

Tesla's Financial Analysis, Security, Technical, And Management Problems and Corresponding Solutions

Bin Dai¹, Ruizhe Wang²*, Lingxiao Zhong³

¹Suzhou Foreign School, Suzhou, China

²School of Gemmology, China University of Geosciences (Beijing), Beijing, China

³School of Marketing and management, Newcastle University, Newcastle, UK

*Corresponding author: 1009171114@cugb.edu.cn

Keywords: Tesla, Management, Energy Conservation, Financial Analysis, Safety.

Abstract: Tesla has developed rapidly in the field of electric vehicles. However, under this rapid development, Tesla also faces many management problems. The purpose of this study is to find out the reasons for Tesla's rise, the problems and challenges faced by Tesla, and the solutions to these issues. It is found that there are external and internal reasons for Tesla's rise. External reasons include energy conservation and emission reduction, technology introduction and integration, and capital support from various countries; Internal reasons include entrepreneurship and quality, industrial chain and production technology, and management advantages. Through financial data analysis of Tesla's sales, profit margin, working capital turnover, and current ratio some problems were exposed, such as industry chain layout management issues and safety and quality problems. In order to address these problems, contract manufacturing, using clean energy, and finding alternatives, and focusing on local car makers can be effective approaches. Although Tesla's sales and profits are gradually rising, Tesla still needs to make further improvements in energy, technology, and production. Through this research, it is found that Tesla's development prospect is very clear, and it still needs a long way to go. To some extent, it is of great significance for Tesla to find a new way for future technological innovation.

1. Introduction

Tesla is a very successful electric vehicle company. As a pioneer of the electric vehicle market, its contribution to the new energy vehicle industry is obvious to all, and it allows us to see that electric vehicles can also have a place in the high-end automobile market. Today, scientific and technological innovation and environmental awareness are gradually paid attention to, the importance of the new energy industry is becoming more and more obvious, new energy vehicles will gradually become the development trend of the automobile industry. Recognizing product positioning in the market, developing product characteristics, seeking professional suppliers, stabilizing supply chain relations, and attracting customers through advanced Internet direct sales, O2O, and other business models are the development path of new energy automobile enterprises in the new era summarized and put into practice by Tesla, which is worth learning and drawing lessons from later generations. But Tesla still has a lot of management problems. Tesla's supply chain management problems mainly occur in the production and procurement links. The particularity of its product parts and the urgency of demand time affect its cooperation with suppliers, resulting in delayed parts supply and thus affecting production. As a core enterprise in the supply chain, Tesla needs to take the initiative to adjust conflicts with suppliers, the product design team, engineering, and manufacturing teams should communicate frequently and promptly with suppliers, establish harmonious and friendly relations with suppliers, sharing information and benefits, so as to reduce supply chain cost, improve enterprise performance. The company's labor relations are tense, and the number of employees who are fired due to poor performance accounts for 2% to 3% of the total, and workers are forced to manually manufacture major parts of cars. The harmonious relationship between workers, leaders, and the company will

directly affect the production process of the company. If conflict among workers is caused, the risk of production chain interruption will be caused, and the quality and safety of automobiles will also have a significant impact.

Through the analysis of the management mode of Toyota Motor corporation in Japan, Guo explores the background of the construction of Toyota management system and the key points in the management mode, including the crisis awareness, basic concept "TOYOTA WAY", production mode, and efficient management methods, talent cultivation, labor relations, TQM rules, etc., to provide a reference for the development of domestic automobile enterprises[1] Compared with technological innovation, management innovation is the driver for organizations to obtain a sustainable competitive advantage. However, because management innovation is not easy to be observed and identified, it lacks due research and attention both in theory and in practice. Apple's unique organizational structure, value chain design, intellectual property management, and other management innovation practices enable Apple to obtain huge business benefits, through Apple's case analysis, also makes other organizations to obtain management enlightenment, only continuous management innovation can bring continuous power and guarantee for technology and product innovation[2] Supply chain risk management (SCRM) is imperative to achieve business sustainability in the long-term perspective and also to increase companies' competitiveness. ISO 31000—Risk Management explains in its latest versions the need for companies to integrate a risk management process into their business models. Complementary to this standard, ISO 31010 presents 31 risk tools to guide companies in this task [3] Tesla's management strategies, organizational policies, and foresight approaches used to plan and implement a pragmatic strategy for the future mass production of electric vehicles (EVs) at affordable prices were studied. The challenges posed by increasing global instability in the automotive business, changing technology, and alarming increase of carbon dioxide emissions, all heightened the immediate need for change from the traditional treatment of automotive practices to something innovative, yet executable. The Tesla organization has developed an ambitious plan and strategy in response to these challenges through long-range battery technology that will enable them to complete production of high volume and low-cost electric cars with no fumes, noise, or dirt to millions [4].

Berdichevsky considered that Li-ion battery can only store a very small amount of energy in Tesla motors, which may be uncontrolled and would post a threat to safety. Therefore, Berdichevsky claimed that the power and energy capabilities of the pack make it essential that safety be considered a primary criterion in the pack's design and architecture. Berdichevsky started the design following: the battery pack of the Tesla sports car consists of many batteries. Its production company has considered investing a lot of funds and engineering resources to minimize the cost and manufacture defects in their cells. Overall, the selection criteria used by Tesla Motors include a number of factors, which are confirmed by extensive internal and external tests and are directly related to the overall safety of batteries in Tesla sports cars [5] Petro adopted Cohan that Tesla car price is still too high for many Tesla supporters. Although the price of model 3 car is affordable for the middle class, there is also a problem. Tesla has a high risk of adopting this pricing method. In fact, it is difficult to price profitably in this way. Petro adopted Ferris that Tesla's operations depend on other people's money. There has not been a profitable year in Tesla's history, and the company which was founded 15 years ago is still making heavy investments requiring significant loans and investments [6] Liu discussed Tesla's financial situation. In order to make more successful economic decisions, investors can change the trend of the company by making full use of financial analysis methods. Liu used financial analysis methodology, horizontal analysis, and vertical analysis. It helps investors measure Tesla's ability to issue dividends and its management. By analyzing the company's financial statements, evaluating its investment risk, and predicting its future development (such as new energy vehicles), Liu can roughly analyze that the company and some other similar jobs are worth investing in [7] Gafarov used several ratios in order to determine the impact on financial performance. Gafarov gives Tesla's background information production and some business analysis to show Tesla how to carry out business and manage its business barriers. Then, the financial ratio is calculated and commented. Tesla's financial analysis has been a challenge for the company for years. Gafarov continues to use the bankruptcy

model (Altman's Z score) to find out the reasons for bankruptcy, Tesla's score, in order to understand the results of the financial situation in the past four years [8].

Tesla succeeded in the saturated automotive industry by first offering innovative product and breaking all the rules of the traditional industry. Traditionally, car manufacturers sell their cars through a network of dealerships who act as intermediaries between car manufacturers and consumers. By contrast, Tesla disrupted the market by completely bypassing the middlemen and going direct to consumers. Tesla sales orders are taken through its website, and if customers want to see the cars in person, they can go to the company-owned show room style stores located in major cities all over the world [9-12].

2. Financial analysis of Tesla

2.1 Sales of products

As shown in Figure 1, the quantity of Tesla vehicles transported have been ever-increasing over a period of 4 years from 2015 to 2018 and is expected to grow in the future, but not that fast in the sales later on. However, this does not mean that Tesla itself is of high quality. It may only be because Tesla's production cost is relatively low, so people's demand for Tesla will increase.



Figure 1. Units of Tesla Vehicles Delivered Worldwide from Q3 2015 to Q4

2.2 Profit Margins

Profit Margins represent what percentage of sales has turned into profits. Simply put, the percentage figure indicates how many cents of profit the business has generated for each dollar of sale. For instance, if a company reports that it achieved a 20% profit margin during the last month, it means that it had a net income of \$0.2 for each dollar of sales generated. The profit margin of Tesla is demonstrated in Figure 2.



Figure 2. Teslas and general motors' profit margins in 2014-2018

Over the past few years, Tesla's profit margin has fluctuated much more than General Motors. Although competitors mainly keep profits, Tesla is unprofitable every year. Tesla is offering a more reasonable price to try to enter the mass market. Since 2017, Tesla's profit margin began to rise and reached the best level in 2018, with a profit margin of - 4.55%. Although Tesla's profit margin gradually tends to get better, it is still negative, far inferior to other cars.

2.3 Working Capital Turnovers

Working capital turnover is a ratio that measures how efficiently a company is using its working capital to support sales and growth. Also known as net sales to working capital, working capital turnover measures the relationship between the funds used to finance a company's operations and the revenues a company generates to continue operations and turn a profit. A high turnover ratio shows that management is being very efficient in using a company's short-term assets and liabilities for supporting sales. In other words, it is generating a higher dollar amount of sales for every dollar of working capital used. In contrast, a low ratio may indicate that a business is investing in too many accounts receivable and inventory to support its sales, which could lead to an excessive number of bad debts or obsolete inventory. As shown in Figure 3.

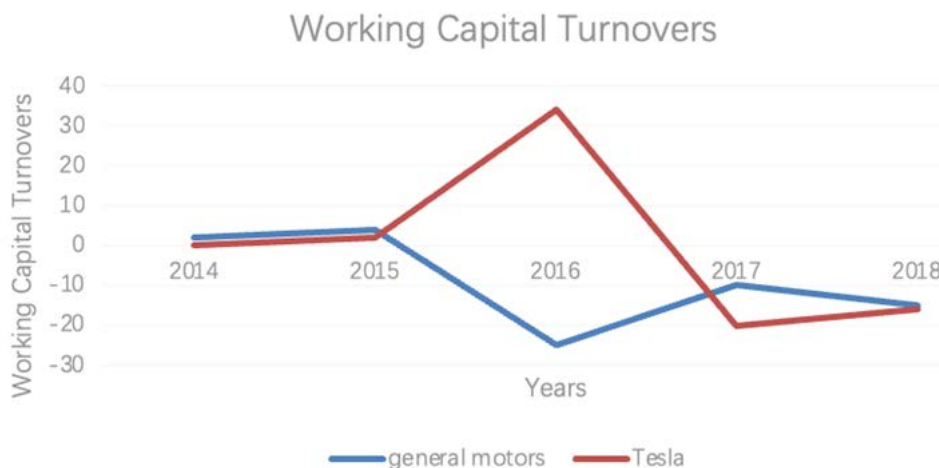


Figure 3. Teslas and its peers' working capital turnovers in 2014-2018

The overall trend of Tesla's working capital turnover rate decreased, of which 2017 was the worst, with a ratio of -35.03. This means Tesla company may have too many bad debts or obsolete inventory.

2.4 Current Ratio

The current ratio is a liquidity ratio that measures a company's ability to pay short-term obligations or those due within one year. It tells investors and analysts how a company can maximize the current assets on its balance sheet to satisfy its current debt and other payables. Some data of the current ratio is displayed in Figure 4.

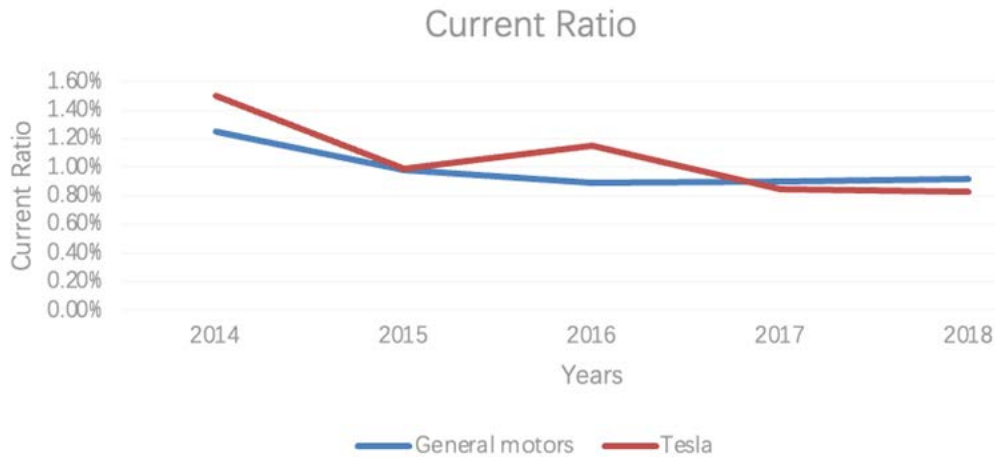


Figure 4. Teslas and general motors' current ratios in 2014-2018

Although Tesla's current ratio was higher than that of General Motors at the beginning, it was still relatively low. After that, the data was even lower than the figure for General Motors and began to decline gradually. It is clear that the company may have problems paying its current liabilities. However, a low current ratio does not mean a severe issue. Tesla company can borrow money from bank to alleviate the problem.

At present, Tesla, as a young, innovative, and rapidly developing company, is in a dangerous situation from the financial position. Tesla is basically not profitable for a year, although sales have indeed increased, but this only represents quantity. Such a situation is closely related to the supply chain management of the Tesla factory.

3. The reasons for Tesla's rise

3.1 The external factors

In 2020, Tesla sold nearly half a million new cars globally, maintaining the position of world sales champion of pure electric vehicles for two consecutive years. The rise of the Tesla car brand, first of all, there are external factors.

The social environment

Addressing global ecological and environmental issues has become the social environment to promote the growth of the Tesla Car brand. Since the 1990s, countries around the world has started to take energy-saving and emission reduction actions, and this action will run through the 21st century. This is highly consistent with the growth of the Tesla car brand. Energy conservation and emission reduction became the theme of Tesla's brand introduction and growth period. The company makes use of the policies and measures of energy conservation and emission reduction in various countries to obtain funds, benefits, and expand the market, and makes use of people's environmental protection concept to expand the market.

The background of globalization

Globalization is another important macro factor for the rise of the brand. In the context of globalization, the company can obtain capital and technology worldwide to support product research and development and manufacturing, can purchase raw materials and export finished products under the condition of free trade, can invest overseas in the context of investment facilitation. The growth of the Tesla car brand is itself a microcosm of globalization.

① Technology comes from all over the world

In the development and production of Roadster, the first car, in addition to using American ACpropulsion electric vehicle transmission technology and the company's own innovative research and development, Tesla purchased the chassis and body structure of Elise sports car from the UK for the car body, and used Panasonic 18650 lithium battery from Japan for the battery. The motor was jointly developed with Taiwan Futian. Panasonic battery and Fukuda motor technology along with the

growth of The Tesla company. The company also established super battery factories in cooperation with Panasonic, and acquired German automation manufacturer Grohmann Engineering, etc., through the introduction or digestion of global advanced technology, to enhance its core technology advantages.

Table.1. Globalization of technology

Technology	Source
R&D technology	American ACpropulsion electric vehicle transmission technology
car body	the chassis and body structure of Elise sports car from the UK
battery	Panasonic 18650 lithium battery
motor	jointly developed with Taiwan Futian

② Capital comes from all over the world

In addition to the founders' input and local financing sources, the company also received capital support from German, Japanese, and Chinese companies. Tesla was saved from bankruptcy in May 2009 when Germany's Daimler injected 50 million dollars for a 10% stake. In June 2010, Toyota Motor Corporation of Japan injected 50 million dollars to join Tesla. In March 2017, China's Tencent Holdings LTD paid 1.8 billion dollars for a 5% stake in Tesla. Financial institutions such as China Construction Bank have provided low-interest loans totally 14.75 billion yuan for the Shanghai plant.

Table.2. Shareholding Structure schedule

Corporation	Capital	Time
Germany's Daimler	50 million dollars for a 10% stake	May 2009
Toyota Motor Corporation of Japan	50 million dollars to join Tesla	June 2010
China's Tencent Holdings LTD	1.8 billion dollars for a 5% stake	March 2017

3.2 The internal factors

Entrepreneurial spirit and quality

Entrepreneurship and quality have shaped the Tesla brand. Musk is committed to his mission of "accelerating the world's transition to sustainable energy" by systematically building a new energy ecosystem through pure electric vehicles, solar business, battery manufacturing, and charging pile layout. This pursuit of "idealism" promotes brand recognition. Musk, known as a Silicon Valley geek, not only has a considerable social reputation, but also entrepreneurial success experience, these factors cast an entrepreneur's strategic vision, strategic layout, public relations ability, and leadership, and these qualities are indispensable for brand growth.

The company's competitive advantage system

Following the strategic layout, making full use of enterprise resources, and building the competitive advantage system of the company is another internal cause of the rise of the brand.

① Industrial chain advantages

Make a layout in key links of the industrial chain to build advantages of the industrial chain through independent research and development, internal supply, or strategic cooperation with other enterprises. First, in terms of batteries, after establishing a factory with Panasonic in 2014, the company established cooperative relations with LG Chem Korea and Ningde Times in 2019 and 2020, respectively. On the solar side, SolarCity, acquired in November 2016, offers clean energy products such as solar panels and Powerwall, which can be recharged by car users. Second, in terms of automobile motors, we have carried out long-term cooperation with Taiwan Futian Company and obtained the support of high-quality electric vehicle motors. Third, 4.2 million yuan has been invested in Shanghai to build a super charging pile factory, in terms of charging piles. The initial production plan is to produce 10,000 V3 super charging piles, and it is expected to be put into operation in the first quarter of 2021.

② Production technology and management advantages

With automation and intelligence as the goal, build production technology and management advantages. First, after the acquisition of Grohmann Engineering of Germany, a leader in mechanical

engineering and robot automation, Tesla Germany's which is Germany highly automated factory was established to focus on solving the needs of Tesla car manufacturing robots to improve full automation efficiency. Tesla is also installing super stamping equipment produced by the Edra Group at four vehicle assembly plants in the United States, China, and Germany. Secondly, the advantages of the production process have been verified in the battery production line. Tesla unveiled its 4680 new battery line on its YouTube channel in January 2021. Tesla's battery production line is thought to have many similarities to the bottling process that a Coca-Cola factory might use for its beverage production line. The speed of new production lines is seven times higher than before.

4. The problems and challenges Tesla faces

4.1 Industry chain layout management issues

Despite the successful rise of Tesla, it still faces many challenges and problems.

Focusing on the theme of "new energy + intelligent" and centering on the core business of new energy intelligent vehicles, Tesla has been attempting to carry out the layout of the whole industrial chain. Our current business scope has covered the research and development and production of lithium-ion batteries, solar power generation and storage, electrical architecture, battery management system, Autopilot system, FSD (fully autonomous driving) chips, vehicle manufacturing, super charging technology and charging pile, mechanical engineering and robot automation, etc. It also has the momentum to continue to expand into the industrial chain, such as battery materials. Although a long and full industrial chain can create a series of core technologies and bring advantages to the cost of control, the company also faces risks such as increased difficulty in management and coordination, failure in the development of some key technologies in the industrial chain, and overtaking of some core technologies.

4.2 Automobile quality and safety issues

Instead of the traditional excessive on-board functions and indoor luxury, Tesla shows the intelligent properties of the car with the minimalist design style. Although it has been gradually recognized by the industry and consumers, compared with traditional fuel cars, the quality problems such as rough workmanship and poor materials have been criticized for years. For example, frequent failure of touch screens, failure to light up in-car dashboards, spontaneous combustion incidents, and loss of control of vehicles all threaten the company's growth. Statistics from the new energy vehicle regulatory platform showed that China's new energy vehicles only have one spontaneous combustion accident every 447 million kilometers traveled, while Tesla has one fire accident every 280 million kilometers traveled on average. Experts said that battery aging, design flaws, BMS system failures, and collisions could all lead to spontaneous combustion in electric vehicles. Since 2020, Tesla has been involved in more than 10 traffic accidents in China due to vehicle loss of control. The common denominators of accidents were that sudden acceleration, braking failure, steering failure, and some other problems, and after the accident, the car returned to normal, no problems could be found.

Tesla CEO Elon Musk even said in an email to employees in late December 2020: "We will be providing special help at the end of the production line to ensure that cars being produced now can be delivered immediately without further improvement of PDI (Pre-delivery Inspection), because there simply isn't enough time to do that." Such comments inevitably raise the suspicion that Tesla has a manufacturing loophole, and if problems continue to crop up on models, it could also mean that Tesla may have lapses in manufacturing and delivery testing. This has something to do with Tesla's blind pursuit of profit and continuous growth in sales while ignoring the important control of the vehicle delivery process. To change this situation, Tesla should adjust the original factory delivery process, and how to control the checkpoint of factory delivery inspection should also be paid attention to by Tesla. However, Tesla lowered its requirements for PDI on the grounds of a lack of time and personnel. When asked by an analyst on the fourth quarter of Tesla's 2020 earnings call why Tesla customers can't even call customer service, Jerome Gillon, the president of Tesla Motor Operations, replied: "We believe the best service is not service. As a result, we are putting a lot of effort into improving the

quality and reliability of our cars. In the last two years, the user connection rate has dropped by a third, and users don't need to go to the customer service as often as they want, which is really the ultimate goal for us." Tesla's attitude is taking it further and further away from users, and even being labeled as arrogant and blaming, which is inseparable from Tesla's management.

5. Tesla's future vision and direction

5.1 Tesla dominates the market

So how to better promote enterprise management and development. After reading Perkins and Murmann (2018), the success of Tesla has demonstrated the key components of the current automobile industry- the advanced battery pack, the power electronics module, the high efficiency motor, and the electronic control software. Tesla's successful experience suggests that, with the lower entry barrier, the automobile industry could use contract manufacturing to reduce the capital costs and secure the loans. In the future, the substantial value will focus on critical aspects, including sensors, specialised computer hardware, communication, and control software, of the automobile value chain or on the electro-mobility market. This increasing innovation and competition will help ensure consumers' new choices of technological vehicles that are more efficient, safer, and have more advanced features in the future.

5.2 The importance of green energy

Middlekoop and Koppelaar have conducted a statistical analysis that in an estimated future of clean energy dominance sales of green energy automobiles or electric vehicles need to grow tremendously. At the same time, since the manufacturing capacity is there in the automobile industries, the current factories need to work more on the large expansion in battery production and the need to provide input minerals lithium and cobalt. In other words, substituting cobalt in batteries plays an essential role in the long-term success of electric cars, unless a virtuous battery recycling chain with low losses can be established. In this sense, the authors call for action to enhance space for energy technological companies to innovate and explore new options. In the long run, governments are suggested to invest in expanding capacity, including improving solar panel efficiency, creating a technical solution for daily storage, and finding alternatives for green energy.

5.3 The potential risks and importance of clean energy

Created by Elon Musk, the mercurial CEO of Tesla Motors Inc., the Powerwall batteries are claimed to fundamentally change the way of energy use and to transform the entire energy industry in the world. However, the author raises the question of the high cost of this transformation. With high efficiency and seemingly affordable storage price, technological advancements such as Tesla's fabulous electric cars and its Powerwall Battery, along with the SolarCity PV leasing business, will completely disrupt the utility business model. However, UC Berkeley's Severin Borenstein states that the distributed generation and storage model is not cost-effective for everyone. Thus, the author concludes the topic with speculation and confusion. Contrary to previous studies, this article challenges the traditional perspective of green energy and points out the potential risk of using clean energy. Though not clearly supported, it offers readers a new perspective of examining the new technology.

5.4 The development of Tesla and field trips

How to better manage the operation of the enterprise? In an interview with Professor Feng Lu, who has conducted tremendous fieldwork in the development of the Chinese automobile industry, it is suggested that the Chinese automobile industry should focus on local automobile manufacturers to develop innovation skills and proprietary products. First, in China, customer experience is the key to success. Second, with a well-established local industrial system around the Chinese automobile industry, Chinese manufacturers are able to design and develop new automobiles in house. Also, Lu doubts Chinese internet giants' replication of Tesla by competing directly with established automobile manufacturers. Instead, they will collaborate with automobile manufacturers and get deeply involved

in the electric vehicle sector, but not attempt to dominate the sector. This indicates that some local electric vehicle industries, could develop their own operating systems and joint ventures, like the ChineseEV sector. In the future, Tesla will not be a mere strong competitor in the global market but a cooperator to participate in the global automobile industry.

6. Conclusions

With the strengthened awareness of technological innovation and environmental protection, Tesla, 15th the pioneer of electric automobiles, plays an integral role in the new energy vehicle industry. Examining the internal and external factors of its current situations, we attribute its success to the social environment as well as globalization. At the same time, entrepreneurship and Tesla's competitive advantage system help promote brand growth. Tesla succeeded in the saturated automotive industry by first offering innovative products and breaking all the rules of the traditional industry. However, its industrial chain layout and failure in the development of key technologies might prevent Tesla from further progress. Therefore, Tesla is suggested to use contract manufacturing to reduce the capital cost and focus more on efficient, safer features of its technological vehicles. In the future, Tesla will not be a mere strong competitor in the global market but a cooperator to participate in the global automobile industry.

References

- [1] Guo Jincheng. (2012). Research on Toyota's management mode. *Automotive Industry Research* (02), 41-46.
- [2] Zhang yinghua, & Yao Li. (2014). Management Innovation from the case of Apple Inc. *Journal of Tianjin Normal University: Social Sciences* (6), 77-80.
- [3] Dias, G. C., Oliveira, U., Lima, G., & Fernandes, V. A. (2021). Risk management in the import/export process of an automobile company: a contribution for supply chain sustainability. *Sustainability*, 13(11), 6049.
- [4] Akakpo, A., Gyasi, E. A., Oduro, B., & Akpabot, S. Foresight, organization policies and management strategies in electric vehicle technology advances at tesla.
- [5] Berdichevsky, G., Kelty, K., Straubel, J. B., & Toomre, E. (2006). The tesla roadster battery system. *Tesla Motors*, 1(5), 1-5.
- [6] Petro, S. (2019). BUSINESS AND FINANCIAL ANALYSIS OF TESLA INC.
- [7] Liu, Y. (2020). Evaluation of Financial Risk in TESLA Company.
- [8] Gafarov, R. (2019). Evaluation of the financial position and the performance of Tesla, Inc (Doctoral dissertation, Masarykova univerzita, Ekonomicko-správní fakulta).
- [9] Perkins, G., & Murmann, J. (2018). What Does the Success of Tesla Mean for the Future Dynamics in the Global Automobile Sector? *Management and Organization Review*, 14(3), 471-480. doi:10.1017/mor.2018.31
- [10] Middelkoop, W., & Koppelaar, R. (2017). The Tesla Revolution. In *The Tesla Revolution: Why Big Oil is Losing the Energy War* (pp. 27-84). Amsterdam University Press. doi:10.1017/9789048531950.003
- [11] Tesla's New Battery: The Future Is on the Wall. (2015). *The Electricity Journal*, 28(6), 1,4–1,4. <https://doi.org/10.1016/j.tej.2015.06.011>
- [12] Jiang, H., & Lu, F. (2018). To Be Friends, Not Competitors: A Story Different from Tesla Driving the Chinese Automobile Industry. *Management and Organization Review*, 14(3), 491–499. <https://doi.org/10.1017/mor.2018.34>