

technological advancements (McKinsey Company, 2016). Today's vehicles feature advanced driver-assistance systems (ADAS), autonomous driving capabilities, and increasingly sophisticated electric propulsion systems, reflecting a growing demand for technologically sophisticated vehicles (Thompson et al., 2020). Nearly 50 percent of global consumers say advanced technology is one of the most critical factors in their vehicle purchase decision today (Deloitte, 2021).

4. *Environmental issues* have changed consumers' expectations in the car market, and they motivate vehicle purchases towards vehicles that reduce carbon footprint. As a result, electric vehicles (EVs) and hybrids have emerged as the most sustainable and environmentally friendly modes of transport (Rezvani et al., 2015; Egbue & Long, 2012). KPMG (2020) reports that more than 60 percent of consumers worldwide are ready to consider an EV for their next car purchase and cite the environmental advantage of such vehicles as the main driver. High cost and limited infrastructure for charging points, as well as range anxiety, are the main barriers to the use of EVs (Sovacool et al., 2018). Tax rebates and subsidies from the government offer policy incentives to price them in the range of conventional cars, reduce their TCO (total cost of ownership), and hence facilitate consumers' uptake (Hall Lutsey, 2017). Public perception of the brands also plays a significant role in purchase; this depends mainly on the regulatory responses and environmental campaigns by the automotive companies, such as Tesla, that leverage the green nature of their CSR (corporate social responsibility) activities to build a devout following (Mangram, 2012).

5. *Social and psychological factors*, such as self-expression, status, and lifestyle projection, are essential determinants of automobile purchases (Sirgy et al., 2017). Automobiles reflect personal identity and material status, and consumers often select products that resonate with their values, aspirations, and social circles (Solomon, 2020). Symbolic consumption, which is purchasing to communicate social meanings to others about their success or environmental awareness, also plays a crucial role in consumption behavior (Vigneron & Johnson, 2017). Emotional attachment to brands or models, often related to feelings of nostalgia or heritage, can also influence purchases. Loveland, Smeesters, and Mandel (2010) found that consumers with a high need for belonging tend to prefer nostalgic brands that evoke positive memories and emotions. Moreover, peer influence and social media have a compounding effect on shaping perceptions and preferences as digital platforms increasingly impact consumer decisions (Hennig-Thurau et al., 2010)

6. *Demographic variables* (age, gender, income, education, etc.) influence motivations for automobile purchases. Younger consumers tend to consider technological integration and sustainability more important than older consumers, who place greater emphasis on factors such as reliability and comfort (Holmlund et al., 2020). Gender also influences purchase motivations, with men often emphasizing performance and brand prestige and women focusing more on safety and practicality (Noble et al., 2006). Income levels influence buying preferences through the likelihood of purchasing a specific vehicle type, with higher-income consumers preferring luxury and premium brands (Satista, 2021). The educational level, in turn, impacts the choice of car and the decision to purchase it. Being better informed on environmental and technological innovations, more educated consumers are more likely to choose eco-friendly or technologically advanced vehicles (Ziefle et al., 2016).

7. *Cultural factors* can strongly influence what motivates people to buy cars, and there are different patterns in how and why people buy vehicles across regions and in various cultural contexts. While in individualistic cultures, people are more prone to purchase a car because of their desire and the way it expresses their personality, in collectivist cultures, the family's voice and what is expected of them in society might strongly influence the purchase decision (Lambert-Pandraud Laurent, 2010). Another important aspect of cultural influence is that different countries value luxury, technology, or environmental considerations differently (Schefer et al., 2020). This means marketing strategies and campaigns must target different cultures to resonate with local audiences. For instance, environmentally conscious consumers in Nordic countries are more likely to purchase electric vehicles. In contrast, American consumers might prefer more extensive and powerful vehicles when buying their next car (Sovacool Axsen, 2018).

3.3 Motivation for Luxury Consumption

Luxury goods are consumed by signaling, quality, exclusivity, and hedonic motives relating to status, emotional satisfaction, and personal expression.

1. *Conspicuous Consumption*: Luxury goods are status goods consumers buy to signal wealth and social class. Therefore, the motivation for such conspicuous consumption is consistent with Veblen's theory, which states that people buy luxury goods to signal high status and rank within a social hierarchy. to differentiate themselves (Vigneron & Johnson, 2004; Veblen & Galbraith, 1973).
2. *Quality*: Luxury consumers value high-quality craftsmanship, superior technological features, and technical perfection. Because luxury brands are associated with high quality and technical excellence, signs and symbols that suggest quality-related expertise are highly valued by luxury consumers (Kapferer & Bastien, 2009; Vigneron & Johnson, 2004).
3. *Uniqueness*: Consumer desire for exclusivity and differentiation is a key driver for luxury consumption. Limited production runs, customization of products, and a sense of uniqueness add value to luxury goods (Dubois et al., 2001; Bain & Co, 2014).
4. *Hedonism:* The pleasure and emotional satisfaction of owning or consuming luxury goods. This motivation reflects luxury consumption's sensory and experiential aspects (Kivetz & Simonson, 2002; Berthon et al., 2009).

A complex interplay of internal and external motivations drives luxury consumption, which ranges from personal gratification and emotional satisfaction to social signaling and status demonstration. This understanding of motivations is essential for luxury firms in developing a tailored product range to meet customers' expectations and desires (Eastman & Eastman, 2015; Vigneron & Johnson, 1999).

Two types of motivations guide consumers in purchasing luxury products: internal and external.

Internal Motivations are self-referential and intrinsic:

1. *Hedonic Gratification*: Luxury goods offer substantial hedonic returns (emotional payoffs and pleasures) through design, performance, and exclusivity. The pleasure and novelty incentive underwrites this motivation (Kivetz & Simonson, 2002).
2. *Self-reward*: Purchasing luxury goods can also be a self-reward incentive, with consumers treating themselves for their efforts and accomplishments. This self-reward motive tends to be especially powerful as consumers increasingly interpret luxury purchases as signals of personal success and achievement (Eastman & Eastman, 2015).
3. *Perfectionist desires*: Perfectionist consumers prefer luxury goods for their craftsmanship, innovation, and detail and demand products that offer better qualities and distinctiveness than other alternatives (Eastman & Eastman, 2015).

External motivations are social and extrinsic factors:

1. *Social status and signaling*: Consumers aspire to own expensive, high-status products to signal that they are more successful than others, that they can afford such costly luxuries, and that they are unique (Veblen & Galbraith, 1973).
2. *Snob appeal*: The snob appeal of luxury consumption is related to exclusivity; customers desire to feel different ('better than') from the crowd, to be proud of their status possessions, especially if their possessions are unavailable to most people, making them feel special (Vigneron & Johnson, 1999).
3. *Peer Influence*: Social norms and peer influences are strong determinants of luxury consumption. Belonging to certain social circles can compel individuals to purchase luxury items to align with their peers and feel accepted (Sheldon & Kasser, 2001).

The reasons for buying luxury goods can change with age and self-concept. Young adults, who are more focused on creating an identity, are more strongly influenced by peer acceptance and external validation. At the same time, middle-aged consumers tend to favor luxury consumption more for personal expression and less for outward identity signaling (Sheldon & Kasser, 2001).

Analyzing different models of luxury consumption helps to understand the deep, multifaceted, and sometimes conflicting motivations influencing luxury purchases. The model provided by Brun and Castelli (2013) identifies three fundamental dimensions of luxury consumption: content, social, and form, from which arise five primary consumer profiles:

- Quality Lover**:** Prioritizes high-quality craftsmanship and tangible product attributes.
- Fashion Victim**:** Driven by emotional appeal and recognizable style.
- Tech Addicted**:** Passionate about technological advancements and innovative features.
- Luxury Admirer**:** Seeks exclusivity and personalized luxury experiences.
- Hedonist**:** Values aesthetic and philosophical aspects of luxury, appreciating simplicity and imperfection in high-end products.

These consumer profiles highlight how individuals engage with luxury, providing insights into how brands can cater to different motivations within the luxury market.

3.3.1 Concept of luxury car

The concept of luxury in the automotive industry has evolved from simply offering high-performance vehicles to creating holistic luxury experiences. This evolution includes advancements in technology, design, and customer service. For instance, brands like Ferrari and Rolls-Royce limit their production capacity to maintain exclusivity and high perceived value among consumers (Kapferer, 2012). Additionally, the modern luxury car market has seen the introduction of "affordable luxury" models, which complicate traditional categorizations but expand the appeal of luxury cars to a broader audience (Kapferer & Bastien, 2009).

The concept of luxury has significantly evolved, and despite the numerous proposed definitions, the automotive industry continues to seek a definition that captures the peculiarities of what makes a car not just a mode of transport but a symbol of status, prestige, and exclusivity. According to Dubois et al. (2001), luxury can be identified through six aspects.

1. High Price: Luxury vehicles command premium prices, reflecting superior quality and exclusivity.
2. Excellent Quality: These cars exhibit top-notch craftsmanship, using high-quality materials and advanced technologies to ensure exceptional performance and longevity (Kapferer, 2012).

3. Scarcity and Uniqueness: A famous statement by Enzo Ferrari, the founder of the brand, “Ferrari will always deliver one car less than the market demand,” embodies this concept. Limited production runs and bespoke options enhance the exclusivity of luxury vehicles, making them desirable to consumers seeking uniqueness (Bain & Co., 2014).
4. Aesthetic Appeal: Luxury cars often feature distinctive and visually striking designs that appeal to consumers' sense of style and status.
5. Heritage and History: Many luxury brands have a rich history and heritage that add to their prestige and allure (Dubois et al., 2001).
6. Exclusivity and Personalization: The ability to customize and personalize features according to individual preferences further elevates the status of luxury vehicles (Kapferer & Bastien, 2009).

These attributes differentiate luxury cars from standard vehicles, offering their owners a superior driving experience and status symbol.

Luxury Car Classification

The classification of luxury cars often overlaps with various vehicle segments, making it essential to understand the distinctions. Table 1 combines three car classification systems: the model from Nunes et al. (2016), which includes European NCAP and American EPA classifications, and the ANFIA classification used previously to align with my standardization study of the Italian market. The merging of these systems helps ensure that the characteristics specific to the Italian automotive landscape are accurately reflected, aligning with local insights and broader global standards.

Table 3.1: Car segmentation by ANFIA, US EPA, and European Class

ID	Italian Class (ANFIA)	US EPA Size Class	European Class (EC, 1999)	Description
A	Superminis	Mini Cars	A-segment	Compact, efficient cars for urban use.
B	Utility	Small Cars	B-segment	Small, cheap cars.
C	Medium-Lower	Medium Lower Cars	C-segment	Medium-sized cars for family use.
D	Medium	Medium Cars	D-segment	Larger cars with more space and comfort.
E	Upper	Executive Cars	E-segment	Premium cars offer superior comfort and performance.
G	Luxury	Luxury Cars	F-segment	High-end luxury cars with bespoke features.
H	Sports	Sports Cars	S-segment	High-performance sports cars.
I01	Small/Compact SUVs	Small Compact SUVs	J-segment	Versatile, compact SUVs.
I23	Medium/Large SUVs	Standard SUVs	M-segment	Larger SUVs with more capabilities.
L	Minivans/Multipurpose	Multi-purpose Minivans	M-segment	Family-oriented, spacious vehicles.
Z	Station Wagons/Combi	Station Wagons/Combi	Z-segment	Practical vehicles with extended cargo space.
N	Unrecognized	Special Purpose	N/A	Specialized vehicles for unique purposes.

These classifications help understand the diverse range of luxury vehicles available and their respective market segments; however, it needs more clarity in defining vehicle segments. For instance, the E-segment typically includes executive cars. However, whether these cars should be considered luxurious or whether the F-segment should also be considered part of this luxury categorization remains uncertain. Berger (2001) critiques this methodology for its oversimplification, noting that it overlooks essential aspects such as design, engineering, price, and accessories, which are critical for a comprehensive evaluation of cars beyond mere size and body configuration. Moreover, introducing so-called 'affordable luxury' models complicates the categorization of modern vehicles in the luxury segment, given that historical brand prestige and technological advantages must be considered.

To understand the luxury market concept, it is necessary to point out the so-called 'Theory of Luxury,' which highlights three main company strategies that firms can use: 'luxury,' 'premium,' and 'fashion' (Kapferer & Bastien, 2009).

- Luxury Strategy: Aim at creating timeless and highly exclusive products. Brands such as Aston Martin, Ferrari, and Rolls-Royce exemplify this strategy, focusing on status, refined taste, and wealth.
- Premium Strategy: Competes on high-quality products where the price reflects performance and features. Brands like Audi, Lexus, and Volvo fall into this category.
- Fashion Strategy: Harnesses short-lived trends for high sales volumes, often reinventing the brand without relying on heritage. Brands such as Toyota and Hyundai may utilize this approach.

Kivetz and Simonson (2002) describe the purpose of vehicles like luxury cars as providing more than mobility: 'the pleasure principle.' They note that luxury is defined as "a non-essential item or service that contributes to luxurious living; an indulgence or convenience beyond the indispensable minimum."
This paper defines luxury cars as "the segment in the automotive industry that seeks to win customer orders through superior design, engineering, and image by offering differentiation beyond customers' standard mobility needs and exclusivity in their products."

3.4 Motivations for Sustainable Consumption

Increasing attention to environmental concerns and growing interest in sustainability issues alter consumer behavior and evoke sustainable purchase motivations. Environmental matters, social responsibility, personal values, perceived benefits, and socio-cultural influences drive sustainable purchase motivations.

1. *Environmental awarene*ss has been widely regarded as a key factor in facilitating sustainable purchasing behavior. As consumers acquire more information on how their consumption activities negatively impact the environment, they become more willing to purchase goods and services that minimize harmful effects on the planet's surface (Ottman, 2011). Furthermore, many studies have found a positive correlation between environmental concern and participation in green purchase behavior (Laroche et al., 2001; Gupta Ogden, 2009). Ecological awareness includes many facets as it implies concern towards a wide range of environmental issues such as climate change, pollution, and resource-sharing depletion, and they might trigger consumers to make environmentally sound purchasing decisions. In addition, the mechanism often overlooked is the role of education and information dissemination. Gifford Nilsson (2014) points out that 'exposure to green information via media, education, and social networks' could significantly impact people's attitudes and behavioral tendencies toward sustainability. Awareness often comes hand in hand with personal responsibility for damaging the planet and, in turn, the emergence of green intention. Hansla et al. (2008) find that this awareness often leads to a sense of personal responsibility and a desire to reduce their ecological footprint, making more sustainable purchasing decisions.

2. *Social responsibility and ethical values* are powerful motives for sustainable consumption. Today, many consumers seek to match their purchasing decisions with their moral beliefs regarding social justice, fair labor practices, and animal welfare (Schwartz, 1994; Carrington et al., 2010). This attempt to match purchases with ethics is sometimes called ethical consumerism. In such cases, consumers base their purchasing on moral considerations rather than economic ones (Shaw & Clarke, 1999). Such ethical values are compelling when consumers perceive that their purchases can bring positive outcomes. For example, Fair Trade products, guaranteeing decent wages and working conditions for producers, are attractive to consumers with ethical concerns (De Pelsmacker, Driesen and Rayp, 2005).

3. *Personal values and self-identit*y are key drivers of sustainable purchasing decisions. Building on the self-congruity theory, consumers prefer products consistent with their self-

concept and personal values (Sirgy, 1982). Those who value environmental stewardship and sustainability are more likely to purchase products that reflect these values, thus reinforcing their identity as paragons of ecological stewardship (Akehurst et al., 2012). Moreover, because buying sustainable products can fulfill such identities, these products can also enable self-expression. Purchasing sustainable products can allow consumers to express their identity to others (Griskevicius et al., 2010). For instance, the conspicuous purchase of visible products, such as the consumption of organic foods or an electric vehicle, allows consumers to express their environmental commitment by making their ecological identity an object of their self-expression and thereby communicating it to others. When products are visible, such conspicuous signaling enhances one's social status and satisfaction (White & Simpson, 2013).

4. *The perceived benefits of sustainable products* also strongly motivate sustainable purchasing. Such benefits include perceived health or safety advantages, cost savings, and enhanced quality and value over time (Nguyen et al., 2019). Customers often assume that organic foods are healthier and safer than their conventionally produced alternatives, making them willing to pay a price premium for those products (Hughner et al., 2007). Similarly, energy-efficient appliances are valued for their potential to reduce utility costs, offering both financial savings and environmental benefits (Gadenne et al., 2011). Customers might be motivated to buy sustainable products because of the broader effect they believe they will have on the environment, whether by reducing waste or preserving resources. For instance, it suggests that one aspect of the appeal of products that use recycled materials, or reduced packaging is their perceived ability to mitigate environmental harm. This perception is facilitated by presenting sustainable products as high-quality alternatives that do not sacrifice performance or appearance relative to ordinary products (McDonald & Oates, 2006).

5. *Social norms and culture* also significantly impact sustainable purchase motivations. The expectations, recommendations, or observations of others can influence whether people purchase a given product. When sustainability is a norm in one's peer group, family, or other social group, it can motivate sustainable purchases (Goldstein et al., 2008). Social norms as a sustainable purchase motivation can occur through direct recommendations or requests, modeled behavior, or expectations from peers and the larger society that favor sustainable consumption. Cultural values also play an essential role in shaping sustainable purchase perceptions to the extent that they can predispose people to buy products seen as more sustainable to societal ideals that are personally relevant. In collectivist cultures, where group well-being is more important, people are likelier to purchase products linked to environmental

or societal benefits (Steg, 2016). In contrast, in individualist cultures where personal gains take precedence, products related to individual benefits, such as wellness or cost benefits, might be more likely to trigger sustainable purchases (Nguyen et al., 2019).

Despite the increasing motivators for sustainable consumption, different barriers can hinder consumers from sustaining their consumption. Price sensitivity, unavailability, perceived inconvenience, and skepticism towards the actual positive impact of eco-friendly products (Young et al., 2010). Moreover, the attitude-behavior gap shows that despite the positivity of climate change, people seem not to convert their environmental attitudes into sustainable behavior in their purchasing decisions (Vermeir & Verbeke, 2006). Tackling these barriers usually involves increasing awareness and accessibility of sustainable products and explicitly addressing consumer concerns, such as lack of information about the qualities and trustworthiness of sustainable claims (Thøgersen, 2000).

3.4.1 Factors influencing EV purchase

A key factor to electric vehicles' ever-increasing attention is that they are ecological and green. Nowadays, how to cope with the problems of global warming and environmental pollution is a common topic of discussion. With the knowledge of the ecological footprint of transportation among consumers, the concern about purchasing transportation that can cause potential harm to the environment is rapidly increasing. A vehicle that generates no tailpipe emissions and is much environmentally friendlier than traditional internal combustion engine-driven vehicles is an appealing choice among consumers (Huang et al., 2018).

Another factor driving this trend has been the increase in battery-driven vehicle capacity, charging time, and driving range due to advances in battery technology, charging infrastructure, and vehicle performance (Yan et al., 2018). More advanced functionalities enable EVs to catch up on combustion vehicles' functions and performance, including regenerative braking, electric power steering, advanced driver assistance systems (ADAS), and vehicle-to-vehicle and vehicle-to-infrastructure communications systems.

This economic incentive, usually in subsidies or tax rebates to people who buy an EV, is an essential driver of the switch to electric vehicles. In many countries, government policies are now supported by carmakers who also want to promote the electric vehicle market. This is reflected by the increasing number of countries where some subsidy or tax rebate is provided to consumers if they choose an electric vehicle. Meanwhile, the lower costs of operating and

maintaining an EV also contribute to this economic picture, as falling prices for EV technologies reduce the cost of electric vehicles for more consumers (Cui et al., 2021).

The use of EVs was also influenced by social factors and by the demographic of the consumer. Consumers' attitudes towards EVs are influenced by peer pressure, social norms, and image considerations (Bratucu et al., 2019). Consumers receptive to modern technology are likelier to have a positive attitude toward EVs. Younger, wealthy, and technology-savvy consumers favor innovative technologies such as EVs more. Additionally, urban residents, who are more likely to suffer from air pollution and thus more aware of the adverse effects of fossil fuel cars and have better access to charging infrastructure, are more prone to choose EVs as an alternative to conventional vehicles (Huang et al., 2018).

On the other hand, electric vehicles have gained much attraction. Still, mass adoption is hindered by several factors, including the higher upfront costs, lack of charging stations, limited driving range, safety and durability of batteries, and poor resale value of electric vehicles (Zhao et al., 2020). To fast-track the adoption of electric cars, there is an urgent need to conquer the issues of high initial costs, expand charging stations, reduce range anxiety, and improve battery technology.

The luxury automotive sector has been among the first to embrace the EV and find the fundamentals of a profitable appeal between luxury and sustainability in Eco-luxury. Luxury electric models, such as Tesla and Porsche, introduce a high-tech attitude to luxury while developing luxury specifications and features, offering a combination of high performance, great styling, and upgraded ecological soundness. The manufacturing of the EV has allowed luxury to acquire a new and distinct ecological aura as a value-added functional feature, and, at the same time, it has found an emerging eco-conscious target market (Hartmann & Ibanez, 2006).

3.5 Influence of Electric Vehicles on Luxury Consumption and Willingness to Pay

This paragraph provides the theoretical foundation to understand the relationship between luxury goods and willingness to pay (WTP) and the moderating influence of electric vehicles (EVs). As the luxury market also experiences a revolution alongside higher environmental awareness and new technologies, there is a shift in the traditional concept of luxury. This chapter attempts to do a theoretical review to support these dynamics. To do so, the chapter will rely on different theories, including Signaling Theory, Self-Concept Theory, Perceived Value Theory, Social Norms Theory, Innovation Diffusion Theory, Intrinsic and Extrinsic Motivation Theory, Demographic and Psychographic Segmentation, and Social Identity Theory. Together, these frameworks offer a comprehensive lens to examine how EV adoption may influence consumer behavior in the luxury market.

3.5.1 Signaling Theory

According to Signaling Theory (described by Michael Spence in 1973), people behave in specific ways or purchase particular goods to signal their status or identity to others. This theory is particularly relevant in luxury goods, often used as symbols of wealth, status, and social success (Bagwell & Bernheim, 1996). Acquiring luxury goods – such as fashion, watches, or cars – is a form of symbolic communication conveying messages about the owner's social standing and lifestyle (Veblen, 1899; Han et al., 2010). In traditional markets, the value of luxury goods derives not just from their intrinsic properties but also from the owner's social status that the goods convey (Belk, 1988). For example, owning a 'luxury' car has been a marker of financial success and social status (Wiedmann et al., 2009). However, the rise of EVs as both a green and luxury option changes this dynamic. EVs and the EVs of brands such as Tesla have become status goods, representing technological innovation, environmental consciousness, and luxury.

The integration of EVs into the luxury market could alter traditional signaling behaviors. While luxury has always been associated with opulence and exclusivity, modern luxury consumers may also prioritize sustainability and innovation (Hume & Mills, 2013). This shift suggests that the signaling value of luxury goods might be moderated by the type of vehicle a consumer chooses, mainly when that vehicle is sustainable. For instance, a consumer who values environmental sustainability may prefer an electric luxury vehicle over a traditional luxury car, signaling a different set of values to their social group (Kapferer & Michaut-Denizeau, 2014).

This moderating effect could lead to a differentiated impact on WTP, depending on how consumers perceive the signaling value of luxury in the context of EVs.

3.5.2 Self-Concept Theory

As articulated by Sirgy (1982), Self-Concept Theory tries to define how individuals perceive themselves and how these perceptions influence consumer behavior. According to this theory, consumers purchase products aligned with their self-identity, using them to express their values, beliefs, and social roles (Belk, 1988). Luxury goods often resonate with consumers who see themselves as affluent, successful, or stylish, providing a means to express and reinforce these aspects of their identity (Phau & Prendergast, 2000).

In the context of EVs, this alignment with self-concept may shift. Younger consumers or those who identify with environmental and technological advancements may find that traditional luxury goods do not fully align with their self-concept, especially when these goods are contrasted with the values symbolized by EVs (Kleine et al., 1993). For instance, consumers who identify as environmentally conscious and tech-savvy may perceive traditional luxury cars as outdated or misaligned with their values, preferring a luxury EV that better reflects their self-identity (Heffetz, 2011).

This shift in self-concept can moderate the relationship between luxury goods and WTP. While luxury goods may traditionally increase WTP due to their alignment with a consumer's self-concept, this relationship may be attenuated when the consumer prioritizes sustainable and innovative identity traits over traditional luxury (Chandon et al., 2000). This moderation effect is particularly relevant in a market where EVs are increasingly seen not just as eco-friendly options but as cutting-edge technology that represents the future of mobility (Morton et al., 2016). Thus, for a segment of consumers, the alignment of EVs with their self-concept may diminish the importance of traditional luxury attributes, leading to a potential decrease in WTP for non-electric luxury vehicles.

3.5.3 Perceived Value Theory

Perceived Value Theory, as explored by Zeithaml (1988), emphasizes how consumers assess the overall value of a product based on the perceived benefits relative to the perceived costs. In the luxury market, perceived value is often enhanced by associations with high quality, exclusivity, brand prestige, and emotional satisfaction, all of which contribute to an increased WTP (Netemeyer et al., 2004; Vigneron & Johnson, 1999).

However, when considering the role of EVs in the luxury market, the perceived value of luxury goods could shift from traditional attributes like brand prestige and material quality to other factors such as environmental impact, technological innovation, and long-term savings (e.g., lower fuel and maintenance costs) (Sheth et al., 1991). For many modern consumers, the value of a luxury product is increasingly tied to its alignment with their ethical and environmental values and its contribution to sustainability (Griskevicius et al., 2010).

This evolving perception of value can have significant implications for WTP. For example, a luxury EV may be perceived as offering superior value because of its brand name or performance, its lower environmental footprint, and cutting-edge technology (Kapferer & Bastien, 2009). In contrast, traditional luxury vehicles that do not offer these benefits may be seen as less valuable in comparison, leading to a moderated WTP (Hennigs et al., 2013). This shift underscores the importance of understanding how perceived value is constructed in the minds of contemporary consumers, particularly as environmental concerns and technological advancements become more central to their decision-making processes (Steg, 2005).

3.5.4 Social Norms Theory

Social Norms Theory, developed by Cialdini et al. (1991), examines how individuals' behavior is influenced by their perceptions of the norms within their social group. These norms, which can be either descriptive (what others do) or injunctive (what others think one should do), play a significant role in shaping consumer behavior, particularly in the luxury market (Ajzen, 1991).

Luxury consumption has traditionally been driven by the desire to conform to or exceed the norms of a reference group, thereby reinforcing one's social identity (Solomon, 1983). For instance, owning a luxury car may have been perceived as a norm among certain affluent social

circles, where status and wealth are highly valued (Trigg, 2001). However, as societal values evolve, so do luxury consumption norms. The rise of sustainable consumption, particularly among urban and younger demographics, reflects a shift in social norms, where sustainability and ethical consumption are increasingly valued (Johnstone & Tan, 2015).

This shift is particularly evident in the luxury automotive market, where EVs are becoming more prevalent. The integration of EVs into the luxury segment reflects a broader change in social norms, where the traditional attributes of luxury, such as opulence and excess, are being redefined to include sustainability, innovation, and environmental stewardship (Luchs et al., 2010). Consumers attuned to these emerging norms may be less inclined to pay a premium for traditional luxury vehicles that do not align with these values (White & Simpson, 2013).

This evolution in social norms may reduce the relative importance of traditional luxury attributes, thereby moderating the effect of luxury branding on WTP. For example, within a social group that values sustainability, owning an EV may be more prestigious than owning a traditional luxury car, even if the latter is more expensive (Griskevicius et al., 2012). This shift in perceived prestige could lead to a decreased WTP for traditional luxury items and an increased WTP for luxury EVs that align with the group's values and norms (White et al., 2019).

3.5.5 Innovation Diffusion Theory

Innovation Diffusion Theory, proposed by Rogers (1962), provides insights into how new ideas and technologies spread through societies. The theory categorizes adopters of innovation into five groups: innovators, early adopters, early majority, late majority, and laggards, each with varying levels of openness to new products and technologies (Bass, 1969).

In the context of electric vehicles, which represent a significant technological innovation in the automotive industry, adoption patterns can significantly influence market dynamics (Bennett & Vijaygopal, 2018). Currently, EVs are transitioning from the early adopter phase to broader market acceptance, driven by increased awareness of environmental issues and improvements in EV technology (Moons & De Pelsmacker, 2015). Luxury consumers, particularly those who fall into the innovator and early adopter categories, are likely to prioritize the innovative aspects of EVs over traditional luxury attributes (Axsen & Kurani, 2013). For these consumers, the

appeal of being at the forefront of technological and environmental advancements can outweigh the traditional allure of luxury vehicles (Struben & Sterman, 2008).

This adoption behavior could moderate the relationship between luxury goods and WTP. For example, early adopters of EVs may be more willing to pay a premium for a luxury EV because it represents a status symbol and a commitment to innovation and sustainability (Rezvani et al., 2015). In contrast, traditional luxury vehicles may be perceived as less innovative, reducing their appeal and the WTP among these consumers (Plötz et al., 2014). As EVs become more mainstream, this moderating effect may become more pronounced, particularly as the social value of owning an EV increases within specific consumer segments (Morton et al., 2017).

3.5.6 Intrinsic and Extrinsic Motivation Theory

Intrinsic and Extrinsic Motivation Theory, as explored by Deci and Ryan (1985), differentiates between actions driven by intrinsic motivation (internal satisfaction) and extrinsic motivation (external rewards). Luxury consumption is typically associated with extrinsic motivation, often driven by the desire for social recognition, status, and external rewards (Vigneron & Johnson, 1999).

In contrast, the adoption of EVs may be more intrinsically motivated, particularly for consumers who prioritize sustainability, environmental consciousness, and ethical considerations (Lin & Huang, 2012). These consumers may derive internal satisfaction from making choices that align with their values, such as reducing their carbon footprint or supporting technological innovation (Hartig et al., 2007). This intrinsic motivation can significantly influence their purchasing decisions and their WTP for luxury goods (Steg, 2005).

This divergence in motivation types could moderate the relationship between luxury goods and WTP. Consumers with intrinsic solid motivations toward sustainability may place less importance on traditional luxury attributes, thereby reducing their WTP for luxury items that do not align with their values (Griskevicius et al., 2010). Instead, they may be more willing to pay a premium for luxury EVs that satisfy their extrinsic desire for status and intrinsic values (Bolderdijk et al., 2013). This interplay between intrinsic and extrinsic motivations highlights the complex factors influencing consumer behavior in the luxury market, particularly as it intersects with the growing demand for sustainable and innovative products (Deci & Ryan, 2000).

3.5.7 Demographic and Psychographic Segmentation

Demographic and Psychographic Segmentation, as outlined by Kotler and Keller (2012), emphasizes the importance of understanding consumer subgroups to predict purchasing behavior. Demographics such as age, income, education, and psychographic factors like lifestyle, values, and attitudes can significantly influence how consumers perceive and interact with luxury goods and EVs (Hawkins & Mothersbaugh, 2010).

For instance, younger consumers, often more environmentally conscious and tech-savvy, might be more inclined to value EVs' environmental benefits and technological advancements over traditional luxury status symbols (Sovacool et al., 2018). This segment may perceive luxury EVs as aligning better with their values and lifestyle, leading to a higher WTP for these vehicles than traditional luxury cars (Noppers et al., 2014). On the other hand, older consumers, who may have established a sense of prestige and identity around traditional luxury brands, might still prioritize the established attributes of luxury vehicles, such as brand heritage and craftsmanship (Fitzgerald, 2019).

Understanding these segments allows for a more nuanced analysis of how EV adoption might moderate the relationship between luxury and WTP across different consumer groups (Solomon, 2017). For example, while younger consumers might view traditional luxury attributes as less relevant to their evolving values, older consumers may continue to place a high premium on these attributes, resulting in different WTP dynamics (Tian et al., 2001). This segmentation approach is crucial for identifying and targeting specific consumer groups in the evolving luxury market (Arnould et al., 2004).

3.5.8 Social Identity Theory

Social Identity Theory, introduced by Tajfel and Turner (1979), posits that individuals define themselves based on their membership in social groups. This theory is particularly relevant in luxury goods and EVs, as both symbolize group membership and identity (Hogg & Abrams, 1988).

Owning a luxury vehicle has traditionally been associated with belonging to a high-status group that values wealth, exclusivity, and success (Belk, 1988). However, the rise of EVs introduces a new dimension to social identity, particularly among consumers who identify with

environmentally conscious and technologically progressive groups (Van Boven, Campbell, & Gilovich, 2010). For these consumers, owning an EV is not just about the practical benefits or the environmental impact; it is also a way to signal their identity and values to others (Thøgersen, 2014).

The interplay between these identities could moderate the impact of luxury on WTP (White et al., 2019). For example, consumers who strongly identify with sustainability and innovation may perceive traditional luxury vehicles as inconsistent with their values, leading to a decreased WTP for these products (Guzman & Becker-Olsen, 2010). Conversely, they may be more willing to pay a premium for luxury EVs that align with their social identity and group membership (White & Simpson, 2013). These dynamics highlight the importance of understanding the social and psychological factors that influence consumer behavior in the luxury market, particularly as they intersect with broader societal trends toward sustainability and technological innovation (Luchs et al., 2010).

3.6 Purchase of Luxury and Sustainable Luxury Automobiles

A complex set of consumer motivations and behaviors distinct from the broader automotive sector drives the luxury automobile market. As sustainability becomes an increasingly important factor for consumers, the demand for sustainable luxury automobiles has also evolved, integrating traditional luxury attributes with eco-friendly elements.

3.6.1 Motivations for Purchasing Luxury Automobiles

Luxury automobiles are associated with status, wealth, and personal achievement symbols. The motivations for purchasing luxury cars are multifaceted, including conspicuous consumption, superior quality, exclusivity, emotional satisfaction, and high performance.

1. Conspicuous Consumption and Status Signaling: Conspicuous consumption was also deemed to be the main driving force behind the purchase of luxury cars. According to Veblen's theory of conspicuous consumption, when individuals purchase luxury goods, they do so to signal their economic power and their difference from others (Veblen & Galbraith, 1973). This perspective was echoed by Vigneron and Johnson (2004), who mentioned that luxury cars are status symbols that help owners express an image of success and wealth. The desire for social recognition and to upgrade one's status drive the luxury car market (Hennigs et al., 2012).

Similarly, Heffetz (2011) found that the visibility of consumption plays a significant role in luxury purchases, as consumers are motivated by the social prestige of luxury cars.

2 Quality and Craftsmanship: Luxury cars perceived as superior quality and craftsmanship are another critical driver of consumer purchases. Luxury car brands are known for their commitment to quality, using cutting-edge materials, technologies, and craftsmanship in design and production (Kapferer Bastien, 2009). These elements endow the brand with a feeling of technical excellence and reliability. Indeed, technical quality is the first criterion luxury car buyers consider (Hoffmann Coste-Manière, 2012). Quality is a key driver of luxury consumption, as consumers are willing to spend extra money to buy quality and durable items (Wiedmann et al., 2007)

3 Uniqueness and Exclusivity: Another key feature of luxury cars is their exclusivity, often achieved through limited production runs, bespoke customization opportunities, and individual design details. Such rarity improves the desire for the luxury car, causing consumers 'compelling needs for differentiation from the crowd' (Dubois et al., 2001). The strategy of supply restriction, where the brand deliberately limits production to stay below customer demand, is exemplified by companies like Ferrari. Ferrari attributes this controlled scarcity to its ability to create strong demand by carefully managing production choices (Bain & Co., 2014). This sense of scarcity and exclusivity not only elevates the perceived value of luxury cars but also reinforces their status as symbols of success and distinction (Kapferer, 2012)

4 Hedonism, Driving Emotion, and Performance: Lastly, emotional fulfillment and hedonic pleasure from driving also play key roles as motives for people in the luxury car segment. Hedonic consumption refers to consuming products to experience enjoyment and sensory gratification, which luxury cars can offer through their driving performance, design, and driving sensation (Kivetz & Simonson, 2002). Other key features, such as fast-revving high-performance engines, precise, responsive handling, and overall good driving dynamics, can improve the emotional appeal of luxury cars (Berthon et al., 2009). Studies by Atwal and Williams (2017) have found that wanting to enjoy a superior driving experience that provides sensory thrill and excitement is one of the key reasons for buying a luxury car. Performance, especially in the context of sports cars, is a significant aspect of luxury cars. Luxury sports cars are engineered to deliver superior performance, characterized by high horsepower, rapid acceleration, and precise handling (Hoffmann & Coste-Manière, 2012). This performance is also linked more to the performance being experienced in terms of an 'emotional spin-off' so

that the high torque of the engine, rapid acceleration, and precise handling become features of the car that help drivers to enjoy a ‘special experience in the driving act’ (Schröder & Olsen, 2018).

3.6.2 Motivations for Purchasing Sustainable Luxury Automobiles

Combining conventional luxury drivers and environmental consciousness prompts consumers to sustainable luxury cars. The concept of "green conspicuous consumption" suggests that eco-friendly luxury products allow consumers to signal both wealth and ecological responsibility (Griskevicius et al., 2010), indicates that sustainable luxury buyers are often younger, more affluent, and more likely to prioritize social and environmental values in their purchasing decisions. Sustainable luxury consumers are attracted by brands that communicate their commitment to reducing their ecological footprint while striving for superior quality and performance. A brand's perceived environmental and social responsibility leads to higher consumer loyalty and improved willingness to pay a premium for luxury products (Davies et al., 2012).

1. Technological Innovation and Environmental Performance: Sustainable luxury cars blend cutting-edge technology with high performance to reduce environmental impact. Advanced lightweight materials, electric drivetrains, and hybrid powertrains are sustainable luxury cars' most common design features, making them more efficient and less polluting than traditional luxury cars (Kumar & Christodoulopoulou, 2014). Brands like Tesla, Porsche, and BMW have introduced electric and hybrid models to the field. This appeals to luxury consumers by offering the dual benefits of cutting-edge technology and environmental sustainability (Berggren & Magnusson, 2012). However, transitioning to electric and hybrid technologies in luxury cars presents particular challenges. For some consumers, the lack of traditional engine sound and the distinct driving feel associated with high-performance internal combustion engines (ICE) are seen as drawbacks in electric vehicles (EVs) (Cocron & Krems, 2013). The Swedish study of Rezvani, Jansson, and Bodin (2015) found that, despite positive feelings about EVs for their environmental benefits, for the luxury segment, concerns about range, performance consistency, and driving experience remain barriers to EV adoption (Kumar RS & Christodoulopoulou, 2014).

2. Aligning Sustainability with Luxury Values: The overarching challenge in sustainable luxury automobiles is integrating sustainability considerations with the traditional core luxury values,

including the pursuit of exclusivity, high quality, and status. Some consumers perceive a trade-off between luxury and sustainability, fearing that eco-friendly vehicles may compromise the prestige and performance traditionally associated with luxury cars (Kapferer & Michaut-Denizeau, 2014). To address this perception, brands must emphasize that sustainability can enhance, rather than diminish, the luxury experience by offering a new form of exclusivity that resonates with eco-conscious consumers (De Angelis et al., 2017).

3. Market Trends and Consumer Segmentation: Likewise, growing concerns about environmental issues and evolving consumer awareness fuel the demand for sustainable luxury automobiles. Young, environmentally conscious consumers are considerably more interested in sustainable luxury brands who perceive these options as a balancing strategy between sustainability and prestige. Evolving demographics foster innovation as luxury firms strive to integrate sustainability into core business strategies, making sustainable luxury a growth area in the automotive industry (Hennigs et al., 2015).

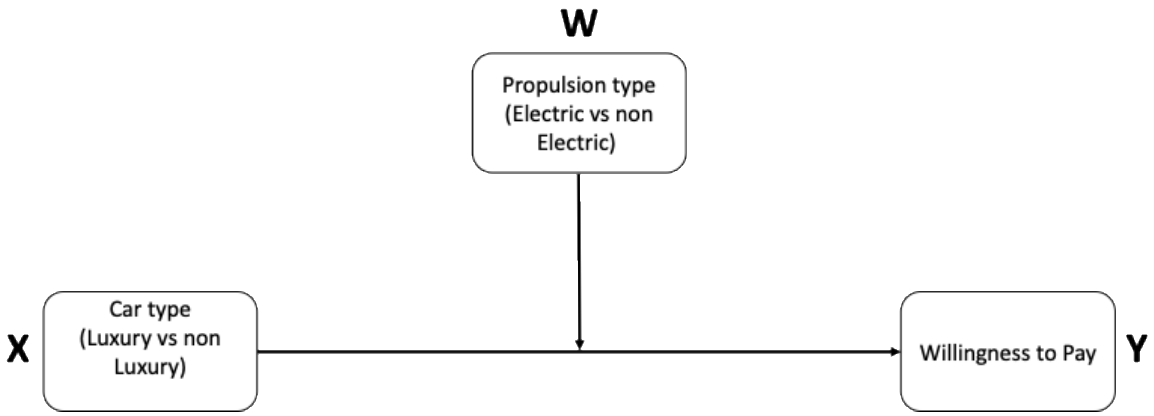
Barriers to Adoption

Despite the growing interest in sustainable luxury vehicles, several barriers constitute important obstacles to the mass diffusion of sustainable luxury vehicles. These include high costs, limited infrastructure, performance concerns, and range anxiety (Egbue Long, 2012). Skepticism about the actual environmental impact of sustainable luxury EVs, including controversies about battery production and end-of-life disposal, can also erode consumer trust in the ecological claim of these luxury EVs (Harth et al., 2013). Over time, technological, infrastructure, and communication development will be necessary to address these barriers further in the diffusion of sustainable luxury automobiles.

3.7 Conceptual framework

The primary objective of this experimental study is to investigate how different types of cars (luxury vs. non-luxury) influence consumers' willingness to pay (WTP) in the automotive sector. To test this relationship, it was decided to complete the conceptual framework by considering the moderating effect generated by the type of propulsion (non-electric vs. electric) that characterizes the vehicle. Based on this assumption, the research model was developed using a moderation factor represented by propulsion type (non-electric vs. electric), an independent variable related to the kind of car (luxury vs. non-luxury), and a dependent variable concerning consumers' WTP.

Therefore, Andrew F. Hayes's Model 1 was adopted to develop the conceptual framework. It is characterized by the presence of an independent variable (X), a dependent variable (Y), and a moderator (W).



Variables

Independent Variable: Automotive car type (Luxury vs. non-Luxury): This variable represents whether the automotive brand is considered a luxury brand, typically associated with consumers' higher willingness to pay (WTP).

Moderating Variable: Propulsion type (non-Electric vs Electric): This variable determines whether the luxury or sports car brand has integrated electric vehicles into its product lineup. It is hypothesized that this could moderate (potentially reduce) the positive effect of luxury status on WTP.

Dependent Variable: Willingness to Pay (WTP): This is the primary outcome variable, representing the amount consumers are willing to pay for luxury and sports car brands, especially those that have adopted EV technology.

Control Variables: Gender and age are not direct moderators but are used to examine correlations with the overall model to understand how different consumer groups might respond differently to the combination of luxury status and EV adoption.

Research Questions

To address the research gaps identified, the following research questions (RQs) and hypotheses have been formulated:

RQ1: How does adopting luxury vehicles compared to non-luxury vehicles influence consumers' willingness to pay (WTP)?

RQ2: How does the propulsion type (electric vs. non-electric) moderate the relationship between the type of automotive car (luxury vs. non-luxury) and consumers' willingness to pay (WTP)? Specifically:

- Does adopting non-electric luxury vehicles influence WTP differently than electric luxury vehicles?
- Does adopting non-luxury electric vehicles influence WTP differently than non-luxury, non-electric vehicles?

Hypotheses

H1: The adoption of luxury vehicles positively influences the WTP (willingness to pay) more than the adoption of non-luxury cars.

H2: The propulsion type moderates the relationship between the automotive car type and WTP. Specifically, adopting non-electric luxury vehicles positively influences WTP more positively than adopting electric luxury vehicles. Additionally, adopting non-luxury electric cars has a more positive influence on WTP than non-luxury non-electric vehicles.

Ch 4: Experimental research

4.1 Methodological approach

4.1.1 Methodology and Study

The present experimental study consists of a conclusive causal between-subjects 2x2 research design. The experiment results are represented by responses to a questionnaire obtained through an independently administered survey conducted in Italy during August 2024 using the Qualtrics XM online platform. The survey participants were selected by adopting a non-probabilistic sampling methodology. In particular, they were selected based on criteria aligned with the characteristics relevant to the research.

The survey was distributed to 250 individuals, of whom 242 respondents fully participated in the experimental study by providing complete and thorough answers to all the questions in the questionnaire. The remaining eight incomplete responses were initially selected and discarded from the dataset during the data-cleaning procedure. The respondents were contacted via an anonymous link generated by the online platform Qualtrics XM, which was subsequently distributed through emailing, instant messaging applications, and social media networks such as WhatsApp and LinkedIn as the main distribution channels. The sample population reached by the survey primarily included company employees and self-employed professionals located in various cities across Italy. Accordingly, the average age of the respondents was 45.24 years, although the age range varied from a minimum of 15 to a maximum of 78 years. In terms of gender, the majority of respondents identified as male, representing 58.7% (142/242), while females accounted for 40.5% (98/242). The remaining 0.8% (2/242) of respondents preferred not to identify with a specific gender (0.4%; 1/242) or selected the third gender/non-binary option (0.4%; 1/242).

4.1.2 Data Collection and Questionnaire Composition

To conduct the experimental study, a questionnaire comprising 12 questions, including 10 specific questions and two demographic ones, was developed. To manipulate the independent variable (Car type: Luxury vs. Non-Luxury) and the moderator variable (Propulsion type: Non-electric vs. Electric), it was essential to create four visual stimuli, each different from the other, composed of combinations of scenarios X and W.

The first scenario consisted of an image of a non-luxury car with an electric propulsion engine (Fiat 500e), with a brief description of the characteristics, including the medium price.
The second scenario consisted of an image of a non-luxury car with an internal combustion engine (Fiat 500), with a brief description of the characteristics, including the medium price.
The third scenario consisted of an image of a luxury car with an electric propulsion engine (Maserati GranTurismo Folgore), with a brief description of the characteristics, including the medium price.
The fourth scenario consisted of an image of a luxury car with an internal combustion engine (Maserati GranTurismo Modena), with a brief description of the characteristics, including the medium price.
As mentioned earlier, the data was collected using a questionnaire divided into four main parts.

At the beginning of the questionnaire, a brief introduction was provided, including an explanation of the academic purpose of the experimental research. Additionally, after including the university's credentials, total compliance with privacy regulations concerning data collection and management policies was ensured.

The second part of the survey consisted of a randomized block of four distinct scenarios. The randomization process was essential within the questionnaire structure to achieve an even exposure distribution to all four visual stimuli. To avoid potential cognitive biases and conditioning effects, luxury scenarios and their corresponding non-luxury counterparts were represented by the same registered car brands, Maserati and Fiat. All simulations were sourced from the official websites of the respective car brands.

Respondents were introduced to the third part of the survey after they were exposed to one of the four scenarios. This section of the questionnaire consisted of 10 questions: the first related to the dependent variable (Willingness to Pay), 3 to the first control variable (Luxury trait), 3 to the second control variable (Environmental trait), and 3 to the third control variable (Tech Savviness). All the questions above were assessed using a 9-point Likert scale.

The first scale, related to the dependent variable, was independently developed based on the needs of the experimental research.
The second scale, related to the first control variable (Hedonism), was derived from the pre-validated scale by Arnold, Mark J., and Kristy E. Reynolds (2009), "Affect and Retail Shopping Behavior: Understanding the Role of Mood Regulation and Regulatory Focus,"

Journal of Retailing, 85 (3), 308-320.

The third scale, related to the second control variable (Environmental Concern), was derived from the pre-validated scale by Carmela Donato and Feray Adıgüzel (2022), "Visual complexity of eco-labels and product evaluations in an online setting: Is simple always better?"

The fourth scale, related to the third control variable (Tech Savviness), was derived from the pre-validated scale by Kim, Sora, Eric Haley, and Gi-Yong Koo (2009), "Comparison of the Paths From Consumer Involvement Types To Ad Responses between Corporate Advertising and Product Advertising."

All scales were adapted to meet the needs of the experimental research.

Finally, the fourth and last part of the questionnaire consisted of the block dedicated to the two demographic questions, where respondents were asked about their gender and age.

4.2 Experimental results

The data collected through the questionnaire generated on Qualtrics XM were exported to the statistical software SPSS (Statistical Package for Social Science) for analysis.

Firstly, a descriptive statistical analysis was conducted on the model's variables to provide an overview of the data distribution and to understand the sample's general characteristics.

Table 4.1 Descriptive Statistics

Variable	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Error	Std. Deviation Statistic
Car Type (IV)	242	0,00	1,00	0,5041	0,03221	0,50102
Propulsion Type (MOD)	242	0,00	1,00	0,4752	0,03217	0,50042
WTP (DV)	242	1	9	4,64	0,194	3,011
Gender	242	1	4	1,43	0,034	0,528
Age	242	15	78	45,24	0,860	13,372
Valid N (listwise)	242					

The table presents the descriptive statistics for the variables considered in the experimental model, including the dependent variable, Willingness to Pay (WTP), the independent variable (Car Type: Luxury vs. Non-Luxury), the moderating variable (Propulsion Type: non-Electric vs. Electric), and the demographic variables (Age and Gender).

A linear regression analysis was then conducted, with Willingness to Pay (WTP) as the dependent variable and the independent and moderating variables, Car Type and Propulsion Type, along with their interaction. All relevant variables, comprising control variables such as age and gender, were included in the model.

Table 4.2 Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0,989[a]	0,977	0,977	0,459

a. Predictors: (Constant), Interaction, Gender, Age, IV, MOD

The model summary indicates that the R^2 value is 0,977, meaning that the model explains 97,7% of the variance in WTP. This suggests that the independent and moderating variables, along with the control variables, provide excellent predictive power. The standard error of the estimate is 0.459, indicating that the unexplained variability is relatively low.

Table 4.3 Coefficients Table

		Unstandardized Coefficients		Standardized Coefficients		
Model	Variable	B	Std. Error	Beta	T	Sig.
1	(Constant)	2,708	0,146		18,534	<0,001
	Car type (IV)	4,133	0,082	0,688	50,348	<0,001
	Propulsion type (MOD)	-1,197	0,085	-0,199	-14,125	<0,001
	Age	-0,008	0,002	-0,037	-3,788	<0,001
	Gender	-0,004	0,057	-0,001	-0,063	0,950
	Interaction (IV*MOD)	3,250	0,119	0,467	27,349	<0,001

a. Dependent Variable: WTP

The coefficients table provides detailed information on the influence of the predictive variables:

Car Type (Luxury vs. non-Luxury) - IV: has a positive and highly significant effect on WTP (B = 4,133, $p < 0,001$), confirming the hypothesis that luxury cars increase willingness to pay more than non-luxury cars (H1).

Propulsion Type (non-Electric vs. Electric) - *MOD*: has a significant negative effect on WTP (B = -1,197, p < 0,001), suggesting that non-electric vehicles have a greater influence on willingness to pay compared to electric vehicles.

The interaction between Car Type and Propulsion Type - *Interaction (IV*MOD)* is positive and significant (B = 3,250, p < 0,001), confirming that propulsion type moderates the effect of car type on WTP. Specifically, for non-luxury vehicles, there is generally a higher WTP for electric vehicles compared to non-electric ones. However, this relationship is reversed for luxury vehicles, with a higher WTP for non-electric luxury vehicles than electric ones. These findings support the hypothesis that propulsion type moderates the relationship between car type and WTP (H2).

The control variables, such as *Age* and *Gender*, were included to isolate the effects of the main variables. In particular, Age has a small but significant negative effect on WTP (B = -0,008, p < 0,001), suggesting that older participants tend to be slightly less willing to pay than younger ones. Meanwhile, Gender does not significantly impact WTP (p = 0,950), indicating that willingness to pay is not substantially different between male and female participants in this model.

Ch. 5 General discussion and conclusions

5.1 Theoretical contributions

One of the primary theoretical contributions of the research is the empirical evidence of the strong impact of car type (luxury vs. non-luxury) on Willingness to Pay (WTP). Perceived Value Theory (Zeithaml, 1988) suggests that consumers evaluate luxury products not only for their functional utility but also for their symbolic, emotional, and social value. The finding that luxury vehicles have a positive and significant effect on WTP compared to non-luxury vehicles confirms this theory. Furthermore, it supports Signaling Theory (Spence, 1973), where luxury goods are used as signals of social status, wealth, and success. This contribution adds empirical support to the literature exploring the link between luxury goods and WTP, solidifying the relationship between luxury perception and the ability to command a premium price.

A significant theoretical contribution relates to the moderating effect of propulsion type (electric vs. non-electric) on the relationship between car type and WTP. The results indicate that, for luxury vehicles, consumers show a higher WTP for internal combustion engine vehicles compared to electric ones, while for non-luxury vehicles, adopting electric vehicles increases WTP. This finding challenges the current narrative of growing acceptance of electric vehicles as the new frontier of luxury (Kapferer & Michaut-Denizeau, 2014), suggesting that luxury vehicle consumers may still prioritize traditional aspects like engine power and sound over sustainability. This moderation confirms the assumptions of Innovation Diffusion Theory (Rogers, 1962), where early adopters of electric vehicles, especially among younger and non-luxury consumers, may view electric vehicles as an opportunity to signal modernity and technological progress.

A key theoretical contribution from the research is the challenge for luxury brands to integrate sustainability without compromising traditional luxury values like exclusivity and status. The finding that electric luxury vehicles have lower WTP than internal combustion luxury vehicles suggests that consumers may not view electric vehicles as true luxury substitutes. This aligns with the literature on luxury and sustainability, where perceptions of a potential trade-off between luxury and sustainability (Kapferer & Michaut-Denizeau, 2014) continue to dominate. The results underscore the need to reconcile the growing focus on sustainability with the expectations of performance, quality, and status typical of the luxury market, contributing to a broader discussion on sustainable luxury consumption (Davies et al., 2012).

Another interesting theoretical contribution concerns the effect of age on WTP. As the analysis shows, age has a small but significant negative impact on WTP, suggesting that younger consumers are more willing to pay than older ones. This supports theories like the Self-Concept Theory (Sirgy, 1982), where younger consumers, more inclined to adopt technology and green innovations, tend to see value in products that align more with their ecological and technological identity. This phenomenon opens new perspectives for targeting different market segments and contributes to discussing consumer preferences based on age and technological progress.

Finally, the research highlights some barriers that limit the widespread adoption of electric vehicles in the luxury segment, such as concerns about performance, range anxiety, and the perceived loss of emotional quality linked to the absence of the traditional engine roar. These findings are consistent with studies by Rezvani et al. (2015) and Hennigs et al. (2015), contributing to a deeper understanding of the psychological and performance barriers perceived in the luxury electric vehicle segment. This provides a solid theoretical foundation for further studies on the transition to sustainable luxury.

5.2 Managerial implications

Automakers operating in the luxury segment must recognize that, despite the growing focus on sustainability, luxury car consumers still highly value internal combustion engines over electric ones. This suggests that luxury car manufacturers should not entirely abandon internal combustion models while promoting electric versions. To maximize Willingness to Pay (WTP), brands should adopt a hybrid strategy that integrates electric cars for younger, eco-conscious consumers while maintaining combustion engine models for more traditional customers.

The results indicate that for luxury vehicles, sustainability alone is not yet perceived as a sufficient added value to justify a premium price, especially if consumers believe electric vehicles compromise driving emotion and performance. Managers should focus on communication campaigns that highlight how luxury electric vehicles can combine high performance, exclusive design, and sustainability. For example, communication could emphasize the power of the electric engine and innovative technologies like autonomous driving or the integration of eco-friendly materials while maintaining the image of exclusivity and technical superiority.

Luxury electric car manufacturers should consider that purchasing a luxury car is a functional decision and an emotional experience. A key managerial implication is to develop personalized luxury experiences for electric vehicles. This could include exclusive events for launching electric vehicles, private factory tours, or test drives showcasing how electric cars retain the traditional appeal of luxury. Additionally, manufacturers could offer exclusive services such as private charging stations for VIP customers to enhance perceived value.

The research reveals that younger consumers are more willing to pay for electric luxury cars than older ones. This suggests that luxury car manufacturers should segment the market and develop targeting strategies based on age. Younger consumers, more focused on technology and sustainability, can be attracted by campaigns emphasizing technological innovation and positive environmental impact. On the other hand, older consumers, who may be more attached to the sound and power of internal combustion engines, could be targeted with campaigns that emphasize brand traditions and craftsmanship.

The findings about the moderating effect of propulsion type suggest that electric vehicles are not yet perceived as fully equivalent in luxury compared to internal combustion models. Managers must plan a gradual transition to electric mobility, using Innovation Diffusion Theory (Rogers, 1962) to understand the pace of adoption across different market segments. This involves investing in educational campaigns to shift consumer perceptions that electric cars can offer luxury driving experiences equivalent to, if not better than, traditional vehicles in terms of performance, comfort, and status.

The research highlights that consumers still have concerns about the performance of luxury electric vehicles and range-related issues. Companies should invest in infrastructure and post-sales services to reduce these barriers. For example, incentives could include fast VIP charging services, personalized home charging solutions, or leasing contracts with battery maintenance support. Additionally, managers should collaborate with local governments to improve the charging infrastructure network, facilitating the adoption of electric cars in the luxury segment.

Finally, luxury electric vehicle manufacturers should capitalize on the evolution of social norms and the desire for green status. For sustainability-conscious consumers, adopting an electric vehicle can become an important signal of belonging to a progressive and eco-aware social group. Managers should position electric luxury vehicles as a new form of exclusivity, tied not only to wealth and power but also to innovation and environmental responsibility. This

positioning could be supported by partnerships with environmental organizations or corporate social responsibility initiatives, reinforcing the brand's green image.

5.3 Limitations and Future Research

One limitation of this study relates to the sample selection process and its potential implications for the generalizability of the findings. The survey was conducted among a sample of primarily company employees and self-employed professionals in various cities across Italy, with an average age of 45.24 years. While this demographic profile aligns with the typical target market for luxury automotive purchases, it must fully represent the broader population of potential luxury car buyers, particularly regarding income variability and global diversity.

Additionally, the sample was selected using a non-probabilistic method, which may introduce selection bias and limit the external validity of the results. The respondents were primarily reached through digital channels such as email and instant messaging platforms.

The data collection took place in August 2024, a period that may have unique economic or social conditions influencing consumer behavior, such as temporary economic uncertainties or specific regulatory changes related to sustainability and electric vehicles. Future research could employ a longitudinal study design, allowing for observing changes in consumer preferences over time and providing deeper insights into how evolving economic conditions and technological advancements influence Willingness to Pay (WTP) for luxury and electric vehicles.

Future research should address these limitations by employing a more rigorous sampling methodology, such as stratified random sampling, to ensure a more representative sample of luxury car buyers. This approach would allow for greater generalizability of the findings across different demographic and socioeconomic groups.

Further studies could also expand the geographic scope of the research to include a more diverse set of markets, capturing regional variations in consumer preferences and WTP for luxury and alternative fuel vehicles. This would provide insights into how cultural and economic factors influence the adoption of luxury vehicles with different propulsion types.

Future research could explore longitudinal designs to track changes in WTP and consumer attitudes over time as alternative fuel technologies and infrastructure develop. Experimental

designs incorporating real-world purchase simulations or behavioral data (e.g., actual sales data or revealed preferences) could also provide a more robust understanding of consumer behavior in the luxury automotive market.

Ch. 6 Conclusion

This study has sought to explore the dynamics between luxury vehicle consumption and the increasing integration of electric propulsion, examining how these factors influence Willingness to Pay (WTP) among consumers. Through an experimental approach based on a 2x2 design, the research analyzed the effects of car type (luxury vs. non-luxury) and propulsion type (electric vs. non-electric) on consumer WTP, while also considering the moderating effects of demographic and environmental factors.

The findings highlight several key insights. First, luxury vehicles strongly influence WTP, confirming that consumers are willing to pay a premium for products that signal status, exclusivity, and high quality. This result is consistent with existing literature on luxury consumption, particularly Perceived Value Theory and Signaling Theory, which suggest that consumers derive functional benefits and emotional and symbolic value from luxury goods.

However, the study also reveals the complexities of integrating sustainability into the luxury market. While electric vehicles are gaining traction, especially among younger, tech-savvy, and environmentally conscious consumers, they do not yet command the same WTP as internal combustion luxury vehicles. This suggests that the traditional values associated with luxury—such as performance, craftsmanship, and emotional engagement—are still highly valued by many consumers, who may perceive electric vehicles as a potential compromise in these areas. As such, luxury brands face the challenge of maintaining their core attributes while incorporating sustainable innovations.

Moreover, the moderating effect of propulsion type on WTP suggests a nuanced consumer preference: non-luxury electric vehicles are increasingly seen as viable alternatives to traditional cars, especially for environmentally conscious consumers. Yet, combustion engines remain highly desirable in the luxury segment, signaling that the shift to electric mobility in the luxury market will require more than just technological advancement. It will demand a redefinition of luxury in an eco-conscious world, balancing heritage with innovation.

From a managerial perspective, these findings underscore the importance of differentiated marketing strategies that address the distinct needs of luxury consumers while gradually promoting sustainable alternatives. Electric vehicles must be positioned not merely as eco-friendly options but as high-performance, exclusive experiences that do not sacrifice the essence of luxury. Additionally, automakers should continue to invest in consumer education,

emphasizing the technological advancements and long-term benefits of electric vehicles, while also addressing concerns around performance, range, and emotional connection.

This study contributes to the broader understanding of consumer behavior in the luxury automotive sector, providing empirical evidence on the relationship between luxury, sustainability, and WTP. Nevertheless, it also highlights areas that require further investigation, particularly as the market for electric vehicles continues to evolve. Future research could explore the long-term adoption of electric luxury vehicles, the psychological drivers behind consumer preferences, and the impact of emerging technologies and regulatory changes on the luxury automotive landscape.

In conclusion, the luxury automotive market is pivotal, where traditional values of exclusivity and performance must increasingly coexist with sustainability and innovation. As electric vehicles become more prominent, luxury brands must navigate this transition carefully, ensuring they meet consumer expectations while leading toward a more sustainable future. This balancing act will determine the success of individual brands and the future of luxury in an evolving, eco-conscious world.

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