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BANGALORE-560 103
2020-21

A PROJECT REPORT ON

"ELECTRIC VEHICLES – TESLA INC. "

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CERTIFICATE

It is certified that the report entitled **"ELECTRIC VEHICLES – TESLA INC."** carried out by **ANUBHAV GUPTA (1NH18ME018),** a bonafide student of **New Horizon College of Engineering, Bengaluru,** during the year **2020-21**. It is further certified that all corrections/suggestions indicated for internal assessment has been incorporated in the report deposited in the department library. The report has been approved as it satisfies the academic requirements in respect to Product Lifecycle Management Assignment prescribed for the **Bachelor of Engineering** degree.

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Abstract

The transportation sector has been reported as a key contributor to the emissions of greenhouse gases responsible for global warming. Hence, the need for the introduction of electric vehicles (EVs) into the transportation sector. However, the competitiveness of the EVs with the conventional internal combustion engine vehicles has been a bone of contention. Life cycle analysis (LCA) is an important tool that can be employed to determine the competitiveness of a product in its early stage of production. Moreover, the LCA obtained from the different models of EVs were compared. There was a growing interest in research on the LCA of EVs as indicated by the upward increase in the number of published articles. A variation in the LCA of the different EVs studied was observed to depend on several factors. The goal of this methodology is to highlight vehicle development bottlenecks and make recommendations on the best practices. The intent is to layout a vehicle development process that will focus on the major development of new technology in hopes of minimizing costly changes. The methodology developed in this thesis starts with literature review, which provides a historical perspective of the technology and discusses the advantages and disadvantages of electric vehicles. Environmental issues and concerns will be explored as well. The capital cost of developing this new technology, and assembly plant issues to accommodate this technology will be discussed.

Acknowledgement

We thank the Lord Almighty for showering his blessings on us.

It is indeed a great pleasure to recall the people who have helped us in carrying out this project. Naming all the people who have helped us in achieving this goal would be impossible, yet we attempt to thank a selected few who have helped us in diverse ways.

We wish to express our sincere gratitude to Dr. Manjunatha, Principal, NHCE, Bangalore for providing us the learning environment for preparing this report.

We wish to express our sincere gratitude to Dr. M S Ganesha Prasad Dean, Prof. & HOD-Department of Mechanical Engineering, for his constant encouragement and cooperation.

We wish to express our sincere gratitude to our teacher Dr. Bopanna KD, Department of Mechanical Engineering, NHCE, for his valuable suggestions, guidance, care & attention shown during the planning and preparation of this report.

We express our sincere thanks to all the staff members and non-teaching staff of Department of Mechanical Engineering, for the kind cooperation extended by them.

We thank our parents for their support and encouragement throughout the course of our studies.

Contents

- **Certificate.....**
- **Abstract .....**
- **Acknowledgement .....**
- **Contents.....**
- **Introduction……**

Chapter-1 Life Cycle of Tesla Electric Vehicles .....

Chapter-2 Feasibility Study……

Chapter-3 Characteristics of Electric Vehicles…….

Chapter-4 Conclusion……

Introduction

Unlike conventional cars that are powered by heat energy produced during the combustion of gasoline, electric cars are powered by electricity. The electricity is generated by chemical reactions that take place in batteries. Rechargeable lead-acid batteries (similar to those used for starting the engine in conventional cars) are commonly used. The main advantage of electric cars is that there are no tailpipe emissions; indeed, they are the only zero-emission vehicles. Polluting emissions do result from power plants that produce the electricity needed for recharging the batteries, however, emission control is easier at a single stationary plant than for the comparable number of motor vehicles. Including pollution from recharging its batteries, electric cars generate only one-tenth the pollution of conventional cars.

Electric vehicles are radically different from today's gasoline powered vehicle. Instead of storing gasoline, the electric vehicle stores electric energy in a large, rechargeable battery. A vehicle system controller sends this power to the electric drive motor whenever the driver pushes down on the accelerator pedal. Refuelling is accomplished by plugging the vehicle's charge plug into a 240-volt charge receptacle specifically designed for an electric vehicle. We prefer 240 volts because the vehicle charges faster - recharging at 120 volts can take up to 24 hours.

Electric Vehicles (EV) is the latest technology that the automotive industry is pursuing. Electric cars have been around since the beginning of the automobile. However, the internal combustion engine (ICE) was chosen because it turned out to be the best power system. Modem cars have much lower emissions than their predecessors, but still are not clean enough. As easily recoverable petroleum deposits dwindle, automobile populations soar, and cities become choked with combustion by-products, ICE is increasingly becoming the victim of its own success.

Automobiles must become cleaner and more energy efficient. Nearly after ten decades, the electric vehicle and hybrid electric vehicle may actually prevail. In order to assess the potential benefits of various technologies, it is critical to understand how vehicles are used. Technological research and development have shown that electric vehicles can make a difference in reducing the emission standards. The use of electricity as an energy transporter makes it possible for conservation of environmental quality. Further technology development in the field on energy and drive systems must take place in order to find the proper vehicle process. No one really knows if there is a market for electric vehicles, and how successful they will be? Many automotive manufacturers are developing and implementing EV and HEV. General Motors and Toyota have both release vehicles in 1998, GM EVI and Toyota Prius Hybrid. Ford, Daimler-Chrysler, Honda, and others are also developing this technology as well.

CHAPTER 1

LIFE CYCLE ANALYSIS OF TESLA ELECTRIC VEHICLES

Development of Tesla Inc.

Tesla was founded (as Tesla Motors) on July 1, 2003 by Martin Eberhard and Marc Tarpenning in San Carlos, California. The founders were influenced to start the company after General Motors recalled all its EV1 electric cars in 2003 and then destroyed them, and seeing the higher fuel efficiency of battery-electric cars as an opportunity to break the usual correlation between high performance and low fuel economy in automobiles. The AC Propulsion t-zero also inspired the company's first vehicle, the Roadster. Eberhard said he wanted to build "a car manufacturer that is also a technology company", with its core technologies as "the battery, the computer software, and the proprietary motor".

Ian Wright was the third employee, joining a few months later. The three went looking for venture capital (VC) funding in January 2004 and connected with Elon Musk, who contributed US$6.5 million of the initial (Series A) US$7.5 million round of investment in February 2004 and became chairman of the board of directors. Musk then appointed Eberhard as the CEO. J.B. Straubel joined in May 2004 as the fifth employee. A lawsuit settlement agreed to by Eberhard and Tesla in September 2009 allows all five (Eberhard, Tarpenning, Wright, Musk and Straubel) to call themselves co-founders.

Musk took an active role within the company and oversaw Roadster product design at a detailed level, but was not deeply involved in day-to-day business operations. Eberhard acknowledged that Musk was the person who insisted from the beginning on a carbon-fiber-reinforced polymer body and that Musk led design of components ranging from the power electronics module to the headlamps and other styling. Musk received the Global Green 2006 product design award for his design of the Tesla Roadster, presented by Mikhail Gorbachev, and he also received the 2007 Index Design award for his design of the Tesla Roadster.

Arrangement of funds

From the beginning, Musk consistently maintained that Tesla's long-term strategic goal was to create affordable mass market electric vehicles. Tesla's goal was to start with a premium sports car aimed at early adopters and then moving into more mainstream vehicles, including sedans and affordable compacts.

Musk's Series A investment round of US$7.5 million in February 2004 included Compass Technology Partners and SDL Ventures, as well as many private investors. In February 2006, Musk led Tesla's Series B US$13 million investment round which added Valor Equity Partners to the funding team. Musk co-led the third, US$40 million round in May 2006 along with Technology Partners. This round included investment from prominent entrepreneurs including Google co-founders Sergey Brin & Larry Page, former eBay President Jeff Skoll, Hyatt heir Nick Pritzker and added the VC firms Draper Fisher Jurvetson, Capricorn Management, and The Bay Area Equity Fund managed by JPMorgan Chase. Musk lead the fourth round in May 2008 which added another US$40,167,530 in debt financing, and brought the total investments to over US$100 million through private financing.

In December a fifth round of investment turned into debt financing and added another US$40 million, avoiding bankruptcy. By January 2009, Tesla had raised US$187 million and delivered 147 cars. Musk had contributed US$70 million of his own money to the company. On May 19, 2009, Germany's Daimler AG, maker of Mercedes-Benz, acquired an equity stake of less than 10% of Tesla for a reported US$50 million. According to Musk, the Daimler investment saved Tesla. In July 2009, Daimler announced that Abu Dhabi's investments bought 40% of Daimler's interest in Tesla.

2009 Department of Energy loan

In June 2009 Tesla was approved to receive US$465 million in interest-bearing loans from the United States Department of Energy. The funding, part of the US$8 billion Advanced Technology Vehicles Manufacturing Loan Program, supported engineering and production of the Model S sedan, as well as the development of commercial powertrain technology.

Introduction of Tesla Vehicles in market

Model 3 was unveiled in March 2016. A week after the unveiling, global reservations totalled 325,000 units. As a result of the demand for Model 3, in May 2016, Tesla advanced its 500,000 annual unit build plan (for all models) by two years to 2018.This would in turn allow more Model 3 buyers to benefit from the full US$7,500 U.S. tax credit before the limit of 200,000 cars per maker since 2010 reduces the credit.

In the week preceding the debut on July 7, 2017, of the Model 3 sedan, Tesla's stock-market value declined by more than US$12 billion from a previous value of US$63 billion. Demand for Tesla's existing luxury models, Model S and Model X, did not grow in the second quarter. Brian Johnson of Barclays said that customer deposits for the Model S and Model X fell by US$50 million, potentially indicating that Tesla's introduction of the Model 3 could be adversely affecting their sales. Tesla predicted that luxury sales would reach 100,000 per year, below some analysts expectations.

In January 2012 Tesla ceased production of the Roadster, and in June the company launched its second car, the Model S luxury sedan. The Model S won several automotive awards during 2012 and 2013, including the 2013 Motor Trend Car of the Year and became the first electric car to top the monthly sales ranking of a country, when it achieved first place in the Norwegian new car sales list in September 2013.The Model S was also the best-selling plug-in electric car worldwide for the years 2015 and 2016.

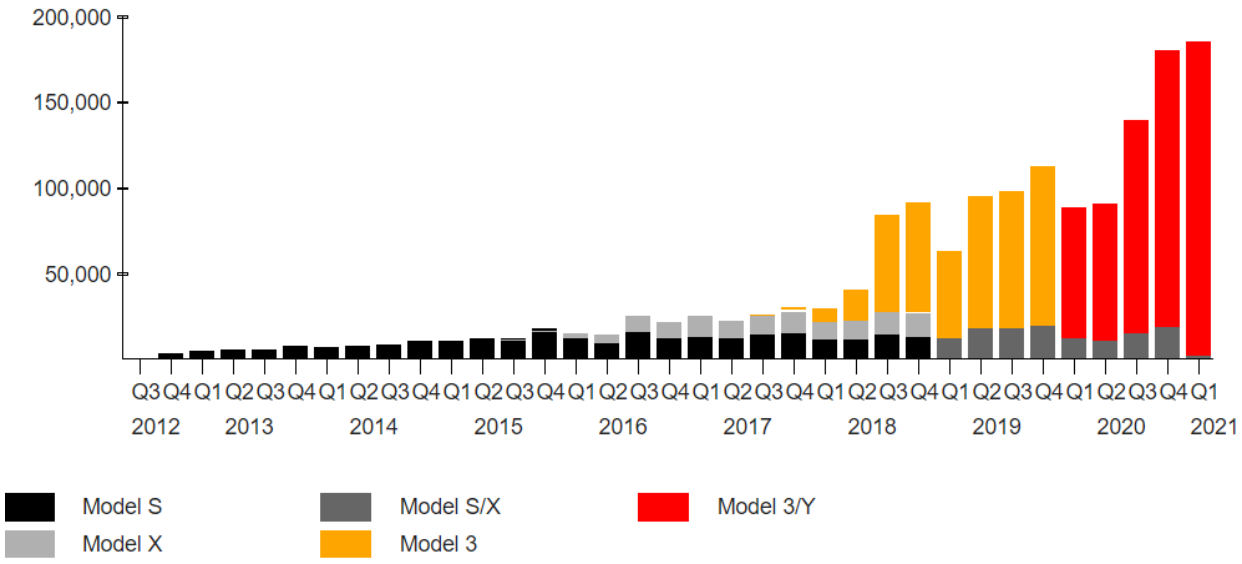
Tesla announced the Autopilot, a driver-assistance system, in 2014. In September that year, all Tesla cars started shipping with sensors and software to support the feature, with what would later be called "hardware version 1" or "HW1".

Tesla launched its third vehicle, the luxury SUV Model X, in September 2015. By this time, the company was selling over 10,000 vehicles per quarter.

Growth of Tesla Inc.

On February 1, 2017 the company changed its name from Tesla Motors to Tesla. In late March 2017, Tesla Inc. announced that Tencent Holdings Ltd., at the time China's "most valuable company," had purchased a 5% stake in Tesla for US$1.8 billion. In 2017, Tesla surpassed Ford Motor Company and General Motors in market capitalization for a couple of months, making it the most valuable American automaker. In June 2017, Tesla appeared for the first time in the Fortune 500 list. In April 2018, Musk increased the 5000 per week number by 20%, forecasting Tesla could achieve 6,000 units per week by the end of June 2018. Tesla sold around 140,000 Model 3 vehicles worldwide in 2018.

In recent years the company has been expanding their production capacity globally. Tesla opened its first Gigafactory outside the United States in Shanghai, China, in 2019. The Giga Shanghai was the first automobile factory in China fully owned by a foreign company, and was built in less than 6 months. The following year Tesla also started construction on a new Gigafactory in Berlin, Germany, and another in Texas, United States. In March 2020, Tesla began deliveries of its fifth vehicle model, the Model Y crossover.



On January 10, 2020, Tesla reached a market capitalization of $86 billion, breaking the record for greatest valuation of any American automaker. On June 10, 2020, Tesla's market capitalization surpassed those of BMW, Daimler and Volkswagen combined. The next month, Tesla reached a valuation of $206 billion, surpassing Toyota's $202 billion to become the world's most valuable automaker by market capitalization. On August 31, 2020, Tesla had a 5-for-1 stock split following the increase in value. For the fiscal year 2020, Tesla reported a net income of $721 million, the company's first annual profit. The annual revenue was $31.5 billion, an increase of 28% over the previous fiscal cycle.

Year	Revenue (mil. USD)	Net income (mil. USD)	Total assets (mil. USD)	Employees
2005[458]	0	-12	8	
2006[458][459]	0	-30	44	70
2007[458]	0.073	-78	34	268
2008[458]	15	-83	52	252
2009[458]	112	−56	130	514
2010[460]	117	−154	386	899
2011[461]	204	−254	713	1,417
2012[462]	413	−396	1,114	2,914
2013[463]	2,013	−74	2,417	5,859
2014[464]	3,198	−294	5,831	10,161
2015[465]	4,046	−889	8,068	13,058
2016[466]	7,000	−675	22,664	17,782
2017[467]	11,759	−1,962	28,655	37,543
2018[468]	21,461	−976	29,740	48,817
2019[469]	24,578	−862	34,309	48,016
2020[5]	31,536	721	52,148	70,757

From July 2019 to June 2020, Tesla reported four profitable quarters in a row for the first time, which made it eligible for inclusion in the S&P 500.Tesla was added to the index on December 21 of the same year. It was the largest company ever added, and the sixth-largest company in the index at the time of inclusion. As investors tried to buy more shares as a result of this inclusion, some analysts, such as J.P. Morgan's Ryan Brinkman, suggested investors exercise caution as Tesla was "dramatically" overvalued. In 2020, the share price of Tesla increased 740%, and on January 26, 2021, its market capitalization reached $848 billion, more than the next nine largest automakers combined and making it the 5th most valuable company in the US.

Maturity phase of Tesla Inc.

In last three months, we saw a sudden fall in Tesla share value as well as the problems related to the huge prices of importing Tesla cars in various middle income level countries. So Tesla is now working to make the cars affordable for buyers by setting up its production factories in such countries so that the cost of import will be saved.

Also, Tesla is now working hardly on their new upcoming projects in order to maintain its position in global markets. Some of them are mentioned below :

Roadster (Second generation)

Tesla Roadster 2020 prototype at the launch event in November 2017 through a surprise reveal at the end of the event that introduced the Semi on November 16, 2017, Tesla unveiled the second generation Roadster. Musk said that the new model will have a range of 620 miles (1,000 km) on the 200 kWh (720 MJ) battery pack and will achieve 0–60 mph in 1.9 seconds; it also will achieve 0–100 mph in 4.2 seconds, and the top speed will be over 250 mph (400 km/h). The vehicle will have three electric motors allowing for all-wheel drive, and torque vectoring during cornering and the SpaceX Package which will include SpaceX cold air thrusters that will increase the speed even more.

At the time, the base price was set at $200,000 while the first 1,000 units. Deliveries of the second generation Roadster are expected to start in 2022.

Tesla Semi

The Tesla Semi is an all-electric Class 8 semi-trailer truck announced in November 2017. Musk confirmed that two variants would be available: one with 300 miles (480 km) and one with 500 miles (800 km) of range. The Semi will be powered by four electric motors of the type used in the Tesla Model 3 and will include an extensive set of hardware sensors to enable it to stay in its own lane, a safe distance away from other vehicles, and later, when software and regulatory conditions allow, provide self-driving operation on highways. Musk also announced that the company would be involved in installing a solar-powered global network of Tesla Megachargers to make the Semi more attractive to potential long-haul customers. A 30-minute charge would provide 400 miles (640 km) of range.

Musk initially said in 2017 that Semi deliveries would start in 2019 and be selling 100,000 trucks a year, but deliveries were later delayed to 2021. Part of the reason for this delay, according to Musk, is that the Semi includes five times more battery cells than their passenger cars, and the battery supply is not yet sufficient for both Tesla cars and the Semi.

Cybertruck

The Cybertruck is a light duty truck unveiled on November 21, 2019, with production set for late 2021.

On September 22, 2020, Musk revealed roughly 600,000 Cybertruck pre-orders. The truck's angular design had a mixed reception, and some Wall Street analysts questioned whether pickup truck buyers will have interest in the Cybertruck. James Goodwin, chief executive of an Australian car safety organization, says that the angular design and steel construction of the Cybertruck may pose safety risks. After the Cybertruck's unveiling, Musk announced that the Tesla Cyberquad, an electric four-wheel quad bike revealed alongside the Cybertruck, would be an optional accessory for Cybertruck buyers in 2021.

Decline phase of Tesla Vehicles

On June 4, 2017, the **American Automobile Association** raised insurance rates for Tesla owners following a report from the Highway Loss Data Institute. The report concluded that the Model S crashes 46% more often and is 50% more expensive to repair than comparable vehicles. Similarly, the Model X was concluded to crash 41% more often and to be 89% more expensive to repair than similar vehicles. As a result, AAA raised insurance rates on Tesla cars by 30%. Tesla said that the analysis is "severely flawed and not reflective of reality", however, Tesla failed to provide any contradictory numbers. Shortly thereafter, Russ Rader, the spokesman for the Insurance Institute for Highway Safety, confirmed the AAA's analysis and that "Tesla's get into a lot of crashes and are costly to repair afterward". The following year, an analysis of claim frequency and insurance cost data by the Insurance Institute for Highway Safety conducted by financial research provider 24/7 Wall St. found that the Tesla Model S and Model X were the two most expensive vehicles to insure. Musk hopes that these insurance rates will greatly decrease once driver-assist and self-driving technology become commonplace.

On April 20, 2017, Tesla issued a worldwide recall of 53,000 (~70%) of the 76,000 vehicles it sold in 2016 due to faulty parking brakes which could become stuck and "prevent the vehicles from moving".

In 2013, a Model S caught fire after the vehicle hit metal debris on a highway in Kent, Washington. Tesla confirmed the fire began in the battery pack and was caused by the impact of an object. As a result of this and other incidents, Tesla announced its decision to extend its current vehicle warranty to cover fire damage.

In August 2015, two researchers said they were able to take control of a Tesla Model S by hacking into the car's entertainment system. The hack required the researchers to physically access the car. Tesla issued a security update for the Model S the day after the exploit was announced.

CHAPTER 2

FEASIBLITY STUDY

Scope of Tesla Electric Vehicles

The research conducted in this thesis reviews two new technologies, Electric Vehicles (EV), and Hybrid Electric Vehicles (HEV). Determining the vehicle development process of radically new technology in the automobile industry is not widely understood. Automobile manufacturers use many different product development practices to produce vehicles. There is little consensus on the right approach to design the most efficient and effective electric vehicle.

Technological research and development have shown that electric vehicles can make a difference in reducing the emission standards. The use of electricity as an energy transporter makes it possible for conservation of environmental quality. Further technology development in the field on energy and drive systems must take place in order to find the proper vehicle process.

Current Analysis and Requirements

Charging

Supercharger network

In 2012, Tesla began building a network of 480-volt fast-charging Supercharger stations. As of November 2020, Tesla operates over 20,000 Superchargers in over 2,100 stations worldwide. The Supercharger is a proprietary direct current (DC) technology that provides up to 250 kW of power. The navigation software in Tesla cars can recommend the fastest route for long-distance travel, incorporating possible charging delays.

Almost all Tesla cars come standard with Supercharging hardware. Model S and X cars ordered before January 15, 2017 received free unlimited supercharging. Model S and X cars ordered between January 15, 2017 and August 3, 2019 got 400 kWh (1,400 MJ) of free Supercharging credits per year, which provides a range of roughly 1,000 miles per year (1,600 km/a). Between August 3, 2019 and May 26, 2020, all Tesla Model S and X cars ordered came with free unlimited supercharging again. Being a less premium model, Model 3 cars do not come with free unlimited supercharging.

Tesla Model S charging at a Supercharger station in Newark, Delaware

Destination charging location network

In 2014, Tesla launched the "Destination Charging Location" Network by providing chargers to hotels, restaurants, shopping centres, resorts and other full service stations to provide on-site vehicle charging at twice the power of a typical home charging station.

Destination chargers are installed free of charge by Tesla-certified contractors; the locations must provide the electricity at no cost to their customers. All installed chargers appear in the in-car navigation system.

Software updates and upgrades

Tesla vehicles' software is regularly updated over-the-air when new software and firmware versions are released. This allows the cars to remain up to date and improve after purchase. Tesla also offers the option to unlock features in the car through over-the-air software upgrades after purchase. Available upgrades include basic Autopilot, Full Self Driving, acceleration boost (for Model 3 owners), and rear-heated seats (for Model 3 owners).

Connectivity

All Tesla cars come with "Standard Connectivity" which provides navigation using a cellular connection, and video streaming, internet browsing, and music streaming (with a paid subscription) only over WiFi or Bluetooth. "Premium Connectivity" adds cellular access to live traffic, satellite maps, and music streaming, as well as video streaming, browsing the internet and "caraoke" when parked.

Vehicle servicing

Tesla service strategy is to service its vehicles through remote diagnosis and repair, mobile technicians, and Tesla-owned service centres.

In 2016, Tesla recommended to have any Tesla car inspected every 12,500 miles or once a year, whichever comes first. In early 2019, the manual was changed to say: "your Tesla does not require annual maintenance and regular fluid changes," and instead it recommends periodic servicing of the brake fluid, air conditioning, tires and air filters.

Insurance

Tesla partnered with Liberty Mutual Insurance Company to offer an insurance plan designed specifically for its electric cars. The plan was made available to US customers in October 2017. In August 2019, this partnership was superseded by a partnership with State National Insurance designed specifically for its electric cars. It was initially only available to Tesla owners in California. In July 2020, Musk, relying on data obtained through their partnership with State National Insurance, announced that Tesla was creating its own major insurance company. The insurance will use individual vehicle data to offer personalized pricing.

Tesla’s Approach to Feasible solution

At the time of Tesla's founding, electric vehicles were very expensive. Tesla's strategy was to first produce high-price, low volume vehicles, such as sports cars, for which customers are less sensitive to price. This would allow them to progressively bring down the cost of batteries, which in turn would allow them to offer cheaper and higher volume cars. Tesla's first vehicle, the Roadster, was low-volume (less than 2,500 were produced) and priced at over $100,000. The next models, the Model S and Model X, are more affordable but still luxury vehicles. The most recent models, the Model 3 and the Model Y, are priced still lower, and aimed at a higher volume market, selling over 100,000 vehicles each quarter. Tesla continuously updates the hardware of its cars rather than waiting for a new model year, as opposed to nearly every other car manufacturer.

Tesla does not pay for direct advertisement. The company aims to educate customers through its showrooms situated in malls and other high-traffic areas, and sells its vehicles online rather than through a conventional dealer network. The company is the first automaker in the United States to sell cars directly to consumers.

Tesla has a high degree of vertical integration, reaching 80% in 2016. The company produces vehicle components as well as building proprietary stations where customers can charge their vehicles. Vertical integration is rare in the automotive industry, where companies typically outsource 80% of components to suppliers and focus on engine manufacturing and final assembly.

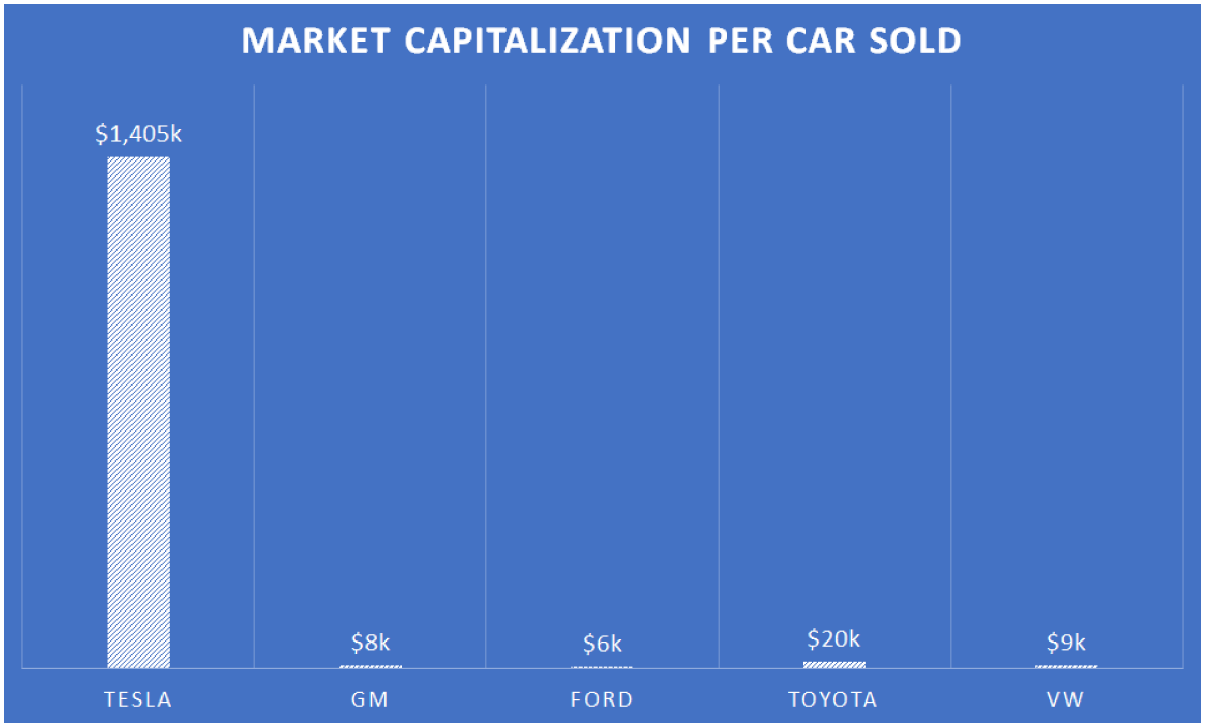
Tesla generally allows its competitors to license its technology, stating that the purpose of the company is to accelerate sustainable energy. Licensing agreements include provisions whereby the recipient agrees not to file patent suits against Tesla, or to copy its designs directly. Tesla retains control of its other intellectual property, such as trademarks and trade secrets to prevent direct copying of its technology.

Total Cost Evaluation

Electric-car maker Tesla is worth about $700 billion following an incredible rally in 2020. The stock was recently added to the S&P 500 index as its fifth largest constituent. Tesla is worth more than Berkshire Hathaway, Johnson & Johnson, Visa, and Mastercard. It's worth more than Disney and Netflix combined.

Tesla now sells around half a million cars annually, while 64 million passenger cars were sold globally in 2019, according to the International Organization of Motor Vehicle Manufacturers. Tesla accounts for less than 1% of the global auto market in terms of volume, yet the stock is worth far more than any other automaker.

Yes, if you assume that Tesla eventually captures a huge percentage of the global auto market, launches a self-driving taxi service, puts a solar roof on every house, cures cancer, and invents time travel, that $700 billion market cap starts to look like a bargain. But without assuming Tesla enters and dominates a bunch of new markets, the valuation is impossible to justify.



Final Reviews and Partnership Agreements

Many reviews were conducted in order to decide whether the product is feasible or not and also the thoroughness and accuracy of the feasibility study is checked for its approval. Tesla has also signed many partnership agreements some of which are listed below.

Panasonic

Panasonic Energy Company President Naoto Noguchi presented Tesla CTO JB Straubel with the first lithium-ion cells from Panasonic's facility in Suminoe-ku, Osaka, Japan. On January 7, 2010, Tesla and battery cell maker Panasonic announced that they would together develop nickel-based lithium-ion battery cells for electric vehicles. The partnership was part of Panasonic's $1 billion investment over three years in facilities for lithium-ion cell research, development and production.

Beginning in 2010, Panasonic invested $30 million for a multi-year collaboration on new battery cells designed specifically for electric vehicles. In July 2014, Panasonic reached a basic agreement with Tesla to participate in battery production at Giga Nevada.

Tesla and Panasonic previously collaborated on the manufacturing and production of photovoltaic (PV) cells and modules at the Giga New York factory in Buffalo, New York. The partnership started in mid-2017 and ended in early 2020, before Panasonic exited the solar business entirely in January 2021.

Piedmont Lithium

In September 2020, Tesla signed a sales agreement with Piedmont Lithium to buy high-purity lithium ore for up to ten years, specifically to supply "spodumene concentrate ('SC6') from Piedmont's North Carolina mineral deposit to Tesla."

Toyota

On May 20, 2010, Tesla and Toyota announced a partnership to work on electric vehicle development, which included Toyota's $50 million future conditional investment in Tesla and Tesla's $42 million purchase of a portion of the former NUMMI factory.

In July 2010, the companies announced an agreement to develop a second generation compact Toyota RAV4 EV. A demonstrator vehicle was unveiled at the October 2010 Los Angeles Auto Show. Toyota built 35 of these converted RAV4s (Phase Zero vehicles) for a demonstration and evaluation program that ran through 2011. Tesla supplied the lithium metal-oxide battery and other powertrain components based on components from the Roadster.

On June 5, 2017, Toyota announced that it had sold all of its shares in Tesla and halted co-operation, as Toyota had created their own electric car division.

CHAPTER 3

CHARACTERISTICS OF TESLA ELECTRIC VEHICLES

Singularity and Cohesion of Tesla vehicles

Vehicle batteries

Tesla was the first automaker to use batteries containing thousands of small, cylindrical, lithium-ion commodity cells like those used in consumer electronics. Tesla uses a version of these cells that is designed to be cheaper to manufacture and lighter than standard cells by removing some safety features; according to Tesla, these features are redundant because of the advanced thermal management system and an intumescent chemical in the battery to prevent fires.

Motors

Tesla makes two kinds of electric motors. Their oldest currently-produced design is a three-phase four-pole AC induction motor with a copper rotor(which inspired the Tesla logo), which is used as the rear motor in the Model S and Model X. Newer, higher-efficiency permanent magnet motors are used in the Model 3, Model Y, the front motor of 2019-onward versions of the Model S and X, and is expected to be used in the Tesla Semi Class 8 semi-truck. The permanent magnet motors increase efficiency, especially in stop-start driving.

Autopilot

Autopilot is an advanced driver-assistance system developed by Tesla. The system requires active driver supervision at all times. Starting in September 2014, all Tesla cars are shipped with sensors and software to support Autopilot (initially hardware version 1 or "HW1"). Tesla upgraded its sensors and software in October 2016 ("HW2") to support full self-driving in the future.

Full self-driving

Full self-driving (FSD) is an optional upcoming extension of Autopilot to enable fully autonomous driving. At the end of 2016, Tesla expected to demonstrate full autonomy by the end of 2017.

Reflectiveness of Tesla Vehicles

It is very easy for the system to define changes and modifications in the vehicle.

Tesla vehicles' software is regularly updated over-the-air when new software and firmware versions are released. This allows the cars to remain up to date and improve after purchase. Tesla also offers the option to unlock features in the car through over-the-air software upgrades after purchase. Available upgrades include basic Autopilot, Full Self Driving, acceleration boost (for Model 3 owners), and rear-heated seats (for Model 3 owners).

Tesla service strategy is to service its vehicles through remote diagnosis and repair, mobile technicians, and Tesla-owned service centres.

In 2016, Tesla recommended to have any Tesla car inspected every 12,500 miles or once a year, whichever comes first. In early 2019, the manual was changed to say: "your Tesla does not require annual maintenance and regular fluid changes," and instead it recommends periodic servicing of the brake fluid, air conditioning, tires and air filters.

Traceability and Cued Availability

After so many attempt and efforts which were made to create the product global are examined and the most promising plan has been worked upon. All the necessary documentations related to the product data in terms of its characteristics and features can be backed up using the screen which is provided in the vehicle and this information is also stored in Tesla's database. So Tesla vehicles serves their customers in the best way possible.

With Tesla vehicles, it is possible to get right information and processes whenever the user needs it. In September 2020, Tesla signed a sales agreement with Piedmont Lithium to buy high-purity lithium ore for up to ten years, specifically to supply "spodumene concentrate ('SC6') from Piedmont's North Carolina mineral deposit to Tesla". Also at the beginning of 2010, Panasonic invested $30 million for a multi-year collaboration on new battery cells designed specifically for electric vehicles.

Also, bringing the information from the virtual storage to the real storage is easy.

CHAPTER 4
CONCLUSION

Conclusion

Electric vehicles are anticipated to be a key future component of world's mobility system, helping reduce impacts on climate change and air quality. There is, therefore, an increasing need to understand EVs from a systems perspective. This involves an in-depth consideration of the environmental impact of the product using life cycle assessment (LCA) as well as taking a broader 'circular economy' approach. On the one hand, LCA is a means of assessing the environmental impact associated with all stages of a product's life from cradle to grave: from raw material extraction and processing to the product's manufacture to its use in everyday life and finally to its end of life. On the other hand, the concept of a circular economy considers impacts and in turn solutions across the whole societal system. In a traditional linear economy products are made, used and then disposed of.

Electric vehicles can be seen as future alternative and this vision is made possible by Tesla.