Volkswagen and the EV market

Project in business studies

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Abstract

With a world under constant change and increased advancement in technology and science, today's world has a lot of options to build its future upon. With technological advancement our society gained the possibility to reinvent our use of energy sources and establish a more environmentally friendly future. In this project we analyze one of the automotive industry largest players, Volkswagen. Volkswagen and the automotive industry have recently been under massive change and still is. With regulations which aim for a greener society and increased interest from consumers, automakers could hardly ignore what is potentially the next big market in the automotive industry. The electric vehicle has gained a lot of attention and how Volkswagen can take advantage of its resources and strengths to stay competitive in the relatively new market is what the project aims to answer.

With various tools to analyze opportunities and businesses' current situation the project wants to understand how big corporations like Volkswagen can compete in a market which faces massive change.

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1. Project Introduction

1.1 Problem Area

In the 21st century, we have seen everyone starting to base their entire life around technology whether it was their professional life or everyday lifestyle. We have seen the way this world works, completely turned around and mostly dependent on technology and electric equipment and softwares. In this project, our sole focus will be on electric vehicles. Early electric cars discovered a profitable opportunity, particularly for use in city driving. Women were among their most frequent customers, as they considered them to be ideal for quick trips around the area (Mc Fadden, 2019). Electric vehicles have been around for a long time, but because this generation appears to be surrounded by more technologies than ever and seem to be more sustainable and environmentally concerned along with other factors, we've seen a massive increase in demand for electric vehicles. Electric vehicle production has advanced dramatically in recent years, moving from a niche luxury item to the modern industry norm. Sports cars, freight trucks, motorcycles, and a slew of other items intended to make commuting simpler, faster, and more environmentally conscious are now available as electric vehicles. Many firms have changed their production processes to concentrate on producing electric vehicles for their customers. Volkswagen (VW), one of the most well-known automobile manufacturers, will be the subject of this project. While it is essential to recognize Volkswagen's entry into the automobile market, we raised the question of whether they are capable of being successful and competitive in this rapidly growing industry.

There may be few criteria and regulations to enter a market, but to remain a part of such a rapidly growing industry, one must keep up with different requirements and have revised strategies. This thinking made us wonder what these specific requirements are in order to remain viable and competitive in the automobile industry, particularly given the fierce competition. It also made us wonder if Volkswagen is able to uphold these criteria and, if so, what their plans are to do so.
This leads us to our research question:

"How will the company Volkswagen (VW) stay competitive in the automotive market with the new requirements for electric vehicles in Europe?”

1.2 Supporting Questions

These following supporting questions will be the base of backing up our main research question. The entire project will be answering these questions especially in the analysis chapter.

- Where does Volkswagen stand in the automotive industry?
- What are the requirements to stay successful in the automotive industry?
- Is Volkswagen meeting these requirements? If yes, how?
- If not, is it affecting them negatively or positively?

2. State of the Art

This chapter will be concerned with the previous academic literature written within our research field and particular developments within the individual subsections of our literature, as it aims to provide a coherent understanding of electric vehicles and its background.
The study deems it important to understand why electric vehicles are an important market for the automotive industry and how technology has played a vital role in reaching this point. These sub chapters have been chosen by the group behind this project, and these chapters are what we consider useful background information to provide.

2.1 Electric Vehicles

The continuous use of gas as an automotive fuel, especially in recent decades, has led to several environmental problems, such as global warming and air pollution. Considering that vehicles consume most fossil fuels globally, an effort has been made to change the scene so that vehicles are as least polluting as possible (Skouras et al., 2019). Concerning the environment, EVs can provide emission-free urban transportation. Even considering the emissions from the power plants needed to fuel the vehicles, EVs can offer a secure, comprehensive, and balanced energy option that is efficient and environmentally friendly, such as utilizing various kinds of renewable energies. Therefore, EVs can significantly impact energy, environment, transportation, hi-tech promotion, new industry creation, and economic development (Chan, 2004).

Past, Present, and Future of EVs

EVs have experienced tremendous changes from the nineteenth century until the present day. This chapter reviews the past of the electric vehicle and its history, the present challenges, and looks through trends in Europe for the future.

i. Past development

Personal use of electric vehicles has a long history that began in the nineteenth century. Various innovators from the past took note of the electric vehicle's high interest, searching for ways to enhance the technology. For instance, Ferdinand Porsche, founder of Porsche, produced an

electric car called the P1 in 1898. Around the same time, he designed the world's first hybrid electric car -- a vehicle powered by electricity and a gas engine. Thomas Edison, one of the world's most famous inventors, thought electric vehicles were more solid technology and worked to build a more incredible electric vehicle battery. Even Henry Ford partnered with Edison to explore options for a low-cost electric car in 1914 (Strohl, 2010). Due to barriers associated with the batteries and the rapid advancement of internal combustion motor vehicles (ICEVs), EVs have almost vanished from the scene since 1930 (Strohl, 2010).

By the early 1980s, electric cars would focus on the problems of air pollution in larger cities. Moreover, by the end of the decade, in 1990, California introduced its first zero-emission regulations, which sparked new initiatives in developing electric vehicles during the 1990s. Zero-emission vehicles became a new term. In this context, the focus shall, however, be on quite another discourse: sustainable development. Since the late 1980s, we have experienced a new and intensified focus on developing alternative energy resources and technologies in the transport sector. Not only has this focus become an integral part of the current environmental and alternative energy discourse, but it has also even come to dominate this discourse. The term is no longer soft energy paths, but sustainable energy systems, with energy for mobility purposes as a crucial part. Issues related to the development of alternative energy in the transport sector have thus been integrated into the much broader discourse on sustainable development (Høyer, 2008).

ii. Present challenges

At present, the primary driving force for electric vehicles (EV)s is the environmental issue; thus, the main question to be answered becomes, "What do consumers think about electric vehicles?"

Surveys have shown that users are usually enthusiastic about accepting the electrification of vehicles. Around 75% are seriously concerned about the high price of fuel. 55% are preoccupied with the high emissions/pollution of an ICE car and understand the advantages of EVs. Thus, it was identified that 42% consider environmental friendliness as an advantage of Evs, and 36% think it is cheaper to run than fuel. Interestingly, while the environmental impact is well known across all countries, the economic benefits of EVs are perceived differently. For example, only

14% of Italians see EVs as a cheaper option to run vs. 49% of British. Such caution and misinterpretation have resulted in the fact that just 9% of car owners seriously considered an EV during their recent car purchase. At the same time, there are two significant difficulties in increasing electrification. Firstly, the limited driving ranges of EVs, challenging their suitability for long-distance traveling (35%), nearly allied to the second, the underdeveloped infrastructure of public charging stations (36%). Notably, despite strong expectations towards developing public charging infrastructure, this is only the second most preferred location to charge an EV, charging at home/in-car garage being the most acceptable option (Vincent Dupray, Peter Otto, 2019).

iii. Future trends for electric vehicles in Europe

Europe is going through the initial adoption phase of electric mobility for a few years. After a period of ups and downs, it is now possible to express a more detailed view of the development of electric mobility.

The research organization BloombergNEF predicts that by 2040 EV sales will climb to nearly 60% of the global auto market — comparing it to 2010 when annual sales were near zero. With consumer awareness growing and market forces gaining impulse, EVs are fast shifting the future of the automotive industry and becoming the favorite for investors who understand this growth potential (Cohen, 2020).

Roughly half of the European continent's market growth can be credited to growing demand in Germany and the Netherlands, accompanied by France and Norway. Purchase grants and improving battery technology are strengthening the appeal of EVs but introducing a new EU emission model - no more than 95g of carbon dioxide/km for passenger cars by 2021 - possibly contributed to a considerable increase in sales (Cohen, 2020).

In 2019, France introduced a carbon-neutral target to 2050, with the UK following suit. The French president Emmanuel Macron announced an $8.8 billion aid package for the country's automobile industry, offering the most generous buying incentives of any country by providing

buyers up to 12,000 euros. With Tesla developing ground on its Berlin giant factory set to be complete by July 2021, it is clear that the European EV market is in acceleration (Cohen, 2020).

Current Technologies Status

EVs are going through a series of technological developments due to the recent popularity. Attentions have been placed on improving technologies, especially the battery and charging infrastructure. Consequently, these components experience major shifts along the EV development process. Battery technology is transformed from lead-acid to nickel-based to finally lithium-based types. Charging infrastructure, which provides fast charging facilities, is adopted lately to solve the shortcoming of the long recharging time of the common's low chargers.

i. Recent Lithium Battery Technology Developments

Over time, EV components and entire EVs have become more solid and accurate. Lithium batteries are the dominant type of technology in EVs. There are many different types of lithium batteries with different characteristics. The characteristics of the battery determine their driving range, life cycle, performance, and safety. Battery chemistries and composition can further improve a vehicle's driving range, environmental performance, and cost.

Lithium Cobalt Oxide (LCO) is the most advanced technology, with the highest energy frequency but low power density and service life. Although the LCO continues to be the technology of consumer electronics, many markets move away from this technology due to its dependence on cobalt, a scarce resource usually mined in emerging countries (Mierlo et al., 2021).

On the other hand, Lithium Iron Phosphate (LFP) batteries have a long life and can produce very high power thanks to the rigid olivine composition of the material. However, this technology is less suitable for high-energy applications, remaining a solid choice in power applications such as hybrid vehicles and power tools or where many cycles are required, such as commercial electric vehicles, grid energy storage (Mierlo et al., 2021).

Both NCA (lithium nickel cobalt aluminium oxide) and NMC (lithium nickel manganese cobalt oxide) are technologies with a high energy density, which means that they are commonly used in electric cars. A trend in both technologies is to reduce the amount of cobalt in favour of nickel (Mierlo et al., 2021).

ii. Towards the Next Generation Battery

Set to penetrate the market in the coming five to ten years, the next generation of Li-ion battery technology is likely to have low nickel and cobalt content (Mierlo et al., 2021).

Li-ion batteries are extensively studied to meet these targets. They are non-toxic and not flammable. Accordingly, a significant safety improvement could be observed. It is also worth mentioning that the Li-ion, solid electrolytes, show outstanding resistance on dendrite propagation which is one of the advantages of Li metal. The solid electrolytes developed for EV applications require fast charging properties (Mierlo et al., 2021).

iii. Charging Technologies

As EV technologies are advancing and electrified transportation is becoming more popular, standardized charging ports are necessary. The same way a driver of an internal combustion engine vehicle (ICEV) can fill up at any gas station, the same need to happen for EVs (Villeneuve et al., 2020). Even nowadays, a lack of charging port standardization is a significant obstacle holding back EV adoption, as the various EV companies still use different charging port configurations. The Society of Automotive Engineers (SAE) exists to consolidate and improve technologies by creating industry-accepted models. In 1996, SAE released its first coupler standard EV conductive charging, which has been reviewed repeatedly until the present day.
SAE has created other EV and plug-in hybrid electric vehicles (PHEV) standards such as a wireless power transfer standard, a three-phase conductive charging standard, and other various

standards that direct information and vehicle performance measurement standards (Villeneuve et al., 2020).

Although the SAE has developed standards, they still have not been adopted by the manufacturers. As EV technology continues to develop, the manufacturers' expectations will concentrate on one plug-in port. There are four of the main charging connectors emerging on the market today: the North American, the European, the standard developed in Japan and China, and the Tesla SuperCharger. Recently, the China Electricity Council is pushing towards a global EV charging standard, inviting all auto manufacturers worldwide to participate in the design. The new standard will provide a charging power upwards of ~900 kW (1500 V, 600 A). The high-power handling capacities will allow the standard to be used for several years as battery and charging technologies continue to improve, allowing for higher power charging. Tesla's latest ultra-fast "Supercharger V3" can have a power output of up to 250 kW per car and will finally cut the amount of charging time by 50% (Villeneuve et al., 2020).

The lack of a global standard has caused much confusion for consumers. Along with high prices, battery recharge times, and range anxiety, this lack of a standard has prevented widespread acceptance of EVs. Therefore, further advancements in charging technologies and standards will lead to the public's adoption of EVs (Villeneuve et al., 2020).

Impacts of the electric vehicle deployment

Extensive research is in the process of examining the consequences of EV deployment, placing attention on three critical impacts: economic, environmental, and power grid due to EV rollout. The core conclusions from these three categories will be discussed in detail in the sections below.

i. Economic impact

The economic impact of EV deployment can be evaluated from two perspectives: from the point of view of the power grid and the viewpoint of EV owners. EVs are additional loads that need to be plugged into the power grid to receive charging from the power grid perspective. In order to

cope with these massive additional EV loads, system costs will increase due to increased fuel used for more power generation. There are also more power losses during the power transfer across the power grid to supply these EV loads. However, this situation can be changed entirely by managing EV charging. Controlled EV charging can significantly reduce the system cost with savings of up to 60%. The cost reduction is even better with integrating renewable energy resources in the power grid, particularly wind energy. EVs have low operating costs from the EV owner's perspective because of efficient electric motors and inexpensive electricity. However, EV has a higher initial purchase cost than conventional ICEVs due to the expensive battery component. A term called "EV payback period" is introduced to estimate the length of time required to recover the investment cost of an EV. Many actions can be implemented to ease EVs' high initial purchase cost, such as mass-producing EVs, implementing energy trading policy, and adopting appropriate charging strategies (Yong et al., 2015).

At first glance, the economic impact of EV deployment on both the power grid and EV owners is not favorable. Power grids need to have more generation capacity for the additional EV load demand, while EV owners have to pay the high initial purchase cost of EV at the present time. However, with the implementation of coordinated charging, energy trading, and various electricity rates policy, EV deployment can be profitable for power grid and EV owners (Yong et al., 2015).

ii. Environmental impact

EVs are claimed to be green and environmentally-friendly since EVs have zero tailpipe emissions. However, EVs use electricity generated from the power grid to charge their batteries, and the power generation process does produce GHG emissions. In order to compare the emissions level of EVs to the conventional ICEVs, a parameter called "wells-to-wheels emissions" is introduced. Wells-to-wheels emissions take into account the emissions over a vehicle's entire life, including the energy and materials used to power a vehicle and the direct tailpipe emissions. Many researchers conclude that EVs have the lowest wells-to-wheels emissions. However, EV charging from a power grid with a coal-fired and other polluting fuels generation may cause EVs to have higher wells-to-wheels emissions than ICEVs. For instance,

the Texas power grid, which has a mix of coal and natural gas-fired generation, has been proven to generate higher EV emissions than ICEVs (Yong et al., 2015).

Similarly, the Ohio power grid with coal-fired generation yields higher SO2 and NOx emissions with EVs use, although reducing CO2 emissions up to 24% from EVs than ICEVs. These results show that EVs could not be environmentally friendly if EVs are charged from a dirty power grid. However, with the comprehensive employment of green renewable energy sources lately, the power grid will become greener. Hence, the wells-to-wheels emissions of EVs will be reduced (Yong et al., 2015).

iii. Impact on the power grid

EV deployment raises concerns about the effect of EV charging on the power grid. The interconnection of large EV fleets to the power grid to receive charging can negatively impact the power grid, such as harmonics, system losses, voltage drop, phase unbalance, increase of power demand, equipment overloading, and stability issues. Various possible charging rates and dynamic behavior of EVs even complicate the potential impacts (Yong et al., 2015).

A study performed to investigate the impact of EV charging on the load profile of the German grid in 2030 reveals that uncontrolled charging of one million EVs has a slight impact on the daily peak load, where the peak load increases only by 1.5%. However, if EVs replace all the conventional ICEVs in Germany (around 42 million units), then the EV charging will increase the peak load approximately two times. The study also shows that a maximum peak load reduction of 16% can be achieved using one million EVs as grid stabilizing storages (Yong et al., 2015).

Another study was carried out to analyze the effect of large-scale EV integration on the Estonian power grid, where the EV penetration level reaches 30% of the total passenger vehicles. The study shows that EV integration has a minor impact on power load profile. For uncontrolled EV charging, the peak load increases by 5%. On the other hand, the peak load will increase only by

4% for the controlled EV charging scenario. In addition, controlled EV charging will disperse the EV loads over the nighttime periods and level the load profile (Yong et al., 2015).

In short, EV deployment will affect the load profile of the power grid as EVs are additional loads to be connected to the power grid to receive charging. It has a high probability that Evs will be charged during residential peak load periods because EV owners tend to start charging their Evs once they arrive home after work. As a result, large fleets of EV charging will increase the peak load of the power grid load profile. Fortunately, some solutions can be implemented to solve this problem, such as implementing the TOU tariff system and appropriate charging management policies (Yong et al., 2015).

Government programs on electric vehicles: The European context

Promotion efforts addressing vehicle acquisition and operation are focused mainly on cutting down the cost gap between electric and combustion engine vehicles. The study considers one-time grants and tax benefits on vehicle purchases and tax breaks for operating a vehicle in private ownership and company-owned cars, usually applied at the national level.

i. BEV and PHEV purchase benefit.

National incentives on car purchases have been significant components of electric vehicle policies in Europe. In 2018, consumers in nine cities within the selected countries benefited from national purchase grants. These cities included Berlin, Birmingham, Copenhagen, Hamburg, Helsinki, London, Paris, Stockholm, and Vienna. National grant amounts for BEV, and PHEV purchasers ranged between about €1,000 (Sweden) and €6,000 (France), with most countries applying higher rates for BEVs. Grantees were typically individuals and businesses who could apply for grants for different vehicle types, including passenger cars and commercial vehicles. For the sake of completeness, local incentives are mentioned here, as well. However, they are not taken into account in the summary overview, as in contrast to national bonus payments, one-time local grants usually aim at more specific target groups. These groups can include businesses, taxi

companies, driving schools, or carsharing organizations. In 2018, local grants were applied in cities and metropolitan areas such as Amsterdam, Berlin, the Greater Paris area, Madrid, Rotterdam-The Hague, and Vienna (ICCT, 2020).

ii. BEV and PHEV registration tax benefit.

When registering a vehicle for the first time, tax benefits have been an additional vital action to grow the electric vehicle market. Reduced rates or exemptions on registering an electric vehicle were applicable in 11 cities in 2018 (Amsterdam, Birmingham, Brussels, Copenhagen, Helsinki, London, Madrid, Oslo, Paris, Rotterdam-The Hague, and Stockholm). In the Brussels metropolitan area, only buyers of a BEV could benefit from exemptions on registration tax while all other markets addressed BEVs and PHEVs equally. Austria, Germany, and Switzerland do not apply registration tax. France and Sweden have a bonus-malus tax scheme, integrating a bonus payment for electric vehicles on registration. Norway is the only country where buyers of a BEV are exempted from paying value-added tax (VAT), which is 25% of the vehicle's net price (ICCT, 2020).

iii. BEV and PHEV ownership tax benefit.

Tax advantages for owning a vehicle have been key measures at national and partly local levels in electric vehicle adoption. In 2018, owners of an electric vehicle in 14 cities benefited from tax exemptions or reductions compared to drivers of conventional cars. In Brussels, Oslo, and Vienna, only a BEV owner could benefit from a tax break. In France, ownership tax applies for vehicles emitting more than 190 g CO2/km; hence most vehicle owners were exempt from ownership tax. Norway replaced the tax in 2018 with a road traffic insurance tax, collected by the insurance companies on behalf of the authorities (ICCT, 2020).

iv. Electric vehicle parking benefit.

Parking benefits such as exemptions or reductions on parking fees or preferential parking access and permits at the local level have been a standard measure to spur electric vehicle uptake in the transition phase. Ten cities offered parking benefits for users of an electric vehicle in 2018—Amsterdam, Berlin, Brussels, Hamburg, Helsinki, London, Madrid, Oslo, Paris, and Vienna. In Madrid's city center, drivers of a zero-emission vehicle could park without time limitation. Reduced parking fees for electric vehicle drivers were applied in the city centers such as Helsinki. Time-limited, free parking applied in Berlin, Hamburg, Paris, and Vienna. In Amsterdam, residents and companies owning electric vehicles were given priority on the waiting list for parking permits. In Greater London, some of the boroughs offered discounted or free parking or parking permits. In Brussels, companies that equip their parking space for visitors or staff with a charge point for an electric vehicle were offered tax exemptions, saving €75 of tax per car per year. Oslo granted free parking in public parking lots only for drivers of a BEV (ICCT, 2020).

2.2 Rise in the number of electric passenger cars in Europe

This section is assessing the current trend in the electric car industry in Europe. Five types of passenger cars are scrutinized: electrical vehicles, hybrid vehicles (petrol-electric and diesel-electric) and plug-in hybrid vehicles (plug-in petrol-electric and plug-in diesel-electric).

On the vehicles studied

A hybrid car relies on two distinct power sources for motion. In this section, when talking about hybrid cars, we refer to full hybrid and mild hybrid cars. A full hybrid vehicle (FHEV) is powered by an internal combustion engine (ICE), an electric engine, or a combination of the two. Its battery is recharged by its internal combustion engine (ICE). A mild hybrid vehicle is simultaneously powered by an electric propulsion system and by a conventional internal combustion engine (ICE). One does not go without the other. A plug-in hybrid (PHEV) must be charged on mains to recharge its battery. It can run solely on its electric motor.

On the method of analysis

The analysis aggregates the number of each type of vehicle from 34 European countries. The analysis is made on an annual basis from 2012 to 2019. All data are extracted from Eurostat, the database of the European Commission. For each type of studied vehicles, a growth rate is computed. This indicator aims to give the reader an idea of the direction in which the electric car industry is heading toward.

The data is sometimes incomplete. For each category, when a country is missing data for one or more years, the country's number of vehicles is not taken into account for all the 2012-2019 period (e.g. If the number of electric cars of Great-Britain is not available in 2013, 2014 and 2016, Great-Britain number of electric cars in 2012, 2015, 2017, 2018 and 2019 are not taken into account in the aggregate number of electrical cars in Europe).

The most important variable in the analysis is therefore the growth rate and not the exact number of vehicles in each category. Even with this approximation, overall trends remain clear.

Analysis and conclusion

From 2012 to 2019 the growth rate (absolute change / original value) of all vehicles types is the Following:

- The number of electric vehicles grew by 517 %.
- The number of plug-in hybrid petrol-electric cars grew by 3661%.
- The number of Hybrid electric-petrols grew by 998 %.
- The number of Plug-in hybrid diesel-electric grew by 5 560 %
- The number of Hybrid diesel-electric by 244%

While this small analysis contains is fair share of default (lack of data, lack of information on data collection), one conclusion is unequivocal: electric vehicles, hybrid vehicles and plug-in hybrid vehicles are on the rise in Europe.

2.3 Competition in the Automotive Industry

As our research question is “How will the company Volkswagen stay competitive in the automotive market with the new requirements for electric vehicles in Europe?”, it is important to know more about the Electric Vehicles (EV) Market. How is the EV market doing right now, how it is developing itself will be the subject of this section. We will analyse the competition inside the EV industry and in order to do so we will look at car manufacturers but also at electric batteries suppliers which play an important role in this growing market.

We will focus on the European Market for two reasons, the first one is because it overtook China in terms of global EV sales and the second one is because it is the second largest market in the automotive industry in general. Indeed, China saw 1.33 million EV sold in 2020 which accounted for 43% of the EV sales globally while Europe (27 members, United Kingdom and European Free Trade Agreement (EFTA)) accounted for 44%. Battery Electric Vehicles (BEV) and Plug in Hybrid Electric Vehicles (PHEV) showed more resilience during the Covid-19 crisis and increased by 144% in 2020 in terms of sales in Europe (Transport and Environment’s report, 2021).

The race to electric vehicles has just started, most of the car manufacturers are adapting their business models and are investing huge amounts in Research and Development to come up with new vehicle concepts and technical innovations due to the aggressive emissions targets set by the regulators and in order to keep up with the changing automotive industry. The transition to Electric Vehicles results in significant changes in the Value Chain and the Cost Structure (Impacts of Electric Vehicles - Deliverable 4, 2011) of the industry which requires manufacturers to adapt themselves internally.

What can be seen nowadays is that electric vehicles sales are increasing more and more each year and that companies are for the moment succeeding in delivering a new kind of qualitative models and diversifying their portfolio. Globally, in Europe (excluding UK and EFTA), the market share of BEVs and PHEVs are respectively 5.3% and 5.2% of the automotive industry

which is a significant progress as the sales numbers of BEVs and PHEVs increased by 117.4% and 262.3% in 2020 according to the European Automobile Manufacturers' Association (ACEA). Now the question that arises is "what are the actors of this increasing numbers? What are the car manufacturers that are competing at the moment into this huge potential growth market?"

i. Electric Vehicle Competition in Europe

To make our analysis of the competition inside the European market we will focus on the market share of the different important car manufacturers but also to the most sold electric vehicles. As a lack of information about precise sales of brands we will try to look at sales of automotive groups which are easier to find. Moreover, as said previously, we will also base ourselves on the most sold electric vehicles in Europe as this information can be found easily. These last numbers will always be taken from the report of Bart Demandt (2021), except if it is mentioned otherwise.

Firstly, electric vehicles sales in Western Europe of VW Group accounted for 10% of their total volumes worldwide which is approximately 308 000 EVs (BEVs and PEHVs), that only in Western Europe (Kane, 2021). VW Group could count on various models from its different brands. Indeed, Volkswagen highly contributed to this high performance with its Volkswagen ID3 which was sold 54 495 times which made it the 3rd most sold EV in Europe in 2020. The Volkswagen e-Golf, e-up!, Passat GTE and the Golf GTE/eHybrid were other models from the brand which had success. The e-Golf amounted to 33 650, the e-up! to 21 942 and the Passat GTE to 26 421. Other EVs from other brands of the VW Group were the Audi e-Tron which was the most sold fully electric SUV in Europe with 27 713 sales; the Audi Q5 (PEHV) with 18 682 sales and the recently launched Porsche Taycan which amounted to 12 332 units sold.

A big competitor in this emerging market is the BMW Group. Indeed, the group sold 135 000 EVs across Europe in 2020 (Kane, 2021). The main contributors to this number were the BMW "i series" as the i3 was sold more than 23 000 units and the various plug-in hybrids models such as the BMW 330e which was sold 25 087 times. MINI also contributed as they offer the Mini Cooper SE (BEV) and the hybrid Countryman (PEHV).

Daimler, the group that is composed of Mercedes-Benz and Smart also can be mentioned as a competitor as it sold more than 83 907 (calcul made from numbers below) electric vehicles in Europe in 2020. Mercedes electric models such as the A250e and the EQC accounted for 29 427 and 14 645 units sold; the E300e and the GLC 300e models for 18 549 and 21 286 units. Mercedes' little sister, Smart, sold approximately 27 000 electric vehicles and its main contributors were the Smart Fortwo ED (19 576 units) and the Smart Forfour ED (7 640 units), both BEVs.

The PSA group is another automobile group that performed well on the European EV market. It recorded around 120 000 new registrations for electric vehicles in 2020 (Randall, 2021). It performed well mainly due to its French brand Peugeot with its Peugeot e-208 sold 31 287 times and also due to the Opel/Vauxhall brand, another brand of the group, which sold 16 110 e-Corsa and 2 775 e-Ampera.

The Renault-Nissan-Mitsubishi alliance also plays an important role in the electric vehicles competition. Indeed, Renault, the French car manufacturer, also showed high performance in terms of electric vehicles sales. It sold 115 888 BEVs in 2020 whose 100 000 units were their ZOE model which was the most successful electric vehicle in Europe after it overtook the Tesla Model 3 (Randall, 2021). Besides, Renault sold 30 000 PEHVs with their E-TECH vehicles such as the Clio, the Megane and the Captur E-TECH (Randall, 2021). Nissan sold 31 177 units of their Leaf model which was one of the most sold in Europe in 2020 as well as the Plug-in hybrid Outlander produced by Mitsubishi which was sold 26 673 times.

Another actor of this competition is the Swedish car manufacturer Volvo, which is currently the only company to offer a plug-in hybrid variant for each of the models in its portfolio. As they sold 288 000 cars in Europe in 2020 and knowing that 29% of these sales were EVs we can deduct that they sold about 83 500 EVS on the European Market (Kane, 2021; based on Volvo's numbers). Moreover, it is clear that Volvo wants to strengthen its position in the premium SUV market segment as two of their SUVs were amongst the most sold EVs in Europe, namely, the XC 40 plug-in hybrid and the XC 60 plug-in hybrid which accounted respectively for 26 506 and 22 531 sales in 2020.

Tesla, the leader in electric vehicles sales worldwide, performed well in Europe in 2020 as it sold approximately 100 000 units (Demandt, 2021). Their Model 3, which is the most sold electric vehicle in the world, was the second most sold in Europe in 2020 with 85 979 units. Their models X and S showed more modesty in terms of units sold but still accounted for 6 007 and 5 562 units respectively.

Concerning the automotive group Toyota, we do not consider it as a competitor in electric vehicles sales in Europe in 2020 as it sold classical hybrids and not plug-in hybrids. Even though they sold approximately 529 000 units (Automotive World, 2021; based on Toyota Motor Europe), we will not consider them as competitor during 2020 but we will certainly do in 2021 and the years after as it launched new plug-in hybrid and full electric cars such as the RAV4 plug-in hybrid and the 100% electric Mirai by Toyota but also the 100% electric SUV UX by Lexus (Toyota Europe Newsroom, 2021).

Smaller competitors like Hyundai and Kia, even though they expect to grow their market share due to new electric vehicles launches, can also be mentioned as the Hyundai Kona EV was the 4th most sold electric vehicle in Europe in 2020 with 47 796 units and the Kia Niro EV with 31 019 units.

To conclude, what we can say about the EV competition in Europe is that several actors are keeping up with the race to electric vehicles which makes it more intense. Some competitors are bigger, some are smaller, but despite this, nearly all car manufacturers offer electric vehicles.

ii. Electric batteries competition worldwide

Now that we have analysed the current main competitors in the automotive industry for selling electric vehicles in Europe in 2020, we believe it is also important and interesting to look at the electric vehicles' battery market. Indeed, demand for batteries is increasing each year since it is one of the most important components required to build electric vehicles and the dependency of

car manufacturers related to these electric batteries suppliers is an important factor in the competitiveness of an automotive company selling EVs.

Currently, the global leaders in electric batteries are Asian companies and the 6 biggest sellers together have an 86% market share which translates the concentration of the market globally. We will analyse the market share of the leaders in the market and their implementation in Europe but also the actions Europe takes to gain more independence towards these Asian suppliers.

The two biggest sellers worldwide are LG Chem and CATL, a Korean and a Chinese company respectively which make 25% each of the total electric batteries sales in the world in 2020 (Piot, 2021). LG Chem is present in Europe as it has a company in Poland (Lara, 2020) and supplies car manufacturers such as VW Group, Daimler, Renault, Tesla, Hyundai Motor Group, Geely Automobile Holdings (Volvo) and General Motors (Lara, 2020; Piot, 2021). CATL is building a factory in Germany which should be ready to produce in 2022 (Fontaine, 2019) and supplies VW Group, BMW, Tesla, Daimler, Volvo, Renault, PSA Group, Hyundai, Toyota, Nissan and Honda (Celik, 2020; and Fontaine, 2019).

Then, we have Panasonic which is a Japanese company, and which has a market share of approximately 16% (Piot, 2021). They currently have a partnership with two Norwegian companies specialised in energy, Equinor and Hydro, whose plan is to build a factory in Norway (Torregrossa, 2020). They allied recently with Toyota and have a partnership with Tesla (which has a factory near Berlin).

Afterwards, there is Samsung SDI, another Korean company which has a 9% market share worldwide (Piot, 2021). It is, as all the leaders of the electric batteries market, present in Europe with a factory in Hungary (Torregrossa, 2017) and it supplies car manufacturers such as Volvo, VW Group, and BMW (Piot, 2021). Other big sellers of electric batteries are BYD, a Chinese company which manufactures batteries, but also sells cars; and SK Innovation, which is a subsidiary of the Korean holding SK Group. BYD has a market share of 6% (Piot, 2021) and wants to build a battery factory in Great-Britain due to a partnership with Jaguar Land Rover (Bottet, 2020). SK Innovation has a market share of approximately 5% (Piot, 2021) and is implementing his 3rd factory in Hungary (Yonhap, 2021). SKI supplies car manufacturers such as

Daimler AG, Hyundai Motor Group, VW Group and BAIC (and Audi) (SKI's website; Eng.skinnovation.com).

Although the leaders of the electric battery market are Asian, the European Union wants to decrease their dependency on Asian suppliers, close the gap on battery manufacturing and increase their 1% market share worldwide (Le Roy, 2020). Therefore, initiatives have been taken inside the EU such as the European Battery Alliance (EBA) which was launched in 2017 by France and Germany and which is supported by the European Commission. It resulted in the creation of Automotive Cells Company (ACC), a joint venture between the PSA Group et Saft (Total) (Chong, 2020) . A second project was recently established, the European Battery Innovation (EBI), which gathers 42 companies, among them, BMW, Tesla, FCA and Northvolt which is a Swedish company (EBA250's website, 2021). Northvolt will be an important actor in the European production of electric batteries as it is already building a factory in Sweden and as it has attracted investors like BMW, and Volkswagen that wants to build a factory in Germany with Northvolt as their partner (Lee, 2020).

To conclude, the leaders in the electric battery market are currently Asian and have the complete monopoly of the market. They are implemented in Europe and supplied to European car manufacturers. However, the European Union wants to decrease their dependency on these Asian suppliers by launching several plans to increase their market share worldwide.

3. Theoretical Framework

Here, the details of our theoretical considerations and terminology will be explored. These regard our fundamental theoretical assumptions about our field of study as well as our specific problem area.

The theoretical framework we have used in this chapter helps to explain how VW has managed to stay competitive in the automotive industry. Furthermore, we have introduced Porter's Five Forces as well as Porter's Generic Strategies, which helps us to create a better understanding of how their marketing planning works. This chapter contains SWOT analysis to further our understanding of VW's strengths and weaknesses, which is used to create a better understanding of how VW tries to accumulate their strongpoints and use that as their competitive advantage in the automotive industry.

3.1 Porter's Theory

While glancing at Porter's theory (1979), he explains how an industry is decided by five competitive forces: the bargaining power of customers and suppliers, the threat of new entrants, the threat of substitutes and last but not least - the rivalry between competitors. Porter explains very carefully that the goal with the industry analysis is for the firm to find a favourable position where a firm can defend itself from competitive forces or turn them into their favour (Porter, 1979).

Furthermore, Porter's five competitive forces have been used in a wide framework for analysing an industry's competitive landscape and its attractiveness. Meaning, Porter's hypothesis is making the industry analysis easier, but at the same time it only shows a business attractiveness and profitability, making the hypothesis not as full as it could be (Porter, 1979). The critique of Porter's hypothesis comes from Dobbs, who argues how the analysis of Porter should be used to gain insight into how a firm can compete more effectively in an industry. Using this theory would give some insight into how attractive the market of EV is, and will be in the future. Arguably the market for petrol cars worldwide has dropped, so investing in the transition of petrol to EV is the future. Making the EV market very interesting for VW, especially because

VW are adhering to their customers and their wishes. Thus, introducing Porter's Five Forces into this creates an industry analysis, to see how VW can compete in the market and how their strategies would apply in order for them to stay competitive and in order for them to even offer new products to take charge in the EV market.

i. Threat of a new entry

Often, when talking about a threat you associate the word with something usually negative – something's getting in the way of you or your business. According to Porter (1979), the threat of a new entry to an industry depends on the barriers to entry and the reaction from existing competitors when entry occurs. Meaning, an industry will always look at how their competitors react to a new entry, in our case the new entry is EV – how every automobile industry is reacting is crucial. Thus, the expectations on the reaction of the already existing competitors depends largely on what kind of intentions that are displayed by the current incumbent. Furthermore, according to Porter (1979), the incumbents' ability to fight back and cut their prices in their industry, is a response to a new entry – doing that will in the long term make you keep your share of the market. The threat of a new entry in the EV market here is VW themselves, because Tesla has the main market share, making VW the threat in the market. Considering VW as a threat is a genuine concern for many companies, because VW's competitors are well aware of VW and their brand recognition, making them a serious competitor in the EV market. With the introduction of their ID-3, and this alone is enough to think of VW as a serious competition in the EV market.

According to Porter (1979), the entry barriers can be divided into six major groups: economies of scale, product differentiation, capital requirements, cost disadvantages independent of size, access to distribution channels and government policy. So existing players at the market, can gain economies of scale in different parts of the value chain, as an example we could use the production of vehicles here – the already existing players in the market could behind the transition to EV reasonably fast, because they already have a share in the market, making it easier for them to have the upper hand. Arguably having economies of scale, makes it quite

difficult finding a common ground between the competitors. Meaning they have to either enter the market on a large scale or accept a cost disadvantage compared to the existing competitors. According to Porter (1979), having product differentiation within an industry will create barriers to entry by simply forcing new entrants to spend a lot of money in order to create customer loyalty. Creating customer loyalty seems like something incredibly important, and it shows. Making sure the customers in an industry can put their trust in an organization will make it easier for the organization to produce new products, their loyal customers haven't seen before, but because their customers know the organization, they are more likely to accept the change and stay at the organization. Having Cost disadvantages independent of size concerns the fact that existing firms have an advantage in the market. Making an entry barrier, making it even more difficult for new entries in the market. Transitioning to VW's opportunities in the automotive industry is very good, hence they already have a big market share in the automotive industry, their capital is big and even their suppliers are able to change for whatever product VW needs.

ii. The bargaining power of suppliers

Controlling an industry is something very difficult to do, but nonetheless a lot of firms are still doing this, in order to stay in the best position for their organization in the market. As Porter (1979) explained carefully, when you raise price or reduce the quality, suppliers can exert bargaining power over firms in the industry – meaning the suppliers have the power, to negotiate with the biggest firms, and even make demands but it always has to be reasonable because otherwise the firms will simply find another supplier, who will fulfil their demands. If firms cannot raise their own prices towards their customers, then the supplier can simply squeeze the profitability for an industry. VW here is a largescale company, who has a lot of suppliers worldwide. Most of their suppliers comes from China, making the production of their new and improved EV even cheaper to manufacture. This making the power of the supplier for VW on the low side, hence VW has the ability to wreck and choose their suppliers, if their pricing becomes too high.

iii. The bargaining power of buyers

The bargaining power of the buyers are usually very strong – unless the buyer is small in relation to the supplier. Therefore, the relative bargaining power of the buyer is weak (Grant, 2016). The usual buyers in the automotive industry are often individual buyers, which indicates that the relative bargaining power of the customer is very weak in terms of the ability to negotiate the price and have demands to the automaker. Having a large organization, who buys fleets of cars, usually have a higher ability to exert their influence over the automaker.

As an individual buyer, switching costs are very low if the car does not live up to the customers' requirements. Furthermore, the act of digitalization has made the cost of switching even lower, because it has allowed the customers a transparency in the market, allowing them to pick and wreck how they like, using the internet to compare the different cars to their own needs. Meaning if VW's customers have a desire to acquire an EV, they can do research and find a supplier who fulfils their requirements if VW does not, this makes it even harder for VW to compete. Historically software has not been a part of the automotive industry, and the word "software" has only been associated with the IT industry, but now software is something every automaker has in their cars. This can result in an increased perceived switching costs for customers in the future, depending on the compatibility between networks and systems.

When a customer buys a car, they often buy a car in relation to their income. This point especially is something VW is known for, their quality products for a "quality" price. Many of their customers are coming from the middle class, so if VW manages to transition to EV and have the price be lower than Tesla, they can actually compete very well. Taking all the factors into consideration, with the fact of high availability of differently priced options of cars on the market, makes the customer a whole lot more price sensitive. The level of differentiation in the automotive industry is very high, where every firm can differentiate in regard to design, comfort, functionality and even the technological functions every car has now.

To conclude, the bargaining power of customers can be very well defined as moderate due to the low switching costs, high price sensitivity and high transparency.

iv. Threat of substitutes

There are different kinds of possible substitutes for cars, and every single one of them is deemed as a threat for the automotive industry. According to Garvill (1999), customers base their choice of transportation on cost, travel time, flexibility and comfort. Furthermore, Garvil does make another point on how customers usually tend to choose the car more than buses or bikes, but at the same time the customers rank the cars as the worst in regard to pollution and energy consumption. The simple trade-off between price and performance is something that determines if substitutes constitute a real threat to the industry (Porter, 1979). Both Garvill (1999) and Porter (1979), suggests that the threat of substitutes for the car industry is very weak, although the alternatives might be cheaper, easier or even more comfortable, society tends to choose a car every time over the alternatives there are. The substitute for a normal petrol driven car is the EV, and this threat is real, that is why VW is heavily investing in the EV industry. VW actually has a goal for 2030, they wish to transition to 70% in the European EV market (Reuters, 2021). Making the substitute threat clear to VW, especially because the EV industry is a threat to the normal automotive industry. An example of that is the way Norway welcomes the EV, even giving people some goods along the way, as for free charging, free parking in their cities as well as for lanes only for EV.

v. Industry rivalry

The automotive industry has always been associated with high fixed costs. All of these costs include establishing factories, supplier relationships, brands and even sales channels. Grant (2016) also states that there are high exit barriers in the industry as manufacturers have specialized assets. The automotive industry has simply outgrown the demand, making the excess capacity into a fierce competition in the market. This invites other competitors, especially from

China to act in the automotive industry. All of this leads to a competition amongst actors, and one of the "new" actors who has risen up is Tesla and the EV industry. This industry rivalry has been very interesting for VW, hence their heavy investment in the EV market. The industry is seemed as a "new" opportunity for many companies, but VW actually have an advantage here. They are able to enter this new industry and even have a greater share in this industry than the normal automotive industry.

3.2 Porter's Generic Strategies

Competitive strategy is a long-term plan of action, in which a company is directed to gain advantages over its rivals by analysing their competitors' strengths, weaknesses, opportunities and threats in the industry. According to Michael Porter there are four different types of competitive strategies – *cost leadership, Differentiation leadership, Cost Focus Strategy, Differentiation Focus Strategy (*Daft, Murphy, Willmott, 2017). These types of competitive strategies are used worldwide in almost every company there is. A clear understanding of these strategies is crucial in order to compete and manage to gain success in the industry.

We will in this chapter not go into details in every type of competitive strategy but have focus on Volkswagen and what their competitive strategy is or what they will gain most advantage from.

Volkswagen is a multinational firm with high recognition in target market segments. The continual competition in the industry has made it challenging for Volkswagen to sustain their market leadership and increase their market share without having to exert significant economic effort. Volkswagen has throughout the years managed to keep an advantage because of their quality products and their loyal customers, they always manage to listen to their customers and their needs, but time is changing and so is the demand from their customers. Being a global brand with a strong presence all over the world, Volkswagen has created a competitive position based on some critical factors which provides a strong edge over their competitors.

Volkswagen has somewhat adopted a combination of cost leadership, differentiation and focus strategies to manage the competitive pressure. Following the customer base expansion and the sales growth boom, Volkswagen shifts their focus to an appropriate intensive growth strategy which is based on three generic strategies.

i. Cost leadership

Cost Leadership strategy involves gaining a competitive market advantage by lowering the cost (Daft, Murphy, Willmott, 2017). This is the main strategy of Volkswagen in the consumer market. So, what does Cost Leadership mean when we try to introduce it to Volkswagen?

- This allows Volkswagen to expand the market share by targeting the middle class, which also makes up for the largest proportion of the consumer market in most countries. Middle class consumers are generally speaking more likely to care about the pricing and the cost leadership strategy would definitely be appropriate here (Vrontis, D. Sharp, 2003).

- Volkswagen is a brand known for their quality products for reasonable prices, which allows them to compete with brands that are segmented to a specific consumer group. This allows Volkswagen to have a high brand awareness and high sales which provides an even stronger competitive advantage basis. Meaning if and when they introduce their new and improved EV, they already have a loyal customer base, who is ready to invest in their new and better product.

The use of Cost Leadership strategy highlights a certain amount of benefits which is offered through this strategy. Volkswagen has a high brand recognition, able to expand their customer base, encouraging consumption and accessibility are some of the factors Volkswagen is aware of while using this strategy and this allows them to stay on top in the competitive market.

ii. Differentiation leadership

Differentiation is another strategy Volkswagen is using, and this makes it even more interesting seeing how Volkswagen manages to actually use different sets of strategies to compete and gain an even higher brand-recognition. VW aims to distinguish and offer a product or a service, which is better than their competitors. How are they actually using differentiation strategies in the market to stay atop?

- Through differentiation Volkswagens positions its offering in a different way to stand out and be different from their alternatives who offer the same things. Because Volkswagen is an experienced brand with a strong basis, they are able to use differentiation to differentiate themselves from other brands, and they are also doing this by listening to their consumers and their needs (Varadarajan, P. 1983).

- The fact that they are using differentiation atop of Cost Leadership strategy allows them to expand their consumer base by emphasizing over their unique products (Vrontis, D. Sharp, 2003).

- One of the main things that differs Volkswagen from many of their competitors is the fact that they are one of the oldest brands in the world, with very little change to it. This has allowed the brand to establish a strong image in their consumers mind and this will always allow them to stay competitive in the future (Vrontis, D. Sharp, 2003).

Furthermore, Volkswagen uses innovation as a tool to create and offer different tools to their consumers, to keep their interest at bay and to keep offering new consumers a new variety of products that will fulfill their needs.

iii. Focus strategy

Third strategy Volkswagen is using is the Focus strategy, which allows them to target a market segment and to only focus on that segment to gain some sort of competitive advantage (Daft, Murphy, Willmott, 2017). Here in this strategy Volkswagen has put focus on the EV market, because they know their consumers have a wish for EV as well as for the regulations wishing for a change.

- So, by focusing on product attributes, Volkswagen has managed to revise its branding strategies and has continuous changes in their product designs to satisfy their customers' expectations and offer a product that maximizes value for money (Vrontis, D. Sharp, 2003).

- Volkswagen has put focus on the EV market segment, which now allows them to compete and offer their consumers a product that is able to compete against their competitors like Tesla who already has a big market segment. They have a big market share, and their consumers knows their brand and what they are offering, so if VW presents their consumers with a new Electrical Vehicle, that offers everything Tesla does, at a lower price they will be able to compete and even have a greater advantage than Tesla, hence them having a large consumer base is a great advantage.

To sum up Volkswagen is not only using one strategy, but they are also able to use 3 different strategies to stay competitive. The fact that they are using *Cost Leadership, Differentiation and Focus Strategy* allows Volkswagen to aim at different market segments and offer products in their respective markets. Volkswagen already offers Hybrid cars, and their aim is to offer quality EV to their already very big consumer base. The future for Volkswagen at this time and age seems to be very bright, and if they manage to enter the EV market as they plan to do, they might be Tesla's biggest competitors and even have a say in the market as for what the future holds of demands for EV.

4. Project Structure

We'll go through how we organized our project in terms of data collection and sampling in this part. In the following section, we will also describe what methods we chose for this project and how it works and shapes our analysis and conclusion.

4.1 Research strategy

The primary goal of our research is to determine if Volkswagen fulfils the most recent regulations in order to remain competitive in the automotive industry. We looked at these requirements in particular. The idea was then to study secondary data to determine if Volkswagen meets these standards or not, and if so, what they can do to stay competitive, and if not, what may be the reasons behind. We also conducted a SWOT analysis to see how their competitors are performing and to create a modest comparison which helped us to figure out what are the possible strengths and weakness and also what can be opportunities and threats for VW and also its competitor Nissan. For a follow up background, PEST analysis was also conducted to understand the automotive industry and how it works.

To comprehend this, we examine the top priorities in Europe that have resulted in these criteria for companies to follow in order to remain profitable and competitive. To investigate these criteria and priorities, we chose to undertake a qualitative content analysis. Following the discovery of these requirements (codes), we examine Volkswagen's position in regard to Porter's theory, and Porter’s Generic Strategies. We also incorporate reports, books, and quantitative data in our research to dig deeper into Volkswagen's position.

4.2 Sampling process

In this part, we'll go through our sample criteria for picking articles for analysis, as well as our sample options for picking various texts as our research source.

In this regard, it's vital to emphasize that this is a qualitative research aimed at delving further into the phenomena of how automotive firms operate and what it takes to stay competitive. Our idiographic approach to knowing is the source of this.

The phenomenon is one-of-a-kind, and we want to learn more about it. We want to contribute to the area of automotive industries by shedding light on the process and encouraging further research. As a result, our judgment and evaluative competency in line with our general knowledge are significantly reliant on this substantive sampling procedure. Another important aspect of our sample procedure pertains to the study's objectives: we want to look at all of the criteria that a firm like Volkswagen would need to be competitive and successful in the market.

In terms of sample criteria, we use a purposive selection technique in which we strive to choose texts that are representative of the phenomenon yet have a suitable intensity of the phenomenon; i.e., the articles should provide instances of how any automobile firm should plan its goals and strategies to compete in this rapidly increasing sector. As a result, the sampling procedure is directly led by the research topic, and it is also dependent (Bryman, 2016) in the sense that these criteria have changed through time. As our understanding of the phenomena grew, the criteria for processing prospective data became increasingly refined.

As a result, our standards evolved to reflect the emphasis on quantity, quality, and themes. We looked over 150 different publications, studies, and books related to the automotive sector and Volkswagen. While reading through them, some subjects stood out as more usual and favourable to answering our study question, so we focused on these, such as the aspects of "competition," "strategy," "automotive," "Volkswagen," and other themes linked to our coding system, which is discussed following the methodologies section.

We used a looser framework to evaluate the themes and conduct cursory analysis rather than a rigorous set of standards. These represent the coding system, as well as a few additional criteria, which will be shown and discussed later. The texts were largely assessed for the superficial

presence of numerous of the following codes/requirements during the theme sample process with further subcategories. The codes and subcategories are presented in the following table below:

Codes	Subcategories
Customer focus	*i. The range* *ii. The cost* *iii. Charging infrastructures*
Customer experience	*i. In-vehicle experience* *ii. The aftermarket*
Battery production strategy	*i. The battery* *ii. End-of-Life Battery Concerns*
Brand equity	
Business model	

These codes/requirements then have further sub sections that we use to have a more in-depth analysis which can be seen in the analysis section later.

We opted to hunt for texts related to needs rather than creating codes from specific articles after reading through all of the articles and texts. This was a manual procedure in which the articles were read, assessed, and debated with the group, and then a comprehensive comparison of the different articles and their contents was made. After researching and filtering, we ended up using

numerous articles which helped us with both, generating codes and analysing them by linking to Volkswagen. The list of the articles will be listed in a section in the bibliography chapter.

4.3 Methodology

In this chapter, we will be discussing the various methods we use to collect our data and how we used certain tools that will help us in the analysis of this project.

i. Qualitative content analysis

A common qualitative research methodology is content analysis. Rather of being a single method, content analysis is now used in three different ways: conventional, directed, and summative (Hsieh, Shannon. 2005). All three techniques follow the natural model in that they interpret meaning from the content of text data. Coding schemes, sources of codes, and risks to trustworthiness are the key distinctions between the techniques (ibid.).

Coding categories are produced directly from text data in conventional content analysis. The analysis of a directed approach begins with a theory or relevant research results as a guide for first coding (ibid.). A summative content analysis is counting and comparing terms or material, then interpreting the underlying context. We shall use directed content analysis in this research paper.

Content analysis is regarded by researchers as a versatile tool for assessing text data (Cavanagh, 1997 in Hsieh, Shannon. 2005). Content analysis refers to a group of analytic techniques that range from intuitive interpretation to systematic, rigid textual analysis (Rosengren, 1981 in ibid). The sort of content analysis technique selected by a researcher is dependent on the researcher's theoretical and substantive interests as well as the subject under investigation (Weber, 1990 in ibid.). Although the flexibility of content analysis has made it beneficial for a wide range of scholars, the lack of a clear definition and methodologies has the potential to limit its utility. (Tesch, 1990 in ibid.).

The most common distinction made between content analysis and other research methods is whether it is predominantly qualitative or quantitative (ibid.). A more detailed examination of the many applications of qualitative content analysis might possibly reveal crucial concerns for researchers to consider in the design of content analysis studies and the analytic methodologies utilized in such studies, avoiding a muddle of approaches (Morse, 1991 in ibid).

ii. Directed content analysis

There are occasions when an existing theory or earlier study on a topic is incomplete or may benefit from more explanation. A guided method to content analysis may be used by the qualitative researcher. Based on their views on the function of theory, Potter and Levine-Donnerstein (1999) may classify this as a deductive application of theory (Hsieh, Shannon. 2005). A directed method to content analysis aims to validate or enhance a theoretical framework or theory conceptually. Existing theory or research can aid in narrowing down the research issue (ibid). It can provide predictions about the variables of interest or the relationships between variables, assisting in the development of the first coding scheme or code linkages. Deductive category application is the term for this (Mayring, 2000 in ibid.). In contrast to a traditional technique, content analysis employing a directed method is guided by a more organized procedure (Hickey & Kipping, 1996 in ibid). Researchers start by defining essential ideas or variables as initial coding categories, based on current theory or past study (Potter & Levine-Donnerstein, 1999 in ibid). The goal of this study is to demonstrate the requirements that an automobile firm such as Volkswagen must meet in order to remain competitive in this market, which will be discovered using existing data. We've established a number of requirements that will use codes, and then we'll examine each code to determine if it's being utilized by Volkswagen, if so, how, and if not, how it's affecting their position in the EU automotive industry.

iii. SWOT analysis

SWOT Analysis is used to analyse an organization's current position to determine strengths,

weaknesses, opportunities, and threats. Through this analysis, we will be able to determine VW and its competitor's positionality in this fast outgrowing competitive market.

Strengths and Weaknesses are called internal factors while external factors include opportunities and threats. Internal factors are determined by the effect within the organization since what could be identified as strengths may be viewed as weaknesses for another objective.

A SWOT diagram, as shown above, analyses a business by focusing on the internal & external factors. It is usually presented by four boxes, but shape can vary.

SWOT analysis can be used to determine if a business is worth investing in by visualizing the pros and cons. With a clear view of the negatives and positives of a business it also makes it easier to realize how to move forward.

- *Strengths*

SWOT will help you understand what part of the business is doing well. These are key factors to identify since it is essential to build on the strengths of the business. Strengths are also critical for the success of the business as they give a competitive advantage. Realizing these factors will introduce ways to build upon the strengths and grow the business.

- *Weaknesses*

A business would try to build on their strengths and improve their weaknesses. Weaknesses puts the business at a disadvantage competitively. Identifying these weaknesses and trying to improve them before they will cause further damage to the business is essential. This requires a thorough analysis of what needs to be improved upon.

- *Opportunities*

Identifying the opportunities available for the business is also an important factor within SWOT analysis. Trying to pinpoint openings in the market or realizing which trends the business can utilize is also what helps the business have competitive advantage. All these opportunities are external factors like trends and regulations for example. To identify opportunities for a business it would be required to already have identified the business' strengths and weaknesses. Realizing that some opportunities are not reachable at the time is also a vital part.

➢ *Threats*

Threats are external factors that may affect your business in a negative way. It could for example be laws limiting breweries to produce beverages with more than 2,6% alcohol(?). Identifying which threats are possible to eliminate or prepare for will allow the business to build on its strengths easier. This will require knowledge regarding the business' strengths and weaknesses.

SWOT Analysis can be performed multiple times, it would be vital as a business can contain different departments. These departments might consider strengths and weaknesses different from one another. For instance, the rich history Ford has might be an excellent strength for the sales department but not for the tech department. Sometimes it is required to perform multiple SWOT analysis to gain a true and fair view of the entire business.

4.4 Limitations/Delimitations

In the following sections, we acknowledge and address the research's limitations and shortcomings. This means we'll talk about the limitations we've discovered in our research. First and foremost, we looked at how specific publications are establishing a standard for the automobile industry to follow in order to stay competitive. A limitation is that this implies a preconceived notion or expectation that these needs will be noticed in every article and by every author or anybody with even the most rudimentary knowledge of the automobile business. As many of the authors we use generate material for financial gain or produce their content regarding what the audience really wants, we may not be able to focus on their motivations. Instead, we will concentrate on human emotions and what the audience can connect to. A sample size should be sufficient to adequately depict the phenomena of interest and answer the research question. However, a high sample size increases the possibility of repeating data. As a result, the objective of qualitative research should be to reach saturation (Shetty, 2021). As you can see from our sample procedure, we used up to 30 articles to assist us to analyse our project and build the codes for our project. A set of criteria was created using a purposive sampling methodology, which naturally produces delimitations or borders that include and exclude certain publications and authors.

5. Analysis

This section examines each of our codes in detail. To make the code more complete, we first divide it into subsections and then analyse it by linking it to Volkswagen. This section also includes an in-depth SWOT analysis of VW and one of its competitors. Further to explain how markets work in a competitive field we will also use PEST analysis of the automotive industry.

5.1 Customer focus

iv. The range

One of the concerns of consumers is that the range of EVs is less than that of their internal combustion engine counterparts. To be competitive, manufacturers will need to offer vehicles with a range similar to that of ICE vehicles.

A 2019 report by the consultancy firm Deloitte predicts that the phenomenon of 'range anxiety' will soon be a problem of the past. The report states that the planned new BEV models have a range more comparable to that of their internal combustion engine counterparts and that this range will only increase over time. Deloitte supports this thesis for several reasons. Firstly, the optimisation of existing lithium-ion cells and the introduction of new battery cell materials will lead to progressive improvements in battery life. Secondly, the report states that advances in battery management systems will increase vehicle range and extend battery life. Finally, deloitte claims that the progressive improvement in range will also be achieved through the continued reduction of vehicle and battery mass (Deloitte’s report, 2019).

Let's analyse the offer of the Volkswagen brand. The Electric Drive System (MEB) is a system used by the Volkswagen Group in various front-wheel drive and four-wheel drive electric vehicles. The new Volkswagen ID series, which stands for intelligent design, is built entirely on the MEB platform (Groves, 2021). The ID.3, the first electric vehicle in the ID series - produced in Zwickau, Germany - has a range of 330 km to 550 km, depending on the battery options chosen by the consumer. The second model of the ID range, the ID. 4 - an SUV that went on sale

in late 2020 - has a range up to 418 km which puts it in the same category as other electric SUVs such as the Hyundai Kona Electric and Kia Niro EV, but below the 508 km range of the Tesla Model Y (Dorian, 2021).

v. The cost

Another consumer concern that electric car producers will have to address is the price of buying and owning EVs. If the cost of driving an EV is higher than that of an internal combustion engine vehicle, EVs will not spread to the masses and will be reserved for a niche market that can afford to pay a premium.

In this respect, government incentives - such as financial support or tax exemption - have a role to play. Economies of scale will also contribute to the democratisation of the electric car (Deloitte's report, 2019). In the future, as more EVs are produced, economies of scale will allow manufacturers to reduce their cost of production and allow them to distribute their vehicles at lower prices to larger markets. For example, a Deloitte study shows that in the UK, the cost of ownership between ICE cars and their BEV counterparts (both having a 400 km range), supported by a £3,500 government incentive, was equal in 2021. Without the tax incentive, the cost of ownership would be equal in 2024.

To further illustrate this point, let's take a closer look at Volkswagen's flagship electric car, the ID.3. It is believed that its total cost of ownership can be lower than that of its ICEs counterparts. For example, buying the new ID.3 may be cheaper than a Golf model (Kane, 2021). However, this assumes two constraints: taking the most affordable version of the ID.3 and benefiting from government subsidies.

Firstly, the operating costs are higher for internal combustion cars. BEVs have energy costs several times lower than fuel costs to travel the same distance. Secondly, the maintenance of an electric car is also cheaper. Volkswagen expects the difference in monthly running costs to be €50 per month (€600 per year). Lastly, Volkswagen expects the residual value - the resale value after use - of the ID.3 to be roughly equivalent to that of its internal combustion engine

counterparts for two reasons: the growth of the EV market and the slower pace of battery upgrades in new models. Overall, the total cost of the ID.3 is slightly lower than that of a counterpart ICE (Kane, 2021).

vi. Charging infrastructures

Consumers may be concerned about the lack of EV charging infrastructure. To meet this demand - and remain attractive to customers - EV manufacturers should consider increasing the number of charging facilities and reducing the charging time of their vehicles in order to increase the throughput of vehicles in their charging facilities (Deloitte's report, 2019).

Short and medium distances are becoming less of a concern for EV drivers. Two main reasons explain this reduction in concern. First, as mentioned in the previous sections, the range of EVs has increased in recent years. Secondly, these fears can be allayed because of the nature of electric cars. Unlike ICEs, the autonomy of an EV is increased if the vehicle is driven over a short distance where the car stops and restarts frequently (Barretto, 2021). These circumstances allow the EV to recharge its electrical components. Questions remain about the longer distances for which charging facilities are needed.

To address these concerns, the Volkswagen group has launched Ionity (Volkswagen news, 2018). Ionity is a company co-founded by Volkswagen, BMW and other carmakers that have been building a network of fast-charging stations along European highways since 2017, mimicking Tesla's network of superchargers (Behrmann and Wilkes, 2021). Ionity's initial goal was to install 400 charging stations by 2020 - each with an average of six charging points - to reduce Tesla's lead. Currently (March 2021), 336 stations are in operation, with another 39 under construction (Schuetze and Steitz, 2021). With a capacity of up to 350 kilowatt-hours, Ionity's charging stations can provide a significant charge to electric vehicles within minutes. These advances are gradually dispelling consumer fears about the use of electric vehicles over long distances.

5.2 Customer experience

The customer experience - which encompasses various elements that electric car consumers face - has been and will continue to be a key condition for success in the EV market. Customer experience can be separated into three distinct sequences: the sales process, the in-vehicle experience and the aftermarket (Deloitte's report, 2019). It can be argued that the sales process for ICE vehicles and EVs is not and will not be fundamentally different. This section therefore focuses on two aspects of the consumer experience: the in-vehicle experience and the EV aftermarket.

iii. In-vehicle experience

The right in-vehicle experience is and will remain one of the requirements for remaining competitive in the electric vehicle market. To deliver the right in-car experiences - and adopt the right business strategy - carmakers need to determine who their customers are and which new customers they are targeting. As the famous business strategist Michael Porter once said, "You can't be all things to all people". Clearly, Tesla drivers are not looking for the same in-vehicle experience as Volkswagen ID.3 drivers. Many of these concerns - such as the range of vehicles Volkswagen offers and the market it targets - will be addressed in the section on Volkswagen business model.

To improve the in-vehicle experience of their customers, manufacturers - who want to stay competitive - need to collect data about their customers. According to the Deloitte report manufacturers should collect data from connected vehicles, customer points or even external sources (Deloitte's report, 2019). Combined with good analytics, data collection allows companies to invest time and resources in strategic areas.

iv. The aftermarket

The aftermarket - consisting of after-sales service and re-sales - will be a key differentiator to remain competitive in the EV market. EVs are technologically simpler and require less frequent

maintenance than ICE vehicles (McCandless, 2020). However, one of the disadvantages of EVs is that their maintenance and repair infrastructure is more complex and expensive than that of ICE vehicles. A consequence of this complexity is that it creates a strong barrier for new entrants. OEMs that have extensive dealer networks and can cope with the costs and complexity of servicing EVs have a competitive advantage over new entrants, who may not have the ability or inclination to enter into agreements with dealers (Deloitte's report, 2019). Only manufacturers that have developed strong customer service capabilities are and will remain competitive in this industry.

VW is one of the most established car brands (see next section on brand value). VW certainly benefits from its ability to meet service needs. The breadth of the Volkswagen network - both the brand and the group - means that users can find dealers or specialists who can service and repair their electric cars anywhere in the world. In addition, VW is introducing guarantees - which only the big guys can afford - for the maintenance of its electric cars. For example, the Volkswagen ID.4 comes with two years or 20,000 miles (whichever comes first) of scheduled maintenance services as part of Volkswagen's Carefree Maintenance Programme, which takes care of routine items (Automotive world, 2020).

As mentioned earlier, Volkswagen's EVs - and EVs in general - are becoming easier to resell. There are two main reasons for this. Firstly, the demand for electric cars is constantly increasing. Second, the quality of electric cars is increasing, but the rate at which the quality of their batteries is improving is decreasing. This means that even in a few years, electric cars sold today will not be obsolete. Newer cars may be better, but buying a cheaper used car is still a wise investment.

5.3 Battery production strategy

To be competitive in the EV field, an appropriate production strategy is needed. EVs require fewer mechanical parts than internal combustion engine vehicles, but more electronic components. Consider the most expensive component of an EV, its battery.

i. The battery

If a manufacturer does not produce its batteries (i.e. does not pursue a vertical integration strategy in which it tries to own or be its own suppliers and distributors in order to control its value or supply chain (Hayes, 2021)), it must have a strong partnership with a battery manufacturer to be successful in the EV industry. If the OEM does not have a strong relationship with its suppliers, it will be forced to accept "off-the-shelf" specifications for its vehicle batteries. This type of constraint can impact many aspects of an EV - such as its design, price or even capability - and therefore ultimately its attractiveness (Deloitte's report, 2019).

Most of the cell productions used to produce batteries – which are challenging to transport – are located in Asia. In the future, to be competitive, deloitte's report recommends that OEMs implement factories in Asia or have strong partnerships with Asian battery manufacturers. According to Deloitte, manufacturers with the means to do so are also advised to set up battery manufacturing and processing plants close to home. Although cell production and end-of-life battery processing will be more expensive, Deloitte says this will ultimately lead to better vehicle integration and greater power in the manufacturer's value chain.

This approach is being adopted by Volkswagen. Volkswagen announced in March 2021 that it is looking to accelerate the production of battery cells for electric vehicles by creating several "gigafactories" in Europe by the end of the decade (Frangoul, 2021). In Salzgitter (Lower Saxony), for example, 1,000 jobs will be created by 2023/24 for the testing and production of battery cells and more than one billion euros will be invested in the Volkswagen Group's battery cell business over the same period. The Volkswagen Group has also set up a "battery cells' " business unit within Volkswagen Group Components, a research and development unit to further optimise the group's batteries (Volkswagen News, 2019).

ii. End-of-Life Battery Concerns

A specific constraint in the EV market is the end-of-life treatment of their electrical components, particularly their batteries. To remain competitive in the industry, manufacturers must be able to

absorb the various costs associated with the end-of-life of batteries. These costs include the disposal, reuse and recycling of batteries. Unlike the larger players - who have a strong position to negotiate contracts with recycling plants or who have their own suitable infrastructure - smaller players in the sector may be forced to enter into new partnerships if their situation does not allow them to meet these demands (Deloitte's report, 2019).

At VW, depending on the analysis of the battery, two possibilities are offered. Either the battery is given a second life, or it is recycled. If the battery has a second life, it can, for example, become a component of a "flexible charging station", which can be used at music festivals or large-scale events. Batteries that are not destined for a second life are recycled in the Salzgitter plant. In this process, the individual parts of the battery are first shredded, then the material is dried and sieved. A black powder containing the raw materials nickel, manganese, cobalt and lithium is then extracted. All that remains is to separate these materials individually, after which they are immediately available again for the production of new batteries (Volkswagen News, 2019).

5.4 Brand Equity

The first requirement a manufacturer of electric vehicles will need to be competitive in the electric vehicle market is brand and its value, namely its brand equity. Valuable brand is certainly one of the major sources of competitive advantage that manufacturers could use to facilitate their transition from selling ICEs to selling EVs. Having a strong brand generally means having a loyal customer base that has a good perception towards the company brand and trust it. This results from the ability to offer customers products that satisfy their needs and utility expectations. There are different perceptions of brands as each company aims at serving specific customer segments, it can go from low-cost to luxury, can be sporty, stylish or also premium (*Pratap, 2018*). Brand equity is a source of revenues and can result in profitability which is a strong asset for the long term. That means that for current incumbents in the market, they have to keep their brand image and regularly assess it to see if their credentials (mainly green credentials) are still satisfactory regarding the EV market. For new entrants, that would mean to create a brand while having no manufacturing history which can definitely be difficult to

accomplish, at least in the short term. Therefore, understanding the brand positioning is important for new entrants as many of them would lack credentials owned by current incumbents (*Deloitte's report, 2019)*. Moreover, brand equity can be really helpful for marketing. Indeed, car manufacturers are more and more aggressive since sales are related to the brand image you have and the buzz you are making with your products. Marketing is certainly an important tool to bring visibility to the new EVs products and will be facilitated if you own a strong brand equity (*Pratap, 2018*).

Concerning the brand equity of Volkswagen, we can state that for the moment their brand image is currently helping them to make the transition from selling ICEs to selling EVs. Indeed, Volkswagen has been able to keep its strong brand image through the years by focusing mainly on product quality, innovation and the satisfaction of customer needs and expectations (*Pratap, 2020*). Even though they were the authors of a scandal which occurred in 2015, the "dieselgate", in which they sold diesel cars with digital devices able to cheat the pollution tests, but which produced greenhouse gases as soon as used on the road; they were able to go back up the slope and be the one of the worldwide leader carmakers. Volkswagen is currently building a recognisable EV-dedicated brand even though they were seen as laggards in the race to EVs. They are extending their EV products range as they expect 70% of their sales to be full-electric cars in Europe, 50% in China and in the US by 2030 (*Reuters, 2021*); and rebranded itself by changing its logo into a two dimensions, more modern and authentic one which aim is to represent the electric vehicles and digital future of the company (*Wong, 2019*). The company even calls the rebranding the "New Volkswagen" in reference to the 2015 scandal. Moreover, Volkswagen has been recently improving its marketing capabilities, they recently (2019) improved it by 30% while keeping the same budget (*Hammet, 2018*). They also made an astonishing marketing campaign in the US as they faked a rebranding of the US name of Volkswagen by "Voltswagen" on April Fools' day. This campaign turned out to be a real success as it made the brand more famous regarding electric vehicles (*Lewis, 2021*).

5.5 Business Model

The last requirement needed to be strong in the electric vehicles market is a specific business model. Indeed, as customers' needs and expectations are evolving over time, car manufacturers are pushed to adopt different business models from traditional business models. Customers are more and more searching for more flexibility, convenience and cost effectiveness which gives an advantage to new entrants as they can create totally new customer focused business models rather than change these. Initial incumbents in the market will show more difficulties to adapt its business models as they are already deeply rooted in partnerships and commercial deals. However, even though new entrants might have an advantage towards initial OEMs, the key to succeed in the electric vehicle market is more likely to be implementing a flexible innovative customer focused business model, regardless of your initial advantages (*Deloitte's report, 2019*). What will be important is to have strong partnerships that will align with the transition from traditional business models to a more customer focused one (*Cubiss, 2019*). Some other general important things that will help car manufacturers to have a strong business model to compete in the electric vehicles market are the same as required in the ICEs market. These are mainly having an efficient supply chain and qualitative value chain; ways of cutting down the price will be seen as great advantages as these reduced costs will be reported on the consumer's price (*Pratap, 2018*) which represents a strong incentive as EVs are more expensive than ICEs regardless of the financial incentives of each country. Having revenues and a strong financial position will also be an important tool as investments in Research & Development and Marketing are necessary for providing products that will satisfy customers.

Regarding the business model of Volkswagen, we can say that even though they only recently began to progressively change it in order to cope with the changing environment of the automotive industry and that it is not completely implemented, it definitely aims at fulfilling important business model's requirements to be strong in the EV market. They are progressively launching new types of vehicles aiming at answering different types of customers' needs as Thomas Ulbrich, member of the Board of Management of the VW Brand responsible for e-mobility, says that they want "to take e-mobility out of its niche and make the e-car affordable for millions of people" (*Volkswagen AG's website*). Indeed, with their new era of full electric vehicles, namely ID range, they are targeting multiple customers as each ID vehicle has a different utility, it goes from the ID 3 which is the first ID vehicle launched by VW to the ID 4, ID VIZZION, ID ROOMZZ and even ID BUZZ. The ID 3 being a small comfortable vehicle, ID

4 a compact SUV, ID VIZZION an electric sedan, ID ROOMZZ a familial SUV and ID BUZZ an electric version of the old California and modern Combi vans. This range of vehicles are all constructed on the same car modular platform, the MEB platform (Modular Electric-drive Toolkit), which "represents an ideal compromise between range, vehicle dynamic and cost, and can be tailored to all ID vehicles as it can be easily reconfigured" (*Volkswagen News, YouTube Channel*). This MEB platform therefore helps reduce costs as economies of scale can be achieved.

As previously mentioned, they want to make electric vehicles affordable with the help of economies of scale and obviously, as it goes hand in hand, production capacity; efficient supply chain and distribution system; goal aligned partnerships and backward vertical integration. Economies of scale would be easily gained if they succeed to reach their ambitious set goals and as their ID vehicles range would include less variants than it is the case for ICEs (*Randall, 2021*), and due to MEB platforms, this seems quite feasible. However, the fact that less variants would be offered for their electric vehicles range would mean that the customers' needs would be less easily satisfied because it would mean less choices and less flexibility for them. That could therefore be seen as a limitation in their value proposition and in their business model in general in the short term. The production capacity of electric vehicles does not seem to be an issue as Volkswagen has electric vehicles dedicated factories in Germany whose productions are 330 000 units for the Zwickau factory dedicated for the ID family and 150 000 units for the Hanover factory only dedicated for the ID BUZZ car (*Volkswagen AG's website*). Moreover, as the value chain of Volkswagen is different for EVs compared to ICEs, it requires supply of different raw materials and therefore new partnerships. Supply Chain will be a very important thing for succeeding in the EV market and for the moment VW is quite good at having an efficient Supply Chain. Indeed, VW aims at reducing its operational costs and improving its production using technologies; hence, optimizing its supply chain (*Pratap, 2020*). It also has for the moment strong partnerships ensuring the supply of important materials such as electric batteries; they have partnerships with leaders in this market (cfr. *Electric batteries competition worldwide* from section *2.2. Competition in the Automotive Industry*), LG and CATL. However, Volkswagen is planning to make a backward vertical integration as their plan is to build six electric batteries factories in Europe for 2030, the first should be built in Sweden in 2023 with their Swedish partners, Northvolt (cfr. *Electric batteries competition worldwide*).

5.6 SWOT Analysis – Volkswagen and Nissan

The Volkswagen group is widely known for its extremely large portfolio owning more than 10 brands. With a SWOT Analysis we can identify how Volkswagen can improve their business in a market which is under change. The increasing focus on electric vehicles is becoming an intense competition and the improvements on the vehicles are rapidly changing. SWOT analysis will help us realize how Volkswagen could build upon its strength to achieve dominance in the current market.

Nissan Motor Company is also an automaker from Japan. The Nissan group has three different brands: Nissan, Infiniti and Datsun. Nissan primarily operates in US, China, Japan & Russia. The SWOT analysis will compare these two companies' current situation and future opportunities as well as threats.

In the following table, we will be distinguishing what are VW's & Nissan's strengths and weaknesses, and what are opportunities for them and what can be considered as threats which then will be explained thoroughly ahead.

Since both companies operate in the same market, many threats and opportunities are similar, thus the duplication will be left to a minimum and some factors will not be mentioned twice for both companies if they have already been introduced. Strengths are where companies are more a part and this will differ more than threats and opportunities. In addition, the SWOT analysis will not only be to compare the two companies, but also to understand what trends and similar actions can be taken for automakers. The SWOT analysis also tries to pinpoint the intensive competition the automotive industry is, and how Volkswagen and Nissan can overcome future challenges by taking advantage of their strength and improve their weaknesses.

Company:	**Strengths:**	**Weaknesses:**

Volkswagen	Brand Recognition	Low market share in USA
	Worldwide production	Emission Scandal
	Diversification	
	Together strategy	
	Excellent R&D	
	Strong financial position	
	Opportunities:	**Threats:**
	Self-driving vehicles	Operates in highly competitive market
	Digital communication	Regulations regarding emission
	The electric vehicle races.	Other brands
		Raw material cost

Tabel 2.0 – Volkswagen SWOT Table

Company:	**Strengths:**	**Weaknesses:**

Nissan	Alliance with Renault Huge investments in research and development Global presence	Recall of products
	Opportunities:	**Threats:**
	Electric vehicles Research and development	Operating in an intensive and competitive market

Tabel 2.1 – Nissan SWOT Table

i. Volkswagen - Strengths

➢ Brand recognition

Volkswagen is highly recognized worldwide with their iconic VW logo, recognized and widely known is a great strength meaning branding is going well, if known for the right reasons.

➢ Worldwide

Worldwide manufacturers with a total number of 119 worldwide, ready to produce vehicles on demand. It makes it difficult to imagine any production issues in the near future.

➢ Diversification strategy

With Volkswagen's huge brand portfolio including major companies like Audi, Porsche, VW and Skoda it enables them to target different consumer segments and provide the different segments needs better.

According to Volkswagen's financial report 74.5% of Volkswagen's income is coming from the Passengers Cars segment, Commercial Vehicles 12.4%, Power Engineering 1.9% and Financial Services 11.2%. Volkswagen is connected into multiple parts of the market, not just producing cars, which allows them to generate income from other sources.

➢ Together strategy

Volkswagen had an emission scandal which tainted their reputation (Hotten, 2015). In response Volkswagen has tried to restore what was lost with a new public vision for the year 2025. Volkswagen will focus on providing a few key goals. The objectives are stated in the following points.

· 30 new electric vehicles by 2025, also called major company's electrification. Which indicates that Volkswagen is ready to join the race for electric vehicles.

· Develop new battery technology, digitalization, and self-driving. A promise to not only join the race of electric vehicles, but also to stay innovative as an automaker. Increasing their position in the future if managing to provide.

· Further investments into the research and development department, spending double digit billion numbers. Making it well known to everyone, that they not just want to join the race, but they want to win it. Also shifting focus to technology, development, and innovation.

These goals are an excellent response to the public after the emission scandal Volkswagen had. Electric vehicles are not only provided because of consumer demands, but regulations are limiting the automotive industry and essentially pushing electric, hybrid, and environmentally friendly solutions into the automotive market. Knowing that Volkswagen is ready to adjust to the changing market is great for loyal customers and potential new customers who are looking for electric solutions as well.

Increasing investments in research and development, will make Volkswagen interesting to be aware of in the future. If they can manage to gain competitive advantage through improved technology as TESLA did after they introduced their first model (Fortuna,2020), it may very well increase Volkswagen market share even further.

➢ Excellent R&D

Volkswagen has a strong research and development department which has been allocated bigger funds every year. To match the market demands for technology advancement, designs, and innovation it is essential to have a department which can develop such solutions.

➢ Strong financial position

According to Forbes, Volkswagen were number #8 in sales revenue and #37 in profitability. It is incredible to have an economy which enables the company to beat the competition with financial strength, through investments for example.

ii. Nissan - Strengths

➢ Alliance with Renault

Nissan managed to form one of the longest lasting alliances in the automotive industry. Nissan and Renault both own stakes in each other's companies which secures that both are interested in both companies doing well in the industry. There are a couple of benefits with this alliance:

· Investments in costly research and development activities

· Shared capital for investments

· Combined efforts to enter new markets or segments

· Manufacturing costs are shared which would increase economies of scale.

➢ Huge investments in research and development

Nissan has invested over 4.2 billion dollars into research and development (R&D) in 2015. The amount is not the largest in the automotive industry, but it has helped Nissan focus on the development of Electric vehicles.

Nissan has been able to produce their bestselling electric vehicle, Leaf. Leaf managed to sell over 200.000 units in 2016 according to their annual report and 400.000 units in 2019. Leaf was forecasted to be the leading product in the electric vehicle segment and increased brand value since it proved that Nissan was able to produce high quality Electric vehicles.

Electric vehicles are attracting consumers now more than ever and Nissan has responded to the growing trend and produced new models with technology like pro-pilot. Their catalogue is among some of the strongest and most attractive regarding electric vehicles which seems like to be the future.

Technology is also a relatively new demand to stay competitive in the automotive industry and is a key factor for securing faster growth. With the increased focus to develop new technology for their consumers Nissan has almost been future proofing themselves for the coming challenges in the automotive industry.

Nissan has as a result of this developed Pro-pilot which is a fully automated driving system, epedal which allows for acceleration and breaking all in one pedal, all of these innovations are paving the way for new technology to mass produce for their products. Nissan has done a positive job to position themselves in the future (Nissan, 2019).

➢ Global presence

Nissan has been able to have a global presence and successfully compete in the larger market like the U.S and China. This results in a stronger brand and better competitive position. With the alliance of Renault and Mitsubishi Nissan can benefit from the market reach, engineering, and business development the partnership allows. Nissan can enjoy their strong product line and by the partnership which can help them expand their market base and increase in market share.

iii. Volkswagen - Weaknesses

- Low market share in USA

USA is the second largest automotive market. A high market share in the US, would generate a large amount of earnings. With less than 5% of the market share despite being the largest

automotive maker in the world, it should share more of the market share. General Motors and Ford both rely on the US market to provide above 50% of their revenue (Jurevicius, 2016)

With global productional power and leverage, it should be possible to provide quality products which the US market will utilize and start gaining more market share along with becoming a worrying competitor for General Motors and Ford.

iv. Nissan - Weaknesses

- ➢ Recall of products

The automotive industry is no stranger to relegations, lawsuits and scandals. The same goes for Nissan. The brand was forced to recall 3 million units in 2016 due to airbag issues. In results, the brand image is tainted, and the brand image suffers from this, it's not critical for their success (Lin, 2016).

In 2018 and 2019 Nissan was also required to recall their vehicles due to passenger safety and risk of vehicle crash. Multiple instances are serious, and the previous errors. Nissan committed should not be repeated if they want to establish themselves as the leading brand in electric vehicles. If such flaw continues it could end up costing market share for Nissan.

v. Volkswagen - Opportunities

- ➢ Self-driving vehicles

With Google, Ford, Tesla etc. working on self-driving vehicles, it is not easy to calculate the market value for self-driving vehicles, but as for now, all the major competitors are investing into the market, it seems to be worth the effort to gain an edge in what seems to be the next "big thing" for the automotive industry.

Volkswagen introduced their goals to produce Self-driving vehicles in 2025, but if they want to gain a better advantage in the market, they should introduce it earlier, to gain increasing market share and sales.

- ➢ Digital communication

Current society is digitizing more than ever. Taking advantage of communicating with customers through media and providing information and advertising is a great way to target potential customers. With a potential new self-driving market emerging, it is important to reach as many potential customers as possible. Maximizing customer base and potentially extending product life cycle, would increase sales and revenue for the business.

➢ The electric vehicle races

While we previously introduced a potential new market coming up, we are already entering a new age in the automotive market. TESLA took the whole automotive industry by storm and started a demand for electric vehicles. The competitive advantage gained by TESLA was a strength for the company, but their numbers are minimal compared to Volkswagen. Volkswagen can produce a high volume of vehicles, and therefore provide a way to broaden their audience. Gaining a competitive advantage in the current market and a high market share is a positive outcome, but as a company, it is also required to produce enough cars, which is hardly a problem for Volkswagen.

vi. Nissan - Opportunities

➢ Electric vehicles

Globally electrical vehicles have increased sales. Tesla is one of the companies who benefited from their electrical products which established them as high-quality products which would compete with the diesel vehicle and fossil fuel ones. The concerns about battery range were calmed down due to the new technology Tesla presented to the world. The technology is still in development as Porsche introduced their line of electric vehicles which according to Porsche could charge from 10 percent to 80 in 15 minutes. The market is still inventing new technology to optimize what seems to be the future product as regulations are being tightened.

All of this indicates that electric vehicles are not slowing down and will be the main source of transport for the future. Thus, Nissan must focus on their research and development to compete in the market. Without bringing something new to the table it will always be behind their competitors and be without competitive advantage in terms of technology. The large amount invested in research and development is important, and Nissan recognizes it by keeping investing

into research and development as the demand for electric vehicles will most likely grow further.

➢ Research and development

The demand for innovation in the automotive industry has never been higher. The investments among the automotive companies are large sums. The market wants to explore and discover new innovative ways of transportation and research and development is a part of that. With investing in research and development it is no longer a department who may bring something valuable to the company, now it is one of the most important areas in the automotive industry. Not only has electric vehicles raised in demand but autonomous driving technology is also an uprising trend in the market. Research and development help ensure Nissan they can compete now and, in the future, and reduce the risk of falling behind to competitors. The race for market leader with electric vehicles is intense but still a relatively new market and research and development is the key factor here.

For autonomous driving technology which we already see in our world today it's still limited and not fully functional everywhere. This technology could acquire high popularity and end up being a must-have technology. These technologies could end up being the deciding factors for those who become dominant in the new age of the automotive industry and whose too fall behind.

vii. Volkswagen - Threats

➢ Operates in a highly competitive market

Due to the very nature of the automotive industry every possible competitor is producing something which could potentially steal customers and reduce market share. Volkswagen group is considered a respected and large corporation, but that's not enough to succeed in the automotive industry. The race for dominance the market is desired by all and falling behind could have repercussions not easily recoverable.

➢ Regulations regarding emission

Automotive industries must operate within laws which could directly limit automakers. The claims and visions to have countries free of petrol cars in 2030 is pushing Volkswagen and others to prioritize electric vehicles as they will soon be the only legal passenger transportation.

Laws and regulations have been influencing how automakers are responding and planning on a hybrid/electric catalogue of vehicles. This might seem like a positive outcome, but from the company perspective it would be better to operate without worrying about breaking any laws.

➢ Other brands

With the high number of brands which are competing on the daily with new cars in terms of petrol, hybrid, and electric vehicles. It is no secret that all automakers are threats to one another.

➢ Raw material cost

A rise in raw material cost will be costly for automakers as they depend on raw material to produce vehicles. Therefore, it would be considered a threat to have the price of raw material increased.

viii. Nissan - Threats

➢ Operating in an intensive and competitive market

The automotive industry involves a large sum of competitors. Each company is trying to compete for market share, improved technology, and new models. Nissan and its competitors need to be active in the market and produce new models often to stay competitive in the industry. Without an active involvement in the market the consequences could be damaging as competitors are always trying to improve and be innovative. The increasing amount of research and development in recent years is an aftermath of the electric vehicles which the automotive industry is highly competitive in. Innovation and technology are a key aspect for many automakers' brands and exploring this segment of the market can ensure a great deal of market share if the companies can establish themselves as the leader in electric vehicles.

5.7 PEST of the automotive industry

PESTLE analysis is a tool used by businesses to monitor the environment they are operating in or plan to operate in. Combined with the SWOT analysis the PESTLE will clarify in which environment Nissan has strengths, weaknesses, opportunities, and threats in and not only focus

on the internal factors of a business.

PESTLE stands for Political, Economic, Social, Technological, Legal and Environmental. These different factors will be described and analyzed within the framework. Since a large portion of the automakers are under the same environment, this analysis will focus on the automotive industry as a whole and not on a specific business.

i. Political

➢ Emission regulations

Politicians have shown great interest in a greener earth as of late. This has resulted in a quantitative limit of air pollutants that can be released from a certain source. These regulations have put pressure on the automotive industry as the need to operate within the law. Thus, automotive businesses are interested in developing electric vehicles to stay within the requirements and customer interest for electric vehicles has increased since the future seems to be more environmentally focused.

➢ Safety requirements

Each type of vehicle has different requirements for safety. Governments across the globe have enforced regulations to ensure the automotive industry produces safe cars in the unfortunate events of a crash. These requirements are quite specific and go down to details like seatbelts.

ii. Economical

➢ Benefits for electric vehicles purchase

In the EU, the members are offering bonus payments and premiums to the consumers of electric vehicles. Some countries also grant tax reductions for their purchase. This benefits the automakers as they're not involved in granting tax reductions or premiums, so it increases the attractiveness of electric vehicles without further cost for the automakers (Association, 2020).

➢ Economic

Economic crises and downs can have huge importance for the automotive industry. When the markets, countries or even on a global scale experience poor economic conditions the automotive

industry suffers as there will be a decrease in the sales of vehicles. Premium and high-end vehicles are less in demand during situations where the purchasing power is low. Automotive industry enjoys, however, good economic conditions as sales can increase or at least be steady. Automakers have multiple options for purchase to increase their sales, and these options are more likely to be utilized by the consumers. These options increase access to products at lower rates but for a longer period of time.

iii. Sociocultural

- Prices

Sociocultural factors for the automotive industry could be disposable income, which is a key determining factor for consumers, as they would want to purchase something at affordable rates.

The automotive industry also has different options of purchasing. Financing and leasing are options for consumers who want a higher-class vehicle but cannot afford the asking price and would rather pay monthly rates to afford their vehicle.

iv. Technological

- Electric vehicles & Self-driving vehicles

One of the biggest shifts in the automotive market is electric vehicles. The demand has been experiencing exponential growth despite the global pandemic. In early 2019 there were 5,6 million electric vehicles on the road which was a 64% increase from the previous year (Schmidt, 2019).

In 2020 electric vehicles surpassed 10 million units on the road. With Tesla offering premium electric vehicles, and other competitors following suit, the industry may have to develop and compete through the strongest battery, best technological experience, and such. The values behind what describes a great car might change as the technology changes. Acceleration can reach new highs and with further development the electric engine might overtake the fossil fuelled engine. There is a huge number of investments being poured into electric vehicles and

today's world has only proven how fast technology can improve and develop.

As the conversation of electric vehicles gains popularity, the technology developed can make self-driving vehicles possible. Advanced technology offered by Tesla almost offers fully autonomous vehicles. The autonomous technology could change the way people commute and become a huge market for the first ones to develop a fully perfect self-driving technology. The value of the autonomous market was valued at 816.6 billion dollars in 2019 and this potentially displays how valuable this technology will be in the near future (Research and Markets, 2020).

In addition, technology and innovation has become an important factor which can influence market shares in the industry. The research and development investments are a huge factor for the automotive industry as they all seek low emission and even self-driving vehicles. This also opens the door for the technological industry as businesses like Google potentially could develop and enter the market as the technology components could have great value as none yet has made a fully functional autonomous vehicle ready for production on a global scale.

v. Legal

Automakers must ensure they are operating within the regulations which differs from location. Not only regulations but patents, copyrights are ensuring automotive companies cannot operate freely when producing vehicles.

vi. Environmental

Vehicles has a huge impact on our environment. Transportation in general is a huge benefactor. Regulations focusing on emission is making it the automotive industry operate within certain requirements, this has caused the automotive industry shift from fossil fuelled vehicles to hybrid and electric vehicles as a respond to the more eco-aware consumer and society.

6. Discussion

Under this chapter we will argue the competitive advantages Volkswagen has, and aims to achieve. A discussion about which factors are essential to gain the competitive advantage to stay competitive in the automotive industry is not determined in this chapter – It is however, argued which factors this study finds important and why they are considered so.

The automotive market is under dramatic change, competition growing and regulations tightening. Sustainable technologies are challenging businesses which have been heavily dependent on fossil fuels for years. With the promise of reducing harmful emissions and utilizing resources more efficiently, the global presence of electric vehicles has been more in demand than ever. A suitable technology which seems to be well received by the market and achieved over 10 million units on the road in 2020 on a global scale (Richter, 2021).

This study aims to understand how businesses like Volkswagen can and will stay competitive in the hypercompetitive market they compete in. While the study has focused on which threats and opportunities the automotive market allows for, it also represents recommendations which could help Volkswagen achieve their goals in the future. The project addresses key factors for achieving a competitive advantage in the automotive market by analysing Volkswagen and its competitor's behaviour and responses to the demand for electric vehicles. The response we've discovered from most of the automotive industry is increased investments into research and development as a large portion of the electric vehicles market is connected to technology and innovation. Yet, to stay competitive Volkswagen must do multiple adjustments to gain market leader status for electric vehicles. For example, Volkswagen needs to regain and reposition themselves as a reliable brand and increase their brand value as their competition is growing. With a variety of different factors which will determine if consumers are ready to lay their trust into Volkswagen's portfolio as their future electric transportation vehicle, it's not apparent how to handle or prevent current and future challenges. Still, the project finds a few answers on how Volkswagen can utilize their strength to prevent threats and gain a competitive advantage.

Volkswagen can also develop a business model which emphasizes the more performance-based values with electric vehicles. Tesla for example displayed the benefits of a high luxury electric vehicle and consumers were willing to pay the cost for electrical sports (Etherington, 2017).

Overtime Tesla gained legitimacy in the automotive industry and could move away from the high-end portfolio and provide products which could be accessible for a larger consumer base. Tesla has established themselves as capable of manufacturing high-end quality products to its consumers and challenged the view of electric vehicles as potentially better performing than fossil fuelled vehicles. Tesla seems to have been the only ones manifesting themselves as a premium brand in the electric vehicle market, and something Volkswagen might consider is how they can become incumbent in a certain segment, we cannot confirm if Volkswagen has such a plan. What we do know is the 2025 strategy Volkswagen published, and ultimately announced their presence in the electric vehicles race.

While declaring their focus on electric vehicles is a great way to gain awareness and communicate to the loyal consumer base who considers switching to electric vehicles, it might also not be enough of a statement. The second largest automaker Volkswagen cannot ignore the pivotal role electric vehicles can become, which makes it seems strange to wait for 2025. The automotive market is developing fast and given the company's size it could achieve electric vehicles products faster than its competitors and be a true contender for the incumbent position.

The question how Volkswagen can stay competitive in the automotive market involves a great deal of speculation which ultimately is recommendations-based models is, theories and what not. Without any inside information or public statements our closet hint is the 2025 strategy.

It remains uncertain how Volkswagen plans to stay competitive, their public announcement includes new electric vehicles in the best quality possible, best service and best customer experience. Since we do know little about their actual plan for the near future, it would not appear unlikely that the second largest automaker is prepared for the future challenges as regulations have gotten more and more serious over the years. Investments into research and developments seems more valuable than ever and Volkswagen seems to agree. Not only research and developments but factories to produce its batteries are also a part of the race. Customer concerns about driving range, and battery is a factor Volkswagen needs to respond to. They promise the best quality for their customer and the best service, and in response to customer concerns Volkswagen announced their plan to build six new battery factories in Europe, at a live streamed event called Power Day (Beresford, 2021). Volkswagen can achieve more control of the supply chain if they are in charge of their own factories and achieve higher producing numbers.

Utilizing Volkswagen size and resources to build factories will result in competitive advantage. Not being dependent on other external sources is an excellent way to be in control of the supply chain and be prepared to produce products if demands increase.

Furthermore, Volkswagen also declared at the event to invest in its charging networks globally. 1100 fast chargers should be developed and installed and 240 charging stations in the year 2021 in North America. Europe wants to increase their current numbers of chargers by five times, which in total is 18.000 (Beresford, 2021).

By not only focusing on the end products Volkswagen tries to be actively dealing with the customer concerns and setting up a sustainable business model and operational management to better position themselves in their goal of leading electrification. Threats of regulations regarding batteries might also be the reason why Volkswagen wants deep control of the supply chain. According to Volkswagen's board member, Thomas Ulbrich who says, “the car will be CO2 neutral by the time of handover to the customer” (Groves, 2021). By using regenerable energy in their production and changing resources used in their plants they can provide the ultimate end goal, an absolute CO2 neutral vehicle although Ulbrich admitted there some production of vehicles which will lead to CO2 emission which cannot be avoided (Groves, 2021).

Only the future will reveal how important Volkswagen deep supply chain management will be for their success. Staying prepared and being in control requires specialization in certain areas and Volkswagen will be in need of people with certain skills to achieve their planning. The questions remain, are Volkswagen's plan to stay competitive the best solution, or are there improved choices which must be made to achieve incumbents.

7. Conclusion

So, what does it mean to gain competitive advantage, as shown above it can be achieved in various ways and Volkswagen does not only focus on one area? If we look at the examples we already have in the automotive market, Tesla built their lithium-ion battery in 2017 and saved Tesla around 40$ million in its first year (Tesla, 2017). Cost-efficiency is an attractive goal for any business, and if there is money to be saved Volkswagen should pursue it as well. Not only cost-efficiency but implementing plants global is an offensive strategy to be competent for producing electric vehicles. The alternative would be partnering up with other original equipment manufacturers (OEMs) which would result in reduced control of the production and if the quality is not acceptable in the hyper aggressive market, the partnership could end and would cost further complications. Therefore, businesses in the automotive industry can benefit from establishing factories of their own which focuses on developing technology to compete in the automotive industry.

After analysing each code/requirement, we can conclude that Volkswagen operates in a somewhat different manner than its competitors; yet this does not imply that it is unable to compete; rather, it adheres to certain standards that are tailored to its unique selling point (USP). We've observed a distinct difference in the way Volkswagen builds electric vehicles and tailors them to the demands of its customers.

After such in depth analysis to figure out the positionality of Volkswagen and how they are planning to manufacture new products, what factors are their priorities and what may be not be positively affecting unlike their competitors, it is safe to conclude that Volkswagen stands in a favourable position in the market right now. However, since the market is filled with competition there can be many external and internal factors that can affect their success and profitability in the next 5 years in EU even if they keep on revising their strategies and follow these requirements. We have seen a different approach from VW that their strategy keeps on leaning towards creating more accessible and adaptable products, which through SWOT analysis we can see may not be the case for its competitor.

We learned not just how a company like Volkswagen can and will stay successful in a hypercompetitive market, but also how its competitors are approaching the challenge using

completely different approaches. While the research focuses on the risks and possibilities presented by the automotive sector, it also makes instructions that might aid Volkswagen in achieving their objectives in the future. The study examines Volkswagen and its competitors' behaviour and responses to the demand for electric vehicles in order to identify critical criteria for gaining a competitive edge in the automotive sector.

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