

Tesla Motors

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For this paper, I will conduct an industry analysis using Porter's Five Forces model on the electric car industry of 2015. Then I will give a brief overview of Tesla's foundation, its business model, and its core competencies. Next I will describe Tesla's current strategy while analyzing their internal strengths/weaknesses and threats/opportunities using a SWOT analysis. Finally I will present my own scenario of success I feel that Tesla should implement to create a competitive advantage.

While there are two types of electric vehicles (EV) in this industry: Plug-in hybrids (PHEVs) and Battery Electric Vehicles (BEV), I will be focusing primarily on battery powered vehicles since Tesla only makes BEVs. The best way for us to understand the electric car industry's external pressures would be to conduct Porter's Five Forces Analysis on the electric car industry in its current state (2015).

Threats from new entrants: The biggest obstacle to entering the EV manufacturing market would be the high startup and recurring costs associated with the business. These costs include startup costs associated with purchasing/leasing land, facilities and equipment, raw materials and various licenses and permits. In terms of recurring costs these are associated with labor costs, raw materials, R&D assembly and energy costs. To help with these costs several federal state and municipal governments (such as California) offer low-interest loans to help these companies so the high cost barrier becomes mitigated. Even if a new entrant can overcome these high cost hurdles, they must create brand and product awareness among potential consumers, establish efficient supply chains and distribution systems and strike the right balance between competitively priced and quality performance vehicles. New entrants also have fewer strategic resources at their disposal compared to established companies such as Ford or Toyota making it difficult to thrive. Finally given the large amount of time it takes to complete the manufacturing process, new entrants must be able to have enough capital available to weather the periods of little to no revenues. Overall this is a difficult industry for new entrants with few being able to survive and thrive. **Overall (+)**

Buyer Power: While buyers cannot directly influence prices of EVs, they carry some power due to substitutes (such as gasoline vehicles) that are more readily available. Since for many consumers, a vehicle will be the second most expensive item they purchase many will hold onto their current vehicles and forgo purchasing new models. Consumers also have the option of buying used vehicles or using public modes of transportation instead. These factors give consumers some power. When determining whether to make a purchase of an electric vehicle consumers would consider whether an electric car is comparably priced to gasoline vehicles. Many electric vehicles are still higher in price due to higher material costs associated with producing electric vehicles, high R&D costs, as well as the fact that companies cannot yet take advantage of economies of scale, however these costs are gradually being lowered. The battery is the most expensive component in an electric vehicle with lithium ion batteries being most commonly used. In 2012, Ford's Chief Executive Alan Mulally stated that battery packs for their Ford Focus EVs were between \$12,500 and \$15,000 per battery. Their batteries were 23 kwh (kilowatt hours) and cost Ford between \$522 and \$650 per kwh (Osbourne). Government rebates/incentives, manufacturer subsidies and advancements in technology have all contributed in lowering the overall cost of electric vehicles and making them more competitively priced. **Overall (+-)**

Pressure Among Rival Firms: Competitive rivalry has intensified as more automobile firms have begun branching out from gasoline to electric vehicle production. Companies such as Ford (with their Focus brand), Toyota (with RAV4) and Chevrolet (with Spark brand) have begun to offer electric vehicles to consumers with their Focus, RAV4 and Spark models respectively. Companies try to gain an advantage through offering better warranties/services, heavy discounts or rebates

Consumers want a vehicle that is both high quality and attractively priced. To meet these needs, technological innovations will be a key driving force in determining a manufacturer's competitive advantage since these advancements generally lead to lower costs and higher performance. Companies such as Nissan and Tesla who have cost-effective batteries have an advantage since they can pass these lower costs on to consumers in the form of lower prices. Ultimately firms that can remain on the cutting edge of technological advancements and effectively take advantage of these developments will be the ones who will grow and thrive in this industry. **Overall (-)**

Bargaining Power of Suppliers: Suppliers for EV parts and components are few and in some parts 2-3 suppliers make up a large portion of the market share. For example in terms of volume, lithium ion battery manufacturers Panasonic, AESC, and LG Chem represent 38%, 23% and 12% of the market share respectively with a combined market share of 73% (Deign). These batteries make up a large portion of total weight, in Tesla's case 28.6%, and are one of the most expensive components of EVs (Tesla Model S). Given the importance of these batteries and their high purchase costs, these suppliers wield large power. In order to keep EVs lightweight, the bulk of the exterior is made of aluminum rather than steel. Automobile manufacturers are increasingly making aluminum a larger part of the exterior. In 2009, over 327 pounds of aluminum were used per vehicle. By 2025, this is expected to jump to 550 pounds per vehicle (Passenger Vehicles). In terms of bargaining power, Novelis has heavy influence since they currently represent over 50% of aluminium sheet in the auto industry (Novelis). Overall suppliers of electric cars wield great bargaining power. **Overall (--)**

Threat of Substitutes: There are many modes of transportation capable of satisfying consumer needs and these are in greater abundance. I will only address gasoline substitutes. Fuel costs play a large role in determining this factor. If gasoline prices are low, there is less incentive for consumers to switch to EVs. In terms of price/performance gasoline vehicles still have a slight edge. Potential EV consumers are faced with either spending more money on an EV that can travel the long distances gasoline vehicles can, or they can purchase an EV that is comparably priced yet cannot match gasoline vehicles in terms of travel distance. Since 80% of commuters travel less than 40 miles a day this is not as much of an issue. **(SOURCE)** Advancements in technology have begun to narrow this performance/price gap further mitigating this problem. While demand for EVs is increasing, it still represents less than 1% of the total market (Tierney).

Overall (+-)

Overall this is a relatively unattractive market to compete in. Suppliers have high bargaining power with EV manufacturers, consumers have attractively priced substitutions and other automobile manufacturers have started to enter the market further lowering profit margins. These factors combined with the high costs associated with this industry make it difficult to compete in.

Overall (-)

Company Overview

Tesla was first incorporated in July 2003 in Menlo Park California. It was founded by engineers Marc Tarpenning and Martin Eberhard. During this time, many electric car companies were focused on using a lead-acid battery to power their vehicles thus limiting their capabilities. Instead Tesla focused on taking advantage of the increased capabilities of lithium-ion batteries. This combined with the use of electric motors enabled Tesla's vehicles to achieve high acceleration rates and regenerative braking which in turn made Tesla's vehicles deliver high performance with high efficiency thus giving them a competitive advantage over rivals.

The company currently has over 5 million square feet of property. Tesla's facilities include 350,000 sq. ft. leased from Stanford University which is set to expire in 2020. This facility serves as their administrative and powertrain development headquarters. They also completed the purchase of their Tesla Factory in 2010 in Fremont California which serves as one of their major production hubs. Tesla also has facilities located in Hawthorne, California, Maidenhead, United Kingdom and Tilburg, Netherlands. The recent purchase of Tesla's Gigafactory in Reno Nevada for \$5 billion represents Tesla's largest owned property. With the exception of the Tesla Factory in Pao Alto California and the Gigafactory, the remaining properties are leased (Tesla 10k).

Tesla acquires its revenue from three primary sources: Its automobiles, its powertrain components, and the sale of its ZEV (Zero-Emission Vehicle) credits. In 2013, Tesla earned \$2 billion of its revenues through automobile sales, primarily through its Model S which sold 25,000 units in North America and Europe. Tesla sold these units using its direct sales model where it sells its models to individual consumers either over the Internet or through their company owned stores.

Tesla has been providing development services and full powertrain systems and components to Toyota and Daimler. For Daimler, Tesla sells battery packs and chargers to Daimler's electric vehicles, primarily the Smart model. Tesla also develops full electric powertrain systems to be used by Toyota for their electric cars primarily the RAV4 model. In 2013, Tesla sold 1,600 powertrain systems to Toyota and generated over \$45 million in revenue (Tesla 10k).

In 1990, California passed the Zero-Emission Vehicle Regulations in order to encourage automobile manufacturers to develop zero emission/environmentally friendly vehicles.

Essentially manufacturers must ensure that a portion of vehicles delivered are zero emission vehicles and partial zero emission vehicles. Manufacturers can earn ZEV credits if they produce more zero emission vehicles than the minimum requirement of the law. Manufacturers who have these credits can then sell them to other manufacturers who use them to comply with regulatory requirements and make up for deficits. Since Tesla produces only zero-emission vehicles, they have no minimum requirement and earn credits on each vehicle delivered. They sell their excess credits to other manufacturers. In 2013, the company earned over \$129 million from the sales of these credits (Tesla 10k).

Tesla's Strengths

Tesla's competitive strengths include:

- Their high concentration of R&D spending
- The strategic placement of their facilities
- Quality batteries at competitive prices
- Reputation for quality

One of Tesla's strengths is its high concentration on research and innovation. To remain competitive, Tesla has greatly expanded its funding for R&D activities. From 2010 to 2015 Tesla's R&D budget has expanded from \$93 million to almost \$465 million (N.A.). Some of its innovations are focused in battery packs, motors, powertrain systems and vehicle engineering. Their proprietary technology includes: cooling systems, safety systems, charge balancing systems, battery engineering for vibration and environmental durability, customized motor

design and the software and electronics management systems. As of 2013, Tesla had 208 issued patents and more than 280 pending patent applications (Tesla 10k).

Another of Tesla's strengths includes its strategically placed facilities in California which conducts the bulk of their R&D activities. The majority of these facilities are located in what is known as the Silicon Valley region of California. This region contains universities specialized in various fields of engineering and as a result contains a large pool of engineer graduates that Tesla can potentially employ.

Another of their strengths is the battery pack system. Tesla uses lithium ion batteries made up of thousands of inexpensive commodity cells, similar to what is found in laptops and phones. These cells have been redesigned and simplified on Tesla's vehicle. The expensive safety systems built into each cell were removed. Normally these would be important and necessary in laptops and cell phones, but since Tesla has a built in liquid coolant this problem is non-existent in their vehicles (Fisher)

This system contains two to three times the energy of any other commercially available EV battery pack. This gives Tesla's vehicles an edge in terms of travel distance before needing to be recharged (Tesla 10k).

In 2014, Tesla became the fifth highest rated automobile manufacturer according to Consumer Reports Car-Brand Perception Survey and was the highest manufacturer in technology and innovation. While its brand perception still ranks behind big named manufacturers such as Ford and Toyota, Tesla had the largest increase jumping 47 points from last year's score (2014 Car Brand). What helps enhance their quality image is the fact that the company has full control over many of their processes. Manufacturing and R&D are done at Tesla's factory. Any purchases, service repairs/maintenance are also done through Tesla. This all ensures that the quality is uniform throughout Tesla's operations rather than risk diminishing their image/reputation through using third party companies. Having a reputable perception encourages new buyers to purchase Tesla's products and possibly become repeat customers in the future.

Tesla's Strategies

Currently Tesla has been expanding upon their direct-sales business model. Tesla's direct sales model enables the company to sell its vehicles directly to the consumer either through the company website or company owned specialty stores. With this direct sales model, Tesla hopes to control costs of inventory, maintain/strengthen Tesla Brand, obtain instant customer feedback all while providing the consumer with a unique and personal shopping experience. In 2013, the company had 118 specialty stores located throughout North America, Europe and Asia. By the end of 2014, the company wanted to grow this network by 75% (Tesla 10k).

Tesla has also begun expanding into markets outside of the U.S. Europe represented 18% of Tesla's total sales in 2013 (N.A., Forums). Out of total sales in Europe, Norway was Tesla's largest European market with 801 units being sold. This is quite high when compared to 531 total units sold by a combined Netherlands, Denmark and Germany (Young). Some of the reasons for high sales in Norway include the numerous government incentives and benefits of owning an EV in Norway such as: no tolls, free use of bus lanes, free parking, free ferry rides, free charging at municipal stations and no taxes when purchasing an EV. The biggest market Tesla would like to get into is China with its large consumer base. Unfortunately the company sold only 3500 vehicles in China for the year 2014, well below its estimates (Korosec, K.). One of the major problems stems from the lack of infrastructures in China that support EVs.

Tesla recently purchased their Gigafactory in order to meet the projected increase in demand for EVs for both short term and long term increases. Tesla plans to use 30% of its Gigafactory capacity to produce its lithium batteries and by 2020 Tesla will produce more batteries annually than were produced worldwide in 2013. Using economies of scale and effective manufacturing in conjunction with Tesla's partnerships with Panasonic will allow the company to produce batteries at lower costs and meet the company's projected demand of 500,000 vehicles per year by 2020 (Tesla Gigafactory).

The company also plans to shift its offerings to lower-income consumers. The company's current Model S and its upcoming Model X are still priced fairly high with both being priced at approximately \$69,900. However Tesla is also planning to develop the Model 3 which is

expected to carry a price tag of \$35,000 and be available to the general public by 2017 (Elliott). This dramatic reduction in price stems from Tesla's expected lowered production costs associated with their Gigafactory.

Recently the company has begun to expand into using its batteries to power homes. Dubbed the Powerwall, the battery can be mounted on a wall and can be installed in 30-60 minutes. It will be sold for \$3,500 for 10kWh and \$3000 for 7kWh (excluding inverters and installation fees). Both of these models will be 220 pounds, 51 inches tall, 33 inches wide and 7 inches thick. (Griggs) These batteries will be connected to a grid and will be charged up at night and be used for to power facilities during the day. Tesla expects this will cut electricity costs by 25%. (N.A. Tesla) The big risk with these batteries lies in the fact that at their current price, it is impractical for many households to afford them, even if they carry long term cost-savings. However if advancements in technology and supply chain efficiencies can drive this price down, it could be a reasonable substitution to traditional power outlets. Also Tesla could face problems since the Powerwall lacks a DC to AC converter. Tesla stores DC (Direct current) while many homes operate on AC (Alternate Current) (Allain). In order for Tesla to reach a larger market with the batteries, they would need to have this converter as part of the battery. Finally it is estimated this battery could only run for 5 hours, a relatively short time. Tesla would need to expand this power time.

Tesla has begun testing these batteries with major retailers such as Target and Walmart and other companies such as Amazon, AES, SolarEdge, EnerNOC and Southern California Edison to name a few.

TESLA SWOT ANALYSIS

Strengths	Weaknesses
<ul style="list-style-type: none">-Direct Sales Model-Good Product Value-Highly rated products and services	<ul style="list-style-type: none">-Limited Product Line-Limited Distribution/Sales capabilities-Difficult to appeal to price sensitive consumers-Large array of single source suppliers

Opportunities	Threats
<ul style="list-style-type: none"> -Large growth of EV sales -Sales of components/parts to manufacturers -Expansion into different industries (batteries for example) 	<ul style="list-style-type: none"> -Increased Competition -Wide array of substitutes -Legal issues -Negative publicity

STRENGTHS

-Direct Sales Model: Having a direct sales model in place allows Tesla to build a direct relationship with the consumer, reduce downstream costs and have higher profit margins than it would if it used dealers and other distributors. Tesla has its stores strategically concentrated in metropolitan areas with the highest concentration being in Chicago, Los Angeles, New York, Miami and San Francisco.

-Good product value: When compared with similar high performance EVs offered, Tesla's vehicles are much cheaper. Comparable performance vehicles such as Commuter Cars Tango model and Mercedes-Benz SLS AMG Coupe Electric Drive are priced at \$240,000 (Plug in America) and \$435,000 respectively (Lindberg). This difference in price puts Tesla's vehicles at an advantage.

-Highly rated products: Tesla's Model S has won numerous awards since its rollout in 2012. Motor Trends, a notable car magazine awarded it Car of the Year for 2013. It also received Consumer Reports highest given rating of 99/100. Other awards include Time's best invention of the year (2012), CNET's Tech Car of the Year (2012) and Green Car Reports Best Car To Buy (2013). Even Tesla's repair service was awarded Best Repair Service by Consumer Reports in 2015 (DeMorro).

WEAKNESSES:

-Limited product line: Given Tesla's relatively new appearance in the automobile industry and fewer resources, this isn't surprising. Currently the company only offers 2 models: The Model S, which one can order and receive now or the Model X which is still in development and can only be reserved. Carrying only two models however limits the potential consumer base. If the

company had a wider selection or included other types of vehicles such as trucks or motorcycles, it could appeal to a larger audience.

-Limited Distribution/Sales Capabilities: Since Tesla sells directly to the consumer through either its stores or its website, it limits its sales volume. Also compounding this weakness is the fact that several U.S. states have laws enacted that prevent a car manufacturer from selling a car in that state regardless if they have a physical presence or it is sold online. Instead these states require manufacturers to work with locally-owned dealers (See Legal Issues under Threats for further details)

-Difficult to appeal to price sensitive consumers: The cheapest version of the Model S (after incentives and rebates have been added) costs \$57,500 (N.A. Resale Value)

While the average sticker price of a new (gas) vehicle was \$31,252 (Healey J.)

Even among other EVs, Tesla's models are much higher. Toyota's RAV4 and BMW's i3 have price tags of \$23,680 (2015 (n.d.)) and \$41,350 respectively (BMW i). This price gap makes it difficult for consumers concerned with price and as a result limits the Model S appeal to higher income consumers.

-Large Array of Single Source Suppliers: Tesla has over 300 direct suppliers for its Model S, many of these are single source suppliers who do not have long term agreements in place with Tesla. This could greatly affect short-term operations of Tesla if there is a delay in receiving these parts from suppliers (i.e. natural disasters, terrorist attacks, production shortages) and it could be difficult and costly for Tesla to find these parts from other suppliers.

OPPORTUNITIES:

-Large Growth of EV Sales: Sales in EV have grown tremendously during the last few years. From 2011 to 2014 total annual sales grew from 50,000 units to 300,000 units. This has been in large part due to the Electric Vehicle Initiative (EVI), a multi-government policy forum dedicated to accelerating the introduction and adoption of electric vehicles worldwide. EVI currently includes 16 member governments from Africa, Asia, Europe, and North America, as well as participation from the IEA (International Energy Agency). From 2008-2014, countries under this initiative have invested over \$16 billion particularly in areas such as R&D, financial incentives for EV consumers and infrastructure development to support EVs (N.A. Global). As EVs

become more attractive substitutes to traditional gas vehicles, this growth will continue giving Tesla the opportunity to expand its consumer base and increase its revenues.

-Sales of components/parts to other manufacturers: Tesla's powertrain and battery pack systems are of such quality that they could be used to generate additional revenues by selling these components for other EV manufacturers to use in their vehicles. While they have already done this with Toyota and Daimler, there are many other manufacturers they could engage with to generate additional revenues such as Ford, Honda and Chevrolet.

-Expansion into other industries: Recently Tesla announced its plans to begin using its batteries to power homes and businesses. While their capabilities are limited at this point (only 5 hour power time), research and development activities can greatly increase this time. Its Gigafactory will allow it to produce large amounts of batteries while taking advantage of economies of scale to lower costs, thus making it more attractively priced compared to competitor batteries.

THREATS:

-Increased Competition: Tesla faces increasing competition from both traditional automakers such as Ford, Toyota and Chevrolet as well as newcomers. Apple is planning on releasing an electric vehicle dubbed Titan. Another company looking to enter the EV market is Leshi Internet Information and Technology Co., a Chinese internet TV sales company. This increased competition will make it even more essential for Tesla to stand out among its competitors amid lower profit margins.

-Wide array of substitutes: There are many substitutes of transportation that consumers could use instead of EVs for both long distance and short distance travel. So not only must Tesla compete with other EV manufacturers but with these substitutes as well. Given Tesla's high selling price of its models, this could increase the attractiveness of other lower priced substitutes.

-Legal Issues: Tesla faces legal challenges due to its direct business model. Traditionally automobile manufacturers have sold their vehicles through dealerships. Many federal laws mandate that car purchases go through a third party. Since Tesla sells their vehicles through its

company website or stores, it does not use a third party. As a result, Tesla has been fighting legal battles in several states with its biggest opponent being the National Automobile Dealer's Association (NADA), a trade group that represents the nation's car dealers. Some states where Tesla is banned from selling its vehicles include: Arizona, Texas and New Jersey. This legal battle not only limits Tesla's availability to U.S. consumers but is also costing them financially. The biggest reasons for Tesla's continued use of direct sales model are its control over quality and its higher profit margins.

-Negative Publicity:

In 2013, three of Tesla's Model S vehicles caught fire after their battery packs were damaged. Two of them caught fire after running over metal objects at highway speeds and the third caught fire after hitting a concrete wall. Tesla's design of its battery packs ensured that the fire was limited to a small area and the drivers were alerted to the problem and had time to pull over and escape. This problem has occurred in the Chevy Volt and the Fisker Karma plug-in vehicles as well. While ion-batteries are relatively safe with a fire occurring in 1 per 100 million batteries, the negative publicity surrounding these incidents has made some consumers hesitant to try EVs (Bullis K.).

Scenario for Success:

In order for Tesla to retain and grow its position in the industry, it will need to engage in a combination of several initiatives. These are expansion of its Supercharger infrastructures to support the growth and expansion of the industry, engaging in R&D activities (primarily focused on its batteries and superchargers) that help drive down the price of models while offering quality performance and value to the consumer. Finally Tesla should consolidate and expand its presence in Norway as well as expand its presence in markets such as China and Netherlands.

One of the biggest reasons EVs are unattractive to many consumers is the lack of efficient charging stations. While many EVs can be charged in a person's home or in one of many public charging facilities these are impractical for many since the charging takes too long. In an average household, it would take 15 hours to fully charge an EV and 4 hours at a public station.

(Cunningham, Wayne)

At this point in time, Tesla has some of the best charging capabilities available, its chargers for home use can take a little over 4 hours (this is if the vehicle is equipped with 2 onboard

chargers). Its Superchargers can fully charge vehicles within 30-60 minutes (Wayne Cunningham). While this still takes much longer to refuel compared to gas vehicles, this is an enormous gap compared to other available EV charging outlets. Not only would Tesla need to expand the number of its Superchargers located throughout the world, but it would also need to shorten charge times to a range that can effectively compete with traditional gas refueling stations.

Tesla's research and development is important in an industry where technological advancements make a difference between having a competitive advantage or disadvantage. Its R&D has been responsible for creating a high performance battery as well as charging stations that are better than its competitors. In terms of battery research, the company should focus on making them smaller and cheaper to produce while enhancing their capacity. In terms of Supercharger research, Tesla should focus on reducing total charging time. Finally Tesla should expand its sales and marketing operations in attractive markets such as Norway and China.

Norway has attractive government incentives encouraging consumers to buy EVs. In just 2014 over 23,000 EVs were sold. The country also has almost 6000 public charging stations available. Tesla already has a strong presence there and its Model S is among the highest sold EVs in that market. They are third in total EV market share making up 16.2% of the total market (EV Norway). To expand its market share, Tesla should open up more stores in Norway to reach a larger area of consumers. According to their company site, they have eight stores currently in Norway and are currently planning to open three more soon. Enabling product accessibility to greater numbers of consumers will increase Tesla's revenues.

China's market is attractive due to its large potential consumer base. The government has offered numerous incentives to encourage the production and purchase of EVs. China offers subsidies to local manufacturing companies and to its citizens. Tesla already has a presence in China as well selling 3500 models in 2014 which was well below their expectations. Two major obstacles stand in the way of this becoming a bigger market to Tesla: the high costs of EVs and the lack of supporting infrastructure. The high costs associated with EVs limits Tesla's Chinese consumers to higher-income individuals. China also lacks the charging stations that are available in countries such as U.S. and Norway. By the end of 2013, China had roughly 400 charging stations compared to the U.S. which had over 20,000 charging stations (Marro N.). Tesla should work

together with the government and local utility companies to bring about more charging stations in China. Like with Norway, Tesla should also expand its store outlets to draw in more potential consumers. By engaging in these initiatives now, Tesla will be in a strong position in 2017 when its Model 3 rolls out. Since it will have greater brand awareness among Chinese consumers as well as more charging stations available this will complement the Model 3's price of \$35,000 appealing to many lower income consumers.

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