Tesla, Inc.: Strategic Report 2020

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1 Executive Summary

December 2030, an autonomous Taxi TESLA Model Y second generation is driving me to the airport. The news projected on the brand-new TESLA front window states “another electrifying year for the global leader of Electric Vehicle breaking its target of 10 million cars sold this year”. Is it fiction or the life achievement of a visionary leader called Elon Musk?

The fundamental story of TESLA is grounded in the outstanding capacity of its charismatic CEO to drive the acceleration of sustainable energy vehicle adoption globally and to revolutionise transportation with the automation of driving. Since the beginning of the story in 2003, Musk’s objective is to leave a legacy and to be at the forefront of the car industry transformation. Similarly, to Ford in the beginning of the last century with the invention of the assembly line, TESLA aims to outpace the competition where “the second place should need a telescope to see TESLA”. The company aims to master product development and innovation in Electrical vehicle, to lead manufacturing with unprecedent level of automation and to transform the customer experience with the best technology integration ultimately to enable autonomous driving and no service concept.

TESLA’s growth is supported by strategic bold choices, focussing first on premium segment in order to gain momentum and by then increasing volume as new offering is introduced and internationalisation developed. Its Gigafactories in US, China and soon Europe should propel the electrical vehicle producer to category champion. The confidence in its growth potential projected the company at the most valued car maker position on earth in 2020, increasing its market value by an outstanding 36% per year over the last decade.

The outstanding investor confidence is reinforced by a number of global trends, the VW diesel gate, global CO2 concern and new generations sustainability concerns are few elements to promote even further the adoption of Electric vehicles around the globe. The Norwegian example, with 55% penetration of EV’s for new cars sold, summarises very well how policy markers could influence macroeconomic trends by subsidising Electrical Vehicles to make them as competitive as standard cars. China is no exception, concentrating 25% of global car sales and adopting EV’s at double digit rate, the market is strategic for TESLA. The construction of its second Gigafactory translates the ambition of the company to play a leadership role in the country. Whilst over the last decade, all global car leaders have heavily invested in conventional cars capacity to capture growth in China, TESLA built competitive edge in EV’s with Panasonic strategic partnership in battery construction.

This competitive edge on electric powertrain could be a considerable advantage for TESLA but also a major threat as all car manufacturers are now rallying on this new EV trend with an unprecedented proliferation of EV or hybrid models putting pressure on TESLA’s leadership. TESLA also stands out by the ecosystem the company developed in the renewable energy segment, by building a network of superchargers in key strategic countries and by acquiring Solar City to develop sustainable residential charging and energy storage solutions.

As Ford at the beginning of the last century, TESLA is different in the vertical integration of its supply chain and is known for rather making than buying while its competitors often quoted as “car assemblers”. To notice the acquisition of Grohmann automation in 2016 and Perbix in 2017 which gave to the company a competitive advantage in automated manufacturing systems. This integrated strategy is the most debated as the company constantly underdelivers on its manufacturing volumes, leaving space for criticism amongst its most loyal customers.

Contemplating 2030, important challenges remain for TESLA, the proliferation of new EV’s models by the competition, the evolution of mobility consumption by millennials, the constant

improvement of combustion cars in a context of low oil cost and the emerging hydrogen engines supported by Japanese car makers. Our report reveals how TESLA is well positioned to address the transformation of the car industry in a sustainable manner and what strategic choices the company has made to play a leadership role.

Image 1: Elon Musk

2 Tesla Inc.

2.1 Company Origin

Tesla was initially created in 2003 by two Silicon Valley engineers, Martin Eberhard and Marc Tarpenning. The partners had just sold their eReader company for $187 million and were looking for their next big idea. They were inspired by the death of GM's EV1 electric car that year and they ended up re-inventing the concept of Electrical Vehicle. Elon musk came after in 2004 as the first A series investor with a 7,5m$ investment.

Figure 1: Infographic about EV's early days[1]

[1] Inside EVs: https://insideevs.com/news/336938/teslas-origins-superhero-comic-check-out-this-amazing-infographic/

2.2 Company Overview

Tesla, Inc., former Tesla Motors, Inc., is a US-based mobility services and energy company, designing, manufacturing and selling high-performance electric vehicles (EV) with the mission to “accelerate the world’s transition to sustainable energy”[2].

Founded in 2003, Tesla claims to have developed the world’s best and highest-selling pure EVs with a high autonomy and zero tailpipe emissions. At the same time Tesla’s automobiles are presented among the safest and highest-rated cars in the world. 4 product lines for passenger transportation have been launched, meaning that they are being produced and delivered:

- **Tesla Model S** - launched in 2012
- **Tesla Model X** - launched in 2015
- **Tesla Model 3** - officially launched in 2018 with deliveries having started in 2017
- **Tesla Model Y** - launched in March 2020

Image 2: From Left to Right: Tesla Model S, X, 3, Y

It is not by chance that the combination of these models’ letters can be read as S3XY – model 3 was actually supposed to be named Model E but due to a claim by automobile manufacturer Ford for having produced a Model E already, Tesla had to rethink their endeavor.

Above models all incorporate different product line lengths with upgrade options essentially offering an increase in range or performance as well as customization options offering features such as self-parking, navigation systems, traffic light recognition, automatic city street driving, various exterior colours and seating configurations, besides others.

Tesla, Inc. further announced the launch of 3 new models, all of which have been presented as a prototype and have been tested for going into production.

- **Tesla Roadster** - pre-order-marketing until expected launch in late 2020
- **Tesla Semi** - pre-order-marketing until expected launch in late 2020
- **Cybertruck** - production start targeted for late 2021

[2] https://ir.tesla.com

Image 3: Tesla Roadster

Image 3 Tesla Semi

Image 5: Cybertruck

The Tesla Roadster is meant for passenger transportation while the Tesla Semi and Cybertruck open access to new customer segments of the cargo transportation sector.

The company and its brand is strongly correlated with Elon Musk, who initially served as the company's chairman of the board, having been responsible for 98% of the initial funding for the Tesla Motors, Inc. which was founded by July 2003 by the 2 engineers Martin Eberhard and Marc Tarpenning. The brand's name is a tribute to Nikolai Tesla, an electrical engineer, physics scientist and well-known inventor of several technologies in the field of electrical energy. Musk, who laid down his position as a chairman and nowadays is the CEO, said that his vision for Tesla Motors, Inc. is to become a technology company and independent automaker that eventually offer EVs at prices that the average consumer can afford. As of February 2017, Tesla Motors shortened its name to Tesla.

Tesla's strategic planning is composed of 2 main phases so far:[3]

1. **Build-up**: Establish as a high-performance and high-quality producer of EVs with a high brand awareness and a wide reach, producing cars for high-income customers. The main goals were:
    a. to create a low volume, expensive car,
    b. to then develop a medium volume car at lower price,
    c. to then create a high volume, affordable car,
    d. and to provide solar power.

2. **Hypergrowth**: Invest all to establish as the long-term leader in the growing EV market. This includes opening access to all major automobile customer segments by lengthening the product line with products for customers with a low to mid-level income. The main goals are:
    a. to create solar roofs with seamlessly integrated battery storage,
    b. to expand the EV product line to address all major segments,
    c. to develop a self-driving capability 10x safer than manual by massive fleet learning,
    d. to enable cars to generate money while unused.

The Build-up phase has just recently been completed with the launch and ongoing deliveries of the model 3 and Tesla already entered the Hypergrowth phase. This is already reflected in their statement to investors: "...we also offer a smaller, simpler and more affordable mid-sized sedan, Model 3, which we expect will truly propel electric vehicles into the mainstream."[4]

Tesla's Common Stock

Since Tesla's initial public offering in 2010 the company has seen an overall growth in common stock value having reached its peak on February 17, 2020 with a value of $ 901 per share at

[3] https://www.tesla.com/pt_PT/blog/master-plan-part-deux

[4] https://ir.tesla.com

close. Some analysts, investors and forecasters around the world have interpreted this in an extreme overvaluation, but in any way, point out that the short-term risk of investments in Tesla remains high due a potentially high chunk of investors being short sellers. As can be seen in the graph below, the value dropped significantly in the weeks after the peak and reached a new high on another upward trend with about $548 at close on April, 8 2020. The difference of $353 (a drop by 39% from $901) is likely to have been triggered by a rapid decline in the shareholders' and traders' valuation following the outbreak of the Covid-19 pandemic and the consequently expected global economic decline affecting Tesla's ability to sell their existing and new products as per initial schedule. The drop was then empowered by mentioned short sellers betting on the decline.

Figure 2: Tesla's Common Stock Evolution

Besides its market value, Tesla could not yet achieve any profitable year, only individually profitable quarters such as Q3 and Q4 2018 as well as Q3 and Q4 2019.

Being headquartered in Palo Alto, California, US, Tesla operates multiple production and assembly plants, such as in California, Nevada, New York and Shanghai and further owns its own distribution network with which it offers direct sales around the globe. Having established itself as a key player in the market over time, Tesla was able to become a global EV manufacturer with further business models in solar panel and solar roof tile manufacturing as well as in battery energy storage from home to grid scale – thereby Tesla became the first and only fully integrated automobile and energy company in the world. Tesla's global vehicle sales increased by half from about 245k in 2018 to about 367k units in 2019 and on March 9, 2020 Tesla produced its 1-millionth EV.

As will be seen in later chapters, Tesla has been digitizing the automotive industry both with regards to the model offerings themselves and to the distribution and assistance channels.

Contrary to traditional car offerings, Tesla's offerings remain subject to continuous improvement after the point of sale through over-the-air software updates and Internet connectivity. By keeping the products open-ended, Tesla manages to expand the products' life cycle and ensure that these are continuously tailored to the customers' needs as well as adjusted to new market trends.

Tesla has also been using digital tools to optimize the products' distribution channels and after-sale assistance. Customers can customize and order their cars online using the company's website. Furthermore, any issues that the customers may encounter when using

the cars may sometimes be solved remotely with no need for onsite assistance. For example, Model S can wirelessly upload data so technicians can view and fix some problems online without ever needing to physically touch the car.

All these innovations, amongst others, have been contributing to set Tesla apart from the traditional automotive companies and to underpin some of its stock valuation, despite Tesla having not delivered any profits so far.

3 Environmental Analysis

3.1 Macro Environment

3.1.1 PESTEL Analysis

Automobile industry was started in the 1890s combining steam engine with road wagon technology to serve the need of upper class society discovering new mobility vehicles. The early 1900s marked the first boom of the car industry, France dominating the automobile industry quickly followed by the United States and Germany. This countries remained the largest manufacturer and exporter of automobile till the 1980s. The automobile originally manufactured to cater upper middle class became accessible to every house hold (example of Ford T model sold over 15 million times) and technological evolution enabled a race to produce automobiles in the least possible cost to make it accessible to all class level.

Today's automobile industry is entering into a new era of technical innovation by producing smarter, more eco-friendly and even driver less automobiles. In that context the analysis of the Political, Economical, Social, Technological, Environmental and Legal factors can help to understand EV's growth momentum in response to the major trends in its environment.

Context	Trend	Impact on Demand	Impact on supply
Political	Government regulation on CO2 emission	+ Demand of EV - Classic Diesel car Demand	+Increased EV/HEV supply competition -heavy competition on battery supply
	Government incentives on EV & Charging infrastructure	+Boom in demand of EV in China +Rapid development of charging infrastructure globally	-Fluctuation of policy in Europe and China
	Chineese governments measures to improve quality of EV	+EV immatriculation demand	-Proliferantion of low cost/quality cars in China +Reduce production cost with EV volume going up
Economical	China offering large EV market volume	+Growth opportunity and large EV adoption -EV still higher price vs classic cars	+Opportunity for Global car manufacturer to grow outside legacy markets -high investment needed for development
	Global economy rise 2015-2019	+Increase car sales globally +rise of middle class demand	+Devlopment of SUV + Range extension for middle class demand
	Price of material for EV decline	+more affordable EV	+Additional volume/margin improvement
Social	Millenial generation growth	+Greener car demand -Different ways to consume transport	+EV brand image -Affordability vs thermic cars -emergence of alternatives to car ownership
	Shift of ways to consume car transport	+leasing boom -Uberisation of transport	+Green EV taxi in big cities ex-Amsterdam +Autonomous car readiness
Technology	EV manufacturing requiring high level of investment	-Relative high price to consumer	-Drive consolidation of global market manufacturers to build scale
	Battery storage technology advancement	"-increase dependance with battery providers	+Growth of supplier of powertrain -emergence of rivals in China on battery storage
	Battery manufacturing strategic regional focus	+increased autonomy for EV	"-Europe and China declared regional priority and manufacturing investment +increased productivity for EV -decrease barrier to entry
Environmental	EV best fit for sustainable transportation development	+Increased EV car adoption	+ strongest Brand echo to environment for pure EV player -recycling challenge due to rapid obsolescence of models -Barrier to entry
Legal	Safety standards for cars constantly increasing	+legislation focus on safety	+Barrier to entry premium car category +Safety at the heart of Evs
	2030 objectives to be at 30% EV	+Support of demand EV globally	+Sustainable growth supply +allow long term investment with 10+ year growth perspective

Table 1: PESTEL summary table

Political - Policies have major influences on the development of electric mobility
Globally, the automotive industry has been under Governments pressure introducing different regulations forcing manufacturers to move towards more fuel efficient cars, promoting the development of electric and hybrid engines and ultimately charging infrastructure.

This innovative sector of the industry is benefiting in certain countries of a specific tax credit for buying an electric car. Policy approaches to promote the deployment of EVs typically start with a vision statement and a set of targets. An initial step is the adoption of electric vehicle and charging standards. Procurement programs kick-start demand and stimulate automakers to increase the availability of EVs on the market, plus provide impetus for an initial roll out of publicly accessible charging infrastructure.

Another useful policy measure is to provide economic incentives, particularly to bridge the cost gap between EVs and less expensive internal combustion engine (ICE) vehicles as well as to spur the early deployment of charging infrastructure. Economic incentives are often coupled with other policy measures that increase the value proposition of EVs (such as waivers to access restrictions, lower toll or parking fees) which are often based on the better performance of EVs in terms of local air pollution. Measures that provide crucial incentives to scale up the availability of vehicles with low and zero tailpipe emissions include fuel economy standards, zero-emission vehicle mandates and the rise in the ambition of public procurement programs.

Regulatory measures related to charging infrastructure include minimum requirements to ensure “EV readiness” in new or refurbished buildings and parking lots, deployment of publicly accessible chargers in cities and on highway networks, and are complemented by requirements regarding inter-operability and minimum availability levels for publicly accessible charging infrastructure. So far only observed in Norway, when the EV and charging infrastructure deployment evolves, some policy measures may need to be adjusted as the markets and infrastructure mature. One example is how fuel and vehicle taxes are adjusted and their contribution to government revenue.

Front running countries such as those involved in the Electric Vehicles Initiative are already making progress from their initial phases of EV policy implementation (e.g. establishment of standards, public procurement and early charging roll out, economic incentives). Many of these countries have regulatory instruments in place and, to date, some advanced markets like Norway have started phasing out some aspects of their EV support policies developed standards for chargers. Some (China, European Union, India) are mandating specific standards as a minimum requirement; others (Canada, Japan, United States) are not.

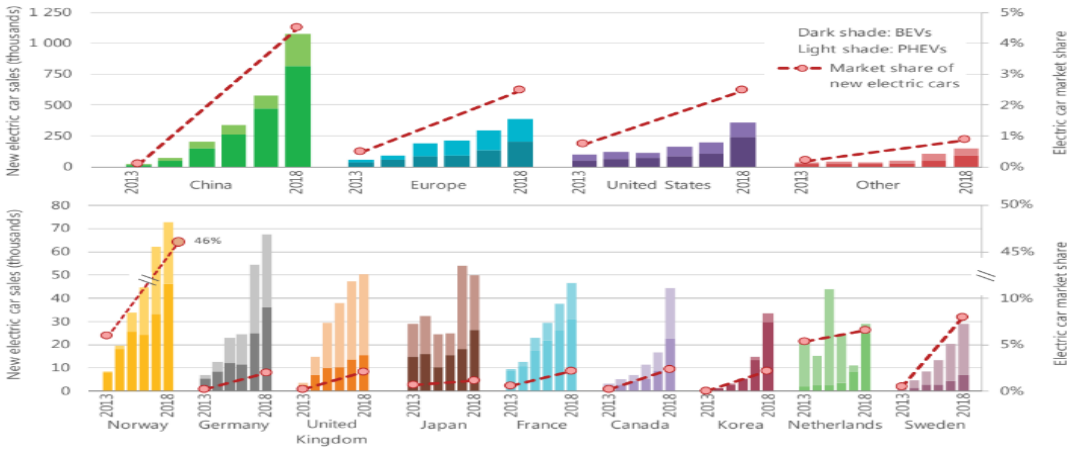


Figure 3: Global Electric Car Sales and Market Share '13 - '18

Key policy developments in 2018/19 include:

- In the European Union, several significant policy instruments were approved. They include fuel economy standards for cars and trucks and the Clean Vehicles Directive which provides for public procurement of electric buses. The Energy Performance Buildings Directive sets minimum requirements for charging infrastructure in new and renovated buildings. Incentives supporting the roll-out of EVs and chargers are common in many European countries.

- In China, policy developments include the restriction of investment in new ICE vehicle manufacturing plants and a proposal to tighten average fuel economy for the passenger light-duty vehicle (PLDV) fleet in 2025 (updating the 2015 limits). The use of differentiated incentives for vehicles based on their battery characteristics (e.g. zero-emissions vehicle credits and subsidies under the New Energy Vehicle mandate).

- Japan's automotive strategy through a co-operative approach across industrial stakeholders, aims to reduce 80% of greenhouse gas (GHG) emissions from vehicles produced by domestic automakers (90% for passenger vehicles) – including exported vehicles – to be achieved by 2050 with a combination of hybrid electric vehicles (HEVs), BEVs, PHEVs and fuel cell electric vehicles (FCEVs). Fuel economy standards for trucks were revised and an update of fuel economy standards for cars was announced.

- India's announced the second phase of the "Faster Adoption and Manufacturing of Electric Vehicles in India" (FAME India) scheme. It reduces the purchase price of hybrid and electric vehicles, with a focus on vehicles used for public or shared transportation (buses, rickshaws and taxis) and private two-wheelers.

		China	European Union	United States	India	Japan
Regulation (Vehicles)	**ZEV mandate**	X		X*		
	Fuel economy standards	X	X	X	X	X
Incentives (Vehicles)	**Fiscal incentives**	X	X	X	X	
Targets (Vehicles)		X	X	X*	X	X
Industrial policies	**Subsidy**	X				X
Regulations (chargers)	**Hardware standards**	X	X	X	X	X
	Building regulations	X*	X	X*	X	
Incentives (chargers)	**Fiscal incentives**	X	X	X*		X
Targets (chargers)		X	X	X*	X	X

Table 2: Comparison of different regions

Economical

Globalization of the car industry and the opening of new geographies with booming demand like China has created opportunities of access to larger markets volume. Sales for electric cars have risen as the global economy increased. In 2017, it was projected that the world economy would grow by 3.5 percent. These rises, in Asia and Europe as well as the United States, led to more electric developments. In fact, the sales of electric cars jumped over 30 percent between 2016 and 2017.

Consequently, the price of materials is actually on the decline for EV producers. Particularly, the cost of batteries is lower, which is great for the company. The more popular their cars become to the public, the lower materials prices may drop.

This allows for the possible creation of a more cost-effective vehicle for the public. That too can positively impact the price of materials. Results depend on the respective country's economy, of course. Any country with a declining economy will slice into the company's profits. In many countries though, consumers are investing in luxury vehicles like SUVs and BMWs.

Social

The Automobile industry has played a key role in society up until now but the upper class baby boomer doesn't represent the biggest consumer pool anymore. People in developed countries has now started to believe that automobile has adversely affected their health and environment, pushing millennials towards healthier alternatives like cycle to travel short distance or new ways of travelling.

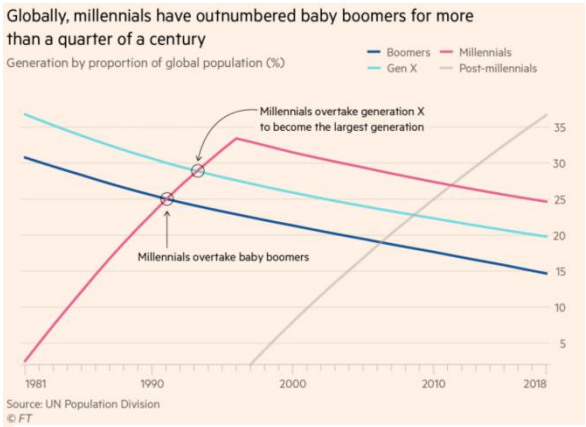


Figure 4: Generations share in population

Millennials, this "technology friendly" consumer group is also influencing the automobile sector, they are aware of the latest technology advancement and can easily compare and evaluate offering. This is considering that they still want to buy a car. In fact, the biggest societal trend is the emergence of new ways to "consume" car and transportation in general, the example in Spain with Cabify offering car booking service, Uber revolutionizing the taxi industry, Blablacar digitalizing car pulling.

The boom of leasing industry like in Germany demonstrates consumers reluctance to own a car on the long run with further consequences on the car second hand market being flooded with these vehicles.

Generation z, native tech. consumers, could be the first generation without the need of a driving licence. The development of autonomous cars industry seemed to be at a cornerstone with recent safety limitations observed in a number of programs. Nevertheless, the automotive industry is made to adopt newest technology and the "part autonomous car" is already around the corner.

On the other hand, it doesn't take much for technology to become obsolete. We, as people, are constantly creating, developing, and advancing what we already have. In a year's time, the newest gadgets and apps can be absolutely useless thanks to upgrades and updates.

Technological

Technology advances are delivering substantial cost reductions for batteries Recent technology progress for battery storage in general has been boosted by high demand for batteries in consumer electronics. Structural elements indicate not only that continued cost reductions are likely, but that they are strongly linked to developments underway in the automotive sector, i.e. changes in battery characteristics (chemistry, energy density and size of the battery packs) and the scale of manufacturing plants.

Strategic importance of the battery technology value chain is increasingly recognized Policy support has been extended to the development of manufacturing capacity for automotive

batteries. This reflects the dynamic development of battery technologies and the importance of EVs to achieve further cost reductions in battery storage for a multitude of applications. It also recognizes the strategic relevance that large-scale battery manufacturing can have for industrial development (due to the relevance of its value chain in the clean energy transition). Examples of policy measures related to battery manufacturing include:

- In China, policy support aims to stimulate innovation and induce consolidation among battery manufacturers, giving preference to those that offer batteries with the best performance.

- In the European Union, the Strategic Action Plan for Batteries in Europe was adopted in May 2018. It brings together a set of measures to support national, regional and industrial efforts to build a battery value chain in Europe, embracing raw material extraction, sourcing and processing, battery materials, cell production, battery systems, as well as reuse and recycling. In combination with the leverage offered by its market size, it seeks to attract investment and establish Europe as a player in the battery industry.

Increase in battery efficiency allows now EV's to perform 400km+ autonomy together with the high developing rate of the battery charging station in key market is a positive for the firm.

Environmental
People love the idea of an electric car. Especially people who have eco-friendliness in mind. An electric vehicle eliminates the need to use as much fuel as a traditional vehicle. And that's far better on the environment. Not to mention an electric car is supposed to be cheaper to use than a traditional car (over time).

A Tesla is environmentally sustainable. It's also new. Very few cars on the market boast the power and luxury Tesla does. The company has done an amazing job maintaining their place in people's mind as that electric car. This makes it more difficult for other, similar vehicles, to come onto the scene. Because when you think electric, you expect a Tesla.

Legal
Automobile safety has been one of the biggest fields for legislation around the world. Regulations are constantly evolving globally putting automobile manufacturers under continuous pressure.

Most recently, the diesel gate generated additional legislation pressure to limit automobile carbon emission. The scandal of Volkswagen in Germany had a global impact in terms of re-enforcing law in that matter.

Outlooks indicate a rising tide of electric vehicles. Dynamic developments in policy implementation and technology advances underpin the projections to 2030 in the New Policies Scenario, which aims to illustrate the consequences of announced policy ambitions. Projections in the EV30@30 Scenario are underpinned by proactive participation of the private sector, promising technology advances and global engagement in EV policy support. It is aligned with the goal of the EVI EV30@30 Campaign to achieve a 30% market share by 2030 for EVs in all modes except two-wheelers (where market shares are higher).

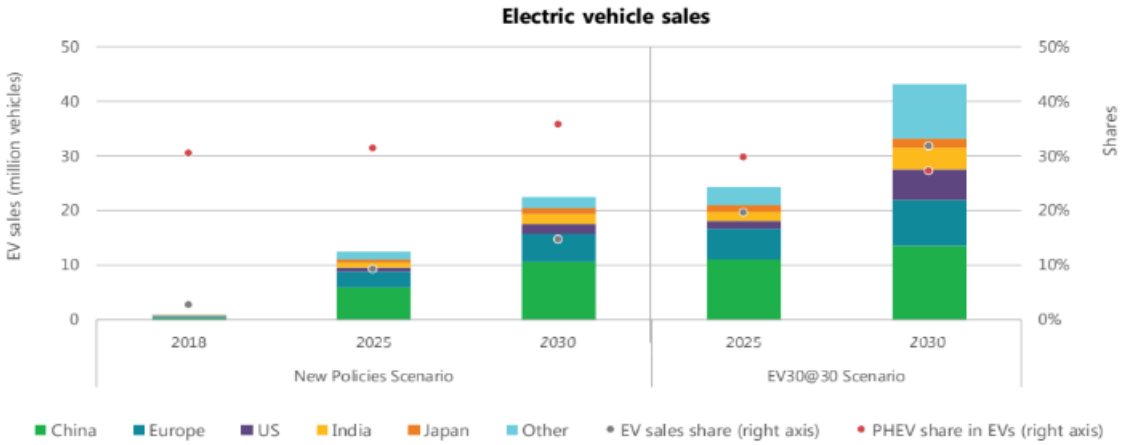


Figure 5: Electric Vehicle Sales

In the New Policies Scenario, China leads with the highest level of EV uptake over the projection period (see Figure 5). It is followed by Europe, where the EV sales share reaches 26% in 2030, and Japan, one of the global leaders in the transition to electric mobility with a 21% EV share of sales in 2030. In North America, growth is particularly strong in Canada (where EV market shares reach 29% by 2030), as well as in California and US states that have adopted zero-emissions vehicle (ZEV) mandates and/or have stated an intention to continue to improve vehicle fuel economy. Other parts of the United States are slower to adopt EVs, bringing the overall EV sales share to 8% of the US vehicle market in 2030.

3.2 Microenvironment

With the 'bigger' picture highlighted in the PESTEL analysis above, it is prudent to also look at the microenvironment – the immediate industry analysis to determine who the market's customers are, who competes in the market, and a look at the inner-workings of the automobile (and electric vehicle) industry. To do that we focussed our analysis on the United States automotive market which can be extrapolated for the other part of the world.

3.2.1 United States Automotive Industry

Table 3 highlights the total new car sales in the United States from 2000 to 2019. According to this data, it seems that the US has a maximum limit in annual new car sales of approximately 17 million before the market begins to decline or stabilize. As seen in 2008, the automobile industry is at a high risk during financial crisis, and the effects of the crisis can be felt for years afterwards – indicated by the lowest sales experienced in this period occurring in 2009 and the market taking more than 5 years to return to over 17 million sales per year.

Before the onset of COVID-2019, the US annual sales of new cars were projected to fall between 16 and 17 million cars. We can assume that the automobile industry will follow the

same recession pattern of 2008 with 2020 maximizing out at between 13 and 14 million cars[5], and 2021 being hard-hit and selling between 10 and 11 million cars. A 5-year recovery period with constant growth can then be expected.

NEW CAR SALES IN US (MILLIONS)[6]			
2000	17.4	2010	11.55
2001	17.2	2011	12.74
2002	16.9	2012	14.43
2003	16.7	2013	15.53
2004	16.8	2014	16.45
2005	17	2015	17.4
2006	16.5	2016	17.46
2007	16.2	2017	17.14
2008	13.3	2018	17.21
2009	10.4	2019[7]	17.1

Table 3: Car sales in US

It is also imperative to look at what kinds of cars make up those 17.1 million sales in 2019 and who was buying them. Table 4[8], adapted from a study done by Hedges & Company, divides the car sales into Sedan, SUV, Truck, Electric Vehicle and Plug-in Hybrid Electric Vehicle. There are many more ways to segment car types, but these are the segments that were chosen in the study. The study also takes into consideration the ages, income levels, and genders of the car owners, as well as whether they own a home or not. Some interesting insights from Table 4 are gathered below.

Car Type
While all the car types tend to follow a similar breakdown in terms of demographics, there seems to be two groupings of similarly accessed vehicles - Sedans and SUVs, and EVs and PHEVs.

Age
Most new cars are bought by people aged 25 - 54, supporting the theory that people younger than that typically do not have the financial capability to buy a new car, and also supporting the theory that new car purchases largely coincide with major changes in lifestyle. As people only retire once, the major change of lifestyle purchases of new vehicles among older people tends to be less than over the larger age bracket.

Income
The majority of vehicles are purchased by persons whose income is over $100,000 per annum, which is expected because vehicles these days are very expensive relative to other costs of living. However, the US is highly unequal, and the bottom bracket of the income table makes up the majority of individuals. The size of this bracket, coupled with the relatively unconcentrated public transport, leads to a large amount of vehicle purchases across the board by low income persons.

[5] https://www.caranddriver.com/news/a31901914/us-sales-production-huge-declines-estimates/
[6] https://fesrvsd.fe.unl.pt:2099/statistics/183713/value-of-us-passenger-cas-sales-and-leases-since-1990/
[7] https://www.cnbc.com/2020/01/06/us-auto-sales-down-in-2019-but-still-top-17-million.html
[8] https://hedgescompany.com/blog/2019/01/new-car-buyer-demographics-2019/

The preference for electric and hybrid vehicles skews far more towards high income purchasers only, which is expected as electric and hybrid vehicles tend to come with a higher price tag. They are also generally less all-round practical than gas powered trucks and sedans. In other words, the extra luxury of electric or hybrid is not something that low- and mid-income household are particularly willing to pay for.

Gender
Across all car types, men purchase more cars. Women tend to prefer traditional Sedan and SUV styles and have shied away from purchasing electric or hybrid vehicles.

Home Ownership
Most people who purchased a car in 2019 own their own home.

Taking these elements into consideration, it appears that the market for car sales in the United States is made up of middle-aged men who earn less than $50,000 in a year and already own their own home. The segments of older men (55-64 years and 65+ years) should definitely not be ignored as together they constitute approximately half the sales of cars in the United States and are more likely to correspond with the $100,000+ income level, which is also a prominent segment.

		SEDAN	SUV	TRUCK	EV	PHEV
AGE	< 24 years	1%	1%	1%	1%	1%
	25 - 54 years	51%	43%	50%	46%	54%
	55 - 64 years	21%	26%	23%	22%	22%
	65 years +	27%	31%	26%	32%	23%
INCOME	< $50,000	39%	31%	37%	20%	21%
	$50,000 - $74,999	18%	19%	20%	16%	12%
	$75,000 - $99,000	9%	10%	10%	4%	10%
	$100,000 +	34%	40%	33%	60%	57%
GENDER	Female	44%	43%	14%	25%	25%
	Male	56%	57%	86%	75%	75%
HOME	Own Home	90%	93%	93%		
OWNERSHIP	Don't Own / Rents	10%	7%	7%		

Table 4: New car sales in the US by car type, 2019

One more interesting trend to note is depicted in Table 5 which looks at the break-down of car purchases by age over time.[9] It appears that in the short time between 2007 and 2017, the age of a new car purchaser has tended upwards with the median age moving from the 45 – 54 year bracket to the 55 – 64 year bracket.

[9] https://www.statista.com/chart/20048/us-buyers-of-new-car-by-age-group/

	2007	2017
< 24 YEARS	1%	3%
25 - 34 YEARS	15%	11%
35 - 44 YEARS	29%	14%
45 - 54 YEARS	24%	20%
55 - 64 YEARS	18%	25%
65 YEARS +	13%	27%

Table 5: Age of car buyers in the US in 2007 and 2017

3.2.2 United States Electric Vehicle Industry

Table 6 below gives an overview of the electric vehicle, plug-in hybrid electric vehicle, and total EV and PHEV sales from 2010 to 2019. At the beginning of the decade, the percentage growth was exponentially higher than the percentage growth at the end of the decade. While this can indicate that the trend of electric vehicles might be slowing down, looking at the actual values of electric cars sold tells a different story with more cars being sold in 2018 and in 2019 than in 2016 and 2017 together.

If COVID-19 had not happened, it would not have been unrealistic to predict that by 2025, the United States would be selling over 1 000 000 EVs and PHEVs per annum. They still might reach this value despite COVID-19 as more companies are bringing out their own versions of electric cars and charging them becomes cheaper and more efficient.

	EV Sales US (millions)	EV Percentage Growth	PHEV US (millions)	PHEV Percentage Growth	Total Sales US EV PHEV (millions)	Total Percentage Growth
2010	0.00119	-	-	-	0.00119	-
2011	0.00975	919%	0.00798	-	0.01773	1590%
2012	0.01465	250%	0.03859	584%	0.05324	400%
2013	0.04769	426%	0.04901	227%	0.0967	282%
2014	0.06342	233%	0.05536	213%	0.11878	223%
2015	0.07104	212%	0.04283	177%	0.11387	196%
2016	0.08673	222%	0.07289	270%	0.15962	240%
2017	0.10449	220%	0.09386	229%	0.19835	224%
2018	0.23882	329%	0.12249	231%	0.36131	282%
2019	0.23972	200%	0.08825	172%	0.32797	191%

Table 6: Electric Vehicle and Plug-in Hybrid Electric Vehicle Sales in the United States

3.2.3 Client Segmentation

Vehicles can be segmented in a number of ways. In this report, they are segmented by luxury sedan, mid class sedan, SUV, pickup, and by sports car / super car. These segments were chosen to represent the types of electric vehicles already in the market, and are summarized below:

	DRIVER VALUES	POTENTIAL SIZE OF SEGMENT IN US (MILLIONS)
LUXURY SEDAN	Luxury, Space, Comfort	30.3
MID CLASS SEDAN	Price, Safety	11.2
SUV	Quality	54.8
PICKUP	Functionality	35.0
SPORT / SUPER CAR	Performance	25.5

Table 7: Potential Segment Size

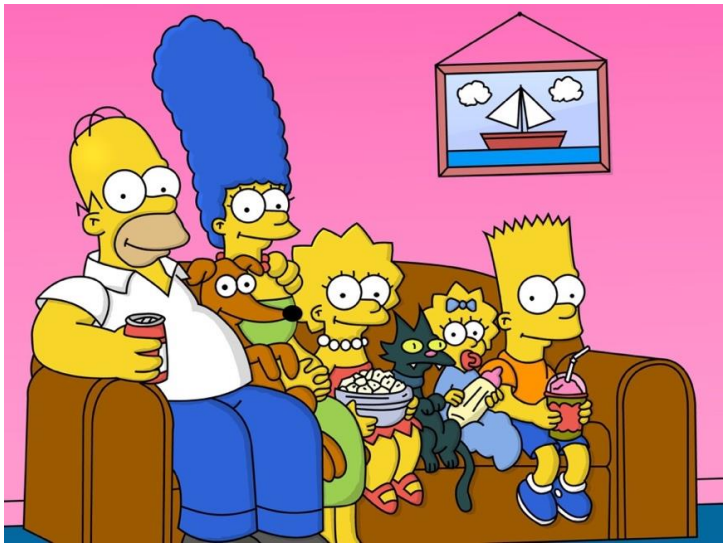
Luxury Sedan

- The luxury sedan is usually driven by individuals who are wealthy and status-driven. They have succeeded in their careers and are looking for a way to flaunt that success. The 'cool factor' matters, and these individuals will spend more money for comfort, luxury, and convenience.
- One type of people who normally drives a luxury sedan is the Ivy Leaguers. These individuals generally live in urban areas, are college-educated, are between the ages of 35 and 64, and have a net worth of more than $250 000. The Ivy-Leaguers account for approximately 30.3 million people in the United States.[10]
- Drivers of luxury sedans value luxury and space over price.

Mid Class Sedan[11]

- The mid class sedan is normally driven by your typical, young American family. These families are starting their lives together, live in urban areas, and are working towards paying off their own home and car. Most purchases are made out of necessity, with frivolous spending discouraged.
- An example of the type of people that drive mid class sedans are the Simpsons. The occupants of this household are married, have a net worth of between $50 000 and $99 000 in some states, and between $100 000 and $249 999 in some of the wealthier states. They generally have more than one child under the age of 18. The Simpsons account for approximately 11.2 million households in the United States.
- Drivers of mid class sedans generally value price and safety over trendiness.

[10] Wealth, Asset Ownership, & Debt of Households Detailed Tables: 2016 by the United States Census Bureau
[11] Image Src. https://www.esquire.com/uk/culture/tv/a31774974/best-simpsons-episodes/



SUV[12]

- The SUV is often driven by families that are established, wealthy, and willing to spend money on items of status.
- In the English language, there is an idiom 'keeping up with the Joneses' – one example of SUV drivers are the Joneses. The occupants of this household are married, have a net worth of over $250 000, and are older than 35 years old. The Joneses account for approximately 26.7 million households in the United States.
- The SUV driver generally values quality and status over price.

Pickup[13]

- The pickup is normally driven by the typical American who likely uses the car for work or for leisure. When used for work, the large vehicle is used for convenience, and when used for leisure, it is used to signal ruggedness and an outdoor lifestyle.
- One type of person who drives a pickup is the Adventurist. According to the Urban Dictionary[14], an adventurist is someone who would climb mountains, jump out of planes, and dive below the surface of the water in search of adventure. These individuals see seeking out adventure as a part of their lifestyle and are willing to pay

[12] Image Src. https://collider.com/the-joneses-dvd-review/

[13] https://bananaleafnewyork.com/tips-for-a-more-enjoyable-and-safer-road-trip/

[14] https://www.urbandictionary.com/define.php?term=Adventurist

for the equipment needed for that lifestyle. These individuals can be of any age, but typically have an average annual income of $100 000 and express a desire to spend time outdoors. Adventurists accounts for approximately 1.65 million people in the United States.

- Another type of person who drives a pickup is the All-round American. These individuals are generally male, are between the ages of 25 and 54, and have a net annual income of $50 000 or above. These All-round Americans account for approximately 33.37 million people.
- Pickup drivers generally value functionality over price.

Sport Car / Super Car[15]

- Drivers of sports or super cars are individuals who are considered car enthusiasts. They typically purchase to collect, and brand name is very important. These individual buy for their own pleasure, and money is often not considered in the equation.
- One group that buys sports cars are men who are generally older than 55 years old and have a net worth of more than $500 000. In the United States, there are approximately 25.5 million people who would fall into this category.
- Drivers of sports cars are looking for performance over price.

[15] https://www.independent.co.uk/life-style/motoring/a-look-inside-the-car-collection-of-michael-fux-a7950721.html

Using the past trends in US automobile and electric vehicle sales, predictions can be made for the expected sales of electric vehicles in the United States in the future (Table 8). These numbers take into consideration the expected sales of all vehicles in the United States (with COVID-19 taken into account), the proportion of electric vehicles sold, the popularity of each type of car, and the price of each car.

					EXPECTED EV SALES (THOUSAND DOLLARS)							
	Segment Size (m)	% of US Population	Total Car Sales '19 (m)	EV Car Sales '19 (tds)	2020	2021	2022	2023	2024	2025	2026	2027
Luxury Sedan	30.3	9.23%	518.13	22.13	2796	1413	1548	1709	2086	2207	2342	2369
Mid class sedan	11.2	3.41%	191.52	8.18	607	425	465	514	627	664	704	712
SUV	54.8	16.70%	937.08	40.02	5372	5223	5720	6317	7710	8157	8655	8754
Pickup	35	10.66%	598.50	25.56	1615	1067	1169	1291	1576	1667	1769	1789
Sports-/ Super car	25.5	7.77%	436.05	18.62	5882	2745	3006	3320	4052	4287	4549	4601

Table 8: Expected EV Sales

3.2.4 Current Segment Sales (SL)

	EXPECTED EV SALES 2020 (THOUSAND DOLLARS)
LUXURY SEDAN	2 796
MID CLASS SEDAN	607
SUV	5 372
PICKUP	1 615
SPORT / SUPER CAR	5 882

Table 9: Current Segment Sales

3.2.5 Annual Compound Segment Sales Growth Rate (G)

	PERCENTAGE GROWTH
LUXURY SEDAN	185%
MID CLASS SEDAN	217%
SUV	263%
PICKUP	211%
SPORT / SUPER CAR	178%

Table 10: Annual Compound Sales Growth

3.2.6 Margin Assessment based on 5 Forces Model (M)

3.2.6.1 5 Forces Model on EV industry

Analyzing the five forces by Michael Porter, we see a dynamic market that is going through a big innovation process currently. The power structures are being rearranged which offers new opportunities for car producers but also creates tensions coming from all five forces. For further details we applied the 5 forces model assessment.

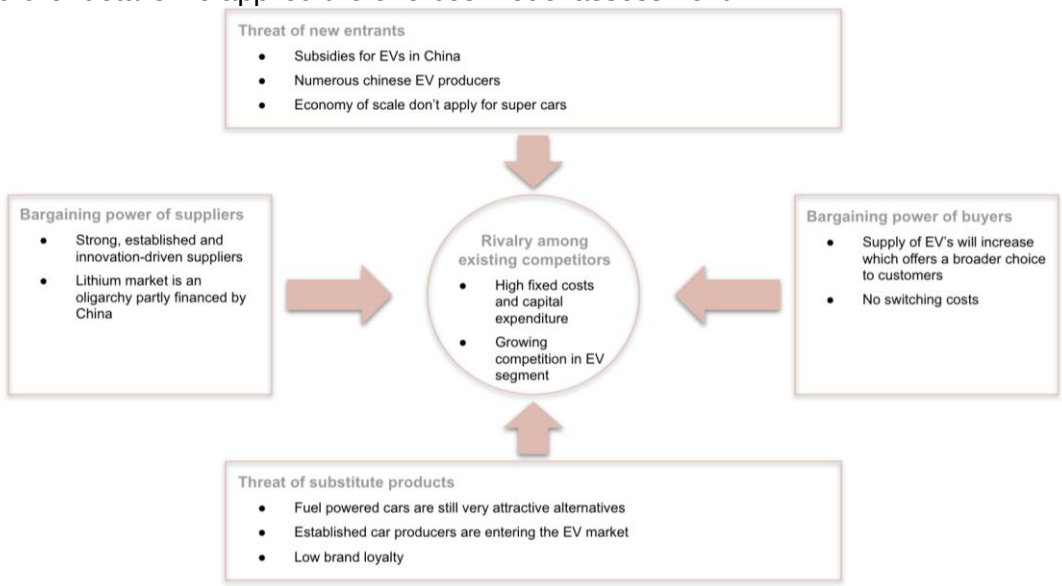


Figure 6: Porter's 5 Forces Model on EV industry

3.2.6.2 5 Forces Model Assessment

To differentiate the influence of the Porter's five forces on the relevant six segments, the 5 forces model assessment has been applied to each of them. By combining the margin after the 5 forces with the average margin rate in the automotive industry of 6%[16], we calculate the margin rate by segment. The results show that among the six segments the "Jeep Wrangler Crowd" has the highest margin with ca. 6,8%, while the segment of the "Young Family" represents the smallest margin with ca. 6,3%.

Segments as per Customers	5 Forces Average	Margin after 5 Forces	Margin index	Average Margin Rate	Margin Rate by Segment
Luxury Sedan	4,6	5,4	1,11	6%	6,65%
Mid Class Sedan	6,5	3,5	0,72		4,32%
SUV	4,3	5,7	1,16		6,95%
Pickup	5,0	5,0	1,03		6,17%
Sports Car/ Super Car	5,2	4,8	0,98		5,91%

[16] Euler Hermes: https://www.eulerhermes.com/content/dam/onemarketing/ehndbx/eulerhermes_com/en_gl/erd/newsimport/pdf/profits-in-the-auto-industry-rich-and-richer-snippet-12sep17.pdf (2016)

Table 11: 5 Forces Model Assessment

Threat of New Entrants

When it comes to the risk of new entrants, EV producers face a moderate risk. To enter this market, R&D costs are considerably high and the benefits of an economy of scale cannot be utilized immediately from new entrants. China just recently announced to raise subsidies for EVs[17] and is also the residence of several EV producers, what makes it harder to control this important strategic region.[18] Considering China as one of the biggest markets in the automotive sector with a current share of 25% and a projected share of 30% in 2025[19] this represents a serious threat.

Another threat can be seen in the segment of car enthusiast (sports car/ super cars). Due to the high prices of those cars the manufacturers usually don't rely on the economy of scale and produce sports/ super cars in small batch sizes. Without the need for big factories, the entry barriers for this segment are lower than for other segments in the car industry. Good examples are producers like Koenigsegg who are producing 20 cars per year but also the first Tesla Roadster of which 490 models left the factory per year on average during its production time from 2008 to 2012.

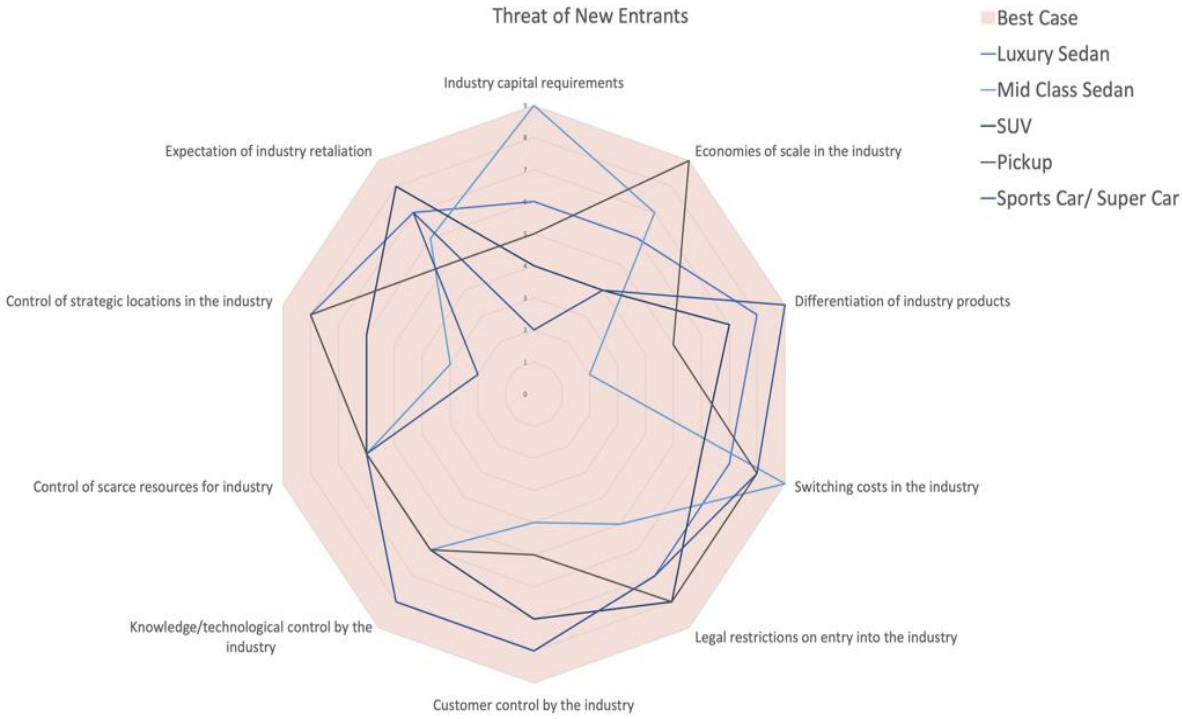


Figure 7: Threat of new Entrants

Threat of Substitute Products

The threat of substitutes is high. Since there are almost no switching costs, switching to a substitute represents a high threat. The biggest substitute for EVs are still primary substitutes such as petrol-engine cars and hybrids. Those are highly profitable and efficient cars, that

[17] Electrive: https://www.electrive.com/2020/04/01/china-considers-extending-ev-subsidies/ (2020)
[18] Globalfleet: https://www.globalfleet.com/fr/connected-manufacturers/asia-pacific/analysis/finally-list-chinese-ev-manufacturers
[19] Statista: https://www.statista.com/statistics/225123/chinas-share-of-the-global-car-market/ (2012)

create the same or more value for a more affordable price. But also, secondary substitutes such as biking, or walking are threatening the EV business.

The strong growth in the field of EVs[20] makes that segment more attractive for new players and intensive research. With each traditional car maker entering the EV segment, the threat of substitutes is increasing.

Since the field of EVs is still considerably young, the brand loyalty is not high yet and customers rather go for value for money than for a specific brand.

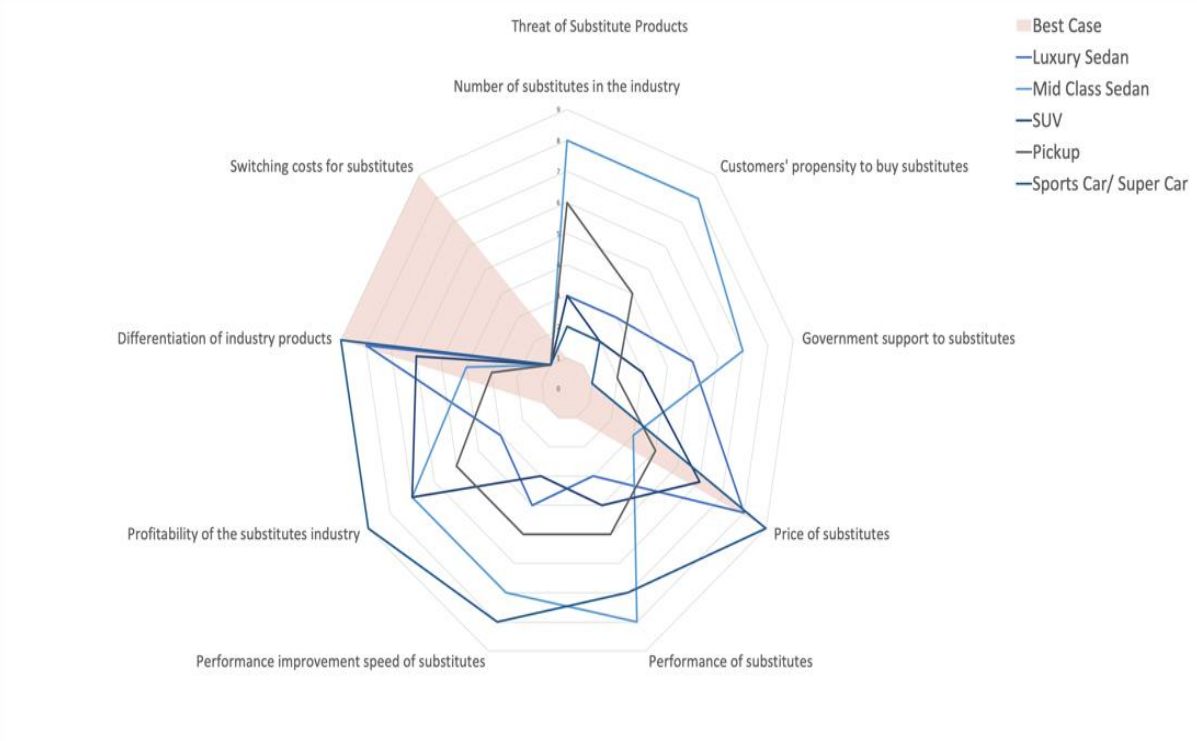


Figure 8: Threat of Substitute Products

Bargaining Power of Suppliers

The threat of bargaining powers of Suppliers is moderate. There are not only global players in the car industry with a huge financial strength, such as Bosch or ZF but also family owned hidden champions such as Boysen and Benteler. Those are innovation-driven and have a huge power over developments in the industry. One of the most important components in the EV industry are the batteries thus far. Panasonic for example is using this power by not delivering one producer exclusively but having major contracts with several producers, like the case of Tesla and Toyota, where both companies use Panasonic battery technology.

[20] McKinsey: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/expanding-electric-vehicle-adoption-despite-early-growing-pains

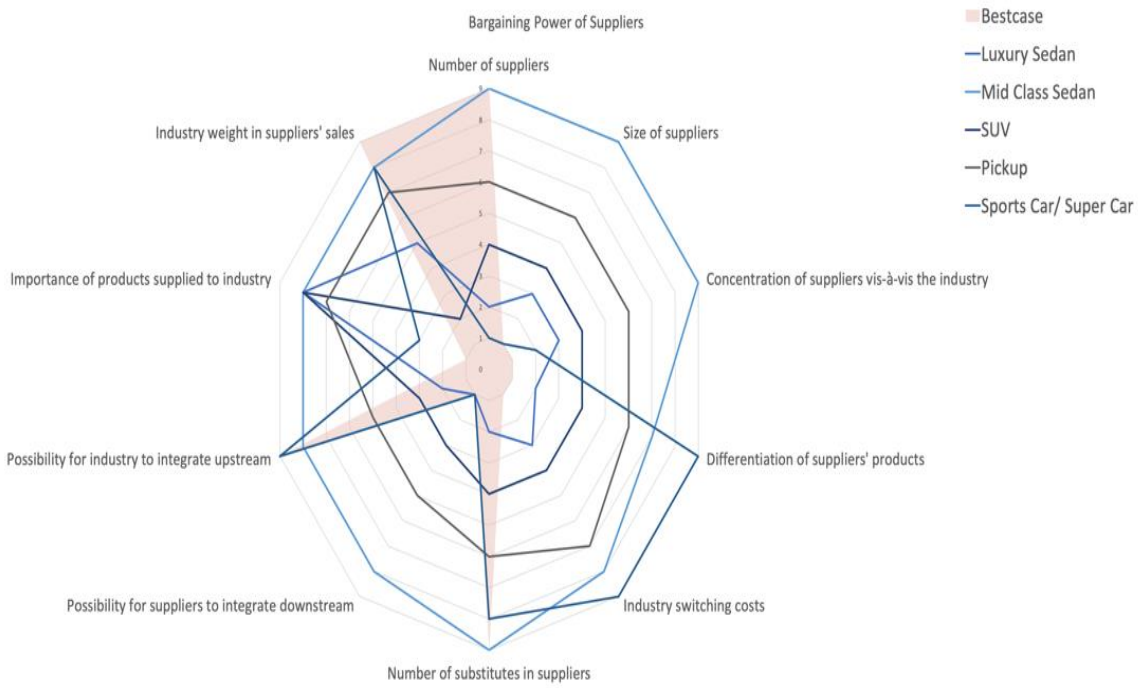


Figure 9: Bargaining Power of Suppliers

Bargaining Power of Buyers

The bargaining power of buyers is high and therefore presents a high threat. The lack of switching costs for EV's makes it easy for customers to switch between any model or brand. The increasing supply in EV's feeds the factor of price sensitivity on the customer side. With a growing offer in electric vehicles, the bargaining power of buyers increases.

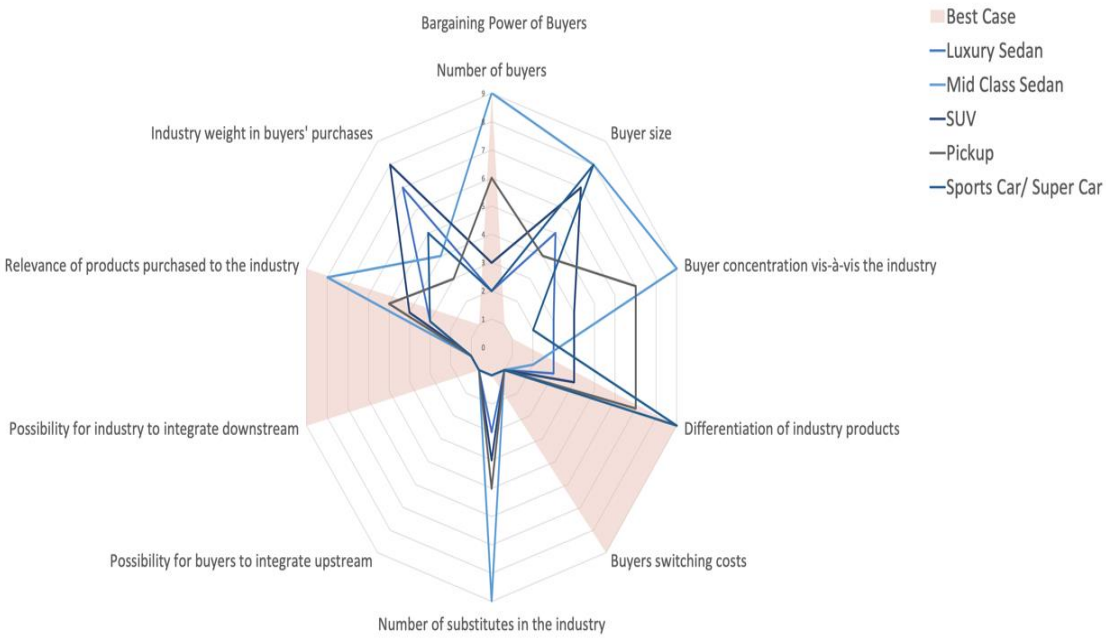


Figure 10: Bargaining Power of Buyers

Rivalry amongst Existing Competitors

The automotive industry is very cost intensive. High investments and fixed costs come along with producing cars. As expensive and large objects, the storage of cars requests a high capital expenditure too.
The number of competitors is growing as well, with more and more traditional car makers entering the field of electric vehicles. I addition, models such as sedans or SUVs highly profitable, what increases the rivalry amongst those models even more.

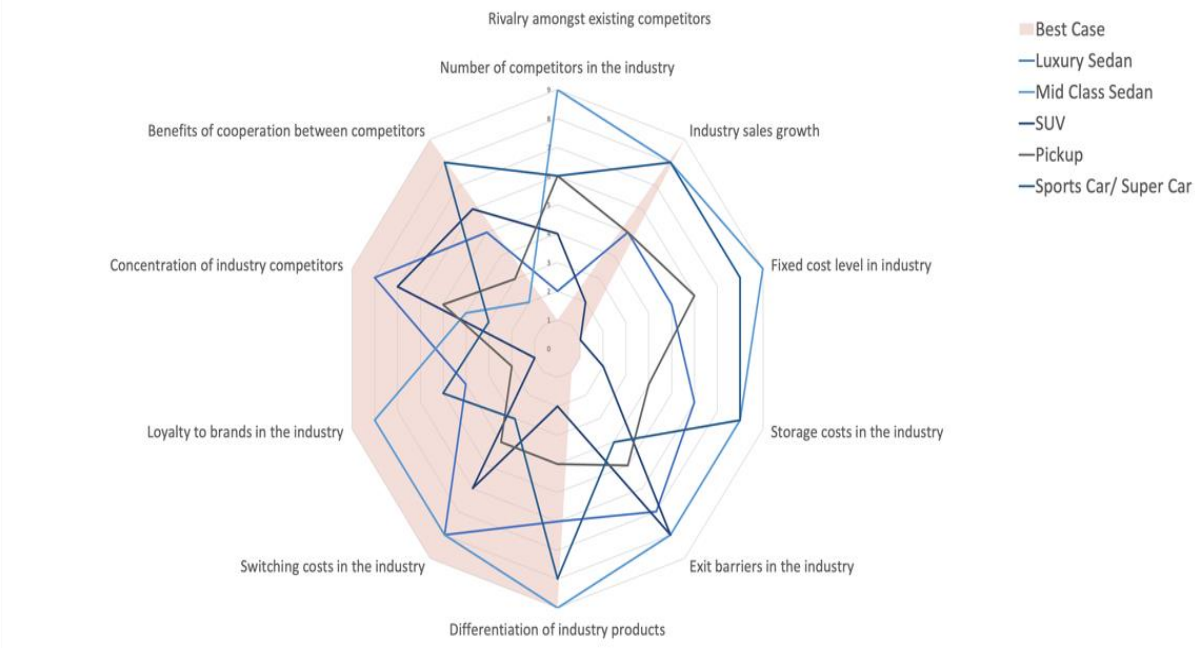


Figure 11: Rivalry amongst Existing Competitors

3.2.7 Risk Evaluation (R)

With the PESTEL analysis and the 5 forces model assessment, we now can easily compute the average risk per segment that automotive companies are focusing on, as being presented in the table below:

Teslas Car Segments	Uncertainty - Macro Environment						Uncertainty - Micro Environment					Average Risk/ Segment
	P	E	S	T	E	L	TNE	TSP	BPS	BPB	REC	
High Class Sedan	8	2	7	3	7	9	7	4	3	3	6	5.4
Mid Class Sedan	3	9	2	6	2	2	6	6	8	5	7	5.1
SUV	8	2	9	2	9	9	6	4	4	4	4	5.5
Pickup	6	5	8	7	9	1	7	4	6	4	4	5.5
Sports Car/ Super Car	9	8	9	8	9	9	6	5	5	3	6	7.1

Table 12: Risk evaluation on Micro and Macro Level

It shows that especially the larger cars such as Pick Ups or SUV but also the sports car with powerful engines, face a higher risk, partly due to the environmental and social impact.

3.2.8 Sustainability Evaluation (SU)

Evaluating Tesla's sustainability efforts, the following table shows us the segments in their respective weight and forms the basis for the following calculation of the sustainable value. Details will be given in the later chapters.

	Environmental Sustainability		Social Sustainability		Governance Sustainability			
Teslas Car Segments	Contribution to Renewables	Emission Reduction	Contribution to Society	Safety for Consumers	Law Compliance (local & international	Business Ethics	**Sustainability by Segment**	**Sustainability Index by Segment**
Luxury Sedan	6	6	4	8	9	5	38	1,00
Mid Class Sedan	5	7	7	7	9	7	42	1,11
SUV	7	5	5	9	9	5	40	1,05
Pickup	7	5	5	8	8	6	39	1,03
Sports Car / Super Car	7	5	2	5	7	5	31	0,82

Table 13: Sustainability Evaluation

3.2.1 Sustained Value Calculation

Table 14 shows us what value can be sustained from the market in the next 5 years based on the current sales volumes in the US, accounting for the forecasted growth rate, the margin, the risk and the sustainability indicator. All sales numbers are indicated in $, as are the sustained values, for which we can clearly see some trends:

Market Segments	Luxury Sedan	Mid Class Sedan	SUV	Pickup	Sports Car / Super Car
SL (in thousands)	2 796.00	607.00	5 372.00	1 615.00	5 882.00
G (%)	1.85	2.17	2.63	2.11	1.78
M (%)	6.65	4.32	6.95	6.17	5.91
R	5.4	5.1	5.5	5.5	7.1
SU	1	1.11	1.05	1.03	0.82
Sustainable Value (t=1)	9.813	1.809	25.873	5.804	11.161
Sustainable Value (t=2)	27.968	5.735	93.921	18.049	31.028
Sustainable Value (t=3)	79.708	18.180	340.932	56.132	86.259
Sustainable Value (t=4)	227.167	57.632	1 237.582	174.572	239.799
Sustainable Value (t=5)	647.425	182.693	4 492.422	542.918	666.641

Table 14. Sustainable Value Calculation

As can be seen from the table, the most attractive market segment in terms of sales volumes is the SUV market which is based on the current relative share as well as on the high margin combined with a medium risk for the development of this segment in the market and a medium sustainability indicator. All of those lead to a sustained value forecast of roughly $4,5 billion in the 5th year from now.

The segments of Sports Cars / Super Cars, Pickups and Luxury Sedans follow and are somewhere close to each other in a range between roughly $540 to $665 million in their 5th year from now, leaving the mid class sedan lagging behind with about $180 million at the same point in time.

3.3 Competitors

As described in the PESTEL analysis, the historical automotive makers have to respond four macro trends. First the electrification driven by policy makers around the globe who are pushing hard in a response to global climate change and urbanization forcing car makers to massively invest in electrification both in terms of R&D and production. Second, China, the epicenter of automotive growth for the last decade, wants to build the next global car maker champion. In the last decade the historical Europeans, Japanese and American leaders captured most of the growth, but now local authorities are taking advantage of the technological electrification leap to change the game with the proliferation of new local entrants. Third, consumers, with millennials taking the lead in terms of global size of consumer groups, automotive makers have to constantly adapt to new technology putting further constraints on the speed of development cycle for new models. Finally, partnership with battery suppliers is crucial for most of the historical players with the risk of becoming irrelevant if not done in a timely manner. Let's see first how global leaders are positioned to respond to the four challenges and how Tesla acts as a gamechanger.

To better understand the competitive landscape of Tesla we've analyzed automotive players with current sales higher than 1 million car per year concentrating 90% of global automotive sales. Over the last decade, historical markets have restructured due to overcapacity in Europe, America and Japan and the necessity shift resources in the growing Chinese market.

3.3.1 Strategic Groups

The development of global economy after 2008 turmoil encouraged car sales growth across the globe. From the histogram below summarizing global automotive sales in 2019 we can position companies according to their global, multi-regional, regional or local presence. Volkswagen, Toyota, the future PSA/Fiat/Chrysler and the alliance Renault-Nissan-Mitsubishi have presence in the 4 major markets China, Japan, Europe and Americas with each one of them leading a region. The multi-regional group formed is formed by a group of generalists having a complete range GM, Hyundai, Ford, Honda and Suzuki plus the premium German manufacturers BMW and Daimler. Finally, accounting for a total of 11 millions of car sales, the local players dominated by six Chinese companies Sais, Geely, Changan, Dongfeng, Baic, Great wall and Tata for India. This last group operate with a lower product range but represent large volumes in comparison of the other players.

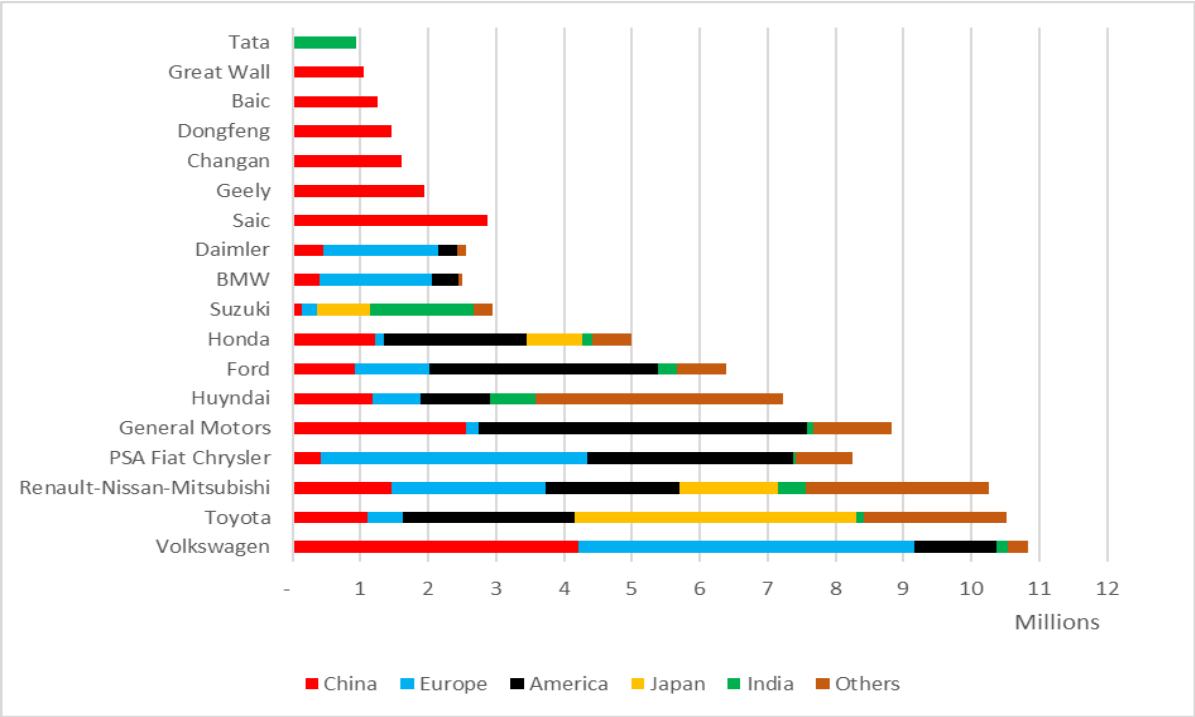


Figure 12: 2019 Automotive Industry Volumes in million Cars

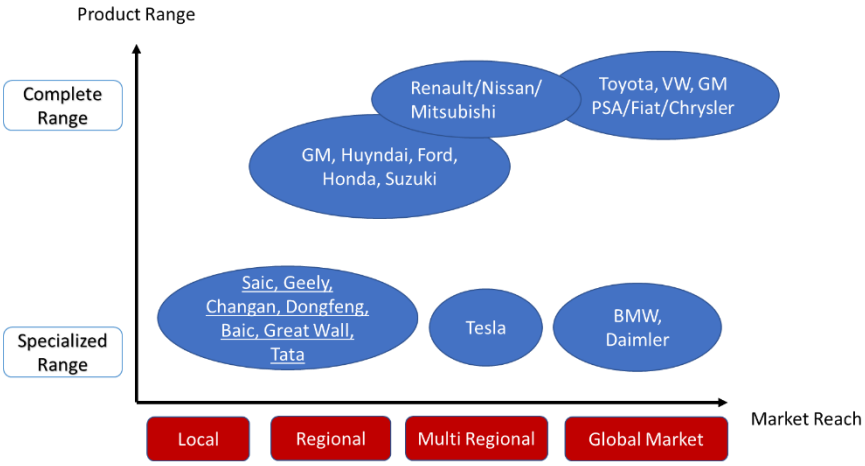


Figure 13: Strategic Groups Cluster Global car manufacturers

Another perspective can be taken in terms of Strategic group by looking at EV's market share for DEV or PHEV based on sales volume more than 50 000 EV sales per year against car manufacturers market reach.

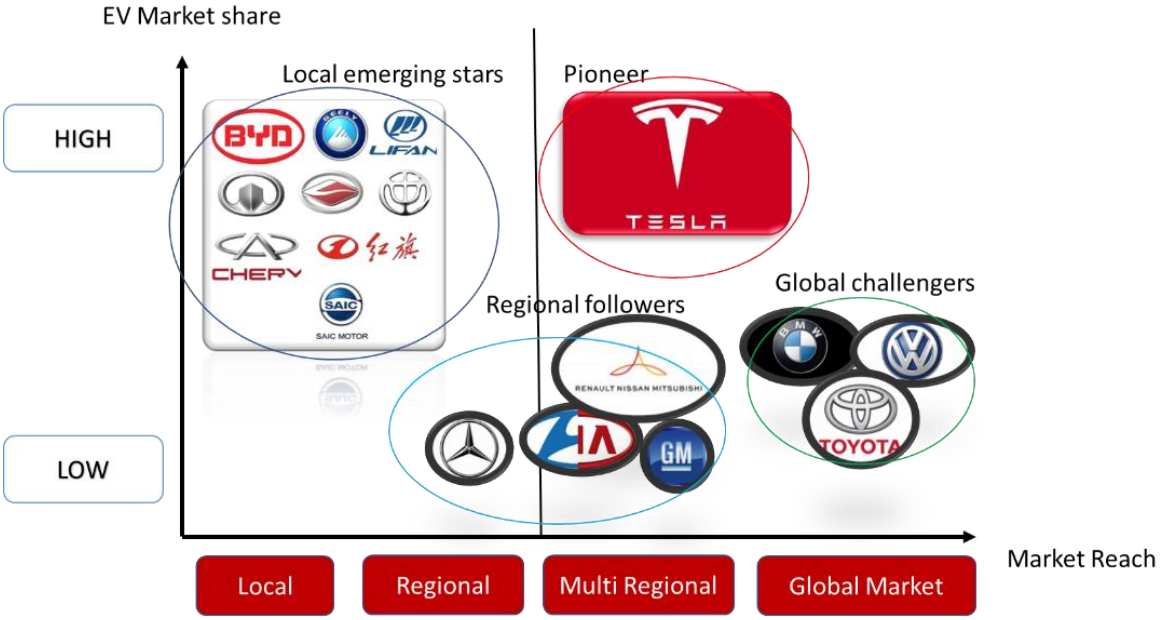


Figure 14: Strategic Groups Cluster EV car manufacturers > 50 000 unit sold in 2019

This perspective shows first the global leadership of Tesla as a pioneer of EV manufacturing. Second, the local emerging stars are concentrated in China with BYD, BAIC and Geely with almost 400 k BEV vehicule sold in 2019 which is 5 times more than VW global BEV sales. This demonstrates the ambition of the Chinese state to create the next EV giant like TOYOTA did in the 90's with the standard car industry. BMW, VW, TOYOTA and Hyundai/Kia are the only global challengers with 100k+ EV car sales with a mix of BEV/PHEV technology in their portfolio marking a transition in terms of technology. Finally the follower group is spread across GM, Nissan/Renault, Toyota, Mitsubishi and Daimler concentrating their EV offering in different regions.

It is important to mention that some of the top 15 global car makers don't appear on that chart. Companies like FORD for instance are taking a significant delay in transforming their range to the new EV reality. Newly announced Peugeot/Fiat/Chrysler conglomerate announced that the benefits of their scale advantage will be mainly focused on EV transformation and global mobility services. The conglomerate can benefit from the fast follower advantage often proven successful if the global integration is made at a fast enough pace.

3.3.2 Competitive Intelligence

Mobility electrification has created an unprecedent investment momentum in the automotive industry, forcing key players to adapt. In 2018 all global or major regional automotive manufacturers have announced strategic move towards Electric vehicles (DEV or PHEV). Whilst in the last 10 years this category of vehicle was the playfield of a few car makers like Toyota, Nissan and Mitsubishi, Tesla has clearly disrupted the market with its pure player DEV positioning.

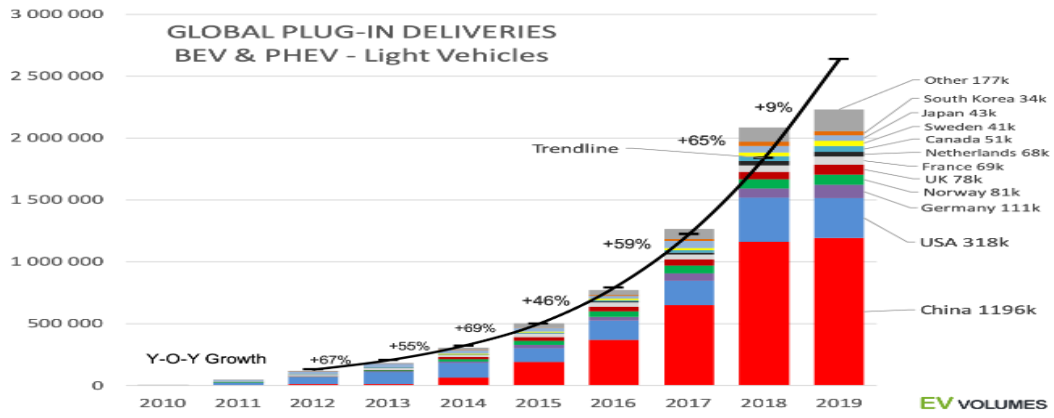


Figure 15: Global Plug-In Deliveries

In that context, to better understand the competition for Tesla, we must analyze the global automotive landscape by looking at current EV global volume, product range and understand Tesla positioning with the level of investment undertaken towards electrification.

Global plug-in vehicle deliveries 2019 reached 2 264 400 units (see Figure 15), 9 % higher than for 2018. This is a clear departure from the growth rates of the previous 6 years, which were between 46% and 69 %. The reasons are in the developments in the two largest markets, China and USA, where sales stagnated in the 2nd half of 2019 and stayed significantly below the sales boom in 2018 H2. In USA, sales of most plug-in models decreased compared to the boom in 2018 H2. In China, further slashing of subsidies, paired with more stringent technical regulation caused a crash in NEV demand and supply, starting in July.

Europe became instrumental in 2019 EV sales with 44 % growth, accelerating towards the end of the year.

The global BEV&PHEV share for 2019 was 2,5 % and the smaller car markets continue to lead EV adoption. The share leader is Norway, where 56 % of new car sales were Plug-ins in 2019. Iceland came 2nd with 24,5 % and the Netherlands 3rd with 15 %. Among the larger economies, China lead with a plug-in share of 5,2 %, UK posted 3,2 %, Germany 2,9 %, France 2,8 %, Canada 2,7 %. All other car markets with over 1 million total sales showed 2 % or less for 2019.

This shows the top-10 markets for plug-ins, underlining the significance of China in the development of the sector. 4,7 % NEV share in the world's largest car market of 25,4 million light vehicles generated 1,2 millions of volume in 2019. Business is kept local: Few units were exported from China and NEV imports accounted for just 56 500 units, over 80 % from Tesla. Imported plug-ins are burdened by the usual import duties and do not receive NEV subsidies. The only way to sell at equal terms is to produce EVs (incl. their batteries) in China and recent

efforts start to pay off. For 2019, 196 000 units China made NEVs, which were sold under foreign brand names, more than double the volume of 2018.

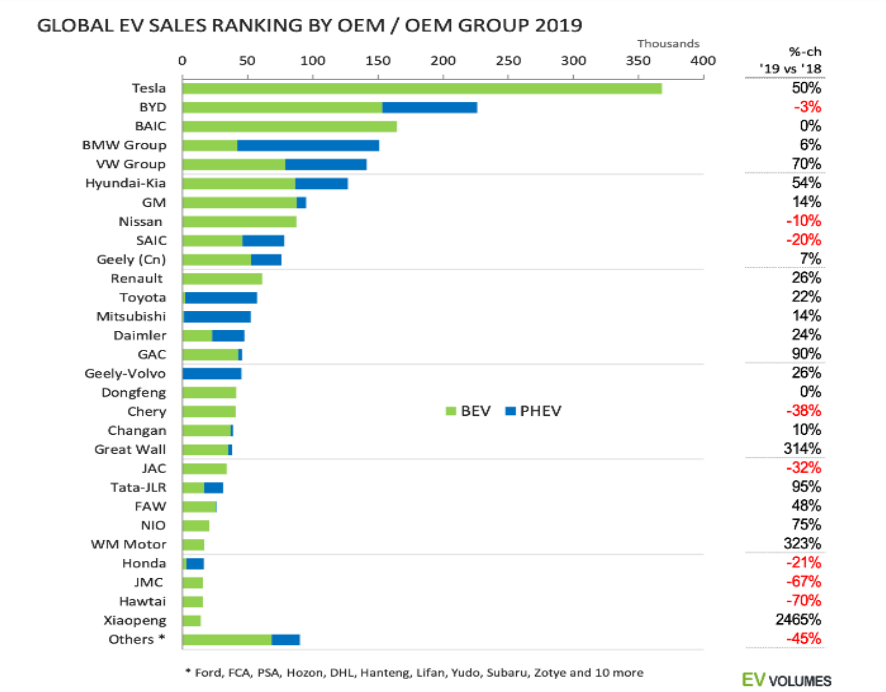


Figure 16: Global EV Sales

Tesla accelerates

Tesla completed the roll-out of the Model-3 which is now available in 48 countries, the top-3 markets being USA (145k), China (34k, all imported) and the Netherlands (30k). With 368 000 deliveries incl. Model S&X, a 50 % increase over 2018, Tesla commanded 16 % share of global BEV&PHEV volume in 2019, 22% if only BEVs are counted.

The slump in China means that most of China's previously fast growing NEV makers faced steep declines during the 2nd half of the year. Notable exceptions were Guangzhou Auto (GAC) with their new Aion S Sedan, Great Wall with the Ora mini-EV and FAW. Also, the EV start-ups NIO, WM-Motor and Xiaopeng fared well, albeit from small volume bases. The larger Chinese OEMs created vast NEV portfolios in recent years but saw volumes of many fresh entries crumple when they did not fit revised policies and requirements anymore. Waste at its worst.

BEV and Model-3 domination

As expected, the new Tesla became the world's bestselling plug-in, with 300 000 deliveries last year. High volume sales outside USA/Canada started in January 2019 and nearly all the additional volume vs 2018 were from exports. The car sells without advertising or rebates and demand remained strong throughout the year.

Beijing based BAIC landed a real hit with the 2nd generation of the EU 260/400 series, aka EU5. It has become very popular among the cities taxi operators and hide hailers, supported by the plan to convert the taxi fleet to EVs and savings on operating cost.

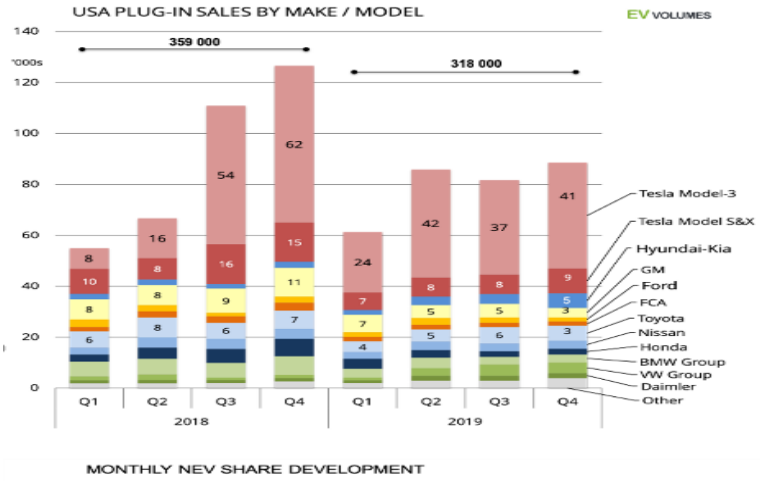


Figure 17: Plug-In Sales USA

The Nissan Leaf lost 17k compared to last year, despite the intro of a larger 62 KWh battery variant called e+, at a €6000 price premium. Too much in an environment where battery upgrades are offered every 2nd year without significant price hikes, read BMW i3, which is still going strong.

The BYD e5 gained for similar reasons as the BAIC EU5, but mostly around Shenzhen, where it is built.

The only PHEV in the 2019 top-10 is the venerable Mitsubishi Outlander, introduced 2013, face-lifted 2 times and still one of the few PHEVs which can use DC fast-chargers.

The Renault Zoe got re-designed for MY2020, Europe deliveries started in Q4 and reached 7500 units for 2019. 40k units were from the old model, unit sales unchanged vs the year before.

The Hyundai Kona BEV became an instant success, reasonably priced and with a 64 kWh battery option. A large order backlog indicates that the 44k do not reflect the real demand for this small SUV. Excluding entries with less than 50 units of sales, 250 individual BEV and PHEV models (nameplates) were available worldwide during 2019. The top-50 models stood for 74 % of the global volume.

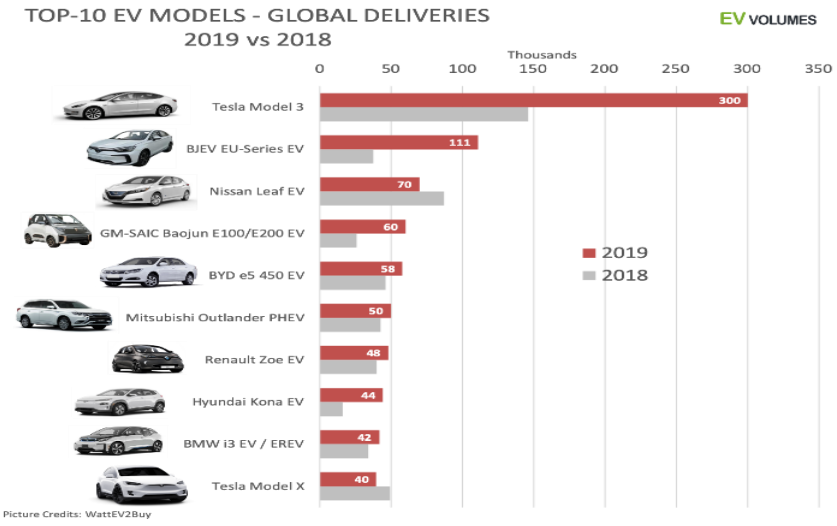


Figure 18: Top 10 EV Models

Industry 2030 projection and investment
The forecast shows that a lot of companies are investing heavily in the EV sectors as shown in the table below.

Original equipment manufacturer	Announcement
BMW	15-25% of the BMW Group's sales in 2025 and 25 new EV models by 2025.
BJEV-BAIC	0.5 million electric car sales in 2020 and ***1.3 million electric car sales in 2025***.
BYD	0.6 million electric car sales in 2020.
Chonquing Changan	***21 new BEV models and 12 new PHEV models by 2025, 1.7 million sales by 2025 (100% of group's sales)***.
Dongfeng Motor CO	6 new EV models by 2020 and 30% electric sales share in 2022.
FCA	***28 new EV models by 2022.***
Ford	40 new EV models by 2022.
Geely	1 million sales and 90% of sales in 2020.
GM	20 new EV models by 2023.
Honda	15% electric vehicle sale share in 2030 (part of two-thirds of electrified vehicles by 2030, globally and by 2025 in Europe).
Hyundai-Kia	12 new EV models by 2020.
Mahindra & Mahindra	0.036 million electric car sales in 2020.
Mazda	One new EV model in 2020 and 5% of Mazda sales to be fully electric by 2030.
Mercedes-Benz	0.1 million sales in 2020, ***10 new EV models by 2022 and 25% of the group's sales in 2025.***
Other Chinese OEMs	7 million sales in 2020.
PSA	0.9 million sales in 2022.
Renault-Nissan-Mitsubishi	12 new EV models by 2022. Renault plans 20% of the group's sales in 2022 to be fully electric. Infiniti plans to have all models electric by 2021.
Maruti Suzuki	A new EV models in 2020, ***35 000 electric car sales in 2021*** up to ***1.5 million in 2030.***
Tesla	Around 0.5 million sales in 2019 and a new EV model in 2030.

Table 15: Projection & Investment

3.4 Industry

3.4.1 Determination of the Industry's and Product's Life Cycle

Industry's life cycle
From a life cycle perspective, each industry (or segment within the industry) tends to assume four typical stages, these being:

1. Introduction
2. Growth
3. Maturity
4. Decline

If we look at the automotive industry as a whole, we can say that this industry is currently at a maturity stage.

Looking at past years, we should note that the global automobile production has increased markedly from 2001 to 2016 (except for a brief period during the 2008 financial crisis). From 2016 onwards, however, the growth rate began to slow down and even became negative from 2017 onwards, as illustrated in the following graph.

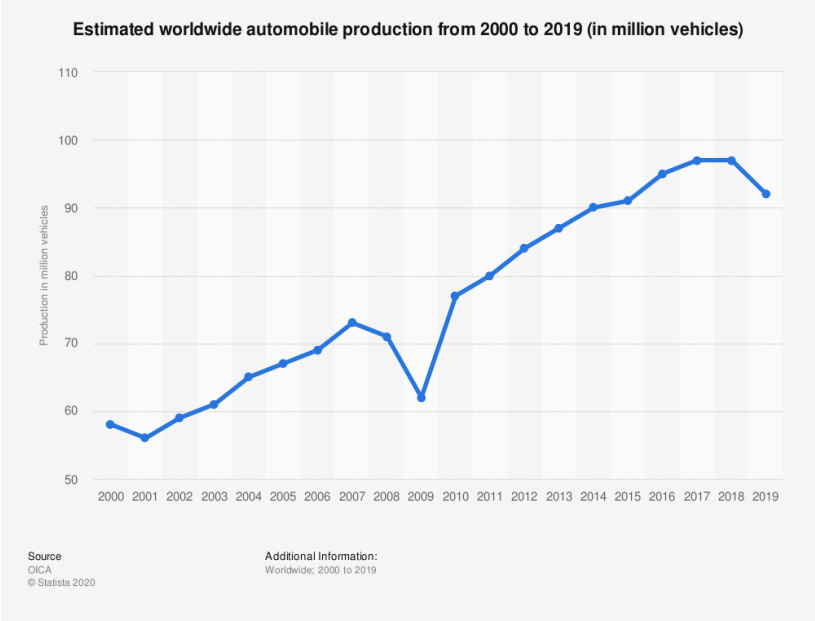


Figure 19: Estimated worldwide automobile production

Even though the auto manufacturing industry in general can be considered to be in a maturity phase and may even experience some decline as car usage moves from personal ownership to car-sharing schemes, there are some emerging segments in that industry that are still in the first phases of their life cycle.

Chief among those is the manufacturing and sale of electric vehicles.
Electric vehicles were at the first phase of their life cycle back in the beginning of last decade. From 2015 onwards, their production and usage became increasingly popular in such a way that this segment is now at its growth stage and is expected to continue growing in the coming decade, as illustrated in the following graphs.

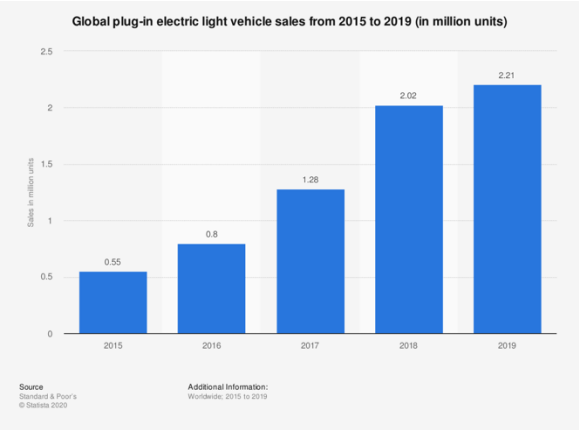


Figure 20: Global Plug-In Vehicle Sales

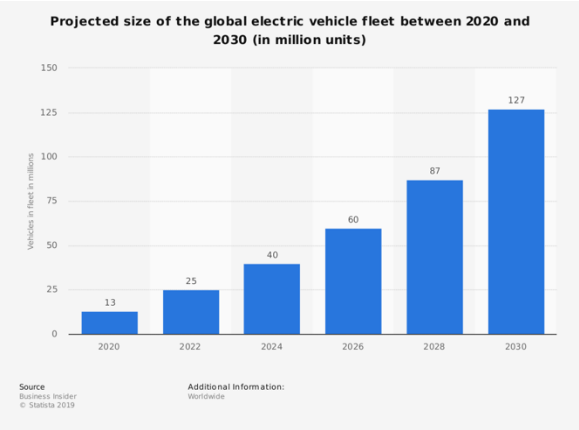


Figure 21: Projected Size of Global EV Fleet 2020-2030

The production and sale of electric vehicles has been fostered by declining costs of available technology (batteries, in particular), as well as by the expanded network of recharging points. Another segment that is currently being introduced and is expected to enter the growth stage in the coming decade has to do with autonomous driving.

Some tech and auto companies have already introduced the first prototypes of autonomous vehicles, but these are still being tested for wider usage pending regulatory checks and overall acceptance in the market.

From the outset, it should be noted that there are several degrees of automatization, some of which are already achieved in current market products. These degrees are illustrated in the following graph by Roland Berger[21]:

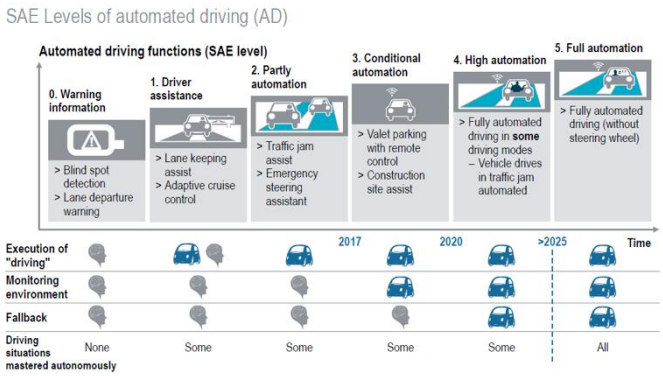


Figure 22: Automated Driving Functions

Level 4 automation is expected to increase constantly along the coming decade. A question mark is still pending over level 5 (full automation), whose market introduction is expected to occur only after 2025. In any case, robo-cars in general are set to become a reality over the coming years.

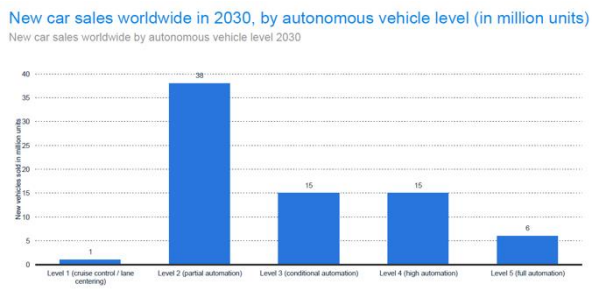


Figure 23: Car sales by autonomous vehicle level in 2030

[21] Roland Berger's global automotive supplier study highlights, Jan 2019.

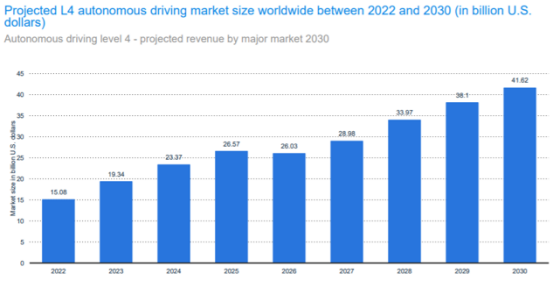


Figure 24: Projected autonomous driving market

The shortening of the product's life cycle

On a more granular level, the products in the industry can be also analyzed from a life cycle perspective, covering the same four stages that we pointed out for the industry as a whole.

At this level, we should point out that in the auto industry there has been a shortening of the product's life cycle. This trend can be explained by the increasing complexity of the end product and by the fact that the sector is exposed to an increasingly fast-paced rhythm of technological innovation.

The increasing complexity of the end product can be seen in the following graph, which depicts the evolution of the customer requirements along the years[22]:

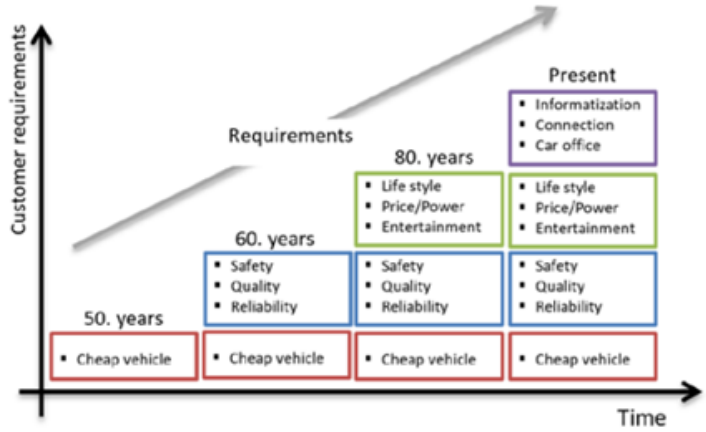


Figure 25: Customer Requirements over Time

In developed countries, the lifetime of an average car model has been shortened by half (approximately from 8 to 4 years) over the last decade[23].

Moreover, the average time of the product development (from concept design to start of series) has been reduced from 48 to 25 months on average[24].

According to a survey conducted by Jabil based on a sample of 126 qualified participants from automotive companies, in 2018 about 50% of the companies stated that their product development and launch cycle was less than 18 months (and 22% stated that it was less than 12 months)[25]. This marks a big difference to previous years when the timeline for vehicle development and launch was much longer.

Against this backdrop, it should be noted that **Tesla has been revolutionizing the product's life cycle in the car industry**. The key element for this change lies in Tesla's digital technology that allows it to keep modifying each car's features after the point of sale through continuous over-the-air software updates and improvements.

[22] Sabadka / Molnár / Fedorko, Shortening of Life Cycle and Complexity Impact on the Automotive Industry, TEM Journal, Vol. 8, Issue 4, November 2019, pp. 1295-1301.
[23] Sabadka / Molnár / Fedorko, Shortening of Life Cycle and Complexity Impact on the Automotive Industry, TEM Journal, Vol. 8, Issue 4, November 2019, pp. 1295-1301.
[24] Sabadka / Molnár / Fedorko, Shortening of Life Cycle and Complexity Impact on the Automotive Industry, TEM Journal, Vol. 8, Issue 4, November 2019, pp. 1295-1301.
[25] Jabil, Managing Automotive Technology Trends, A Survey of *Automobile OEM* Stakeholders, December 2018.

As indicated in a 2018 LSE article, traditionally cars are sold as finished and complete products. Buyers do not expect new cars to improve or change once they are rolled out of the dealer's premises. Only occasional maintenance, software updates or repairs are carried out to keep the vehicle functional. To stay competitive, car makers introduce new models to market every four to seven years and these models are refreshed with minor functional and cosmetic changes around halfway through their life cycle'[26].

But Tesla has been changing this reality. 'Much like [a] smartphone, Tesla releases frequent software updates to improve and change the functionality of the cars they design and manufacture, thereby modifying cars continuously after the point of sale'[27]. This allows Tesla not only to keep adjusting the car's functionalities according to customer needs and preferences but also to generate new revenue streams, by selling additional features throughout the car's lifetime.

The authors of the above-cited article collected data on the Model S from various online sources over 1344 days between June 2012 and February 2016. During that period, Tesla made five major software releases, complemented by 23 minor and 89 maintenance updates. On a more qualitative level, it is also interesting to note that occasionally the functionality was changed or removed as a response to safety risks or regulatory intervention. Namely, Tesla raised ride-height (ground clearance) when battery fires were under investigation in 2013; later on, in 2015, they temporarily disabled the Autosteer and Auto Lane Change functionality to comply with an order from Hong Kong's Transport Department[28].

[26] Lyyra / Koskinen, How Tesla is changing product life cycle in the car industry, LSE, February 5th, 2018.
[27] Lyyra / Koskinen, How Tesla is changing product life cycle in the car industry, LSE, February 5th, 2018.
[28] Lyyra / Koskinen, How Tesla is changing product life cycle in the car industry, LSE, February 5th, 2018.

3.4.2 Key Success Factors

We identified the key success factors for the electric cars market (BEV/PHEV). Within that market, we considered two basic segments of passenger cars: economic and luxury cars. Linking these segments to Tesla's offerings, in the economic segment we include Model 3 and in the luxury segment we include the other Tesla offerings (Model S and Roadster - sports cars - and Model X - large SUVs).

The table below presents the key success factors for each of the segments, based on key purchasing factors and competition factors.

Car industry segment	Key purchasing factors (value to customers)	Competition factors (competition variables)	Key success factors
Economic cars	· Price · Payment terms · Fuel efficiency · Reliability · Comfort	· Operating costs · Infotainment · Mass communication · Warranties and assistance	· Production efficiency · Value for money · Mass communication · Range/autonomy · Distribution network · Service (incl. charging network)
Luxury cars	· Affection to the brand · User experience · Quality · Status · Design	· Infotainment, digital add-ons, vehicle connectivity · Engine performance · Targeted communication · Warranties and assistance	· Production efficiency · Innovation edge · Product design · Targeted communication · Range/autonomy · Distribution network · Service (incl. charging network)

Table 16: Key Success Factors

3.4.3 Industry Value Chain

The value chain covers all the activities starting from conception of the product to final delivery to the end customers.

The value chain of the automotive industry encompasses the following primary activities:

- Inbound logistics - this is the first step of the value chain, involving the procurement of raw materials from suppliers all over the world;

- Design, engineering and manufacturing - this consists of the production phase by which raw materials are transformed into the final product; the related operations may be split into different units with different locations, and/or involve the sub-contracting of some activities, depending on each specific company; Tesla stands out for the high level of automation they brought in their GigaFactories which will ultimately give them a high competitive advantage in terms of manufacturing costs;

- Quality and warranty - this activity involves the control and monitoring of quality throughout the supply chain; it covers, in particular, the management of corrective actions to improve quality of the products and the management of the operations relating to product warranties and correction of defects;

- Connected vehicles services - this activity encompasses a new branch of services dealing with the connectivity of vehicles to other devices through the Internet, allowing for an expanded user experience and for continuous software updates;

- Marketing and sales - this part of the value chain includes distribution of the cars in the market, management of the sales force and dealer networks, advertising, promotions and management of customer relationship; there are nearly no marketing investments around the brand, besides Elon Musk who has a high reach via Twitter;

- Service - this is the final activity of the value chain, comprising post-sale customer support in the maintenance of the vehicle and in the repair of any defective or damaged parts.

The primary activities of the automotive value chain rely on a set of support activities, which include:

- Infrastructure: this comprises all the organizational structure that supports the automotive industry, including aspects such as culture, finance and other enterprise resources; the emergence of the electric vehicles' segment has led to new infrastructure components, such as the recharging networks that serve those vehicles;

- Information technology - technology plays a crucial role in the automotive industry, from the earlier steps of the value chain up to the final phase of delivery and sales; currently, it is important to, among other aspects, provide users with a complete infotainment system, including mobility data (maps, traffic information), assistance systems, device integration (mobile phone) and weather data; in the coming years, IT is expected to become a highly differential point as vehicles move into full autonomation and achieve greater levels of digitalization and connectivity; data analytics and artificial intelligence, in particular, emerge as key aspects in this new environment;

- Procurement and finance - management of procurement is a key activity to ensure a smooth and efficient production process; relationships with suppliers should be established and monitored in such a way as to reduce costs, ensure product quality and timely delivery; any issues in the supply of raw materials or production components may ultimately have a serious impact in the timely delivery of the final product and/or in the quality of the end product;

- Human resource management - last but not least, there should be an adequate management of the human capital, from recruitment to ongoing training and control of performance.

By looking into the various intervening parties and activities, the EVs automotive value chain can be represented through the following graph:

Figure 26: Industry Value Chain

4 Organizational Analysis

Every automobile company in the industry has to contend with the same environmental factors as each other, but there are some companies who consistently perform better than others. Table 16 helps to highlight some of these performance differences between Tesla and some of its direct competitors.

	VEHICLES SOLD	NUMBER OF EMPLOYEES	SALES VALUE (BILLION $)	PRICE PER VEHICLE ($)	NET INCOME (BILLION $)	NET INCOME / VEHICLE ($)	MARKET CAP (BILLION $)
TESLA	367 500[29]	48 016	19.95	54 291	-0.775	-2 109	151.90[30]
BMW	2 538 367[31]	133 778[32]	91.68	36 118	5.022	1 978	36.07[33]
AUDI	1 802 073[34]	90 783[35]	61.69	34 235	4.369	2 424	46.24[36]
PORSCHE	280 800[37]	35 429[38]	31.59	112 505	3.104	11 052	15.50[39]
JAGUAR	578 918[40]	43 224	31.94	55 179	-4.752	-8 208	3.99[41]

Table 17: Structural Performance Differences between Tesla and some Competitors

Even though all of these companies produce at least one high-end electric vehicle, we can see that their net incomes per vehicle and market capitalizations vary considerably. This difference is due to their strategic intent. To determine Tesla's strategic intent, we first need analyze the strategic fit – a cross-section of the key success factors defined previously and Tesla's core competencies.

To determine Tesla's core competencies, we need to first look at their resources and capabilities, couple them with how efficiently Tesla uses those resources and capabilities and ask ourselves what kind of competitive advantage can be gained due to these assets.

4.1 Resources and Capabilities

A company's resources are the assets that provide the foundation for the company. These resources can be human, financial, physical, or organizational.

4.1.1 Human Resources

Elon Musk[42]

Before becoming the CEO and being named a founder of Tesla, Musk had already experienced success in business. With his brother, Musk started a web software company,

[29] Annual Report Tesla Inc., 2019
[30] https://ycharts.com/companies/TSLA/market_cap
[31] https://www.bmwblog.com/2020/01/10/bmw-group-posts-record-sales-for-2019-and-remains-worlds-leading-premium-automotive-company/
[32] BMW Annual Report 2019
[33] https://ycharts.com/companies/BAMXF/market_cap
[34] https://www.best-selling-cars.com/brands/2019-full-year-global-audi-sales-worldwide/
[35] Audi Financial Report 2019
[36] https://ycharts.com/companies/AUDVF/market_cap
[37] https://www.best-selling-cars.com/global/2019-full-year-global-porsche-worldwide-sales/
[38] https://newsroom.porsche.com/en/company/annual-sustainability-report-2019/brief-overview-2019.html
[39] https://ycharts.com/companies/POAHF/market_cap
[40] Jaguar Land Rover Automotive PLC Annual Report 2018/2019
[41] https://ycharts.com/companies/TTM/market_cap
[42] Musk Image: https://www.cnet.com/roadshow/news/tesla-ceo-elon-musk-pay-salary-bonus-stock/

Zip2, which was acquired by Compaq for $307 million in cash. He then went on to co-found an online bank called X.com, which merged with PayPal creators Confinity to create the PayPal we know today, which was acquired by eBay for $1.5 billion in stock. Musk then used some of his own fortune to found Space X, and is currently the CEO and CTO of the company.[43]

Musk was originally interested in Tesla from an investment point of view, and later joined the board of directors as its chairman. He soon found himself overseeing the Roadster product design, and in 2008 was elected the CEO and product architect.

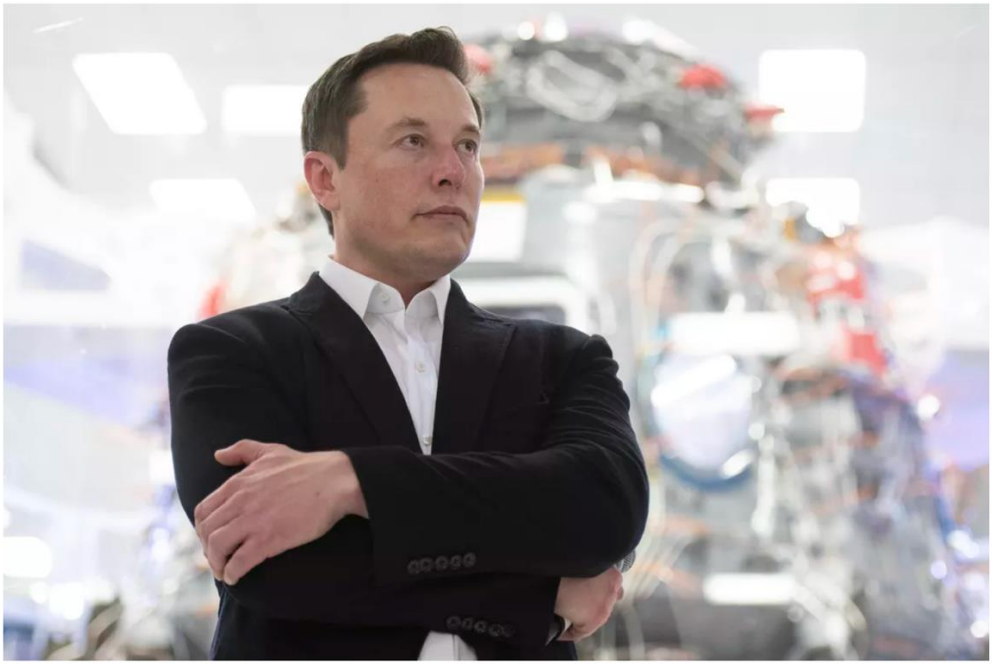
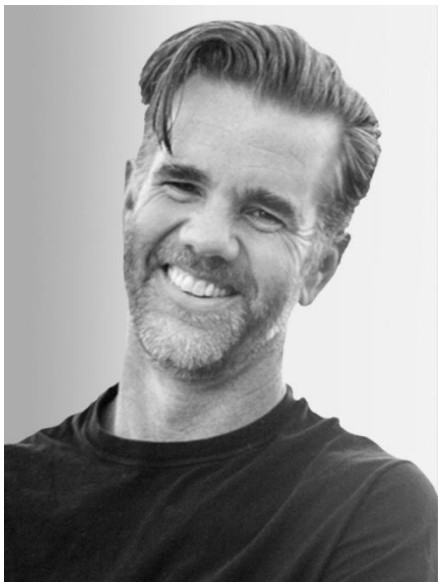


Image 4: Elon Musk

Like Apple and Steve Jobs, Tesla has become synonymous with Elon Musk. Musk has been dubbed the 'real life Tony Stark' with his reputation of invention, disrupting industries, and erratic behavior, and Tesla benefits from his ability to generate headlines. Musk has been dubbed the 'Most Inspirational Figure in Tech'[44] in the 2019 Global Brand Health Report compiled by hired.com and was ranked joint-first with Amazon's Jeff Bezos on the Forbes list of 'Most Innovative Leaders of 2019'.[45]

[43] https://www.businessinsider.com/the-rise-of-elon-musk-2016-7
[44] 2019 Global Brand Health Report compiled by hired.com, accessed via https://hired.com/page/brand-health-report
[45] https://www.forbes.com/lists/innovative-leaders/#48f76f6326aa

Franz von Holzhausen[46,47]



Before joining Tesla, von Holzhausen boasted an impressive CV having worked in car design for over 16 years. He started his career at the Volkswagen Group where he became the Assistant Chief Designer, then moved to General Motors where he was the Design Manager, and then spent some time as Director of Design at Mazda North American Operations.

Having taken the step away from the traditional automobile industry, von Holzhausen has been described as "the most influential designer of his generation"[48] and is credited with some of the radical design decisions that Tesla is known for, such as the uncluttered dashboard inside the cars. Without von Holzhausen, the Tesla we know today would look very different.

High-Skilled Employees

In order to keep up with the level of innovation desired, Tesla has focussed on hiring some of the best automotive and technology industry experts. Their list of employees ranges from electrical, mechanical, and ocivil engineers, to world-class designers, to software and security engineers, as well as supply chain experts and data analysts. There is huge competition between the companies in Silicon Valley, especially with Apple, for these experts, with Apple often coming out the victor due to their higher salaries and more stable stock options.

Despite the competition, Tesla has been growing in employee numbers[49] since its IPO as indicated in Figure 27. The large jump in employees in 2016 was from acquiring Solar City. As of 31 December 2019, Tesla had 48,016 full time employees and had issued $973 million in stock-based compensation to these employees (includes CEO and other upper management).

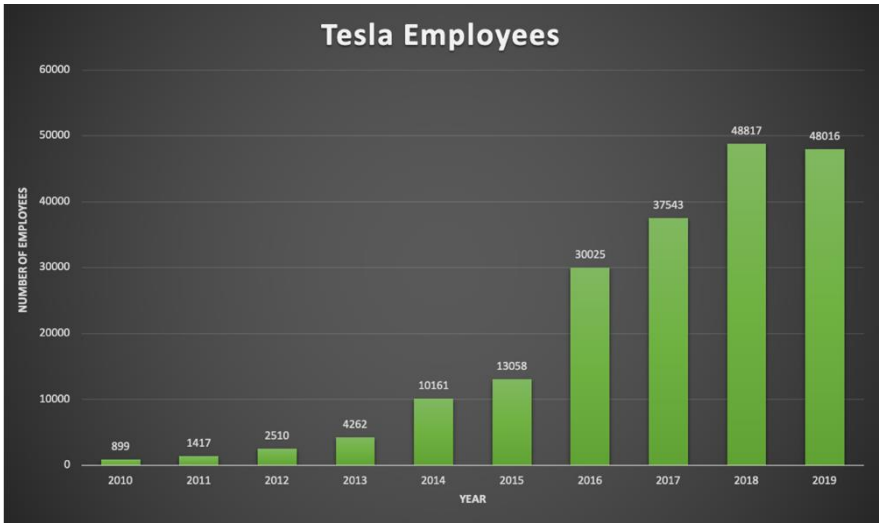


Figure 27: Tesla Employees from 2010 to 2019

[46] Von Halzhausen Image: https://br.pinterest.com/pin/35888128268781525/
[47] https://www.bloomberg.com/graphics/2018-tesla-org-chart/
[48] https://www.businessinsider.com/how-tesla-designs-cars-to-look-so-good-2017-11
[49] Annual Reports Tesla Inc., 2020, 2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011

4.1.2 Financial Resources

Stocks
Tesla's current public market equity financing is constituted solely by common stock and Tesla has reserved the right to future stock issuances. With the increasing stock price (when Musk is not on Twitter), Tesla is in a powerful position where it could issue new shares at a higher price than their IPO to raise capital. Stocks can also be used to make acquisitions or to compensate employees, therefore a higher stock price leads to less stocks being needed for these other transactions.

Despite the high volatility of Tesla stocks (with a Beta value of more than 2 against the S&P 500), once Tesla is profitable it could be inducted into the revered S&P 500 and power up to a new level of institutional buying power.[50]

Cash
According to Tesla's annual financial statements, as of December 2019 Tesla had $6 268 billion in cash and cash equivalents. This is up from $3 686 billion in 2018 and $3 368 billion in 2017. This on-hand cash is important for day to day running of the company, but also to keep the lights on if there's an emergency (like a pandemic).

Pre-order Payments from Customers (Deferred Revenues)
Tesla generally opens up sales of their latest releases before they have the capacity to meet the demand. This results in hundreds of thousands of pre-orders that need to be fulfilled in the future. For example, in 2016 Tesla experienced the "biggest one-week launch of any product ever" when the newly unveiled Model 3 received 325 000 pre-orders.[51] Each customer had to pay a $1 000 deposit, which amounted to $325 million in cash and over $14 billion in implied future sales. Over time they received approximately another 193 000 pre-orders, of which 63 000[52] were cancelled over time.

The reason why this is important is because $518 million received in pre-orders was essentially an interest-free loan from the customers of Tesla. It was also a statement from the customers to Tesla that they have trust in the company, which allows stock prices to rise, and a promise that when Tesla makes the Model 3 there will be people ready to buy it, which allows Tesla to plan for the future.

This phenomenon is common in the electric vehicle industry, and in 2019 the excitement of unveiling Tesla's Cybertruck[53] led to more than 622 000 pre-orders for the truck in less that 6 months. The deposit in this case was $100, resulting in an extra 'free' $62.2 million in cash.

4.1.3 Physical Resources

Property, Plant, and Equipment[54]
As of 31 December 2019, Tesla owns approximately $10,396,000.00 in property, plant, and equipment. Despite leasing many of its facilities - including its headquarters in Palo Alto, California; locations utilized for warehousing, engineering, retail and service location, and

[50] https://www.marketwatch.com/story/teslas-stock-could-see-new-peaks-thanks-to-these-3-catalysts-2020-05-09
[51] https://www.theverge.com/2016/4/7/11385146/tesla-model-3-preorders-375000-elon-musk
[52] https://www.vox.com/2017/8/2/16087432/tesla-model-3-electric-car-manufacture-preorder-cancellations-elon-musk
[53] https://robbreport.com/motors/cars/600000-tesla-cybertruck-preorders-2909910/
[54] Image src: Tesla website https://www.tesla.com/factory

administrative and sales offices; and supercharger sites – Tesla has chosen to own most of their manufacturing facilities.[55]

In order to sell a car you need to first make the car, and in order to make a car you need to have factories. Tesla currently has four named factories globally, and a fifth has been in planning.

Image 5: GigaFactory

Tesla's first, and largest, factory is the Fremont Factory, located in Fremont, California. This facility has a long history of building cars, having been previously owned by General Motors from 1962 to 1982 and then by Toyota's New United Motor Manufacturing from 1984 to 2009. The Fremont Factory has an overall capacity of 500,000 vehicles per year but is currently only equipped for 400,000 vehicles with plans to bring the last 100,000 capacity online in the near future. Most Model 3 and Model Y vehicles, as well as all Model X, are produced here.

Tesla also owns or leases a number of 'Gigafactories'. The Gigafactory Nevada (owned) and the Gigafactory New York (leased) are focused on Tesla's energy storage products, including the manufacturing of the battery packs and drive units that are currently used in the Model 3 and Model Y vehicles.

Gigafactory Shanghai (building owned, land leased) in Shanghai, China, has allowed Tesla to increase the affordability of its Model 3 car for customers in the local market due to reducing transportation costs and import tariffs. The factory currently has a capacity of 150,000 Model 3 vehicles per year, and there are plans to add the equivalent capacity for Model Y cars in the near future. The current bottleneck in Shanghai is the access to battery packs, which will be locally produced in the near future. Similarly to Gigafactory Shanhai, Tesla has plans to open a manufacturing plant in Berlin, Germany with production expected to start in 2021. [56,57,58]

All factories contain the tools and equipment needed in order to manufacture Tesla's vehicles and energy products.

[55] Consolidated Balance Sheet, obtained from Annual Report on Form 10-K of Tesla, Inc. for the year ended December 31, 2019
[56] https://www.tesla.com/factory
[57] https://insideevs.com/news/395889/q4-2019-tesla-production-sites-assignment-capacity/
[58] Annual Report on Form 10-K of Tesla, Inc. for the year ended December 31, 2019

Superchargers
One of the limiting factors in owning an electric vehicle is charging the battery in your car. You not only have to find a charging station, but charging your battery takes time. This is why Tesla has a growing network of superchargers. Tesla currently has 16,585 superchargers available to their customers, located in 1,870 supercharger stations globally (primarily in the United States and Canada, Western Europe, China, and Australia)[59], which can give a car 150 miles of power in a 30-minute charge.

4.1.4 Organizational/Intellectual Resources

Website
At its heart, Tesla is a tech company. This is demonstrated on their website in the form of simple user experience and a unique, sleek design. The true genius of Tesla's website is that it is the primary sales vehicle for the entire company. A consumer can, through the website, learn everything there is to know about Tesla's cars, energy solutions, and about Tesla itself, as well as order their very own Tesla with the click of a button.

Mergers and Acquisitions
While Tesla is at the forefront of innovation in the vehicle and energy sectors, they are unable to do everything and develop all the technology solely by themselves. When they come across another company that has synergy with what Tesla does, or can offer economies of scale or cost reductions, Tesla can offer to acquire or merge with that company. Since 2016, they have five acquisitions that are public knowledge: SolarCity, Grohmann Automation, Perbix, Maxwell Technologies, and Deep Scale. These acquisitions are further explored later in the report (section 8.2.)

Strategic Alliances
Similar to mergers and acquisitions, strategic alliances are created to further increase profits, decrease costs, or enable the sharing of intellectual property, without the need to acquire an or merge with another company. Three partnerships of note are with Daimler, Toyota, and Panasonic, which are expanded upon in section 8.3.

Patents
Due to the extensive research and development done by Tesla's engineers, Tesla has been able to file over 240 patents over the past few years.[60] They have patented everything from roof tile modules to driving controls for autonomous driving to trip-planning software.[61] In June 2014, Musk released a statement called 'All Our Patent Are Belong To You', which announced that Tesla's patents would become open source in a bid to encourage innovation and the advancement of the electric vehicle and energy industries.[62] The drawback of using one of Tesla's patents in your own business is that, by using the patent, you agree to not bring any action against Tesla for patent or intellectual property infringement that they might be liable for.[63]

[59] https://www.tesla.com/supercharger
[60] http://www.patentsencyclopedia.com/assignee/tesla-motors-inc/
[61] https://cleantechnica.com/2020/01/03/7-new-tesla-patents/
[62] https://www.tesla.com/blog/all-our-patent-are-belong-you
[63] https://www.lexology.com/library/detail.aspx?g=ca6c332f-2cc5-401b-b80d-36473d0754c7

4.2 Capabilities

A company's ability to exploit its resources is called its capabilities. Capabilities are often processes or routines and can fall into any category such as marketing, manufacturing, or human resource capabilities.

Futuristic Car Design
When cars are designed at Tesla[64], the first assumption is that the car needs to be beautiful - Tesla wants their drivers to be proud of their electric vehicles and to show them off. Under the capable hands of Franz von Holzhausen, major design choices were made such as replacing all knobs and buttons with a large touch screen that controls almost all the vehicle's function, keeping the interior of the car extremely minimalistic, and emphasizing natural light by having larger windows.

Vehicle Technological Innovation
Other than reigniting the development of electric vehicles in the automobile market, Tesla has questioned every assumption about the car and has worked towards making each part of their cars as efficient and high-tech as possible. Tesla combines engineering and innovation in extraordinary ways to see their version of the future come to life. The dream is to not only have a car that can drive and charge itself, but to have a car that can make an income by driving other people around when they're not in use by their owner.

Level of Vertical Integration[6566]
Many big auto manufacturers are known for outsourcing their production and assemble the final product in their factories. Tesla, known for doing the opposite, has vertically integrated both forwards - in terms of marketing, distribution, and servicing - and backwards - in terms of research and development, procurement, and operations. This level of vertical integration has created value for Tesla because it allows them to be more flexible with their decisions, and shortens the time needed to learn and improve.

Public Image Management
When you consider the history of the electric vehicle and the reasons why they have failed, it's clear why Tesla has succeeded – they made electric vehicles cool[67]. Besides just focusing on beautiful and futuristic design, Tesla used Musk's already established fame to create an appealing narrative of 'the real life Tony Stark' saving the planet. They also pulled in celebrities such as Arnold Schwarzenegger to introduce the Roadster to the world, and George Clooney, Leonardo DiCaprio, and Jeff Skoll to receive the first 100 cars.

While Tesla has opted out of traditional marketing (choosing to focus their attention on their product instead), they are active on social media where they acknowledge and address issues directly to the consumer. Their online announcements are often informal and humour-driven. Today, Tesla continues to make a show of new releases, and some have argued that the announcements of the Cybertruck and Roadster 2.0 are engineered to keep Tesla in the headlines and on top of mind, rather than to sell new types of vehicles[68]. Regardless of what

[64] https://www.forbes.com/sites/innovatorsdna/2016/08/24/teslas-innovations-are-transforming-the-auto-industry/#54edb87019f7
[65] WIRED: Teslas secret second floor (2017): https://www.wired.com/story/teslas-secret-second-floor/
[66] Magna Complete vehicle manufacturing: https://www.magna.com/products/complete-vehicles/complete-vehicle-manufacturing
[67] https://evannex.com/blogs/news/tesla-made-electric-cars-cool-and-they-re-still-the-coolest
[68] https://mondaynote.com/tesla-cybertruck-pr-or-product-e1ef51b22554

people say, there is no denying that it is the image of constant innovation that keeps Tesla in the public eye and is one of their biggest assets.[69]

Sales Process Innovation[70]

One of the biggest differences between Tesla and other car manufacturers is that Tesla can sell their cars directly to the consumer through their website. In the United States, this has been an uphill battle. When Tesla first started selling cars online, it was illegal in a number of states for a car manufacturer to sell directly to the public (due to state laws lobbied for by dealerships), but because they were so firmly set on selling cars through their website and innovating in that department, they fought it out and have succeeded in winning over in a number of those states.[71]

One benefit of selling online is that it allows for the customization of the car by the consumer. You go to Tesla's website, choose what car you want, change the outside colour, choose your interior fittings, decide if you want to install the automatic pilot system hardware, and with 5 or 6 clicks you will have the amount that you can pay immediately. There are also leasing options, which gives a lot of control over to the consumers.

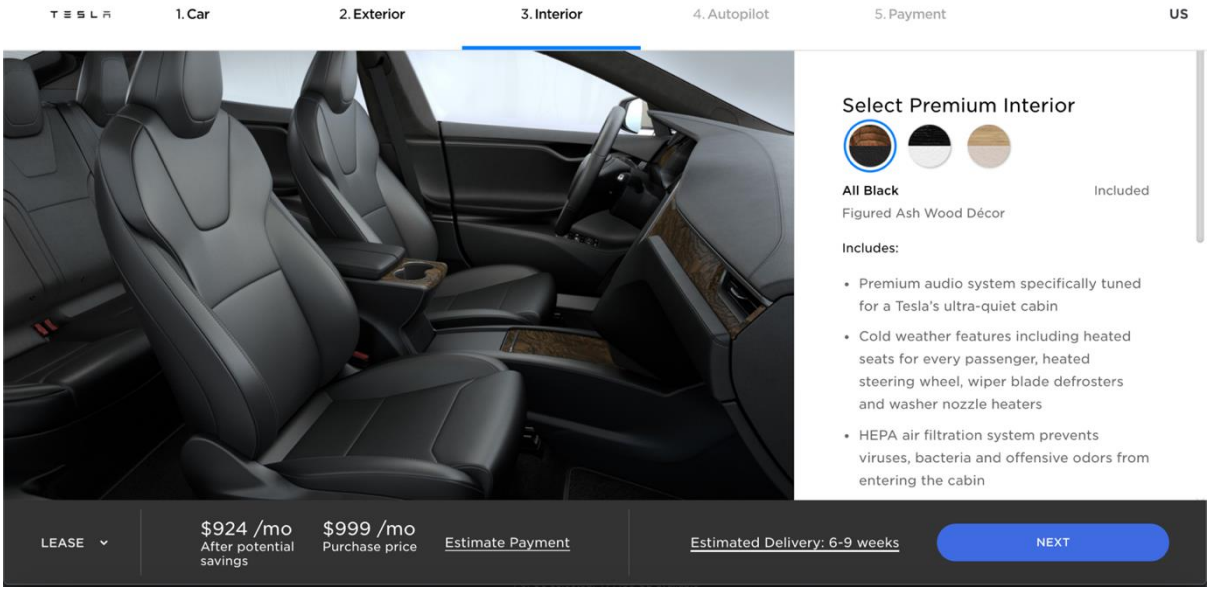


Image 6: Tesla's Online Car Configurator

Convenient Servicing

In terms of servicing[72], Tesla has successfully combined technology with convenience in a massive step away from traditional views of servicing in the automobile industry. Necessitated by the huge costs in owning and managing servicing centers, Tesla launched their 'Mobile Service Technicians' (also known affectionately as 'Tesla Rangers') who go to the consumers to service their cars, instead of asking the consumers to come to them[73]. Up to 80% of repairs can be done outside of service centers, saving Tesla money and saving the consumer time.

[69] https://brandastic.com/blog/marketing-tesla-brand-review/
[70] Image src https://www.tesla.com/models/design?redirect=no#interior
[71] https://www.thecarconnection.com/news/1092795_terrified-of-tesla-nada-launches-campaign-to-tout-benefits-of-franchise-dealerships
[72] https://www.tesla.com/service
[73] https://electrek.co/2017/03/11/tesla-mobile-service-rangers/

Tesla does still have service centers, which are called 'service plus locations' when they double as a sales center. However, even at their service centers Tesla tries to cater to the convenience of the customer by making it easy to schedule appointments through the Tesla app, provide automatic check-in, and keeping the time of the repair or service to an absolute minimum (often the time it takes to drink a coffee).[74] The key to keeping services and repairs timely is each car's on-board diagnostics, which allows Tesla to diagnose a problem and prepare for the consumer's visit before they come in. Tesla is also able to send software updates 'over-the-air', which allows their cars to constantly improve without requiring time in a service center first.

Business Model Innovation
With the invention of Uber and other car-sharing apps, Tesla has been inspired to combine their innovative technology with the new ways that consumers are thinking about their cars. As one of the leaders in the mobility revolution, Tesla is considering alternative uses for its technologies, such as robotaxis – a driverless taxi that can be summoned using an app.

Tesla uses their resources strategically to increase the attractiveness of the electric vehicles industry as a whole. The introduction of the supercharger network was a stroke of genius to encourage people to buy electric vehicles. Tesla is also dabbles in licensing its tech to other electric vehicle manufacturers, enabling a common tech platform, which allows electric vehicles to be more attractive no matter where it is being bought from. Increasing the attractiveness of the industry can lead to more people wanting an electric car, and with Tesla being the current market leader of electric vehicles, a likely increase in sales.

Brand Reputation
It can be argued that Tesla is as much a tech company as it is an automobile company[75]. It sells high-end products, is admired by critics, focusses on disrupting the automobile industry, and has a product and founder that elicit loyalty and an excited buzz. Despite generating losses and the resulting high negative price-to-earnings ratio, Tesla has seen an increased valuation in the market and is experiencing growth that is similar to other tech companies, such as Apple and Alphabet.[76]

4.3 Efficiency and Economies

When analyzing a company's resources and capabilities to determine their core competencies, it is important to also look at how efficient the company is being in terms of using those assets. We use the economies of scale, experience, and scope in order to investigate a company's efficiency.

Scale Economies
When Tesla launched the Roadster, the type of car (a sportscar) was chosen with the idea of a lack of economy of scale in mind.[77] Tesla was a start-up with very little experience and no existing processes to encourage economies of scale, and so their first product, no matter what type of car it would be, was expected to be expensive to produce and therefore expensive for the consumers to buy. The only way Tesla could be competitive is if it competed in the

[74] https://electrek.co/2018/05/21/tesla-mobile-service-request-ranger-through-app-elon-musk/
[75] https://www.investopedia.com/articles/active-trading/072115/what-makes-teslas-business-model-different.asp
[76] https://slate.com/technology/2013/05/tesla-model-s-the-electric-car-company-is-a-little-bit-apple-a-little-bit-google-and-about-to-be-huge.html
[77] https://www.investopedia.com/articles/active-trading/072115/what-makes-teslas-business-model-different.asp

sportscar category where car enthusiasts would be more likely to pay the high price of a vehicle created with very little efficiency.

Over the years and with a proven concept, Tesla has had the freedom to start focusing on mass production of their cars with the aim of creating a more affordable electric vehicle. In 2016, Musk famously revealed Tesla's master plan[78] of:

Build sports car
Use that money to build an affordable car
Use that money to build an even more affordable car
While doing above, also provide zero emission electric power generation options

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It appears that Tesla is currently on step two of the master plan, and is using economies of scale to make it happen. One way of doing this is to take a modular approach, where different components are produced as efficiently as possible and then assembled afterwards. Tesla employs this strategy of maximizing capacity when producing their Powerwall, Powerpack, and Megapack products.

Although Tesla is heavily vertically integrated, when they do purchase components from suppliers, they make sure the components are shared across product lines in order to take advantage of economies of scale and pricing efficiencies.

Experience Economies
Servicing. Due to their innovative on-board diagnostics system, Tesla receives continuous data on their vehicles, including if there are any problems. Using this remote system, they are able to diagnose and remedy problems without needing to look at the physical vehicle. Tesla also performs their own services, choosing not to outsource like many traditional automotive companies. This allows them to quickly identify problems, find solutions, and implement those solutions, and to learn faster in the process.

Production Time. Due to the learning process, Tesla was able to reduce their production time by 40% in 2013.[79] Continuing along the learning curve has allowed Tesla to increase its production capacity exponentially, and reducing the amount of time needed to assemble a vehicle is a huge part of why this has happened. Shorter production times lead to more cars being assembled in the same amount of time, which means factory and employee time is being used more efficiently.

Scope Economies
Same Factory, New Model. When General Motors owned the Fremont Factory, it had the capacity of approximately 500 000 vehicles per year. Musk believes that the Fremont Factory actually has the potential for a capacity of nearly 1 000 000 due to overlaps in components for the Model 3 and the Model Y, and there are talks of adding a new assembly line to the existing factory to manufacture the Model Y with little to no extra costs.[80]

Same Technologies, Different Product. Tesla has been adapting some component-level technologies to advance their energy storage products. Some of these technologies include

[78] https://www.tesla.com/blog/secret-tesla-motors-master-plan-just-between-you-and-me
[79] https://slate.com/technology/2013/05/tesla-model-s-the-electric-car-company-is-a-little-bit-apple-a-little-bit-google-and-about-to-be-huge.html
[80] https://electrek.co/2019/09/10/tesla-new-assembly-line-fremont-factory-model-y-production/

cooling, charge balancing, electronics management, structural durability, safety, and high density energy storage.

Making one Technology more Efficient by Coupling with Another. In order to reduce costs, Tesla has been co-locating their Superchargers with the energy storage systems that they also produce. This allows for their electric vehicles to be charged with renewable energy, and saves on electricity costs.

Strategic Partnerships. Most of Tesla's strategic alliances and acquisitions take place with the goal of reusing existing technology to make their own products better, while still enjoying the revenues those technologies bring in separately. An example of this is at Gigafactory Nevada where Tesla partnered with Panasonic to produce battery cells in an attempt to reduce the cost of their battery packs.

4.3.1 Core Competencies – VRIO

In order to determine if any capabilities give Tesla a competitive advantage, it is important to analyse them using the VRIO framework.

VRIO Framework
The VRIO Framework analyses whether a capability is a core competency by asking if it adds value for the customer, if it is rare to find in the market, if it is difficult to imitate by competitors, and if the organization is equipped to exploit that capability. Only if it meets all of these criteria is it deemed a core competency.

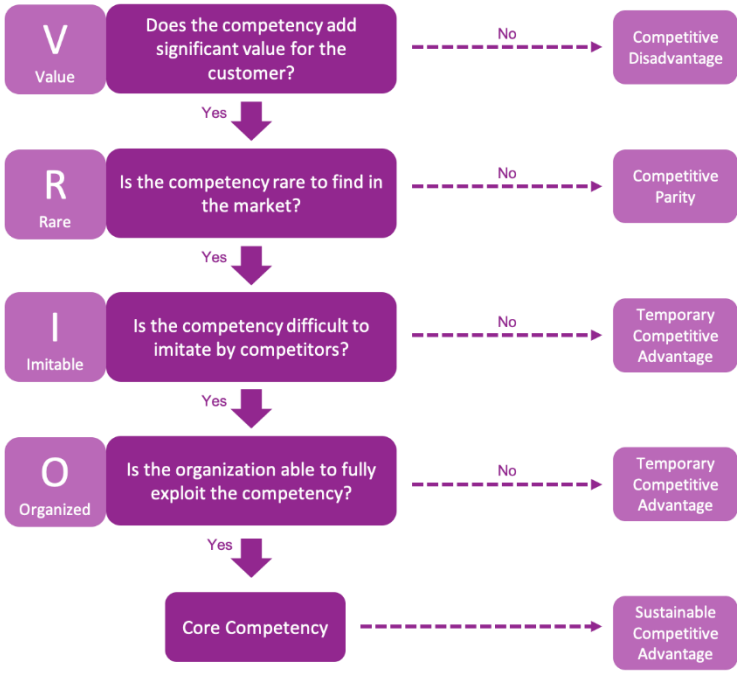


Figure 28: VRIO Framework

Using the flow diagram and the above-mentioned capabilities, we can identify five core competencies for Tesla (application of VRIO framework below):

- **Vehicle technological innovation** – Tesla's ability to reimagine and re-engineer every part of their cars allows them to not only differentiate themselves on efficiency, but to innovate the mobility industry.

- **Energy Sourcing** – Tesla is not only an automobile company; it is also an energy company, and this works as a valuable complement to the traditional car segment. Tesla's solar power segment, as well as their growing charging network, is something that is both valuable and unique to the company.

- **Convenient servicing** – While servicing is imperative for all automotive companies to offer, Tesla has creatively solved their lack of service centers problem with Tesla Rangers, creating convenience for customers and being unlikely to be imitated by rivals due to their current investments in traditional service centers.

- **Business model innovation** – Tesla isn't just looking to join the competition; they're looking to change how the competition is played. Their pushes into autopilot technology and the consequences of a driverless world keeps Tesla differentiable and the leader of the mobility revolution.

- **Brand Reputation** – Being considered a tech company gives Tesla more freedom than traditional automotive companies. Their research and development budget allow for them to make the innovative leaps that they need to be competitive in the market.

	VALUE	RARE	DIFFICULT TO IMITATE	ORGANIZED	STATUS[81]
Vehicle technological innovation	Yes	Yes	Yes	Yes	
Energy sourcing	Yes	Yes	Yes	Yes	
Convenient servicing via rangers	Yes	Yes	Yes	Yes	
Business model innovation	Yes	Yes	Yes	Yes	
Brand reputation	Yes	Yes	Yes	Yes	
Futuristic car design	Yes	Yes	No		Temporary Advantage
Sales process innovation	Yes	Yes	No		Temporary Advantage
Level of vertical integration	Yes	No			Competitive Parity
Licencing tech	Yes	No			Competitive Parity
Public image management	Yes	No			Competitive Parity

Table 18. VRIO Framework to determine Core Competencies

[81] Image src: https://cleantechnica.com/2019/06/13/elon-musk-at-e3-fallout-shelter-netflix-youtube-coming-to-tesla-much-more/

4.4 Strategy

4.4.1 Strategic Fit

Having defined Tesla's core competencies as well as the industry's key success factors, we can now perform an analysis of the company's strategic fit in the EVs market.

Below we analyze both the economic and luxury segments of that market. It should be cautioned, however, that most of Tesla's models are located in the luxury segment. In any case, Tesla's most produced and sold model – Model 3 – is somehow located midway through the economic and the luxury segments. Moreover, Tesla is expected to develop low-cost, high-volume offerings once it enters the phase 3 of its Master Plan. Therefore, it is worth taking a look at both segments, as the company is likely to achieve a wider coverage of the market by capturing lower customer segments in the social pyramid.

Luxury cars

	KEY SUCCESS FACTORS						
CORE COMPETENCIES	Production efficiency	Innovation edge	Product design	Targeted communication	Range/ autonomy	Distribution	Service
Vehicle tech innovation	3	5	5	4	5	-	4
Energy sourcing	4	4,5	-	-	5	-	-
Convenient servicing	-	3,5	-	-	5	-	5
Business model innovation	3,5	4,5	3,5	4	5	4	4
Brand reputation	-	5	-	5	-	4	-
Strategic fit (average: 4,27)	**3,5**	**4,5**	**4,25**	**4,33**	**5**	**4**	**4,33**

Table 19: Luxury Segment Analysis

Economic cars

	KEY SUCCESS FACTORS					
CORE COMPETENCIES	Production efficiency	Value for money	Mass communication	Range/ autonomy	Distribution	Service
Vehicle tech innovation	3	2	-	5	-	4
Energy sourcing	4	4	-	5	.	.
Convenient servicing	-	4	-	5	-	5
Business model innovation	3,5	3	-	5	4	4
Brand reputation	-	-	3	-	4	-
Strategic fit (average: 3,85)	**3,5**	**3,25**	**3**	**5**	**4**	**4,33**

Table 20: Economic Cars Segment Analysis

4.4.2 Strategic Intent

From the strategic fit analysis, it can be noticed that Tesla is particularly strong in factors relating to car innovation and vehicle range/ autonomy. In fact, Tesla has been leading new technological breakthroughs relating to vehicles' in-car software, connectivity and autonomous driving. Moreover, it avails itself of cutting-edge battery technology and has been spreading out a supercharger network to support its vehicles' use and recharging.

Conversely, Tesla's strategic fit is dragged down by weaknesses in the production efficiency and distribution/service factors. In particular, Tesla has been met with difficulties in delivering vehicles on time and in meeting the increasing demand for its cars. Likewise, the company still needs to improve its servicing networks and capabilities in order to ensure prompt assistance to customers whenever the arising issues cannot simply be solved through over-the-air updates.

Lastly, with regards to the economic cars segment, Tesla would still need to improve its cars' affordability as well as invest in new mass communication strategies apart from general word-of-mouth in order to create more brand awareness amongst customers of that segment.

4.4.3 New SWOT Analysis

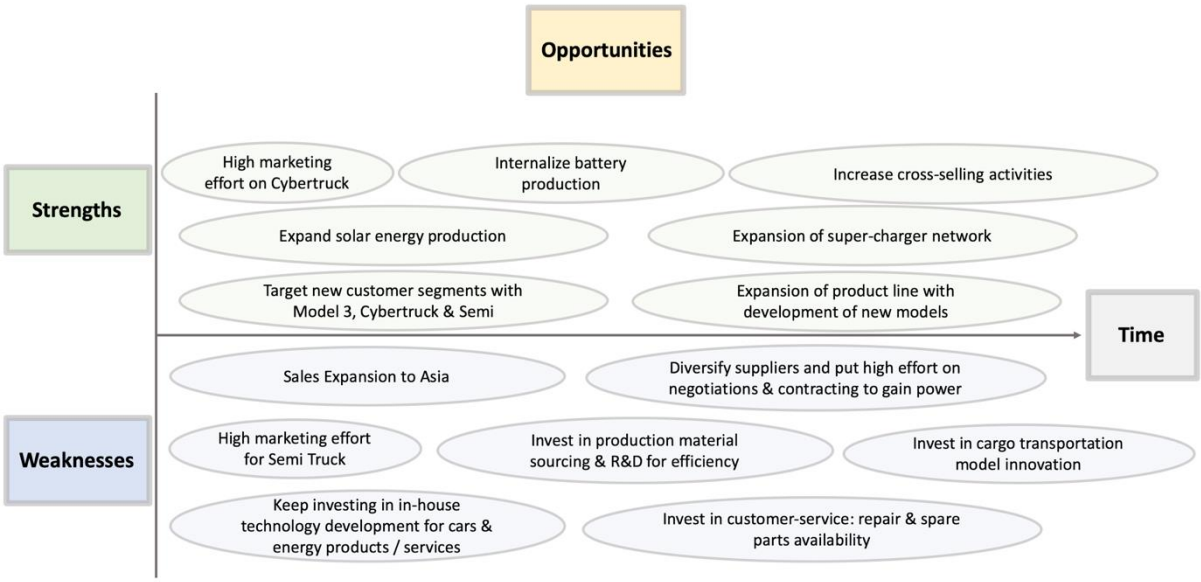


Figure 29: New Swot Analysis

	Opportunities and Time	
	Short-Medium Term Opportunities	**Medium-Long Term Opportunities**
	1. **Increased competition** in Electric Vehicles market both for passenger and cargo as well as B2C and B2B 2. **Limited global market presence** and product availability 3. **Increased availability** of diversified models in the market	1. **Competition** in EV segment from all major car producers such as Volkswagen, BMW, etc. 2. **Production capacities** will be key for medium-long term establishment in new and growing markets (e.g. developing countries) 3. **Density of charging station networks** will be key to global presene of electric mobility
Strengths 1. **First Mover Advantage:** front-runner of electric mobility, e.g. first fully electric cargo truck 2. **Increasing no. of vehicle sales:** from 2.600 deliveries in 2012 to 367.500 in 2019 3. **Increasing market position:** 1% global market share from passenger car revenues in 2019 4. **Top Employer:** Diversity & Innovation-Engaging Culture 5. **Expertise in innovation:** Best-in-class electric vehicles (Models S, 3 and X with highest range) 6. **Brand recognition:** Reach & perception of leader in electric mobility 7. **Fully integrated:** Vehicles, Charging Stations, Energy Production, Supply & Storage **8. Cross-selling:** e.g. Insurance program "InsuremyTesla" with Liberty Mutual insurance	1. **Target new customer segments with recently launched and upcoming models:** Recently launched Model 3 for lower-income customers, and upcoming Cybertruck & Semi for cargo transportation businesses 2. **Internalize battery production** to have the technology as an asset and expand on it for the vehicle production as well as the own energy supply & storage 3. **Expand solar energy production** market by increasing sourcing & marketing efforts, e.g. buying another smaller company in the field **4. Put high marketing effort on Cybertruck distribution in the US:** 17,6% of total car sales in the US automotive market are made up by Pickup trucks	1. **Expansion of Product-Line:** Create, design & Innovate to produce and distribute new models to serve low-income customers as well as cargo transportation customers 2. **Increase cross-selling activities:** also for supercharger-networks, solar panel distribution to Tesla-customers as well as the batteries 3. **Expansion of super charger networks** to other countries and increase of density in the US, partnering with / acquiring of other operators of such networks
Weaknesses 1. **Limited customer segments:** due to expensive pricetags & models for passengers exclusively 2. **History of losses:** Tesla had no profitable year til today 3. **Innovation risk:** e.g. problems in production with mechanical complications 4. **History of overpromises & under-delivering:** e.g. Cybertruck falsly declared "unbreakable" 5. **Lack of quality in customer service:** customers satisfaction with Tesla is on a low 6. **No cargo transportation:** models are desgined exclusively for passenger transportation 7. **Lack of High-Volume production:** Issues with production costs, space and resources 8. **Battery shortage:** limited supply lead to production rate decrease	1. Sales Expansion into untapped markets, especially Asia with existing models 2. Put high marketing effort for Semi Truck for cargo transportation to conquer a small share of that market segment 3. Keep investing in in-house technology for product-line and product-breadth expansion as well as new business development in the energy sector 4. Invest in sourcing as well as in R&D on resources in order to become expert in the supply chain + reducing production costs or keeping them on the same level	1. Get more market power in the supply chain by diversifying suppliers even more and contracting with financial options counter highly volatile resources needed for production 2. Optimize distribution network for customer services by investing into repair services and sparepart availability in/around Tesla distribution centers 3. Continuously distribute the Semi Truck and innovate to expand in the cargo transportation segment and get a significant market share

Table 21: New SWOT Analysis

4.5 Classification of the Business

Tesla is predominantly an automotive manufacturing company. Its core activity consists of the design, development, manufacturing, sale and lease of automotive vehicles, especially of electric vehicles.

Besides manufacturing and marketing its own vehicles, Tesla has also been supplying auto parts to other auto manufacturers, namely powertrain systems and components. Nonetheless, Tesla qualifies as an OEM (original equipment manufacturer), producing its own electric vehicles and selling (or leasing) them to end customers.

Just like many of the other automakers, Tesla has been rendering financial services in the context of its automotive retail offerings, namely in the form of lease or other credit schemes for the acquisition of the vehicles.

Apart from the activities in the automotive sector, Tesla has been developing energy generation and storage solutions for residential clients as well as commercial and industrial businesses and utilities. The energy storage solutions include the Powerwall, Powerpack and Megapack products. Moreover, following the acquisition of SolarCity in 2016, Tesla has been complementing these offerings with solar generation solutions, including solar panels and the Solar Roof (roofing tiles that are capable of converting sunlight into electricity).

Through this business expansion, Tesla features itself as “the world’s first vertically integrated sustainable energy company, offering end-to-end clean energy products, including generation, storage and consumption” (page 1 of 2019 Form 10-K).

In any case, in our analysis we will essentially be framing Tesla as an automotive manufacturing company, given that this is by far the most representative segment in the company’s financials at this date. Nevertheless, we shall bear in mind that the company has been developing additional energy products that can make up for a valuable complement to the automotive segment and improve the company’s overall sustainability.

4.6 Tesla’s Sustainability Impact

Tesla is proud to call itself “the vanguard of the world’s inevitable shift towards a sustainable energy platform.” and is also in public constantly evaluated by its visible actions for fulfilling the promises made. Besides Tesla’s environmental impact, following table gives an overview about Tesla’s activities to promote sustainable business practices followed by representative examples:[82]

[82] Sources:
https://www.businessinsider.com/million-mile-battery-tesla-miles-lifetime-2019-11
https://www.tesla.com/ns_videos/tesla-impact-report-2019.pdf
https://electrek.co/2019/04/16/tesla-battery-recycling-system/
Tesla Annual Report 2019
https://www.statista.com/topics/2086/tesla/

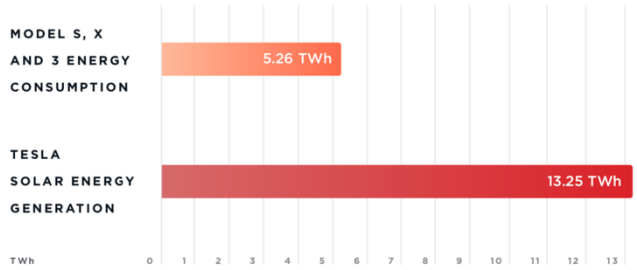
Economic Sustainability		Environmental Sustainability	
Economic and financial results	• No profitability overall but sufficient y-o-y growth to indicate future profitability • Profitable business segments based on net margin but reinvestments are used for rapid growth	**Savings and efficiency in the use of natural resources**	• Investment in research and development for the development of a 1 million mile battery provided results that potentially changes lifetime of existing batteries: resources will probably be safed (status end of 2019) • EVs provide savings on use of fuels for combustion engines • Reduced water consumption due to solar energy production
Remuneration of shareholders and employees	• Overall fair salaries for employees	**Emissions reduction and adoption of renewable energies**	• Provision of EVs + Commitment of working for a sustainable energy future • Contribution to reduce the environmental impacts of transportation, electricity production and energy use • Selling and usage of scalable clean energy generation and storage products • Provision and operation of charging stations for EVs
Regular renewal of equipment and software	• High-end equipment in factories and cutting edge technologies in place with frequent renewal and updates as well as partly company internal development	**Prevention of air, land and water pollution**	• Guidelines for all employees from front to backend for sustainable business practices • Production sites and processes are constructed and constantly improved to enable sustainable production • Guidelines for all employees from front to backend for environmental business practices
Investment in new products and services	• Investments in other business models such as a energy parks or product distribution for solar energy production • Lengthening of product lines	**Recycling and reuse of materials and products**	• Tesla has invested and continues to invest in company internal battery recycling programs in cooperation with third parties • Tesla launched their project to have their own battery recycling system in the near future • Tesla implements various recycling measures at their sites for recycling e.g. Wood used in the process (in some factories with a recycling quote of 100%) as well as for the scrap
Social Sustainability		**Governance Sustainability**	
Protection of employees' physical health	• Global Environmental, Health and Safety (EHS) strategy in place with team to monitor it • Low level of injuries in the factories	**Compliance with local and international laws**	• Code of Business Conduct and Ethics and our Corporate Governance Guidelines to meet local and international laws • Board with procedures to monitor, audit and implement compliance
Privacy of employee data	• The company keeps information reported by employees in confidence. • committed to maintaining an open and transparent culture where it is safe and acceptable for all employees to raise concerns about policy violations by their manager	**Absence of corruption, bribery and fraud practices**	• Ensuring of low level of corruption, bribery and fraud practices by training personnel on other corporate governance policies, such as our Worldwide Bribery & Anti-Corruption Policy
		Promoting employee diversity	• Policy and principles to hire employees, "regardless of race, color, religion, sex, sexual orientation, age, national origin, disability, protected veteran status, gender expression or gender identity, and any other protected status under applicable law"
Community development	• Partnership with local high schools, universities and nonprofits for the education of the yourh	**Transparency and supervision of the directive structure**	• Board and Management staff is known, corporate structure is public and changes are made public upon occasion
		Ethical relationship with suppliers and partners	• strive to have a diverse supply chain and provide the maximum practical opportunities to provide goods and services as a part of the corporate procurement process. • use of diverse suppliers is an integral part of Tesla's purchasing plans

Table 22: Sustainability at Tesla

Emission savings by EVs in comparison to ICE vehicles
As of data from 2018: >550K Tesla vehicles have been sold which had driven over 10bn miles back then. That resulted in a combined savings of over 4mio. metric tons of CO2, which is the equivalent of saving emissions from being released into the environment from over 500.000 ICE vehicles with a fuel economy of 22 miles per gallon.

Tesla's Supercharger Network
As of data from 2018 Tesla's supercharger network had delivered over 595 Gigawatt- hours of energy, saving the equivalent of over 75mio gallons of gasoline, which is enough gasoline for the average ICE vehicle with a fuel economy of 22 miles per gallon to travel round trip from Los Angeles to New York City over 290.000 times.

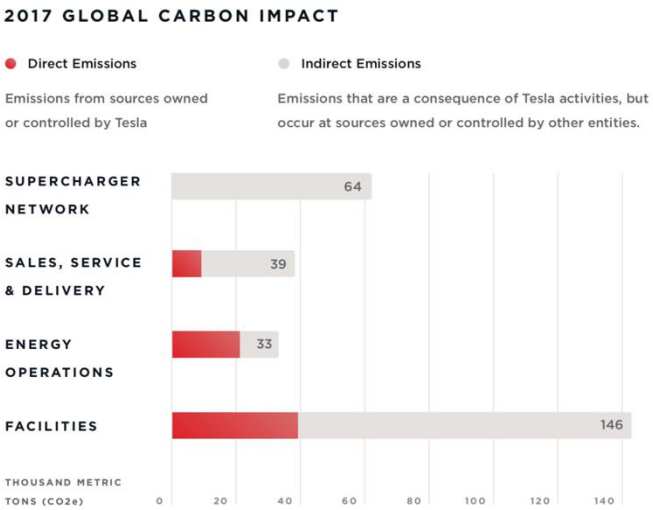
Solar Installations
As of February 2019, Tesla Energy has installed over 3.5 Gigawatts of solar installations and has cumulatively generated over 13 Terawatt- hours of clean, emissions-free electricity. This amount of energy could supply the annual residential electricity consumption for the entire state of Connecticut. Over their entire expected use life of more than 35 years, these solar installations are expected to generate 86.5 Terawatt- hours of energy, enough electricity to power all of Washington D.C. for nearly a decade.



Looking at Tesla's energy generation in comparison to the Model S, X and 3 energy consumption as of 2018 we can see that it has far exceeded the amount of energy the entire Tesla vehicle fleet on the road has consumed.

Figure 30: Tesla Energy Generation vs. Consumption

Furthermore, power generation is one of the leading causes of water withdrawal in the U.S., e.g. for steam-driven turbine generators and also for equipment cooling, Tesla's solar energy production not only lowers CO2 emissions but also water consumption.



Global carbon impact in operating activities
Besides the products, Tesla also spans its efforts to reduce its carbon footprint among their operating activities and measures its global carbon impact in its efforts to become a net zero company.

Figure 31: Global Carbon Impact 2017

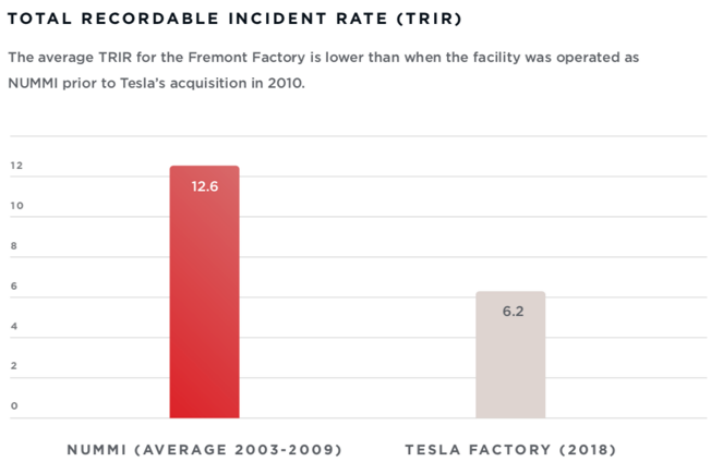
4.6.2 Examples for Social Sustainability

Contribution to air quality
Harmful air pollutants, such as particulate matter, ozone, nitrogen dioxide and sulfur dioxide, are estimated by the World Health Organization to cause over 7mio premature deaths around the globe per year. Tesla's contribution to reduce the use of fossil fuels for decreases the risk of cardiovascular and respiratory disease and stroke in developed and undeveloped countries.

Safety for consumers
Tesla's EVS have an improved frontal impact safety because of the front trunk, which is an entire crumple zone since there is no gasoline engine block. This improves impact absorption in a crash.

Society & Education
Tesla partners with local high schools, universities and nonprofits to accelerate the world's transition to sustainable energy and address the growing demand for science, technology, engineering and mathematics (STEM) jobs.

Employees: Safety & Diversity



Tesla constantly puts effort on improving safety for its employees at work and thereby achieving higher results as traditional manufacturer get as can be seen in the decrease of the TRIR by about a half after takeover by Tesla. In addition are Tesla's factories highly automated, which reduces the level of risk even further.

Figure 32: Total Recordable Incident Rate (TRIR)

Furthermore a good example on how Tesla embraces diversity amongst its employees is the achievement of the full 100 score-points for 5 years in a row from the Human Rights Campaign's Corporate Equality Index, the national benchmarking tool on corporate policies and practices pertinent to lesbian, gay, bisexual, transgender and queer employees, and has been named in the "Best Places to Work for LGBTQ Equality" from the Human Rights Campaign.

Tesla announced that it thrives to hire people regardless of race, color, religion, sex, sexual orientation, age, national origin, disability, protected veteran status, gender expression or gender identity, and any other protected status under applicable law.

Supply Chain Responsibility
Tesla is committed to exclusively source responsibly produced materials and established "The Tesla Supplier Code of Conduct" and a "Human Rights and Conflict Minerals Policy".

Tier 1 suppliers have to register and complete the domestic and international material compliance requirements in the International Material Data System (IMDS) to meet EU and other international material and environmental related regulations. This is obligatory for all

suppliers in the production-parts approval process. Tesla, with partners and independent third parties, conducts audits to observe these principles in action. On a basis of reasonable believe of violation of the Code, Tesla will transition away from that relationship unless the violation is cured in a satisfactory manner.

Furthermore, Tesla has a zero-tolerance policy towards human rights abuses in their supply chain. A lot of products like most electronics contain minerals such as tin, tungsten, tantalum and gold, also known as “3TG”. These minerals can be found over the globe, but also exist in the Democratic Republic of Congo (DRC) and surrounding areas. To cope with local practices, Tesla put a “Human Rights and Conflict Minerals Policy” in place to make sure that Tesla's products do not finance or benefit armed groups through mining or mineral trading, directly or indirectly.

4.6.3 Examples for Governance Sustainability

Board of Directors
At Tesla, the Board of Directors sets standards for the employees, officers and directors and Tesla is committed to establish an operating framework that exercises appropriate oversight of responsibilities at all levels throughout the company and manages its affairs consistent with high principles of business ethics, represented in the Code of Business Conduct and Ethics and the Corporate Governance Guidelines, besides others.

Bribery & Anti-Corruption
Tesla trains its staff on corporate governance policies, such as its Worldwide Bribery & Anti-Corruption Policy, which essentially contains: “Don’t offer any bribe to anybody, anytime, for any reason (and when in doubt, please consult with the General Counsel or the Legal Department).” Tesla further maintains the US Office of Foreign Assets Control compliance policy, which helps Tesla to make sure it doesn’t participate in transactions with sanctioned countries, legal entities or individuals such as terrorists.

Whistleblower Hotline
Tesla maintains a hotline through which employees can report concerns at any time. Information is taken in confidence and policies prohibit retaliatory actions against employees for raising concerns.

Besides having looked at environmental, social and governance sustainability, economic sustainability can be seen in the following chapters about value creation.

4.7 Value Creation for Customers

Current Customers
Tesla, being in its growth phase, has gained more and more customers as time goes on. Their biggest bottleneck in gaining new customers is their own production capacity. Due to the excitement behind the release of each Model, Tesla receives thousands of pre-orders that they may not be able to serve, and so customers herein are defined as people who have had their orders fulfilled and have had their car delivered.

From Table 23, it is clear that Tesla’s worldwide growth in customers has been exponential, reaching a record high in 2019 of 734,772 cars delivered worldwide, with 195,125 of those cars being delivered in the United States. The first quarter of 2020 saw the production of 102,672 cars and a good start to the year delivering 88,496 vehicles to new customers around the world.

	WORLDWIDE MODEL S	WORLDWIDE MODEL X	WORLDWIDE MODEL 3 + Y	WORLDWIDE TOTAL	US TOTAL[83]
2013	22 442[84]	-	-	22 442	
2014	31 655	-	-	31 655	
2015	50 446	212	-	50 658	18 742
2016	50 931	25 312	-	76 243	26 725
2017	54 715	46 535	1 764	103 014	50 067
2018	50 630	48 680	146 046	245 356	197 517
2019	66 683	300 703	367 386	734 772	195 125
TOTAL	327 502	421 442	515 196	1 264 140	488 176

Table 23: Tesla car deliveries from 2013 to 2019

So, who are Tesla's customers?[85] In 2016, before the release of Model 3, Tesla customers tended to be older (50+ years old) Asian males who earned an annual income of more than $100,000 and owned their own home. The release of the Model 3 had changed these demographics, which now tends to a slightly younger (35-44 years old) male who has an annual income of between $50,000 and $100,000 and is less likely to own his own home. As the Tesla becomes more accessible, the more their customer base diversifies. Table 24 is a summary of a study done by Hedges & Company, which corroborates the above customer identification.

	AVERAGE INCOME	MEDIAN AGE	GENDER MALE	GENDER FEMALE	HOME OWNERSHIP
MODEL X[86]	$143 177.00	52	71%	29%	88%
MODEL S	$153 313.00	54	77%	23%	88%
MODEL 3[87]	$128 140.00	46	84%	16%	56%
USA	$61 372.00*	38	49%	51%	64%

Table 24: Demographics about current Tesla car owners

[83] https://www.goodcarbadcar.net/tesla-us-sales-figures/

[84] Tesla Quarterly Updates from 2013 to 2019, accessed via https://ir.tesla.com/financial-information/quarterly-results

[85] https://www.quantcast.com/blog/tesla-model-3-%E2%80%92-an-electric-car-for-the-masses-or-still-the-select-few/

[86] https://hedgescompany.com/blog/2018/11/tesla-owner-demographics/

[87] https://hedgescompany.com/blog/2019/03/tesla-model-3-demographics-income/

For the value creation for customers 3 phases are looked at: Pre-, During and After Purchase. The following table shows the most relevant aspects.[88]

Pre-Purchase	Journey	Number of customer contact points until the purchase is made	1. Potential customers come to company owned stores and service centers 2. Customers get the model presentation on site 3. Customers order their model through an online-sales-system on the Tesla Website
	Interaction	Number of direct interactions with customers until the purchase is made	Interaction is done on site with a number of times depending on the customers' needs
During Purchase	Products and Services	Evolution of the amount of products/services sold to customers	1 mio cars sold in March 2020 to Tesla customers
	Prices	Evolution of the average price of products/services sold to customers	From 2012 with Model S now starting at $80k Tesla initially stayed in the high price segment with Model X starting at $84k, then moved towards lower starting prices with Model 3 ($40k) and Model Y ($53k)
	Satisfaction	Evolution of the level of customer satisfaction with the consumption of products/services	2020: Tesla customers are more satisfied than those of any other auto brand for the 3rd consecutive year, according to Consumer Reports, ranked by Owner satisfaction (89 / 100 points based on driving experience, value, comfort, styling, audio and climate systems)
	Support	Evolution of the number of likes and followers on the company's social networks	Tesla's Twitter Follower grew from about 4,3mio users in end october 2019 to 5,1mio users in mid April 2020
After Purchase	Complaints	Evolution of customer problems and complaints	A "Bernstein" survey from 2018 showed that only 42% of customers described their service center experience as “excellent,” vs. 57% in the previous survey due to growing wait times for appointments, and with poorer rates of problem resolution
	Retention	Evolution of the retention rate in number and sales of existing customers	A 2019 study by EXPERIAN revealed that with about 4/5 (80,5%) Tesla has the highest customer loyalty ranking of all auto manufacturers.
	Acquisition	Evolution of the acquisition rate in sales to customers	From 2008 to 2019 the revenue from automotive sales grew from about $14,7mio to about $20bn. Automotive leasing revenues grew from about $132mio in 2014 to about $870mio in 2019. Car sales increased in 2019 by 50% compared to 2018.
	Brand	Evolution of the company's brand valuation	Tesla became the most valuable US car maker ever in 2020 with market value of $86.5 billion as of January 2020, having gone through a 160% since June 2019.

Table 25: Tesla Value Creation

[88] https://www.businessinsider.com/tesla-tops-consumer-reports-owner-satisfaction-list-2019-2
https://cleantechnica.com/2019/01/09/tesla-has-the-highest-customer-loyalty-of-all-car-brands/
https://www.socialbakers.com/statistics/twitter/profiles/detail/13298072-tesla
https://edition.cnn.com/2020/01/10/investing/tesla-market-value/index.html
Annual Report 2019
https://www.cnbc.com/2019/03/11/teslas-biggest-problem-is-customer-service-new-bernstein-survey.html
https://www.tesla.com/blog/tesla-approach-distributing-and-servicing-cars
www.tesla.com

4.8 Value Creation for Shareholders

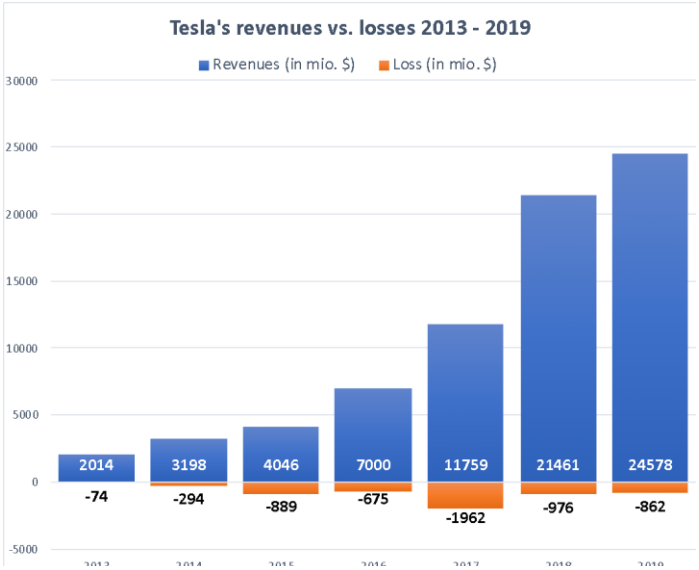


Figure 33: Tesla Revenues vs. Losses

While Tesla was able to increase its revenue by a dozen times from 2014 to 2019, it had to account losses ever since. Tesla's highest loss was recorded in 2017 with nearly $2bn. Tesla's cumulated loss in the same period sums up to about $ 5,73bn in contrast to a cumulated revenue of about $74bn which leads to a total loss/revenue ratio of about 8%.

Tesla, generating its revenues mainly via its automobile distribution, was able to generate a positive net profit from its 2 main revenue sources – automobile sales and automobile leasing – as can be seen in the to graphs below:

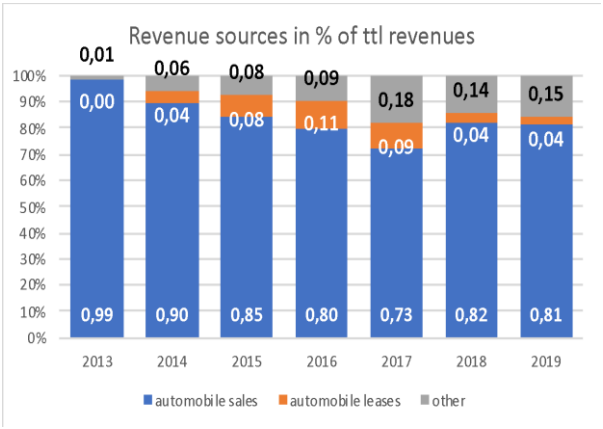


Figure 35: Revenue sources

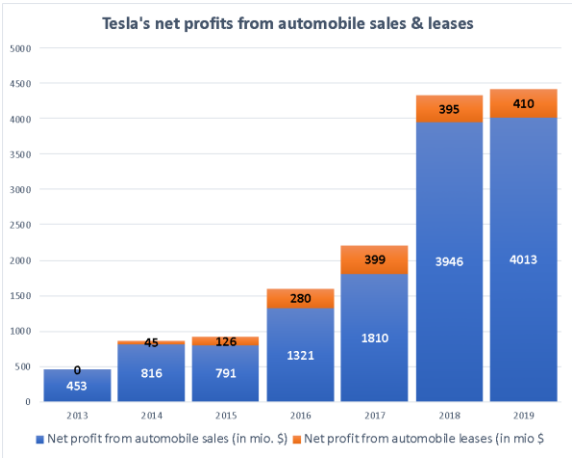


Figure 34: Net Profits from sales & leases

While Tesla has never paid or declared any dividends on the common stock Tesla was able to dramatically increase its market value by creating an average annual return on a stock of 36,81%[89] looking at the time between its initial public offering on 29.06.2010 to 08.04.2020.

As Tesla points out in their investor's FAQ, "*Tesla has never declared dividends on [its] common stock [and intends] on retaining all future earnings to finance future growth and therefore, [does] not anticipate paying any cash dividends in the foreseeable future.*"[90]
That Tesla holds true to that can be seen in their spending on research and development in the graph below:

[89] Calculation: Annual Return = 100 * (($548,84/$23,89)^1/10-1). → $548,84 = Selling price of 1 share on 08.04.2020; $23,89 = Purchase price of 1 share at IPO-date 29.06.2010.
[90] https://ir.tesla.com/investor-faqs

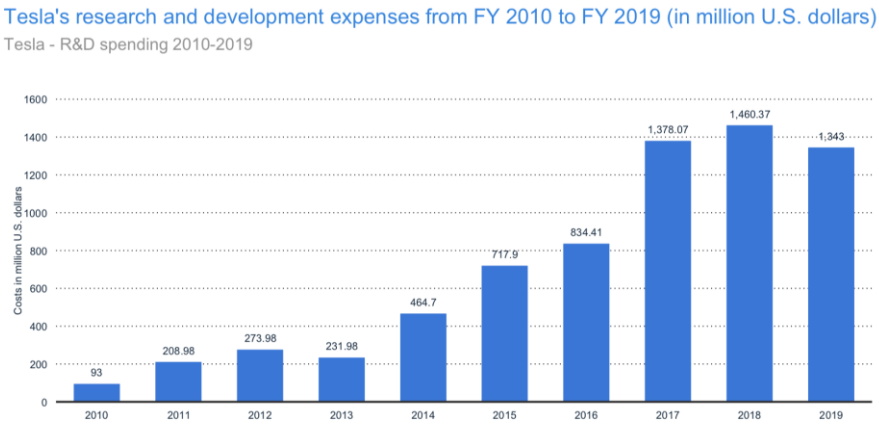


Figure 36: Tesla's R&D Expenses

4.9 Value Creation Aggregate Indicator

For the value creation aggregate indicator this report takes a look at Tesla's total company results.

	Tesla Total
Sales (in millions)	24,578
Growth	24%
Margin	4%
Risk	82%
Time	5
Value (in millions)	**3,179**
Value for customers (in millions)	71,820
Value for shareholders	0.04

Table 26: Value creation aggregate indicator Tesla (2015-2025)

The value creation aggregate indicator shows us, that Tesla creates a huge value for the customers (71,820 million) compared to an incredibly small value created for shareholders (0,04). This is due to the high risk shareholders are facing by holding stock from Tesla. Based on this Analysis, we wouldn't expect such a high valuation, that just had another peak in 2020, outnumbering GM and Ford together.

5 Mission, Objectives, Strategy and Products-Markets

5.1 Vision and Mission

Since its creation in 2003, Tesla's **mission** was initially **to create** but now it is to **accelerate the world's transition to sustainable energy**. Tesla has focused its strategy to develop high-performance Electric Vehicles that are not only the world's best and highest-selling pure electric vehicles but also the safest and most evolutive cars driven in the world. Starting with a unique roadster model, since 2011 Tesla conquered the premium EV category globally with its model 'Model S' sedan and later Model X sports utility vehicle. Lately, Tesla also entered the small premium category with Model 3, which will truly propel electric vehicles into the mainstream.

In addition, with the opening of the Gigafactory and the acquisition of SolarCity, Tesla now offers a full suite of energy products that incorporates solar, storage, and grid services. As the **world's only fully integrated sustainable energy company**.

Tesla **Vision** is to **be the leader in EV Technology, "second place should need a telescope to see us"** said Elon Musk in 2014. To achieve that vision, Tesla ambition is to grow vehicle, production and customer support with a unique set of values summarized in their culture statement:

---

move fast, do the impossible constantly innovate, reason from "first principles", think like owners, we are ALL IN

To materialize the vision, the company has put relentless focus on differentiation around three key pillars

#1 Master product development and innovation for EV

- Leadership on range to achieve maximum miles per single charge and free long distant driving with EV.
- Leadership battery cost: battery pack cost in $/kWh
- Focus on innovation and proprietary technology for battery module, Power electronics and motor
- Partnership with Panasonic (automotive cell), Daimler (battery packs/chargers) and Toyota (full drive train for RAV 4)

Image 7: Drivetrain

#2 Lead manufacturing of Electric Vehicles

- First production platform for EV with blend of vehicle design (aerodynamic, trunk in front, low center of gravity) and EV technology (electric powertrain, quick charge capacity, aluminum body, connectivity) to drive better performance (300miles autonomy, fun to drive, acceleration)
- Unique design inspired by the endurance athlete, blend of aerodynamics and beautiful design, incredible interior utility and cargo space.
- In house engineering creating all aluminum chassis construction, lightweight, low center if gravity, safety 5 star
- Powertrain engineering Integration to build a system that is greater than the sum of its parts and highly scalable, superior cost dynamic and trade secret methodology

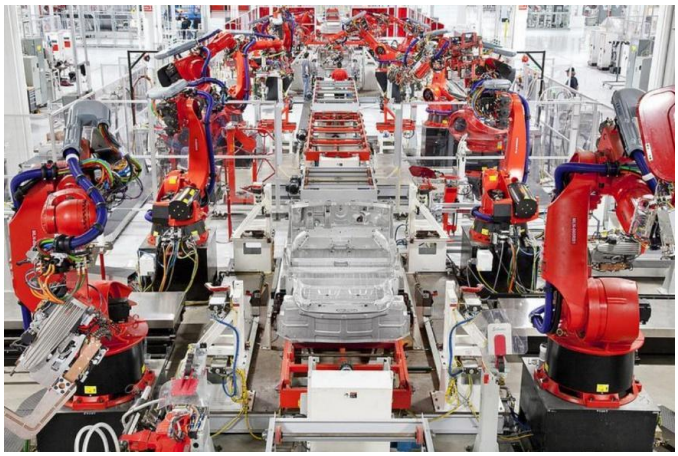


Image 8: Photo inside Tesla GigaFactory

#3 Transforming the customer experience with the best technology integration

- Reinventing sales with their own distribution centers
- Distribution and marketing combined and controlled
- Superior customer experience, streamlined purchase process online, capture retail mark-up and more efficient
- Reinventing Service: best is NO SERVICE with valet loaner service, ranger remote service, no scheduled maintenance
- Constant evolution of the product with unique software engineering with advanced software for battery management, motor control, diagnostic, touchscreen and traction and stability control = customizable and upgradable

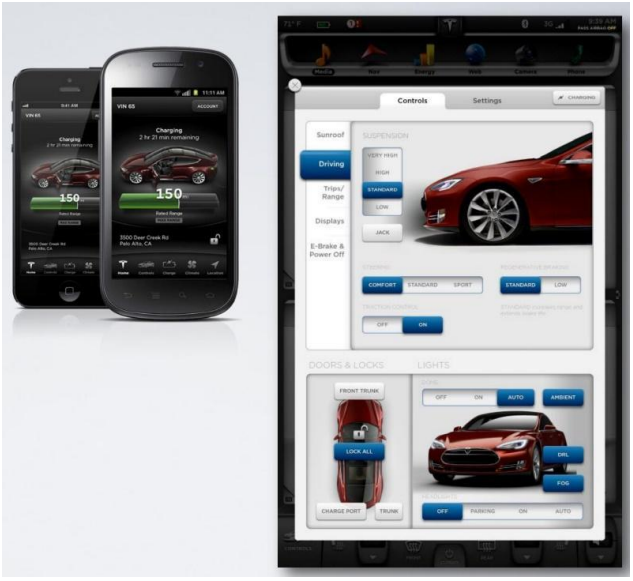


Image 9: Tesla Mobile Application

5.2 Purpose and Value

Tesla's purpose is essentially to create and mass produce zero emission and zero noise cars, allowing for clean and quiet streets.

Coupled with that, Tesla also aims to allow people to produce their own electricity in their homes and store it for later consumption. This can be attained through Tesla's solar roof and power walls.

In terms of its corporate values, Tesla focuses on sustainability as one of its core values. For example, Tesla's gigafactories produce their own electricity through a vast number of solar panels installed on the rooftop of the factory.
Tesla describes its corporate culture as accelerated, energetic and innovative. They also aim to provide an all-inclusive working culture, ensuring that everybody can do its best at the job regardless of sex, race, religion or each worker's past[91].

5.3 Objectives

	Specific	Measurable	Attainable	Relevant and Timely
Produce 500,000 cars in 2020	x	x	x	x
Produce an entry-level car for $25,000 by 2022	x	x	x	x
Develop and sell fully autonomously driven cars	x	x		
Set up autonomous ride-hailing network	x	x		

Table 27: Objectives SMART

In Tesla's public reports, the company's objectives are typically described in broad strokes rather than through quantified targets or goals. Therefore, it is not easy to point out measurable objectives as this kind of information is generally absent from public reports.

In any case, as of today, it is possible to highlight some of the company's objectives by distinguishing between short- or medium-term objectives and long-term objectives.

Short and medium term
Based on Tesla's 2019 form 10-K[92], it is expected that vehicle deliveries should comfortably exceed 500,000 units in 2020. Due to ramp of Model 3 in Shanghai and Model Y in Fremont, production is also likely to outpace deliveries in that year.

With regards to capital investments, considering the expected pace of the products' manufacturing ramps, construction and expansion of factories, and pipeline of announced projects under development, and consistent with the company's current strategy of using partners to manufacture battery cells, as well as considering all other infrastructure growth, Tesla is currently expecting the average annual capital expenditures in 2020 and the two succeeding fiscal years to be from $2.5 billion to $3.5 billion.

Alongside with capital investments, the company expects operating expenses as a percentage of revenue to continue to decrease in the future. This should be attained both by increasing operational efficiency and process automation, and by increasing expected overall revenues from sales. In particular, Tesla's efforts to scale down and optimize the cost structure relative to the size of the business have already manifested in total operating expenses decreasing from $4.4 billion to $4.1 billion from fiscal year 2018 to fiscal year 2019, including restructuring and other charges. Meanwhile, total revenues increased from $21.5 billion to $24.6 billion in the same period.

[91] https://www.tesla.com/pt_PT/careers.
[92] Section regarding Management Opportunities, Challenges and Risks and 2020 Outlook.

At the end of fiscal year 2019[93], Tesla expected both positive quarterly free cash flow going forward as well as positive GAAP net income going forward, with possible temporary exceptions, particularly around the launch and ramp of new products. Underlying these scenarios is the belief that the company has grown to the point of being self-funding. It remains to be seen whether the COVID-19 pandemic is going to adversely impact these objectives and, if so, to which extent.

In a nutshell, Tesla is directing its focus to continuous volume growth, capacity expansion and cash generation. At the same time, it is expecting to start making profits as the volume of sales increases and as operating expenses as a percentage of revenue decline.

Long term
As the time window lengthens, it becomes harder to define measurable targets. In any case, in the long run, Tesla plans to develop a more affordable, high volume car, that may lead to greater demand for the company's products. In particular, Tesla may be in condition to develop an entry-level car at a $25,000 price-point by 2022, which, if successful, would increase its annual demand to 1,1 million cars by 2028[94].

On a different topic, Tesla is also aiming to develop fully autonomously driven cars. However, the timing to achieve this milestone is hard to pin down given the regulatory constraints that self-driving is subject to, as well as the technological hurdles that this type of offering necessarily involves. At the moment, Tesla already offers its customers an Autopilot feature that helps the vehicle navigate highways, change lanes and park with reduced driver intervention. This app currently costs $7,000 for customers who purchase it upfront but may become available through a subscription plan, according to what was announced by Elon Musk in the 2020 first quarter earnings call[95].

Finally, in connection with self-driving technology, Tesla is planning to roll out an autonomous ride-hailing network. This network would include the company's own fleet of vehicles and would allow Tesla to access a new customer base[96].

5.4 Strategy

From an early stage, Tesla's basic strategy as documented in its Master Plan was divided into three stages whereby:

- On stage 1, Tesla makes a small number of high value cars, in order to prove the concept and show that electric cars are a viable alternative to traditional gasoline cars (in other words, electric cars can be fast and long-range, thus they can be widely adopted in the market);
- On stage 2, Tesla produces a car that costs half as much (model 3); this way Tesla starts expanding its customer base towards a more traditional type of customer, though still at the entry level of the luxury level it had been focusing on;
- On stage 3, Tesla produces a very high volume, economy price model, whereby vehicles are now affordable for the average household; in the long run, Fremont factory is meant to produce this low cost, stage 3 car.

In a nutshell, Tesla's strategy is to first focus on a premium segment in order to gain traction and start increasing volume and capacity as new offerings are introduced for lower customer

[93] In the Q4 and FY 2019 Update.
[94] www.forbes.com/sites/woodmackenzie/2020/01/20/when-will-tesla-make-a-profit/#d65e1cb1ba9c
[95] www.businessinsider.com/tesla-elon-musk-monthly-subscription-full-self-drive-autopilot-2020-4
[96] See Tesla's 2019 form 10-k, p. 13.

segments down in the social pyramid. Each stage serves as an anchor for the next one, allowing the company to gradually prune its technology and scale its operations in the face of an expanding demand.
At this moment, Tesla is still on stage 2 and looking to expand its production capacity, namely through the construction or expansion of its GigaFactories.

According to Tesla's 2019 form 10-K[97], a key focus in 2020 will be efforts towards establishing and expanding capacity for vehicle production at volume across three continents.

At the Fremont factory, Tesla commenced Model Y production earlier than anticipated and combined with Model 3 the company has installed annual production capacity for 400,000 vehicles. They expect to further increase that capacity to 500,000 vehicles through the installation of additional equipment.

At Gigafactory Shanghai, Tesla has installed annual production capacity for 150,000 Model 3 vehicles. They have also started the construction of the next phase of that Gigafactory to add Model Y manufacturing capacity at least equivalent to that for Model 3.

Finally, Tesla has selected Berlin as the site of their next factory for manufacturing vehicles for the European market, due to its strong manufacturing and engineering presence. They are still at the very early stages of the construction of that new Gigafactory.

Regarding Tesla's sales objectives, the company's operations in the Chinese market are a key strategic element to ensure the envisaged expansion of demand. Indeed, production at Gigafactory Shanghai allows Tesla to offer Model 3 in China at competitive local pricing and more quickly, which should drive further demand and opportunity in the world's largest market for mid-sized premium sedans, and they expect a similar impact in China for Model Y when they begin production there of this offering in the popular compact SUV segment.

Another key element has to do with technological improvement and product differentiation. Over time, Tesla has been making its vehicles incrementally more compelling, including through a planned software update for FSD-enabled vehicles to react to traffic lights and stop signs and navigate city intersections, and additional functionality of both in-vehicle software and the Tesla mobile app.

Lastly, Tesla has also been looking to expand and invest in its servicing and charging locations and capabilities to keep pace with customer vehicle fleets and ensure a convenient and efficient customer experience. Without an adequate servicing and charging infrastructure, there will be no conditions to sustain an increasing product demand.

[97] Section regarding Management Opportunities, Challenges and Risks and 2020 Outlook.

5.5 Business Model

In order to provide an overview over Tesla's business model of the automotive business, we created a business model canvas.

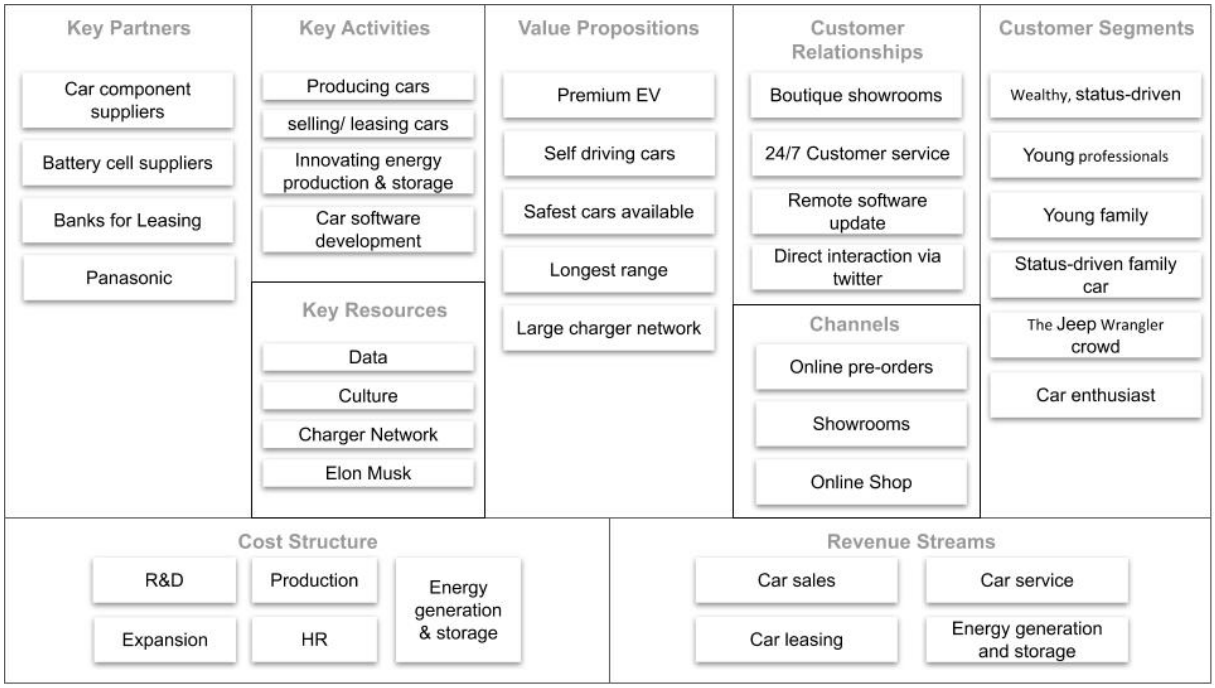


Figure 37: Business Model Canvas

6 Strategic Dimensions

6.1 Products-Markets Strategy

In order to have closer look at the status quo of Tesla's products markets strategy, we set up a products markets matrix, where we have the segments that are served by the current car offering in the horizontal line and the potential demographics in the vertical line.

6.1.1 Products-Markets Matrix

Looking at the different segments, it shows that Tesla already serves (or will serve in case of the new Tesla Roadster and Tesla Truck) some important income levels per segment – mainly the higher income levels. So does the model S for the status driven individual and young professionals, the model X for the status driven family and the upcoming roadster for the car enthusiast serve the high-income targets. Big gaps we discover in the segment of the young family that is usually very price sensitive and probably can't even effort the cheapest model 3 (35k USD) and in the Jeep/ Wrangler Crowd, that is often not as price sensitive but only will have the Tesla Truck starting at 40k USD available while there's is a high willingness to pay more for a luxurious SUV or Jeep.

	Luxury Class Sedan	Mid Class Sedan	Status-driven family car	Pickup	Sports Car/ Super Car
High Income	ooo	oo	ooo	o	ooo
Medium Income	o	oo	o	oo	
Low Income		o			

Table 28: Product-Market Matrix

6.1.2 Ansoff Matrix

The Ansoff matrix is being applied to Tesla in order to analyze how Tesla is positioned in terms of the four strategies of market penetration, product development, market development and diversification.

	Existing Products and Services	New Products and Services
Existing Markets	**Market penetration** • Tesla operates in 30+ countries • Sets up a dense network of chargers (14k so far) • ca. 100 dealerships worldwide	**Product development** • developes new cars but very slow (4 cars in production, 3 unveiled) • also develops outside of automotive segment • strong focus on development of software
New Markets	**Market development** • opening gigafactory in China and Europe • despite reports, Tesla does not go to india	**Diversification** • Superchargers • Software • robotaxis

Table 29: Ansoff Matrix

Market penetration
Tesla is practicing market penetration quite intensely by operating in 30+ countries. Within the countries Tesla set up a global network of 14k+ charging stations for their cars and operates nearly 100 dealerships.

Market development
Despite reports that Tesla wants to enter India as the next major car market, Elon Musk put this project on hold for now due to the high import duties in India, which would make the cars not affordable in India.[98] In order to produce more cost effective and avoid supply chain issues, Tesla set up a GigaFactory in China and is planning to set up another one in Europe.

Product development
Tesla has a fairly low frequency of releasing new cars. Within their existence they only produced 5 cars so far while the production of the first roadster has been stopped already. In the following 2 years there are three more models announced, the new Tesla Roadster, the Cybertruck and the Semi. But considering that Tesla is not even 20 years old, it's nothing to conclude a slow product development from.

Diversification
Already in the early stage of the company, Tesla started to diversify their products, not only by acquiring SolarCity. Today Tesla is operating in several segments next to automotive. In energy production Tesla sets up large solar panel fields or sells solar roof tiles to private households. In energy storage Tesla sets up huge batteries to serve whole regions such as in Australia in 2018. Due to the Corona crisis in 2020 Tesla even shifts their production towards ventilators in order to supply hospitals.

[98] The Economic Times (2019): https://economictimes.indiatimes.com/industry/auto/auto-news/elon-musk-explains-why-tesla-cars-may-not-come-to-india-anytime-soon/articleshow/70492810.cms?from=mdr

6.2 Generic Strategy

In this section, we analyze the nature of the competitive advantage of Tesla in the products-markets it is active on.
From the outset, a company's competitive advantage may take the form of either:

- Cost leadership;
- Differentiation; or
- A combination of the above two.

By adapting the generic strategy model, we can see that Tesla's competitive advantage varies depending on whether it is considered within the broader automotive industry or specifically within the BEV/PHEV segment:

Broad automotive sector		Cost leadership	
		Low	High
Differentiation	Low	-	-
	High	X	-

BEV / PHEV segment		Cost leadership	
		Low	High
Differentiation	Low	-	-
	High	-	X

Table 30: Competitive Advantage

Tesla's competitive advantage within the broad auto industry clearly lies on product differentiation, such as on the vehicle's electric powering, in-car software features and connectivity, user experience, etc. With no surprise, Tesla's vehicles tend to be much more expensive than the average vehicle in the sector.

The following figure shows the relation between the average price of Tesla's make and the average price in the relevant market segment in 2019, globally:

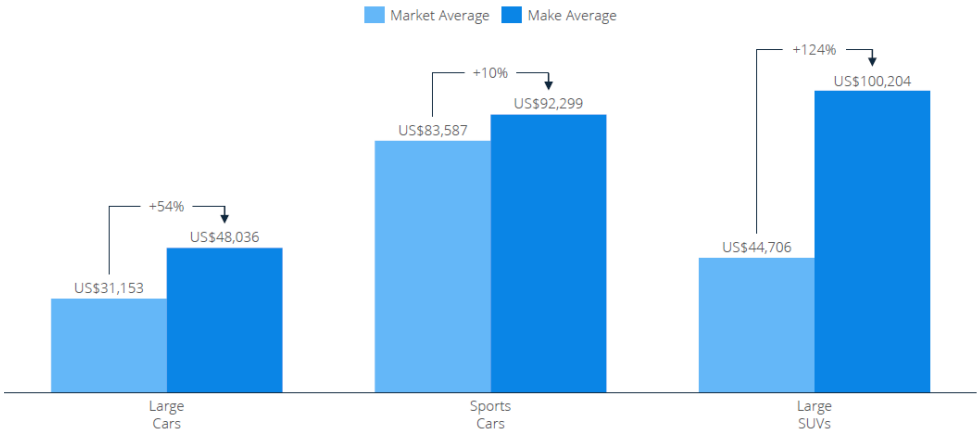


Figure 38: Average passenger car prices in 2019

The situation is different if we consider Tesla's offerings in the specific context of the EVs segment. In this case, Tesla's offerings have been competing with other EVs through a

combination of both product differentiation and cost leadership. Regarding differentiation, Tesla cars stand out for their cutting-edge technologic features as well as for the related supercharging network. Regarding costs, Tesla has been leading the way in the adoption of more cost-effective batteries and has recently launched the Model 3 which has greatly contributed to push down the average price of EVs.

In the long run, each of these competitive advantages do not go without its risks.
Product differentiation raises the risk of other (larger) competing automakers replicating Tesla's technology; this risk is, however, mitigated by the fact that Tesla's competitive edge is capital-intensive and spans a wide range of business sectors from hardware supplies to software and connectivity services to power generation, storage and recharging technology. Legacy carmakers tend to have a much more limited approach which prevents them from covering such a wide range of business sectors without having to engage other entities in partnerships.

Cost leadership, in turn, may be harder to keep. It should be noted that Tesla has been relying on partnerships with third-party suppliers such as Panasonic, LG Chem Ltd and CATL to achieve its cost advantage on batteries. It is to be expected that the other carmakers will also ultimately take advantage of the downward trend in batteries production costs.

6.3 Innovation

In Tesla's Market Conditions we see that Tesla has a global market share of 1% of the global automotive market, but in its "niche", Tesla actually has way higher presence than this figure indicates. This nicht, the EV market, is in the introduction stage and Tesla has used its core competencies to grow from an innovation leader with medium competitive strength and medium technological competencies to a leader with high competencies.

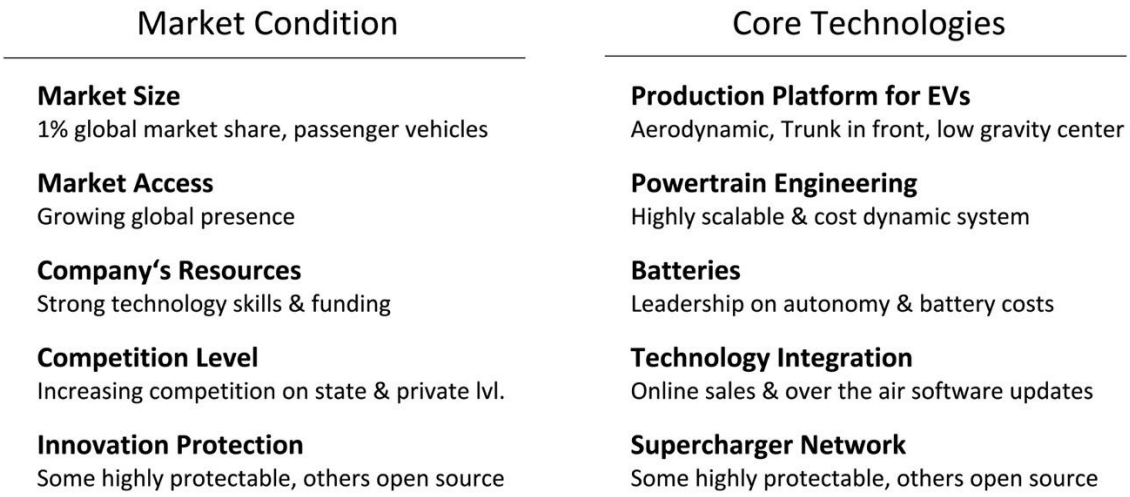


Figure 39: Automotive Market and Tesla Core Technologies

Given Tesla's technological competencies and its efforts on constantly innovating at a high level, visible for example with their unique hardware and software architecture, i.e. how they put their car together, Tesla is running an innovation leadership strategy. Tesla's recent investments as mentioned in sections before, such as in developing vehicles for the transportation sector with the Cybertruck and the Tesla Semi, indicate that it is planning to maintain this strategy.[99]

[99] HBR (2020): https://hbr.org/2020/02/lessons-from-teslas-approach-to-innovation

Innovation Approach		Competencies in Core Technologies	
		Low	**High**
	First Mover	Innovation Specialist	**Innovation Leader**
	Follower	Innovation Streamliner	Innovation Follower

Table 31: Innovation Strategy

For Tesla, given an expected near future success, we expect it to build itself up to become a leader in the maturity stage of the market, with a high competitive strength and high technological competencies. If Tesla wouldn't stand the fight with VW and others it might end up as a Follower.

Introduction Stage		Technological Competencies		
Competitive Strength		Low	Medium	High
	High	Specialist	Leader	Leader
	Medium	Specialist	**Leader** / Follower	**Leader**
	Low	Streamliner	Follower	Follower

Table 32: Innovation Strategy reflected in the Introduction Stage

Maturity Stage		Technological Competencies		
Competitive Strength		Low	Medium	High
	High	Specialist	Follower	**Leader**
	Medium	Streamliner	Follower / Specialist	**Follower**
	Low	Streamliner	Streamliner	Specialist

Table 33: Innovation Strategy reflected in the Maturity Stage

6.4 Vertical Integration

Today most of the big auto manufacturers are nothing but assemblers. They outsource all of their production and are just assembling the final parts in their factories. Some car producers go even further and outsource that process as well, to companies such as Magna.[100]

But as in many other things, Tesla is different in regard to this. Tesla is known for vertical integration and for rather making than buying.

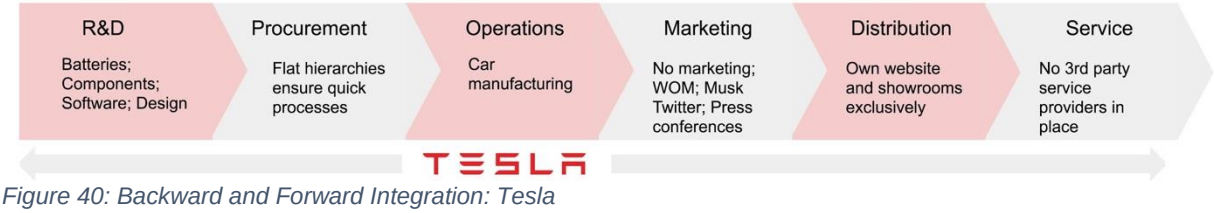


Figure 40: Backward and Forward Integration: Tesla

By looking at Figure 40, it shows that Tesla is practicing their vertical integration in both directions, backward and forward. By practicing vertical integration on such a high level, Tesla

[100] Magna Complete vehicle manufacturing: https://www.magna.com/products/complete-vehicles/complete-vehicle-manufacturing

is planning to gain a competitive advantage. This helps, to gain a deep understanding of their product and knowing how to improve it. Greg Reichow, Tesla's former VP production was mentioning in an interview with WIRED, that for Tesla it makes sense to build components inhouse, that contain "unique intellectual property or that are expected to change quickly."[101] Reichow further states, that outsourcing is connected to intense measures when it comes to problem solving, while problems in an in-house production can be solved in a matter of days for a fraction of the costs. It also allows Tesla to make choices more quickly and to increase the cycle speed of learning and improvement.

Famous examples of vertical integration at Tesla are specific fuses that could be considered as a commodity on the first sight, or their seats. In both cases Tesla found out that their suppliers couldn't deliver products to Tesla's specific needs, so Tesla decided to produce both components on their own.[102] But Tesla is not integrating all process vertically. Many car parts are being purchased from other suppliers, like the strategically very important battery, that is currently supplied by Panasonic.

6.5 Strategic Outsourcing

As mentioned in the section above, does Tesla not do much outsourcing but rather keeps control over all the development and origin of their components. Disassembling of their Model 3 conducted by for example Nikkei Business Publications showed that most components of the car are being produced by Tesla. Especially the board computer creates a huge competitive advantage for Tesla, that is considered as being 6 years ahead of the competition.[103] To get a better understanding of the optimal usage of strategic outsourcing compared to Tesla's approach, we are comparing the following tables of the ideal setup with the setup Tesla is using.

		Strategic Vulnerability to Outsourcing		
		Low	Medium	High
Potential Competitive Advantage	High	**Internal production**		
	Medium		**Strategic outsourcing**	
	Low	**Market purchase**		

Table 34: Ideal Usage of Strategic Outsourcing

		Strategic Vulnerability to Outsourcing		
		Low	Medium	High
Potential Competitive Advantage	High		**Strategic outsourcing**	
	Medium	Internal production	**Market purchase**	Internal production
	Low			

Table 35: Tesla's Approach of Strategic Outsourcing

[101] WIRED: Teslas secret second floor (2017): https://www.wired.com/story/teslas-secret-second-floor/
[102] Reuters (2017): https://www.reuters.com/article/us-tesla-seats/teslas-seat-strategy-goes-against-the-grain-for-now-idUSKBN1CV0DS
[103] CleanTechnica (2020): https://cleantechnica.com/2020/02/18/japanese-tesla-model-3-teardown-result-tesla-is-6-years-ahead/

The comparison of the two tables shows that Tesla produces in many areas internally, where other companies would make use of outsourcing.

One major component Tesla is outsourcing is the battery production. The Japanese battery producer Panasonic is supplying Tesla with the batteries for the cars. But what makes this outsourcing so special is that Tesla created space for the assembly line operated by Panasonic in their own Gigafactory. The batteries don't need to be shipped anymore and problems can be solved quicker. This close integration of a supplier comes very close to a vertical integration, why also in this matter Tesla is changing the way car companies usually outsource their production. It is worth mentioning though, that Panasonic just recently announced a similar cooperation with Toyota, what eliminates the competitive advantage Tesla used to have with this cooperation.

But despite all the success stories of vertical integration and insourcing at Tesla, the first experts are starting to recommend outsourcing more of their production, such as manufacturing.[104] The last few years this has been again and again a bottleneck for Tesla, not reaching their production goals.[105]

Due to Tesla's few outsourcing activities it has a lower level of transaction costs in comparison to their competitors, such as fewer costs for information collection, selection and financing or bargaining, contracting and purchasing. There is also fewer need to monitor and control the compliance of third parties, so litigation or other intangible costs are, relative to competitors, on the low side. Tesla's performance costs are dependent on some third parties, but they have a high level of control over the management of the complexity, coordination and bureaucracy, also enhanced by their market power.

[104] NextBigFuture (2017): https://www.nextbigfuture.com/2017/12/batteries-plentiful-maybe-tesla-should-consider-outsourcing-manufacturing.html
[105] see ibid.

6.6 Internationalization

Since 2011, Tesla has started its internationalisation in 3 majors steps:

- the development of a distribution network in the 3 biggest car markets in the world: North America, Western Europe and China.
- the extension of its manufacturing capacity in the Fremont factory for product range expansion, then the built in 2019 of a first Gigafactory in China and the plan to build a replica in Germany in 2020.
- the expansion of the charger infrastructure network in key market accelerated by the acquisition for home charger of SolarCity

All 3 steps have contributed to the company internationalisation and influenced the four dimensions of the model as described in the Table 36 below.

Image 10: Tesla Sites

Image 13: GigaFactory Shanghai

Image 14: GigaFactory Europe

Component	IMPACT
G GROWTH	• Target 3 major regions for internationalisation: North America, Asia/China, Western Europe to reach the largest and most profitable customer pool • Base camp market in North America with leardership in EV and high speed charger network • Expand to China growth market and high growth customer • Build Gygafactory in China to acquire knowledge on latest factory capabilities and template for Europe Gigafactory • Europe, heavy presence in EV incentivise countries Norway, Netherland • Gygafactory in Europe confirmed in Germany biggest premium car market
M MARGIN	• Developped concept of Gigafactory to gain scale • Deployment in China to gain labour cost, scale in battery cost • Devlopment of powertrain for other brands to gain scale • Higher bargaining power with Manufacturing and distribution presence in biggest car markets: NA, EU, China
R RISK	• Investment in China and Europe allow diversification of risk vs NA only manufacturing resource • Diversification with solar city to gain synergies on electric energy access • Guaranty access to key markets US, China, Germany to balance individual market risks • Presence in China to get access to latest EV technology and manufacturing innovations
SU SUSTAINABILITY	• Car Market share leaders in Norway, Netherland as "role model" market for other countries in favor of incentivise EV • Devleopment of model Y SUV to attack a 3x bigger segment than model X • Acceleration of the densification of the charger infrastructure in key regions

Table 36: Value Creation through Internationalization

6.7 Competitive Advantage of Nations

We conducted a full analysis of the competitive advantage of nations, clustering the key regions for the automotive industry and assessing the attractiveness of each country/region under the consideration of the company.

Regarding the result in Table 37 below the results are comforting the choices made by TESLA in terms of internationalization expansion.

Sales:

First, sales are generated mainly by North America and Western Europe for the time being followed by the huge volume potential offered by China. Despite being a volume market, Japan and Indian scored low in our assessment due to the difficulty to have access to distribution in Japan and India with dominant local players and specifically for India a poor charging infrastructure. The other regions important in terms of car sales (Russia, Brasil) don't represent a strong benefit from a sales perspective vs the other regions and are served only in major capital cities.

Growth:

The location of the first Gigafactory of TESLA in China is strategically aligned with the growth potential of the country in term of volume sales and fast pace evolution of the high/middle class. TESLA's EV market share leadership in North America with double digit market growth will provide sustainable source of growth, despite a low population growth rate. Europe benefits from an important market growth rate for EV's, with markets local incentives in countries like Norway, Netherlands, Germany, France offering a growth potential in premium car segment. Western Europe is also leading the way for the development of charging infrastructure, a key enabler for the development of EV's and TESLA in particular.

Margin:

At the end of 2020, TESLA will manufacture from 3 locations worldwide US Fremont California, China Shanghai, West Europe Berlin. They represent the best ratio in terms of labour cost, access to technical talent and ability to minimise distribution cost being in the top 3 car markets in the world. TESLA benefit from a “green field” approach vs competitors which need to invest billions to transform their current factories impacting their margin.

Risks:
As seen in China, Political risks on EV’s policies is high with a lot of volatility, recent incentive measures where suppressed to force the local EV makers to improve the quality and sustainability of the cars. TESLA can count on the US government to continue to support the “most American car” together with some of the European Markets which don’t have local car industry champions to defend but rather would like to drive the adoption of EV’s for environmental reasons (Norway, Netherlands, Switzerland).

Sustainability:
With current oil prices, doubts can be casted on the sustainability factor. Although the EV’s adoption trend will continue, during the next years, we will probably see a slowdown of general consumption of cars not being a priority good during time of crisis. Furthermore, the arbitrage between EV and thermic motors will be further biased by low oil prices.

Factor	Weight	North America	China	Japan	Western Europe	India	Other regions
Sales							
Market Size in Volume	6%	7	10	5	7	5	5
Average Price Level	4%	7	5	7	7	4	4
Access to the Distribution Network	2%	8	5	2	6	2	2
Cultural Proximity	2%	9	6	7	9	2	3
Other Sales Factors (Charging Infrastructure)	1%	8	7	7	8	2	4
Sales Assessment	**15%**	**1,12**	**1,09**	**0,83**	**1,08**	**0,56**	**0,6**
Growth							
GDP Growth Rate	7%	4	7	1	3	7	1
Population Growth Rate	8%	3	2	1	2	5	5
Market Growth Rate	8%	7	8	2	7	2	4
Openness to International Trends	4%	7	7	2	7	4	5
Other Growth Factors	1%	4	5	2	3	3	4
Growth Assessment	**28%**	**1,4**	**1,62**	**0,41**	**1,24**	**1,24**	**1,03**
Margin							
Access and Cost of Labor	5%	5	8	2	5	8	9
Access and Cost of Qualified Technicians	10%	5	6	5	6	5	3
Cost of Land, Materials and Equipment	3%	6	8	2	5	7	5
Distribution Margin	3%	5	6	4	5	3	7
Financial Costs	2%	9	4	3	6	3	3
Low barriers to Imports	2%	10	4	2	6	2	3
Legal Regulation	2%	6	5	4	5	4	5
Bureaucracy	2%	7	3	4	6	3	4
Other Margin Factors	1%	5	4	4	4	3	3
Margin Assessment	**30%**	**1,77**	**1,78**	**1,08**	**1,65**	**1,47**	**1,44**
Risk							
Foreign Exchange Risk	3%	6	4	2	6	3	4
Political Risk	8%	7	2	2	5	2	3
Competitive Risk	3%	4	2	2	2	2	6
Other Risk Factors	1%	6	3	2	4	4	4
Risk Assessment	**15%**	**0,92**	**0,37**	**0,3**	**0,68**	**0,35**	**0,58**
Sustainability							
Environmental Sustainability	5%	6	4	6	7	3	3
Social Sustainability	4%	8	7	7	7	3	3
Governing Sustainability	2%	5	7	6	6	4	3
Other Sustainability Factors	1%	6	6	6	5	3	3
Sustainability Assessment	**12%**	**0,78**	**0,68**	**0,76**	**0,8**	**0,38**	**0,36**
Global Assessment	**100%**	**5,99**	**5,54**	**3,38**	**5,45**	**4,00**	**4,01**

Table 37: Competitive Advantage of Nations Assessment

Following sectors do and can give more potential to internationalization for Tesla:

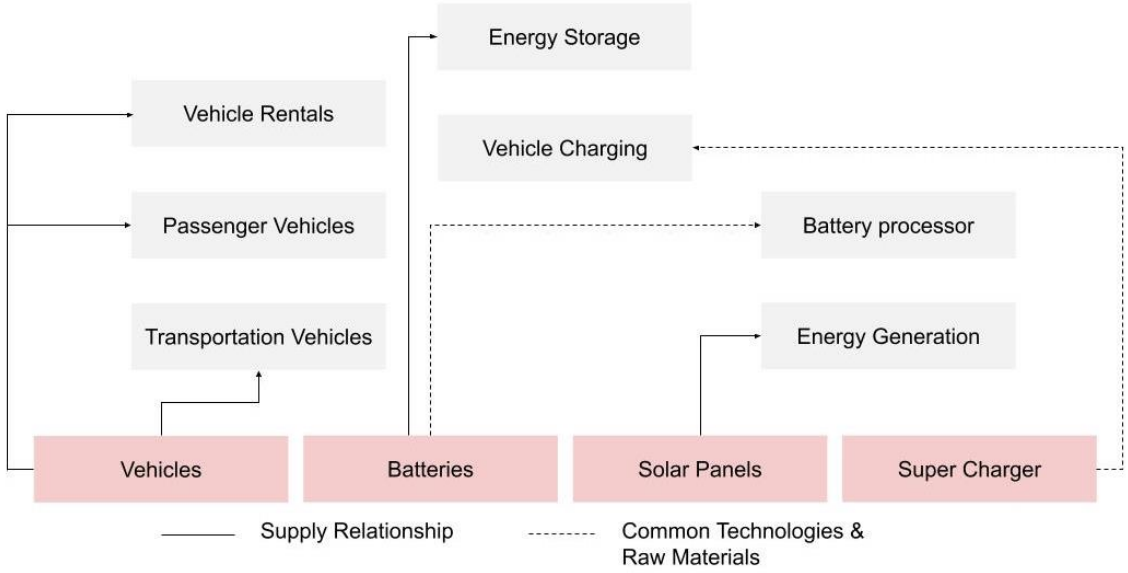


Figure 41: Sector Cluster

For Tesla's Internationalization it refrains from transactional means and is mainly working through own subsidiaries to market and distribute their vehicles, thus invests itself. For some expansion endeavors Tesla sets up projects or integrated joint ventures such as with Toyota for the setup of a factory.

Tesla is currently in a multinational stage on the way to become truly global, meeting customer needs in each region with interconnected crossflows of products, information, money and people.

Global Integratio		Local Responsiveness	
		Low	**High**
	High	Global Company	Transnational Company
	Low	Local Company	Multinational Company

Table 38: Tesla's Internationalization

Having become a multinational and becoming a truly global company has and can be achieved through adaption and standardization as per following matrix. Marketing could so far be extraordinarily well standardized, but it is most likely required to be adapted considering that in some countries a simple social media marketing combined with WOM, user-interaction and user-involvement will not have the same effect as in others or might simply be restricted, a problem that Tesla encounters in China for example.

	Adaption ←			Factor		→	Standardization
	Culture / Habits	Design	Language	Size / Packagin	Technical System	Customer / Application	None
Concept							
Marketing							
Technology							
Product							

Requires local adaption

Can be standardized

Table 39: Adaption vs. Standardization

6.8 Diversification

Tesla is considered as a highly diversified company. The change of the company name in 2017 from Tesla Motors to simply Tesla underlies this.[106] If we compare Tesla with other car manufacturers, it shows that Tesla is operating in several more business segments, which make Tesla's product range and revenue streams more diverse and therefore the whole company better prepared for any crisis. The diversification matrix below gives an overview over Tesla's measures.

	Current commercial performance	New commercial performance
Current technology	Real Life Driving Data	House Batteries Solar Panels Glass Roof Tiles
New technology	Over the Air Software Upgrades Autonomous driving systems Robotaxis	Ventilators (Corona Crisis)

Table 40: Diversification Matrix Tesla

The benefit of Tesla compared to other car producers is that Tesla is not as dependent on the market development of the car industry as others since they created several extra revenue streams. Even the cars themselves still produce revenue when they are on the road by for example subscription models for software services or software updates that are not for free for the user. Especially remarkable is Tesla's product portfolio if it is being combined. Tesla offers not only the car to their customers but also the whole infrastructure around it, such as home chargers and solar panels to generate the electricity.[107]

[106] The Drum (2017): https://www.thedrum.com/news/2017/02/01/tesla-motors-changes-its-name-it-looks-diversify-business-model

[107] Cleantechnica (2020): https://cleantechnica.com/2020/04/06/7-reasons-why-tesla-will-benefit-from-the-crisis-2-diversification/

6.9 Conglomerates

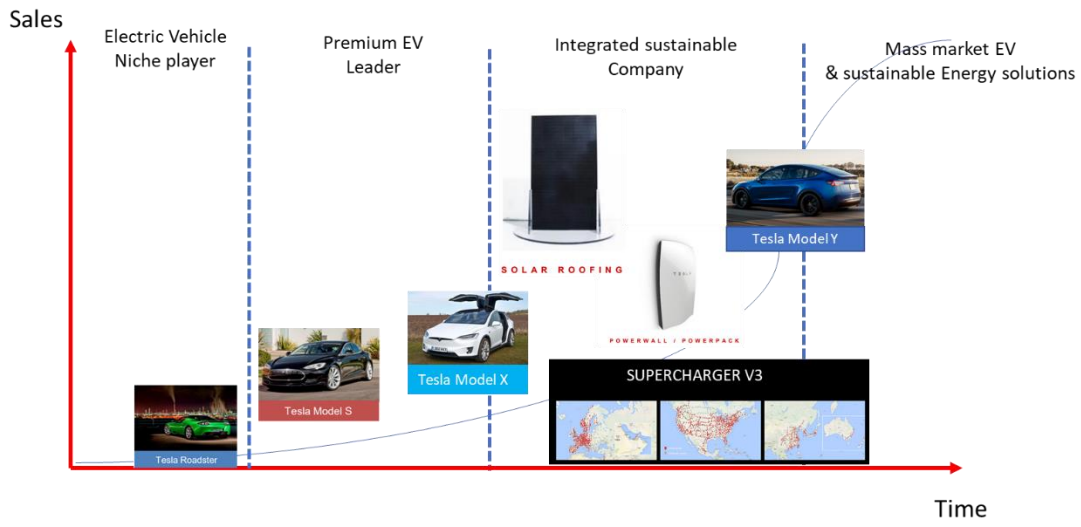


Figure 42: Evolution of Tesla Conglomerate

Conglomerate – The acquisition of SolarCity to create a unique integrated sustainable energy company.

With the acquisition of SolarCity in 2016, TESLA created a unique vertically integrated sustainable energy company from energy generation to energy storage to transportation. With this strategic move TESLA is in capacity to propose a fully integrated offer to its consumers globally.

Combined with a full range of EV's with the latest model Y targeted to mass market, TESLA is the only global company with the potential to offer such an ecosystem to its consumers. The company growth should enter in an high growth period driven by the large adoption of EV's globally but also the development of integrated sustainable energy solutions offered by SolarCity.

Following the acquisition of SolarCity, TESLA remained focussed on EVs geographic growth, manufacturing capacity extension and delivery of its mass market EV production proven to be challenging for Model 3.

Looking at investors' recent reports, the conglomerate expansion to integrated sustainable solutions seems to be challenging to manage as the company is facing challenges in multiple front. First, the core business of EV's remains in its infancy compared to the global car market and the ambitious plans to expand geographically and in mass market EV range seems to be at the expense of the other branch of the conglomerate.

SolarCity roof panels are confronted to a much bigger competition, a large number of local electrical companies are already present in the market with low cost product (mainly produced in China) putting high pressure on cost competitiveness.

Was SolarCity a wrong bet? From a strategic perspective, the integration fully make sense, the oversupply of solar solutions driven by China could have been anticipated. This will certainly impact the overall financial result of the firm in the future.

In the current context, TESLA still remains one of the key players and its market valuation reached groundbreaking records during the pandemic period with its stock price reaching $ 900 in February hand $100 billion valuation.

6.10 Business Portfolio Planning

Business portfolio planning models contribute to decision-making in four distinct areas:

- Formulation of corporate and business strategy
- Establishment of general performance objectives for each business
- Balancing of business portfolio
- Resource allocation

The following are the two main widely used business portfolio planning models:

- The General Electric/McKinsey matrix, which relates the industry's attractiveness with the company's competitive strength
- The Boston Consulting Group matrix, which relates the market growth rate with the company's relative market share

Here we look into Tesla's automotive activities using each of the above matrices.

GE/McKinsey model
This model clusters certain areas Tesla is operating in into a matrix of competitive strength and industry attractiveness.

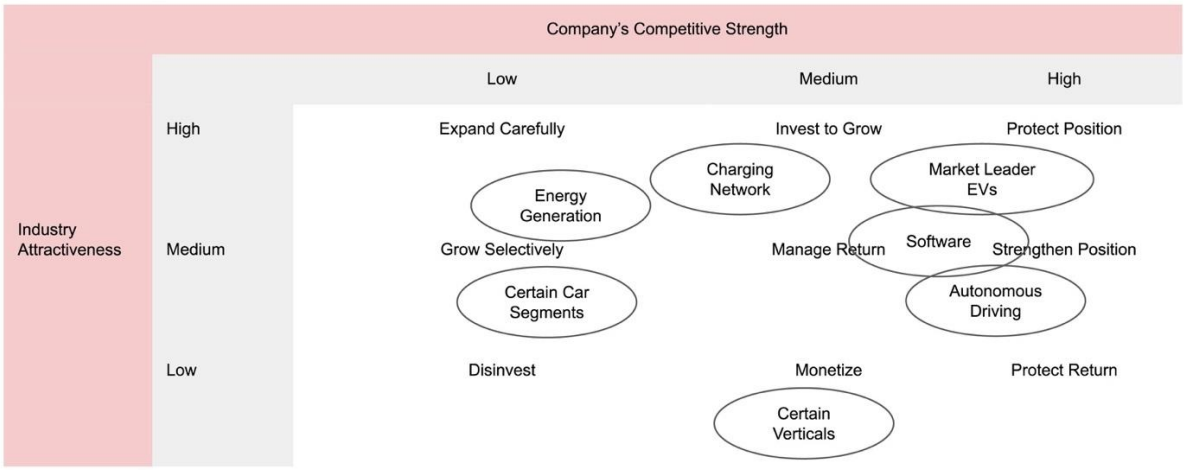


Figure 43: GE/ McKinsey Matrix

Remarkable about the GE/McKinsey model applied for Tesla is in particular, that Tesla as a young company is not operating in many fields with a low attractiveness. Tesla is very selective about the strategic areas they are operating in. Only some decisions to integrate some verticals for their productions such as car seats might not bring the competitive advantage compared to the effort, why it would make sense for Tesla to monetize such components.

BCG model
This model classifies companies or their activities in four different ways based on the relation between the market growth rate and the company's market share:

- Question marks - low market share in a fast-growing market; the company should monitor its position closely and frequently, as the market's high growth rate may end up consuming the company's position and resources;
- Stars - large market share in a fast-growing market; star-segments should be invested in continuously in order to keep their growth and fight competitors;

- Pets/dogs - low market share in a slow-growing market; dog-segments are prime candidates when divesting;
- Cash cows - large market share in a slow-growing market; these segments are the most mature and contribute growth without additional investments.

Given this framework, Tesla has been pivoting several high-growth industry sectors, as illustrated in the following graph:

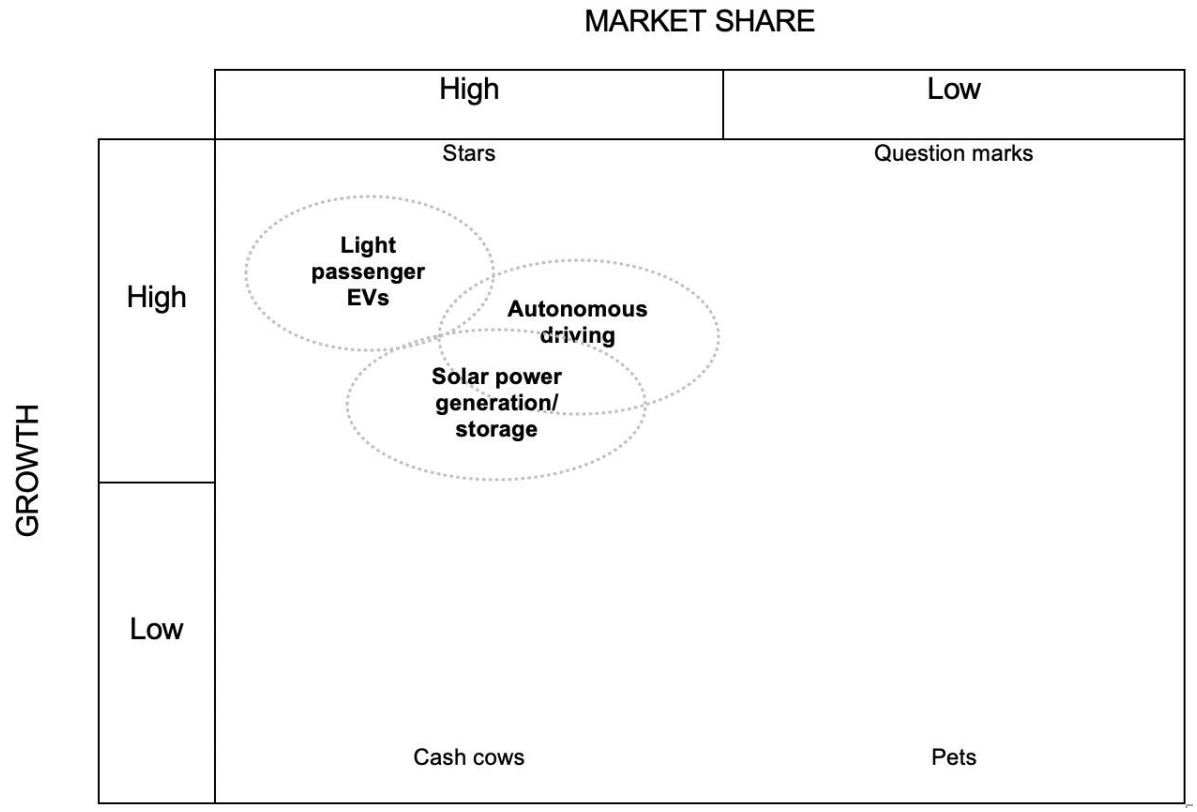


Figure 44: BCG Matrix for Tesla

Tesla's classification as a star in the above sectors helps explain both the company's rhythm of capital expenditure (which has been increasing over the years) and the company's market cap (which has already surged past the combined market cap of Ford and GM). It looks as though both the company's managers and the company's shareholders have been considering Tesla as a star in its own (fast-growing) segments.

Particularly noteworthy is the positioning that Tesla has since early been assuming in the EVs segment of the auto industry.

To begin with, this segment is unequivocally a fast-growing one, as illustrated in the following graph from the International Energy Agency where passenger light-duty cars (battery electric vehicles) show up as the fastest-growing sub-segment amongst the other EVs[108]:

[108] IEA, *Electric vehicle stock in the EV30@30 scenario, 2018-2030*, https://www.iea.org/data-and-statistics/charts/electric-vehicle-stock-in-the-ev3030-scenario-2018-2030

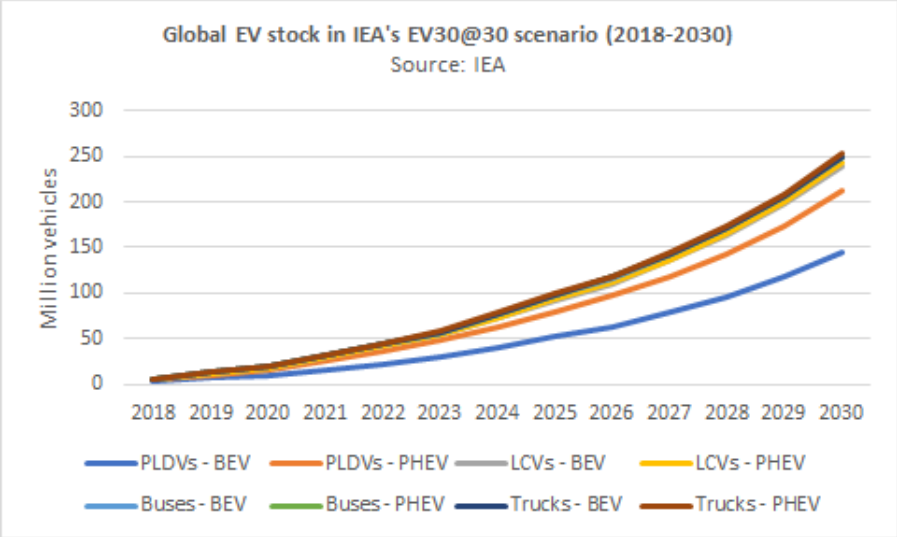


Figure 45: EV Stock in IEA's

Against this backdrop, Tesla stands out as the global market leader in the manufacturing of EVs, as illustrated in the following graphs:

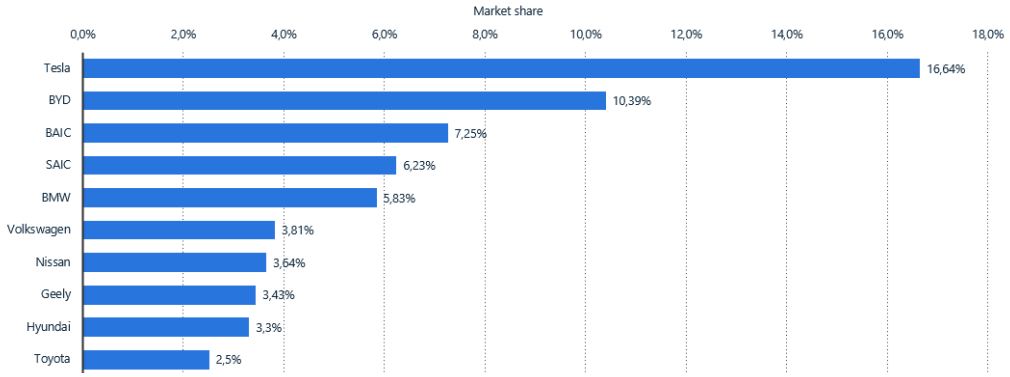


Figure 46: Global plug-in EV market share in 2019, by main producer

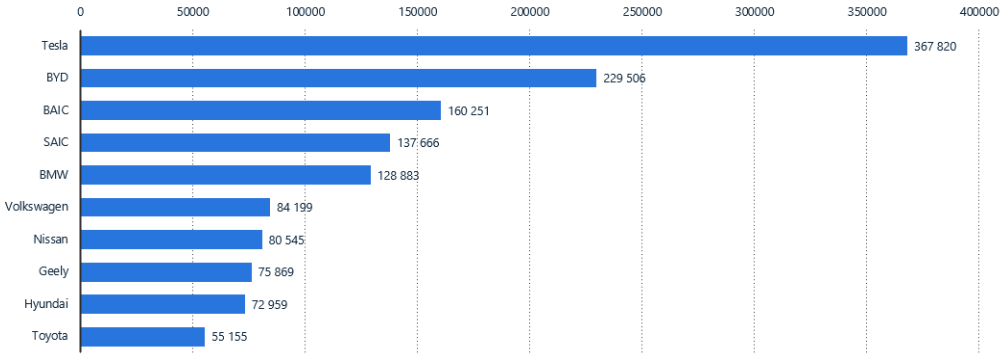


Figure 47: Estimated plug-in EV sales worldwide in 2019, by brand (units)

7 Corporate Development

7.1 Value Creation in Corporate Development

With Tesla's activities, ongoing and in the past years, in strengthening competencies by developing, acquiring or establishing alliances we can see the following value creation:

Component	Impact
G **Growth**	• acquisition of existing manufactury (Nummi, formerly from Toyota) to turn into Gigafactory • acquisition of Maxwell for vertical Integration of battery parts production • acquisition of SolarCity for product line extension (solar panels) • opening of Gigafactory Berlin-Brandenburg for intensifying geographical presence and EU market penetration • opening of dealerships around the world (B3, Europe, Asia, etc.) for geographical expansion • development of own supercharger network for vertical integration
M **Margin**	• Research and Development for own battery production to decrease supply costs & increase product attractivity • Strategic Alliance with Air Alliance, one of Chinese biggest Airline Groups, to Market Model 3 decreased marketing costs • Partnership with Athlon Car Lease for establishment of leasing options for several models increased distribution scale • Partnership with Toyota to set up Gigafactory decreased fixed variable costs for manufacturing
R **Risk**	• Increase in share of cars leased vs. cars sold decreases dependency on sales only and reduces revenue & income risks • Diversification by developing business models in energy generation, storage and distribution • High investment on staying technological leader for EVs including battery capacity to maintain longest range increases risk on profitability due to innovation failure but decreases risk on marketing & distribution side due to brand perception as "best in class"
SU **Sustainability**	• Development of company-owned solar fields for energy generation increases environmental sustainability contribution • Development of company-owned supercharger network to increases environmental sustainability contribution • Acquisition of SolarCity increased environmental sustainability contribution + • Acquisition of SolarCity increased economical sustainability of Tesla by entering another growing market (renewable energies)

Table 41: Value Creation in Cooperation

7.2 Mergers and Acquisitions

Especially in the past 5 years Tesla has been very active when it comes to acquisitions. Even though Tesla does not enclose information about every acquisition in their yearly reports[109], there have been at least five acquisitions since 2016 that are public.

2016

SolarCity - A producer of solar panels and roof tiles for commercial and private purpose. The acquisition of SolarCity is probably one of the most famous acquisitions that Tesla did so far and clearly underlines Tesla's ambitions to diversify their product portfolio in the field of production and storage of electricity.[110]

Grohmann Automation - Grohmann Automation is a 1963 in Germany founded company that is specialized in automated manufacturing systems. Purpose of this acquisition was to acquire knowledge in automated production as well as to produce key elements for Tesla's

[109] Electrek (2019): https://electrek.co/2019/10/29/tesla-acquisitions-worth-96-million/
[110] Tesla (2016): https://www.tesla.com/de_DE/blog/tesla-and-solarcity?redirect=no

factories in the Grohmann factory in Prühn (Germany) in order to make Tesla's factories as productive as possible.[111]

2017

Perbix - Perbix is an American company that is specialized in producing automated production equipment and which has been a supplier of Tesla for several years before the acquisition already. With the acquisition of Perbix is Tesla supporting the strategy of vertical integration, which they are following since day one already. Tesla often states that their factories are a product on its own and are supposed to be a machine that produces the machine. The acquisition of Perbix is bringing Tesla one step further towards that goal.[112]

2019

Maxwell Technologies - Maxwell Technologies is a manufacturer of energy storage and power delivery products for automotive, heavy transportation, renewable energy, backup power, wireless communications and industrial and consumer electronics applications. Though it is obvious that Maxwell Technologies fits into Tesla's profile in terms of product range, does Tesla not share much information about the acquisition and was only doing a vague announcement for their shareholder in 2019.[113]

Deepscale - Deepscale is a technology company, that is focused on the development of perceptual system technologies for automated vehicles and was acquired by Tesla in October 2019. Even though Tesla did not publish any statement on their website, it can be expected that this acquisition helps Tesla to improve their technology for self-driving cars.

7.3 Strategic Alliances

Despite the high vertical integration, does Tesla also have strategic alliances with other companies and even with competitors. Especially remarkable is, that Tesla is able to attract major global players for their partnerships, even when Tesla was still a startup sized car producer from the Silicon Valley.

Daimler in 2009 - In 2009 Tesla and Daimler started to partner with a capital participation of Daimler in Tesla. Daimler acquired 10% of Tesla's shares and got batteries for the soon to be released electronic Smart Car. Tesla got in return needed cash and engineering expertise for their back then planned Model S sedan.[114] The partnership resulted in further development of battery technology and further individual EV projects, such as the Mercedes Benz B-class electric car. The alliance ended it 2014 by Daimler selling its stake in Tesla and making a 800m USD gain.[115]

Toyota in 2010 - In 2010 Toyota bought 3% of Tesla's shares for roughly 50m USD. The deal enabled Tesla to buy the former New United Motor Manufacturing, Inc. (NUMMI) factory in Fremont, California which was created as a joint venture between Toyota and General Motors Corp. in 1984.[116] Toyota expected from the partnership to learn from the flexibility and quick decision making that Tesla has and to get some of Tesla's startup spirit into the corporate

[111] Tesla (2016): https://www.tesla.com/de_DE/blog/formation-of-tesla-advanced-automation-germany?redirect=no

[112] CNBC (2017): https://www.cnbc.com/2017/11/08/tesla-buys-perbix-for-factory-automation.html

[113] Tesla (2019): https://ir.tesla.com/news-releases/news-release-details/tesla-completes-acquisition-maxwell-technologies

[114] WIRED (2009): https://www.wired.com/2009/05/daimler-tesla/

[115] Forbes (2018): https://www.forbes.com/sites/jeanbaptiste/2018/10/29/mercedes-benz-could-partner-with-tesla-again-says-daimler-ceo/#7987dd6a4580

[116] Sloan Review (2016): https://sloanreview.mit.edu/article/how-to-manage-alliances-strategically/

structures of Toyota. The partnership ended in 2016 with Toyota announcing to develop their own EV and selling their Tesla shares, while Tesla grew from a producer of a small-batch sports car to the leading EV car producer in the world.[117] Therefore Tesla became a serious competitor for Toyota.

Panasonic in 2014 - The partnership with Panasonic is the one partnership that is still ongoing and resulted in a jointly 5bn USD investment into a lithium-ion battery plant in Nevada. As already mentioned in this report, do Tesla and Panasonic have a very close relationship, by having a battery production line operated by Panasonic within the Tesla Giga Factories.[118] But as of 2020 is Panasonic partnering with Toyota too by starting a joint venture for electric car batteries. This means that Panasonic can become a threat for Tesla, by joining forces with other car producers and using knowledge gathered in the Tesla Partnership.[119]

[117] Financial Times (2017): https://www.ft.com/content/130a937a-48fd-11e7-919a-1e14ce4af89b
[118] Sloan Review (2016)
[119] Teslarati (2019): https://www.teslarati.com/toyota-panasonic-tesla-partner-ev-battery-2020/

8 Planning

8.1 Organizational Structure

A company's organizational structure is the human resources framework that defines how activities are allocated and how tasks are supervised. Currently, Tesla has a loosely functional structure with CEO Elon Musk as top management with all the control, and with some functions such as Sales or Finance defined. This functional structure is suited for a company focused on one industry and one that is active in a limited amount of markets.

With Tesla's massive growth and expansion throughout the world, their structure would need to grow with them. For each new region entered, they should have a team on the ground concentrating on production, sales, legal and finance, and human resources. Tesla is also an energy company and should have a clear definition of its two divisions – electric vehicles and energy. These two divisions complement each other and interact, but as this is a minimal interaction, there is no need to develop Tesla's organizational structure to a full network structure.

One possible future for Tesla's organizational structure is an advanced macrostructure with strategic business units, indicated below:

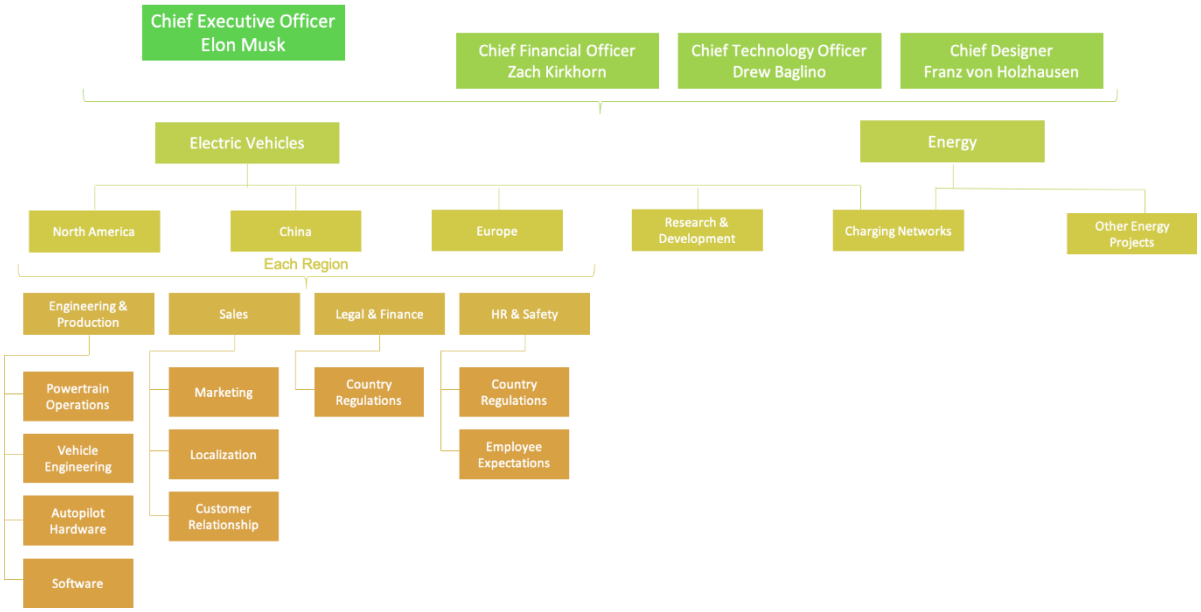


Figure 48: Macrostructure Tesla

9 Implementation

9.1 Functional Management

With every new strategy, Tesla would need to translate that strategy into functional policies that could be undertaken by each function in the organizational structure: Engineering & Production, Sales, Legal & Finance, HR & Safety, and Research & Development.

The table below indicates where new functional policies are needed or where corporate developments should be targeted if Tesla tries to take advantage of the opportunities outlined in the New SWOT.

OPPORTUNITIES FROM NEW SWOT	ENGINEERING & PRODUCTION	SALES	LEGAL & FINANCE	HR & SAFETY	RESEARCH & DEVELOPMENT
Target new customer segments with recently launched and upcoming models: Recently launched Model 3 for lower-income customers, and upcoming Cybertruck & Semi for cargo transportation businesses		Yes			
Internalize battery production to have the technology as an asset and expand on it for the vehicle production as well as the own energy supply & storage	Yes		Yes	Yes	Yes
Expand solar energy production market by increasing sourcing & marketing efforts, e.g. buying another smaller company in the field	Yes		Yes		Yes
Put high marketing effort on Cybertruck distribution in the US: 17,6% of total car sales in the US automotive market are made up by Pickup trucks		Yes			
Expansion of Product-Line: Create, design & Innovate to produce and distribute new models to serve low-income customers as well as cargo transportation customers	Yes				Yes
Increase cross-selling activities: also for supercharger-networks, solar panel distribution to Tesla-customers as well as the batteries	Yes	Yes			Yes
Expansion of super charger networks to other countries and increase of density in the US, partnering with / acquiring of other operators of such networks	Yes		Yes		
Sales Expansion into untapped markets, especially Asia with existing models		Yes	Yes	Yes	
Put high marketing effort for Semi Truck for cargo transportation to conquer a small share of that market segment		Yes			
Keep investing in in-house technology for product-line and product-breadth expansion as well as new business development in the energy sector	Yes		Yes		Yes
Invest in sourcing as well as in R&D on resources in order to become expert in the supply chain + reducing production costs or keeping them on the same level	Yes		Yes		Yes
Get more market power in the supply chain by diversifying suppliers even more and contracting with financial options counter highly volatile resources needed for production		Yes	Yes		
Optimize distribution network for customer services by investing into repair services and sparepart availability in/around Tesla distribution centers		Yes		Yes	
Continuously distribute the Semi Truck and innovate to expand in the cargo transportation segment and get a significant market share		Yes			

Table 42: Opportunities from new SWOT

9.2 Process & Project Management

Henry Ford revolutionized the transportation industry when he introduced the moving assembly line into his factories. It wasn't the introduction of a new car, but the increase in production efficiency that changed the industry dynamics. It seems unimaginable that vehicle production efficiency has barely improved in the last 100 years. Musk, like Ford, wants to revolutionize the machine which builds the machines; and this has the potential to drive humanity forward.

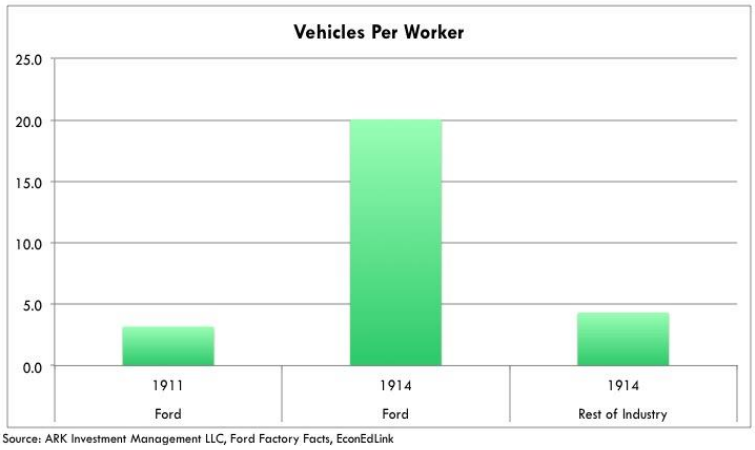


Figure 49: Vehicle per worker 1914

When Ford introduced the moving assembly line, production efficiency increased by roughly an order of magnitude. As shown in Figure 49, Ford's innovation left the rest of industry in the dust and is arguably the tipping point that led to tremendous consolidation in the auto industry. While the moving assembly line is innovative, with few barriers to entry the rest of the auto industry was able to adopt the technology.

Tesla is not the first auto manufacturer to aim for an improvement in productivity. Toyota has its "New Global Architecture", BMW its "Value-Added Production System". Yet, as we see it, most efficiency-driven programs today are focused on less customization and more modularity.

In contrast, Tesla's approach could cause a step-function to increase in productivity. Currently Tesla's productivity is low relative to the competition, as shown below, but the comparison is not life-for-like. Tesla is more vertically integrated than the other manufacturers. Instead of simply assembling out-sourced parts in a plant, it is turning raw materials into cars, much like Ford did in its plants in 1914.

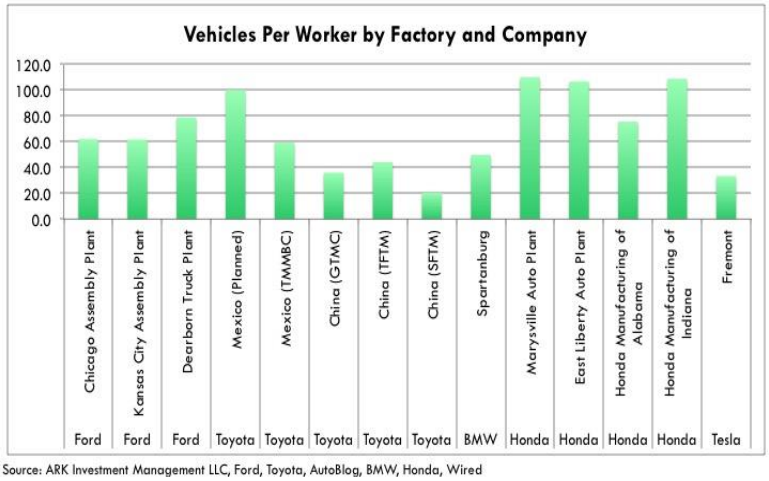
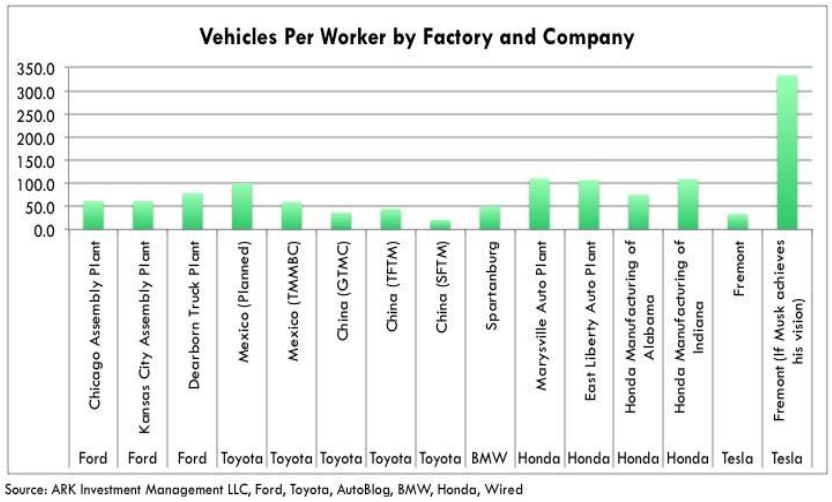


Figure 50: Vehicle per worker 2018

While automotive manufacturing has the highest industrial robot density of any industry, Tesla is unique in the industry as robotics has become part of its vertical integration. Traditional auto manufacturers are constrained during production by the quality and timing of parts received from suppliers. A fully automated factory, building vehicles from scratch, can optimize the process based on first principles, Musk's preferred method of operation.

If Tesla realizes a step-function increase in productivity that it anticipates at its Fremont factory, its production could approach one million units, without an increase in the number of people it employs. Musk notes that employees will be “maintaining machines and upgrading the machines and dealing with anomalies. And the output per person will be extraordinarily high.” We think robots will be key to the turbocharging of the productivity. As shown in Figure 51 below, if Tesla realizes its goals, Fremont’s productivity would increase roughly ten-fold, topping the most productive auto manufacturing plans in place today by nearly three-fold.



Though Tesla haven’t been hitting all their production targets during their relatively short lifetime, Elon Musk doesn’t seem too worried. The new automated lines for the Fremont factory are not just a one of addition to the factory. These automated lines are part of a larger project which is possibly more ambitious than any of his other quests.

Figure 51: Vehicle per Worker Forecast Tesla

Musk’s Gigafactory aims to automate and optimize the production process to new levels; reducing human involvement and maximizing the speed of output. In November 2016, Tesla completed the purchase of a German company called Grohmann Engineering. This obscure German firm are specialists in the development of automated technologies for manufacturing. Some of their legacy clients include Daimler (parent of Mercedes-Benz) and BMW. Tesla’s plan was to add a further 1000 jobs to Grohmann’s existing workforce of 700; a massive increase in production potential now focused solely on one company.

Musk wants to work on the machine which builds the machine; to create a production system so advanced we’ll think of it as an “alien dreadnought”.

For Musk, the way to approach and improve the issue lies in the machine which builds the machine. Like for the car operating system able to adapt and learn new things with the objective of autonomous driving, Tesla has been populating its factories with robots that should be able to learn and improve over time.

Image 11: Tesla Production

Image 12: Toyota Production

10 Conclusion and Outlook

As we have seen in the report, TESLA is one of the most energising car company of the last decade. Through the execution of a clear vision to lead the world's transition to electric mobility by bringing a full range of increasingly affordable electric cars to market. Under Musk leadership, the company achieved the build up phase to become a recognised, high quality producer of EV's with a high brand awareness targeting high income customers. More important the company achieved unprecedent valuation on the stock market, sending a strong signal to the competition in the car industry that investors believe in the company long term growth.

Pure speculation or real confidence? And now with the challenge of the "hypergrowth phase" some key questions remain for TESLA to become a sustainable leader of the car industry. Will the company be capable of delivering on its promises to mass produce EV's for customers with mid-level income globally including succeeding in China and India and up-pace the competition ? Will the company win the debate of autonomous driving to become the first self-driven car fleet or new entry in the semi and cybertruck segment ?

We believe that the following 3 strategies could enable TESLA to further disrupt the market in a sustainable manner:

#1 Win in robotics to build scale in key markets

To win in China the biggest car market in the world, surpass BMW in Germany with the new European Gigafactory and continue to lead in US, TESLA must deliver the machine which teach the machine to achieve unprecedent automation levels and operate its 3 gigafactories with a minimum man involvement. This will result in increasingly low cost of production, delivering on its promises for the increasing EV customer demand and will take years for the competition to obtain.

#2 Lead the world transition to sustainable energy

Using the showcase example of Norway (55% penetration of EVs with 90% renewable energy source), the Netherlands and to a certain extent China with recent regulations, the company can leverage the country examples and its SolarCity branch to influence politicians to embrace the sustainability agenda.

#3 Transform passenger urban transportation

Demonstrate the feasibility of autonomous driving: this will open a huge market for TESLA cars, already containing the necessary technology to replace Diesel buses for public transport. The plan is to develop a self-learning fleet which will be safer and more effective than the existing ways of transportation.