

Is Rivian the Next Tesla?

Jiaxuan Wen^{1,*}

¹ Department of Management and Finance, University of Toronto Scarborough, Toronto, M1H 3K2, Canada

*Corresponding author. Email: jiaxuan.wen@mail.utoronto.ca

ABSTRACT

Rivian, an American maker of electric pickups, went public on The Nasdaq on November 10, 2021, pricing at \$78 and raising \$12 billion. The IPO rose 29.14% on its first day, with a market value of more than \$80 billion, making it the world's seventh largest automaker. A week later it overtook Volkswagen to become the world's third-largest carmaker, with a market capitalisation of \$151.9 billion. For a car company that has not yet begun to deliver on a large scale, this is undoubtedly an exaggeration. Based on the listing experience of Rivian, this paper aims to expand and analyze how electric vehicles have become the general trend, and what advantages and disadvantages they have compared with traditional fuel vehicles. And Rivian, as the electric car company most likely to replicate Tesla's legendary experience, has an advantage over other companies, and what its future should be.

Keywords: Rivian, Electric vehicles, Eco-innovation, Electric pickup truck

1. INTRODUCTION

Climate change and resource shortages have made electric vehicles more and more popular. Kley et al. believe that although electric vehicles are expected to have greater market penetration in the future, there are many stakeholders such as car manufacturers, battery manufacturers, and charging service providers. It takes time to make changes to cater to this trend. How to consider various factors to determine the appropriate business model is crucial [1]. Rivian will make its first delivery of EV pickups in autumn 2021. Laseter and Sesia made comments to Adam Happel, head of Consumer Energy Solutions for Rivian Electric Vehicles, evaluated plans for Rivian home charging stations and a public network of charging stations in the U.S. and Canada. And analyzed and discussed Rivian's plan to build a charging network in the future [2]. Electric vehicles have become a significant technology to reduce emissions and pollution. Helmers and Marx focused on discussing the differences between vehicles using new energy technology in terms of energy saving and transmission efficiency compared with traditional fuel vehicles. The feasibility and significance of electric vehicles are verified, and the attenuation efficiency of the battery is analyzed and discussed, and the key problems of electric vehicles are pointed out [3].

Wilberforce and El-Hassan and others discussed the seriousness of the pollution problem of traditional fuel

vehicles, emphasized the importance of finding new clean energy, and pointed out the trend of fuel cells gradually replacing internal combustion engines. This article also discusses the technical characteristics, advantages and disadvantages of new energy batteries, and analyzes how to solve this for electric vehicles [4]. Li pointed out that in the early stages of any product market, mutual competition will be extremely fierce. In the past ten years or so, the electric vehicle market in the United States has increased tenfold, and policies such as charging standards have gradually been unified. Analyzing the data and information of the five years from 2011 to 2015, we can know that unified standards and mandatory policies can help reduce the cost of various facilities on the market and increase the market size [5]. Globally, the number and market share of electric vehicles are increasing, and China's electric vehicle market is particularly booming. However, Hertzke et al. found that for the automobile market, different market segments have different power preferences, regulatory policies, consumer preferences and adaptability of models. Only by taking into account more audience groups, can electric vehicles achieve greater commercial success [6].

Hausman has studied consumers' potential demand for electric vehicles through analysis of survey data, regards electric vehicles as a new product from the perspective of economics and marketing, and analyzed and predicted its future market. From the perspective of consumers, it analyzes the problems that need to be

solved for the popularization of electric vehicles [7]. Sarah LaMonaca and Lisa Ryan described the current market status of electric vehicle charging device infrastructure, analyzed current charging policies and deployment scope, major manufacturers and providers in the market, and future policies and expansion plans. The solutions to these problems in order to achieve large-scale electric vehicle deployment [8].

Bilbeisi and Kesse conducted research on Tesla, the largest electric vehicle company, discussed Tesla's starting point and theoretical basis for creating electric vehicles, and analyzed environmental factors such as political and economic success, as well as the development of electric vehicles. Compared with traditional fuel vehicles, energy consumption and environmental protection have advantages and future market development prospects [9]. Sierzchula and Bakker and others studied a series of policies introduced by governments in order to promote the popularization of electric vehicles and analyzed the socio-economic factors involved in these policies. Through modeling analysis, it can be known that financial incentives and charging infrastructure are the two most critical factors affecting the penetration rate of electric vehicles [10].

2.HISTORY OF RIVIAN AND ELECTRIC VEHICLES

2.1. The history of electric cars

The 20th Century is the century when humans entered the industrialized society. The manufacturing industry is the most significant industry of industrialization, which affects the development process of the whole industrialization. Among them, the automobile industry is the industry with the greatest impact on human life in the 20th century.

The development of the automobile goes back to the 18th. People often believe that the world's first car is designed and produced by Karl Benz, in 1885/1886, Karl Benz designed and built his four-stroke engine, and used it in his car, and successfully patented it in 1886, which is regarded as the birth date of the automobile. It can be recognized as the Incubation period. However, this is from the perspective of the Internal Combustion Engine Vehicles (ICEV), and the history of electric vehicles is longer than ICEV. The world's first motor vehicle was the first electric car in 1834, half a century earlier than the world's first internal combustion engine car in 1886.

The development of electric cars can be roughly divided into the following four stages: after Faraday discovered electromagnetic induction and invented the first generator in 1831, American mechanic Thomas

Davenport produced the first electric car driven by direct current (DC) in 1834, and the invention of a lead-acid battery in 1859, makes the electric vehicle from the experimental nature to the practical.

In 1896, Hartford Electric Light company realized the importance of promoting charging facilities and promised that every car purchased from General Electric could use the equipment provided by Hartford Electric Light to change the electricity. The service, which began in 1910 and ran for 15 years, has helped electric vehicles drivers drive 9 million kilometers. To "change electricity" instead of "refueling", is the earliest civil car "change station" in human history. In the following years, electric vehicles in Europe and the United States continue to mature and develop. In 1911, the New York Times used "perfect" to praise electric cars for being environmentally friendly, quiet, and affordable to use. At the beginning of the twentieth century, the market share of electric vehicles was significantly higher than that of gasoline vehicles. The early 20th century is the first development period of EV.

But soon the EV development begins to decline, and it enters to the first recession period. As internal combustion engines became more efficient, gasoline-powered cars gradually regained their market share. The advent of The Second World War accelerated the change of the development speed of the two, and the experiment of electric vehicles was gradually reduced. Because of the demand of the war, the characteristics of the fuel engine at that time, such as high endurance, low cost, and convenient replenishment, were more in line with the needs of the war. And the money needed for the electric car experiment was used for the war. In addition, the combustion engine became the more cost-efficient solution due to the improved access to oil which then spurred mass production of this technology [1]. The improvement of oil extraction technology reduces the cost of using oil dramatically.

Since the 1990s, people's environmental awareness has been improved, and people have gradually realized the shortage of oil. EV ushered in its second period of development. The research on electric vehicles has made rapid progress, and many difficulties have been overcome. At present, the mainstream car enterprises have begun to transform, electrification is the trend of the future, after the key issues of mileage and safety are solved, the market share of electric vehicles is gradually rising. And its high energy efficiency, low emission pollution, and other advantages of traditional fuel cars cannot be solved. By 2021, the EV marketplace was growing more competitive with new entrants—both start-ups and venerable auto manufacturers—producing or planning to produce EVs [2].



Figure 1 The Development of EV

2.2. The necessity of electric cars

The pollution of the exhaust of cars is considered to be the most critical environmental pollution. Car exhaust pollution is environmental pollution caused by automobile exhaust gas. Automobile exhaust contains hundreds of different compounds, among these compounds the main pollutants are hydrocarbons, nitrogen oxides, carbon monoxide, sulfur dioxide, lead compounds, benzopyrene, and solid particles. A car emits three times more harmful gases than its weight in a year. As cars become more numerous and widely used, the negative effects that they produced on the environment are also aggravating.

Automobile exhaust is mainly concentrated at a level about 1 meter above the ground, which is near the respiratory zone of people. It is extremely harmful to human health, mainly reflected in the damage to human cells, the reduction of human immunity, ease to cause respiratory and cardiovascular diseases, and the greatest impact on children.

Carbon monoxide is the most concentrated pollutant in vehicle emissions, which account for 75% of carbon monoxide in the atmosphere and are fairly stable, and inhaling carbon monoxide deprives people of oxygen. At present, there are more than 600 million cars in the world, and they emit about 600 million tons of carbon monoxide, 100 million tons of hydrocarbons, and 50 million tons of nitrogen oxides each year, accounting for more than 60% of total air pollutants. The lower the carbon impact accompanying the electricity production in a country, the lower is the greenhouse gas emissions of the BEV in operation [3].

Improving the quality of gasoline is one of the most effective ways to solve the pollution of the car exhaust. However, it can not eliminate that pollution and solve the crisis thoroughly. An alternative power source recently considered and still under intense investigation to replace or complement the internal combustion engine in recent times is Electricity [4].

2.3. Rivian's brand history

Rivian, founded in 2009, makes electric trucks and SUVs in America. Founder and CEO RJ Scaringe grew up obsessed with cars and graduated from college then work for the Mainstream Motors, a predecessor of Rivian, where the company's main product was inexpensive sports cars. Rivian's r&d focus shifted to electric cars only in 2011, and it made a name for itself at the 2018 Los Angeles Auto Show with two electric-only models: the SUV R1S and the pickup R1T. Since 2018, along with the general trend of new energy vehicles, Rivian has completed at least eight rounds of financing with a total amount of more than 10.5 billion US dollars,

with no less than 2.5 billion US dollars in January and July 2021.

For Amazon, Rivian has specially developed and exclusively used electric delivery vans. In the first quarter of 2020, Amazon spent \$11.5 billion on warehousing and logistics, which is more than a quarter of its operating costs. This will undoubtedly reduce amazon's heavy warehousing and logistics burden. For Ford, investing in Rivian is a crucial step in its transition to electrification. On November 10, 2021, Rivian was officially listed on NASDAQ under the stock symbol RIVN. It plans to seek an IPO with a market value of more than \$65 billion and finally closed with a market value of \$85.9 billion on the first day, becoming the first IPO of 2021 so far and the sixth-largest IPO in the US stock history.

3. COMPARASSION BETWEEN EV AND FUEL VEHICLES

3.1. Differences and advantages of electric cars compared with traditional cars

With fuel efficiency and environmental regulations becoming increasingly stringent, car manufacturers have plans to add plug-in technology to most of the cars in their portfolio [5]. and the differences between electric vehicles and traditional fuel vehicles are mainly as follows:

(1) Different driving modes: Electric cars are driven by motors instead of traditional engines. As a result, electric cars can exert maximum torque from the start, giving them a far greater speed advantage than petrol cars. The rollout of more attractive, better-performing EVs in key high-demand segments is another major driver for sales uptake, both in Europe and the United States [6].

(2) Chassis structure is simplified and modular. The clutch, transmission, differential, and other transmission devices in traditional fuel cars are integrated and replaced. But also because of batteries, electric cars are generally heavier than gas-powered ones. And more mass means more inertia, which is a challenge for a car's braking system.

(3) Differences in follow-up maintenance problems. Fuel vehicles cost more and need more frequent maintenance, but the battery is facing the problem of battery life. Petrol cars generally have far more maintenance items than electric cars, which leads to higher short-term vehicle costs. However, from a long-term perspective, when the battery is worn out, it costs a lot to replace the battery of electric vehicles, which is also the reason the maintenance rate of electric vehicles is generally lower than that of fuel cars in the second-hand car market.

(4) Different energy needs, one is gasoline/diesel, the other is electric energy, resulting in the difference in the convenience of refueling. Gas stations are now embedded on roads around the world, and car charging stations, while booming, are still relatively outnumbered. Individuals do not seem receptive to electric cars that have limited range and long refueling periods [7]. Not to mention that traditional gas-powered cars can carry gasoline with them, and it takes far longer to recharge than to fill up. All told, petrol cars have less range anxiety than electric ones.

3.2. Differences and advantages of Rivian compared with other traditional electric vehicle enterprises

Rivian's popularity has something to do with its product strategy. When it comes to the electric car market, Tesla, Rivian's biggest competitor, has to be mentioned. To differentiate its product line from Tesla and avoid direct competition caused by product overlap, Rivian mainly produces two-row passenger pickup trucks R1T and three-row SUV R1S. Rivian competes with Tesla not only by the difference of model but by the development and manufacture of the upper and lower split of "body" and "chassis". This is completely different from the way Tesla and other traditional car companies build electric cars. Rivian's skateboard chassis integrates electric motors, an all-wheel-drive system, batteries, steering mechanism, and suspension mechanism into this "skateboard", and its development and performance will not be affected by the body. It can greatly enhance the convenience of manufacturing, reduce manufacturing costs and shorten the research and development cycle; Second, because there are no intrusive components such as engines, the skateboard chassis allows for more space in the upper cockpit, opening up the possibility of future compatibility. What's more, Amazon, Rivian's largest shareholder, just acquired Autonomous driving startup ZOOX in 2021, so a future collaboration between the two is highly likely.

3.3. Differences and advantages of Electric pickup trucks compared with electric other models

And Rivian's flagship model -R1T, as an electric pickup truck, compared with the traditional electric sedan, has stronger traction, better passability, and better load capacity. This means that as a pickup truck that can carry a lot of junk, it can drive quietly and quickly on the road, and it has acceleration that traditional pickup trucks lack. The Rivian R1T has a separate off-road drive mode that allows the driver to improve the suspension and reduce throttle sensitivity to varying degrees. It's worth noting that this electric pickup truck certainly has more storage space than other electric cars, but compared to other pickups, in addition to the extra storage space at the front

because it doesn't use the engine, it also has a full-width Tunnel between the rear seats and the bucket, called the Gear Tunnel. Users can opt for a full kitchen with cutlery and stove.

4. DILEMMA AND COUNTERMEASURES

4.1. Problems faced by Rivian

In terms of delivery, Tesla has sold more than 500,000 vehicles annually, but Rivian's delivery has not started yet, and a large amount of capital is still needed. In the first half of 2021, Rivian's net loss is \$994 million. For Rivian, the listing is only the first step to catching up with Tesla. In addition to profit and delivery problems after listing, Rivian also faces a tight global supply chain and a global chip shortage. In addition, Rivian's unique product line could be a problem. Pickups are popular in North America but remain a niche model in the global car market, and Rivian competes with The Electric Ford F150, in addition to Tesla's Cybertruck. General Motors' Hummer models and other traditional car companies launched electric pickup trucks.

4.2. The dilemma of electric pickup trucks

First, because the battery and motor provide instantaneous and powerful torque and enormous horsepower, which is needed in a pickup truck, it can greatly improve the vehicle's off-road and maneuverability. On the other hand, the heavy and relatively harsh use environment of pickup trucks, heavy batteries and motors will lead to a significant reduction in the vehicle's range and accompanied by safety problems. Electric vehicles in the face of collision, water, high temperature, and other dangerous situations, often more serious than the consequences of fuel vehicles. This is directly related to the battery installed at the bottom of the electric car. When there is an object running through the battery, the positive and negative poles of the battery will be connected, and the battery will produce high power discharge due to a short circuit, which will lead to sharp heat release. To reduce the charging time, the charging power of electric vehicles will be set at a high level when they are in use. The power of many fast-charging piles is more than 100 kW, which will also bring safety risks. EV charging is also available at different speeds, costs, and locations and these must be tailored to fit drivers' needs [8].

4.3. The future of Rivian

In fact, Rivian's eyes are not limited by the limitations of pickups. In a "Long-term Growth Strategy" filed with the SECURITIES and Exchange Commission (SEC), Rivian lays out its crucial global plans for the future. It says that while its current product focus is on America and Canada, But Rivian plans to enter the European

market soon, and then the Asia-Pacific market. In order to meet Rivian's global layout, localization of production and supply chain is the most critical issue. And Ford and Amazon, Rivian's two biggest shareholders, are crucial. Amazon is not only the biggest investor, but also the biggest customer. Rivian differs from other electric car start-ups in that they have a huge order book from the start, which guarantees steady revenues as long as it can be mass-produced. This is also an important reason why the market is bullish on Rivian. Tesla is not just an automaker. It is also a technology company with a focus on energy innovation [9]. To encourage EV adoption, countries have used financial incentives from both technology specific policies and technology neutral policies, such as subsidies to EV consumers, and emissions-based vehicle taxes [10]. As long as Rivian can successfully overcome capacity woes and chip shortages, becoming a Tesla is not out of the question.

5.CONCLUSION

In fact, the market is not only optimistic about Rivian, but the entire electric vehicle industry. Among those start-ups that have not realized revenues and are directly listed, rank by market capitalization, Rivian is the first, Lucid is the second, and QuantumScape, an electric vehicle battery supplier, is the third. This shows that as electric vehicles have gradually solved their technical pain points, their performance advantages and environmental advantages have been favoured by the market.

REFERENCES

- [1] Kley, F., Lerch, C., & Dallinger, D. New business models for electric cars—A holistic approach, *Energy policy*, 39(6), 2010, 3392-3403.
- [2] Laseter, T. M., & Sesia, A. Rivian Charging Ahead.
- [3] Helmers, E., & Marx, P. Electric cars: technical characteristics and environmental impacts, *Environmental Sciences Europe*, 24(1), 2012, 1-15.
- [4] Wilberforce, T., El-Hassan, Z., Khatib, F. N., Al Makky, A., Baroutaji, A., Carton, J. G., & Olabi, A. G. Developments of electric cars and fuel cell hydrogen electric cars. *International Journal of Hydrogen Energy*, 42(40), 2017, 25695-25734.
- [5] Li, J, Compatibility and investment in the us electric vehicle market. *Job Market Paper*, 2017, 23.
- [6] Hertzke, P., Müller, N., Schenk, S., & Wu, T, The global electric-vehicle market is amped up and on the rise. *McKinsey Cent. Futur. Mobil*, 2018, 1-8.
- [7] Beggs, S., Cardell, S., & Hausman, J, Assessing the potential demand for electric cars. *Journal of econometrics*, 17(1), 1981, 1-19.
- [8] LaMonaca, S., & Ryan, L, The state of play in electric vehicle charging services—A review of infrastructure provision, players, and policies. *Renewable and Sustainable Energy Reviews*, 154, 2021, 111733.
- [9] Bilbeisi, K. M., & Kesse, M, Tesla: A successful entrepreneurship strategy. *Morrow*, 2017, GA: Clayton State University.
- [10] Sierzechula, W., Bakker, S., Maat, K., & Van Wee, B, The influence of financial incentives and other socio-economic factors on electric vehicle adoption. *Energy Policy*, 68, 2014, 183-194.