

MANAGING TECHNOLOGICAL INNOVATION
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CASE STUDY OF TESLA INC.



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Abstract

This work is a case study of managing technological innovation in Tesla Inc. The firm specializes in the manufacturing of sustainable energy vehicles and battery power packs in the automotive industry. The core mission of Tesla is to accelerate the world's transition to renewable energy. The organizational culture and structure were analysed, and it was found to be agile and leans toward a flat hierarchy to support quick and collaborative decision making. Tesla's core competencies have allowed it to build innovations in products, services, and processes that focus on areas such as sustainable transportation, energy storage, and autonomous electric vehicles. Analyses frameworks for business management like the PESTEL, SWOT, VRIO, and Porter's Five-Force model were used to scan and analyze the internal and external environments in the automotive industry, with Tesla in focus. The results and recommendations suggest that Tesla should leverage their innovative strength and excellent brand image to take advantage of the untapped opportunities in the electric vehicle sector of the automotive industry.

1.0 Introduction

Tesla was founded by two engineers, Martin Eberhard, and Marc Tarpenning. These engineers wanted to prove that electric vehicles can disrupt traditional gasoline-powered cars by being better, faster, and more fun to drive (Tesla, n.d). Moreover, electric cars would be part of a solution to the looming global climate crisis, as they are powered by clean energy and comply with the net-zero emission standards.

Contrary to popular belief, Elon Musk the current CEO of Tesla was not a founding member, but an early venture capitalist investor, who invested \$6.5 million out of the \$7.5 million in preferred stock that the company issued in 2004. Apart from the hefty investment portfolio that Elon Musk brought to the company, he also provided technological innovation leadership that has skyrocketed Tesla to the position of a top innovative company in the automotive industry, challenging the likes of General Motors, Toyota, and Ford. Elon Musk oversaw the product design of Roadster, Tesla's first commercially successful product in the automotive industry.

According to the company website: "Tesla is now producing infinitely scalable sustainable energy generation and storage solutions. Tesla's objective is to hasten the world's transition to sustainable energy, so the faster the world moves away from fossil fuels and toward a zero-emission future, the better." (Tesla, n.d.). Fortune (2022), an online magazine, also reported that "through its subsidiary Tesla Energy, the company manufactures and distributes solar panels, solar roof tiles, and other related products and services. Tesla Energy is a major solar energy system installer in the United States and one of the world's largest providers of battery energy storage systems".

2.0 Organizational Structure and Culture

The founders of Tesla envisioned the company as a technology company first before being a car manufacturer. Tesla had also been hailed as a car manufacturer with a Silicon Valley spark. Elon Musk famously twitted that "Tesla is as much a software company as it is a hardware company, both in 'car' and in 'factory'". (Elon, 2022). Based on this, the organizational structure and culture of the company are modern and fast-paced. They encourage their employees to be unconventional in thinking that drives innovation.

According to Meyer (2019) of Panmore Institute, "Tesla, Inc. has a problem-solving culture that is inventive. Employees are encouraged to develop profitable solutions to existing and emerging market problems in this type of corporate culture. For example, the company's organizational culture is used in the development of sophisticated electric vehicles as a

response to the environmental challenges associated with autos with internal combustion engines.”

The six main features of Tesla's organizational culture were highlighted as follows:

- Move Fast
- Do the Impossible
- Constantly Innovate
- Reason from “First Principles”
- Think Like Owners
- We are ALL IN

Tesla has adopted a U-form (unitary form) organizational structure. Under this structure, the organization is managed as a single unit from the perspectives of the functional departments that make up the company. In essence, the accomplishment of the product strategy of the company is departmentalized. The advantage is that there is an effective division of labor that enables the company to be productive while cutting down on product development costs.

Tesla has structural functional groups in engineering, sales, and services. Meyer (2019) of Panmore Institute also pinpoints three important characteristics in Tesla's organizational structure. They are:

- Function-based hierarchy
- Centralization
- Divisions

2.1 Function-based hierarchy

The functional-based hierarchy, which is the most important, in Tesla comprises the following:

- A. Chairman & Chief Executive Officer
- B. Finance
- C. Technology
- D. Global Sales and Service
- E. Engineering
- F. Legal

With the functional-based hierarchy, the company is able to maintain strict control of the departments in its business operations. (Meyer, 2019).

2.2 Centralization

Tesla uses centralization to control the various autonomous groups of its business operations worldwide. This corporate structure is managed from the organization's headquarters. The management team comprises heads of the offices in its global hierarchy. They meet in the corporate headquarters to oversee business decisions made at the functional levels. (Meyer, 2019).

2.3 Divisions

The divisions in Tesla are made up of regions with distinct geographical characteristics or corporate structures. For example, according to Panmore Institute, “the company’s main divisions in its corporate structure are (1) Automotive and (2) Energy Generation and (3) Storage.

Geographical divisions used for financial reporting are (1) The United States, (2) China, (3) Norway, and (4) Other. (Meyer, 2019).

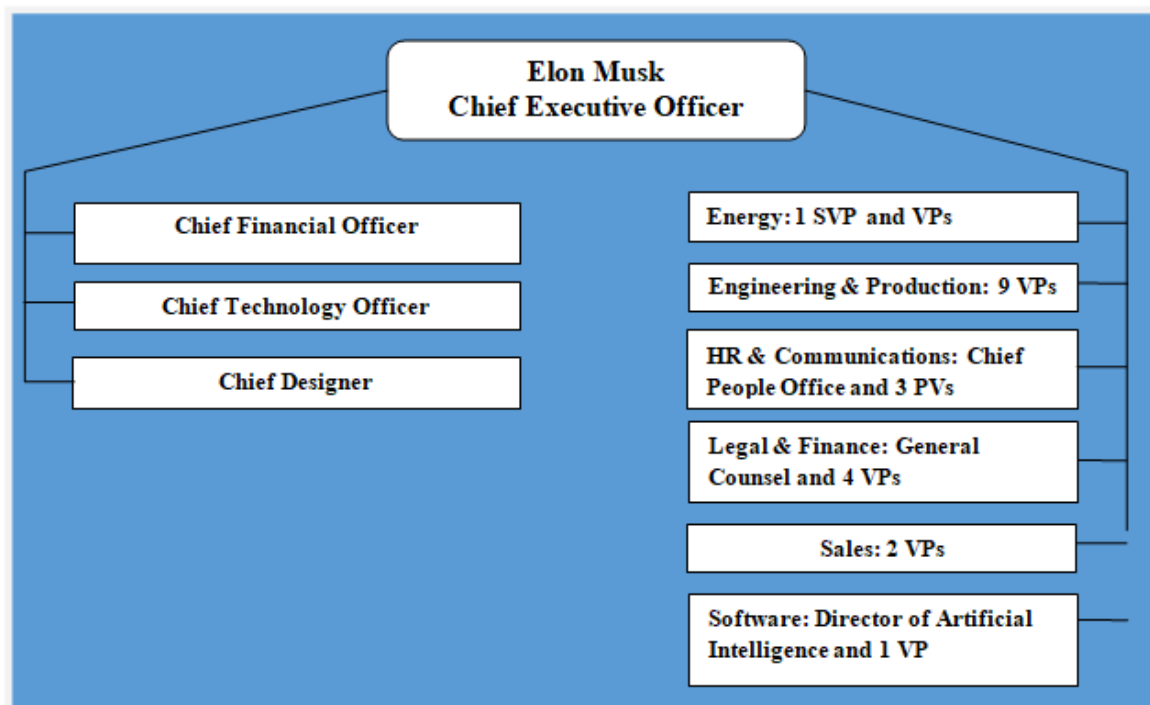


Fig 1: Tesla Organizational Structure (Dudovskiy, 2021).

3.0 Core Competencies, Developments, and Acquisitions

The main vision of Tesla is to accelerate the world’s transition to sustainable energy. Tesla envisages itself as an energy company as well as a car manufacturer. Hence, they have developed competency in energy sourcing and in the process developed the battery pack technology. (Pour, 2020). Tesla has gained industry recognition for its innovative

manufacturing techniques, safety designs, and distribution networks in the automotive industry. Their core competencies extend to areas such as vehicle engineering where they have inspired innovations in driverless and autopilot cars.

To obtain a competitive edge in automated manufacturing systems, Tesla acquired Grohmann automation in 2016 and Perbix in 2017. Tesla also formed strategic alliances with the likes of SolarCity, Maxwell Technologies, Panasonic, and Deep Scale. They even partnered with some car manufacturers such as Daimler and Toyota to gain certain advantages in the auto industry. This enabled them to ramp up production and use existing technologies in the industry to make their products better. They were also able to leverage economies of scale and the distribution networks of their partners. (Auffray et al., 2020).

4.0 Innovation Management in Tesla

Tesla has managed innovations well in products, services, and processes. The company instituted management procedures and practices to keep them in the game in the auto industry. The various innovations in the auto industry had made an impact on Tesla's financial power. The company became a haven for investors, and they had a stock split because the value of their stocks was so good. They are planning another in the year 2022 and have asked stakeholders to vote. (Lambert, 2022). Their innovations are discussed below.

4.1 Product Innovation

Tesla has about 361 patents in product innovations that cut across areas and technologies in electric vehicle design and production, battery packs, EV chargers, solar roof panels, user interfaces, etc. Tesla's electric motors are said to be superior compared to other competitors. Data from sales of electric vehicles show that Tesla sells more than the other competitors in the market in the United States. (Naik, 2021; Lambert, 2021)

4.2 Service Innovation

Tesla now operates a Supercharging network for electric vehicles. A myriad of Supercharging stations is now available along many routes in the world, according to the company's website.

The company site published that: "With 30,000+ Superchargers, Tesla owns and operates the largest global, fast-charging network in the world. Located on major routes near convenient amenities, Superchargers keep you charged when you're away from home. Simply plug in, charge, and go." Vendors could also apply to host a Supercharging facility at their business properties. (Tesla, n.d.)

4.3 Process Innovation

Tesla has filed a patent for a new lithium extraction process. It is projected that this process would cut costs by almost 30% when the lithium is used for the production of EV battery packs. In the word of Drew Balingo, SVP of Engineering: "We are going to use a new process that we will pioneer. It is a sulfate-free process again, we skip the intermediate. It will result in a 33% reduction in lithium cost." CEO Elon Musk further explained that the process uses table salt (sodium chloride) to make the extraction. This is a proprietary and environmentally friendly way to extract lithium from its ore. (Lambert, 2021)

Tesla is also partnering with one of the largest battery manufacturers in the world, a Chinese company named Contemporary Amperex Technology Co. They are improving the process of making lithium iron phosphate (LFP) batteries, overcoming the initial problem of low energy density, and doing so at a cheaper cost. Tesla plans to use LFP batteries for low-cost models of its electric cars. (Hill, 2021)

4.4 Management Practices

Tesla has disrupted the automotive industry by incorporating Agile manufacturing management practices into its organizational culture. Tesla tries to keep the hierarchies as flat as possible. They encourage employees to take charge and speak up if they have any ideas that will improve the company's productivity. Elon Musk, the CEO famously sent an email to all employees asking them to mail him directly with any suggestions that will improve the production processes of the company. (Field, 2018; Clifford, 2017)

5.0 Tesla - Current Product Innovation Approach

The current product innovation strategies of Tesla are tied to solving problems pertaining to sustainable transportation, and climate change mitigation. Also, their innovative approach wants to promote renewable energy capture and storage and shift to autonomous technology.

Elon Musk the CEO of Tesla recognizes that to make this possible, the company needs to ramp up production of its innovative products, such as electric vehicles and battery power packs. To this end, the company has invested in building new Gigafactories in the United States and some parts of the world. Currently, three of these factories are operational in the United States in locations: Fremont, Nevada, and New York. One is also operational in Shanghai, China.

Two Gigafactories are under construction in Texas in the United States and Berlin in Germany. Other laid-out locations for Gigafactories are in the United Kingdom, India, and Turkey. After the completion of these factories, Tesla is expected to double its production capacity. (Akgunduz, 2022).

6.0 Strategic Analysis and Results

The **PESTLE** analysis and **Porter's Five-Force Model** can be used to analyze the automotive industry in general terms. In specific terms, two strategic analysis frameworks that could be used to analyze Tesla and provide recommendations are the **SWOT** and **VRIO**.

6.1 PESTLE Analysis of Automotive Industry

This analysis looks at how political, economic, social, technological, legal, and environmental factors affect the automotive industry. The challenges automakers face and the unique opportunities they can capitalize on.

6.1.1 Political

Governments issue regulations that guide the safety of passengers and pedestrians, hence auto companies must abide by all regulations or face legal charges. The governments are also favoring sustainable energy options for automobiles to curb pollution. Automakers like **Tesla** have used this opportunity to market their electric vehicles.

6.1.2 Economic

Emerging markets in Asian countries like China and India are opportunities for low-cost manufacturing of vehicle parts. Also, the income of households is increasing, so people can afford to own cars. Financial institutions also make it possible to own cars with installments payments.

6.1.3 Social

Cars are now in vogue not just as a necessity or luxury, people use them to show off their trendy lifestyle and as a fashion statement. These social trends have increased sales, growth, and revenue in the automotive industry. It is also reported that population distribution is correlated with the sales of automobiles.

6.1.4 Technological

Rapid advancements in technology have made it possible to manufacture autonomous self-driving cars, although their adoption has been slow due to government regulations, and

ethical and safety concerns, among others. Technology has also advanced such that zero-emission is becoming the new standard in the industry. This is the area where industry players like **Tesla** thrive.

6.1.5 Legal

Intellectual property rights, trademarks, and patents are being filed by many automakers. Sometimes there are lawsuits and battles between them for infringements and unlawful use of proprietary technology. Governments and individuals also sue automakers for safety issues, especially when forensic evidence shows they caused accidents and endangered lives.

6.1.6 Environmental

Many automakers are moving towards electric vehicles due to climate change and global warming. Governments and environmental groups are putting pressure on the achievement of net-zero emissions.

6.2 Porter's Five-Force Model

Porter's five-force model is summarized generally for all the companies in the automobile industry and for Tesla in particular. (Daniel Kissinger, 2019)

The Competitive Rivalry (Overall: Strong Force)

- A small number of firms in the industry (weak force)
- There is high aggressiveness of firms (strong force)
- Low switching costs (strong force)

The Bargaining power of buyers or customers (Overall: Moderate Force)

- They have low switching costs (strong force)
- The availability of substitutes (moderate force)
- They make a low volume of purchases (weak force)

The Bargaining power of suppliers (Overall: Moderate Force)

- The chances of a forward integration (moderate force)
- The size of suppliers (moderate force)
- Their supply level (moderate force)

The Threat of substitutes or substitution (Overall: Moderate Force)

- There a low switching cost (strong force)
- Substitutes have moderate availability (moderate force)
- The performance level of substitutes (moderate force)

The Threat of new entrants to the industry or market (Overall: Weak Force)

- There is a high cost of brand development for new entrants (weak force)
- They can face a high cost of doing business (weak force)
- The economies of scale (weak force)

6.3 Strategic Analysis - SWOT

SWOT takes into cognizance the internal factors, such as the **Strengths** and **Weaknesses** in TESLA, and compares them side by side with factors in the external environment, **Opportunities**, and **Threats**, in a bid to obtain and maintain a sustainable competitive advantage.

<u>Strengths</u>	<u>Opportunities</u>
<ul style="list-style-type: none">• Highly innovative• Brand image and recognition• Supercharger network expansion• Partnership networks• Environmental and energy-friendly• In-house battery production technology• Energy efficiency technology• Autonomous driving technology	<ul style="list-style-type: none">• Globally untapped EV market• Climate change and clamor for sustainable forms of energy• Depletion of fossil-fuels and increasing gas prices• Technological advancements<ul style="list-style-type: none">• Diversified usage for battery power packs
<u>Weaknesses</u>	<u>Threats</u>

<ul style="list-style-type: none"> • Limited global presence • Premium EV product range • Succession strategy • Management and employee scuffle • Huge financial costs to launch products • Low production volume • Inability to meet demand 	<ul style="list-style-type: none"> • Increased extensive competition • Slow user adoption for EV and autonomous cars • Supply chain disruptions and shortage of raw materials for battery production • Legal hurdles for autonomous cars • Customer needs are ever-changing and insatiable
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6.4 Strategic Analysis - VRIO

The VRIO framework will assess the ability of TESLA to develop and maintain a sustainable competitive advantage in the auto industry. It considers the **Value, Rarity, and Imitability** of the internal resources or capabilities that Tesla possesses. It also highlights if Tesla has **Organized** systems, management processes, culture, and structure to take advantage of its resources and capabilities to sustain a competitive advantage in the industry. (Ferris, n.d., Pratap, 2020)

Competency	Valuable	Rarity	Imitable	Organized	Implication
Brand image	Yes	Yes	No	Yes	Competitive advantage
Innovation	Yes	Yes	Yes	Yes	Competitive advantage
Product range	Yes	No	Yes	Yes	Temporary Advantage
Market position	Yes	No	Yes	Yes	Temporary Advantage
Human resources	Yes	No	Yes	Yes	Temporary Advantage

Proprietary battery	Yes	No	Yes	Yes	Temporary Advantage
Unique design	Yes	Yes	Yes	Yes	Competitive Advantage
Manufacturing	Yes	Yes	Yes	Yes	Competitive Advantage
Supercharging Network	Yes	Yes	No	Yes	Temporary Advantage

6.5 Conclusion and Recommendations for Tesla

From the above strategic analyses, it is recommended that Tesla leverage their strengths in innovation and brand image to match the opportunities in the industry. They should expand their operations globally and tap into the growth of renewable, sustainable energy in the automotive industry. Tesla can overcome the constraint of low production volume that limits them to take advantage of the growth of electric vehicle and battery power pack markets by investing in the expansion of their supercharging service infrastructures and by building more production Gigafactories.

Tesla must realize the vulnerabilities in the supply chain for raw materials for their electric vehicle battery production. They should make efforts to diversify the supply chain to reduce the risk of not meeting demand due to the unavailability or increased purchase and delivery costs of raw materials. Finally, they should be aware of the problems that increased extensive competition in the automotive industry, and their own internal weaknesses pose to their organization. However, they should focus on their strengths and continuously improve. The succession strategy of Elon Musk's replacement as the technology innovation leader of the firm should be well crafted out, and the potential successors should be in training getting ready to take over the reins of leadership.

REFERENCES

Akgunduz, B. (2022). How Many Gigafactories Does Tesla Have? Possible Locations for the New Gigafactories. Retrieved April 15, 2021, from:

<https://www.licarco.com/news/how-many-tesla-gigafactories>

Auffray, A., Osorio, M., Henrici, P., Merks, R., Freitas da Costa, V. (2020). Tesla Inc.: Strategic Report 2020. The Lisbon MBA. Retrieved April 12, 2021, from:

<https://www.strategosinstitute.com/uploads/861ce4b50259bfef33cd2da967e7af51542b042848d2a4b6b7940e4b8ae4faeb.pdf>

Clifford, C.(2017). Why Elon Musk encourages his employees to tell him exactly what he's doing wrong. CNBC Entrepreneurs. Retrieved April 15, 2021, from:

<https://www.cnbc.com/2017/07/27/why-elon-musk-and-ray-dalio-want-their-employees-to-speak-up.html>

Dudovskiy, J. (2021). Tesla Organizational Structure: divisional and flexible. Business Research Methodology. Retrieved April 12, 2021, from:

<https://research-methodology.net/tesla-organizational-structure-divisional-and-flexible/>

Elon Musk [@elonmusk]. (2022, January 31). Tesla is as much a software company as it is a hardware company. Twitter.

<https://twitter.com/elonmusk/status/1488391303520034817>

Ferris(n.d.) VRIO Framework. Retrieved April 15, 2022, from:

<https://harrisonmcintire.wixsite.com/tesla/vrio>

Field, K (2018). Tesla Has Applied Agile Software Development To Automotive Manufacturing. CleanTechnica. Retrieved April 15, 2022 from:

<https://cleantechnica.com/2018/09/01/tesla-has-applied-agile-software-development-to-automotive-manufacturing/>

Fortune (2022). Tesla. Retrieved April 11, 2022, from:

<https://fortune.com/company/tesla/>

Hill, J.S. (2021). Tesla LFP battery supplier sets up new technology in Shanghai. Retrieved April 14, 2021, from:

<https://thedriven.io/2021/08/25/tesla-lfp-battery-supplier-sets-up-new-technology-in-shanghai>

Kissinger, D. (2019). Tesla Inc. Five Forces Analysis (Porter's Model) & Recommendations. Panmore Institute. Retrieved April 12, 2021, from:

<http://panmore.com/tesla-motors-inc-five-forces-analysis-recommendations-porters-model>

Lambert, F. (2021). Tesla leads EV sales to more than double in the US. Electrek. Retrieved April 14, 2021, from:

<https://electrek.co/2021/08/24/tesla-leads-ev-sales-double-us/>

Lambert, F. (2021). Tesla's patent reveals Elon Musk's 'table salt' lithium extraction process that could slash costs. Electrek. Retrieved April 14, 2021, from:

<https://electrek.co/2021/07/09/tesla-patent-reveals-elon-musk-table-salt-lithium-extraction-process/>

Lambert, F. (2022). Tesla (TSLA) announces another stock split; shareholders to vote later this year. Electrek. Retrieved April 14, 2021, from:

<https://electrek.co/2022/03/28/tesla-tsla-2022-stock-split-shareholders-vote/>

Meyer, P. (2019). Tesla Inc.'s Organizational Culture & Its Characteristics (Analysis). Panmore Institute. Retrieved April 12, 2021, from:

<http://panmore.com/tesla-motors-inc-organizational-culture-characteristics-analysis>

Naik, A. (2021). All The Innovations By Tesla Beyond Electric Cars. Opinions. Retrieved April 14, 2021, from:

<https://analyticsindiamag.com/all-the-innovations-by-tesla-beyond-electric-cars/>

Pratap, A. (2020). VRIO Analysis of Tesla Motors. Retrieved April 12, 2021, from:

<https://notesmatic.com/vrio-analysis-of-tesla-motors/>

Pour, A (2020). What is Tesla's Core Competency? Asking Lot. Retrieved April 12, 2021, from:

<https://askinglot.com/what-is-teslas-core-competency>

Tesla (n.d.). About Tesla. Retrieved April 11, 2022, from: <https://www.tesla.com/ABOUT>

Tesla (n.d.). Supercharger. Retrieved April 11, 2022, from:

https://www.tesla.com/en_in/supercharger