

Competition Between New Energy Vehicles and Traditional Automobile

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ABSTRACT

The main objective of this research is to analyze the difference between traditional motor vehicles and new energy vehicles. Chapter 2-4 introduces some basic knowledge of new energy vehicles and analyzes traditional vehicles and new energy vehicles through sales comparison, related technology development, and after-sales maintenance. What is more, research also forecasts the development of new energy vehicles, some possible problems, and give some useful solutions to the problems faced by the new energy vehicle industry. In conclusion, the competition between traditional motor vehicles and new energy vehicles will promote the development of new energy vehicles, which may be beneficial to optimizing the structure of energy consumption new energy vehicles saves gasoline, which can significantly reduce reliance on traditional nonrenewable energy sources. They also serve the primary objective of conserving resources and optimizing the energy usage structure. Furthermore, the development of alternative energy vehicles has a significant impact on the organization of the automotive market.

Keywords: *New energy vehicle, Motor vehicle, Competition*

1. INTRODUCTION

The increased global consumption of petroleum resources has resulted in a shortage of oil resources, and the situation of energy resource deficit in various countries is critical. In this circumstance, the development of the traditional automobile sector, which uses gasoline as its primary fuel, is threatened. The development of new energy cars has made new energy vehicles another choice for the long-term growth of the global automobile industry. The cost of gasoline for automobiles has also increased. During the period of rising gas prices, certain new energy cars appear a relative cost advantage. To avoid paying high gasoline expenses, some consumers have abandoned their desire to purchase traditional motor vehicles as new energy vehicles with relatively low fuel consumption. Automobile manufacturers also recognized the potential for the development of new energy vehicles and began to promote the research and development of new energy vehicle technologies. Several policies were also implemented by governments to stimulate the adoption of new energy vehicles. The new energy vehicle industry has recently experienced remarkable expansion. The ongoing growth of the new energy vehicle may provide some new energy cars with a competitive advantage.

Analyzing the various benefits of traditional motor cars and new energy vehicles can assist automotive producers in producing products that meet market demands. Besides, with the large-scale popularization and use of motor vehicles, the amount of motor vehicles is getting higher and higher, which has caused traffic jams in many cities around the world. What is more, the pollutants of motor vehicles will destroy the ozone layer, then produce some harmful weather such as acid rain, black rain, and other phenomena which may cause various diseases to the human body. Therefore, analysis of the difference between motor vehicles and new energy vehicles is necessary for the promotion of the new energy vehicle.

Liu et al. discussed the application of the new energy vehicles, as the application of NEV are still in the early stage, the reliability still needs to improve. Therefore, it introduced the fault diagnosis based on advanced machine learning. The research also simulates some common system mistakes, the results show that the diagnosis system is reliable [1]. Feng and Lu researched promoting new energy vehicles are one of the most effective ways of addressing the growing concerns of energy efficiency and environmental pollution. The dual-credit strategy has been used in the policy development process as a business environmental regulation. This is critical for the advancement of NEVs and the

modernization of the automobile sector. [2]. Liu et al. found that more cost-saving measures are needed to popularize NEV. Consumers may perceive that they are more tend to tax policies than other policies. Based on the investigation of policy effects, research recommends a plan to gradually decrease the purchase tax on NEVs after 2024, raise the fuel tax rate after 2025, and impose an excise for NEV after 2030. The study revealed that more economic measures are needed to popularize NEV [3].

Wang et al. examine the influence of subsidies on companies' financial success, researchers used empirical data from 153 Chinese listed new energy vehicle companies from 2009 to 2018. Subsidies have a bigger effect on the financial performance of upstream enterprises than on midstream and downstream companies, according to the findings. Furthermore, the detrimental impact of subsidies on firms and non-state-owned businesses in the western and central areas is greater than that on enterprises and state-owned businesses in the eastern region [4]. Zhao et al. used five different profit distribution models of supply chain members were solved using the idea and method of game theory, and the pricing of sales channels, the pricing of recycling channels, the change of profit range of each supply chain member, and the change of profit distribution ratio were all solved [5]. Jiang et al. claimed that promotion NEV is an important part to achieve the goal of carbon neutrality and air purification. Research result shows that the sale of battery and charging pile is related to NEV. What is more, people's prejudice of NEV accident rate also affects the promotion of NEV, especially in less developed areas [6].

Li et al. discussed the impact of the NEV policy document by combing the LDA topic model and econometric method. The result shows that the support rate of NEV is related to the sale of NEV. Under the COVID-19 public pays more attention to the production policy than the promotion subsidy policy [7]. Yu et al. classified the subsidies into government subsidies beforehand (GSB) and government subsidies afterward (GSA) and analyzed the different subsidies' impacts on NEV companies. The results show that there is a positive U-shaped relationship between GSB and financial performance, and an inverted U-shaped relationship between GSA and financial performance [8]. Yang et al. claim that government incentives, tariffs, and other supportive measures may significantly increase the market share of new energy vehicles with low technical content However, this method is unsustainable because local new energy vehicles with lesser technology content can only thrive in the market by closing the technological gap with imported brands. [9]. Wang et al. discussed the preferential policies are being updated and adjusted to meet the current development of the new energy vehicle industry and consumer purchase needs. Besides, the research discussed how to make subsidies more targeted to propose manufacturing strategies under the influence

of policy and consumer demand [10].

The main target of this research is to analyze the difference between traditional motor vehicles and new energy vehicles. The first part will introduce some basic knowledge of new energy vehicles, then analyze the traditional between the motor vehicle and new energy vehicle by making comparisons on sales, relative technology development, and after-sale maintenance. In the last part, this research will make predictions of new energy vehicles development, some issues that may appear, and give some useful solutions of the issues that the new energy vehicle industry faces.

2. NEW ENERGY VEHICLE'S HISTORY AND WORKING PRINCIPLES

2.1 New energy vehicle's history of development

Petrol has been in a precarious situation as a nonrenewable resource, and the world's reliance on petrol is relatively significant. The growth of new energy vehicles can help to alleviate some of the world's high need for oil, a big number of automobile exhausts is an important cause of air pollution, and emission reduction is an environmental protection measure. In the sphere of transportation, the internal combustion engine that consumes gas is increasingly being replaced by a power system based on renewable energy sources which can be seen as environmental protection, technological progress, and energy security improvement. In 2018, a majority of European Union members committed to restricting or banning the sale of internal combustion engines, with France announcing that also decrease the number of automobiles that consume gas. In 2018, a majority of European Union members committed to restricting or ending the registration of internal combustion engine vehicles, such as France, which announced that this would stop the sale of internal combustion engine vehicles by 2040, and the United Kingdom, which also announced that it would prohibit the sale of internal combustion engine vehicles by 2040. Some countries have stricter deadlines, such as Norway, which has set a deadline of 2025.

2.2 New energy vehicle's operating principle

New energy vehicles (NEV) are the vehicle that uses unconventional fuels as the power source. The NEV includes blade electric vehicles (BEV), hybrid electric vehicles (HEV), and fuel cell electric vehicles (FCEV). With the development of NEV technology, battery costs are gradually decreasing. Cathode materials account for about 30%-40% of the cost of power batteries, which largely determines the price of power batteries and affects the cost of new energy vehicles. The cost of cathode materials is mainly concentrated in the nickel, cobalt,

manganese three elements. The price of nickel is much cheaper than cobalt because nickel can improve the battery energy density, improve vehicle endurance, so the perspective of occupying the market or obtaining high subsidies, high nickel, low cobalt batteries are more applied by car companies, and cobalt-free batteries are also in the process of research and development. Another direction for cost reduction is to replace the graphite in the negative electrode material with silicon. Silicon is 30% cheaper than graphite, and silicon can carry more lithium than graphite, which means that silicon cells can have a greater energy density. NEV mainly uses vector control and direct torque control driven by induction motors. Because the direct torque control is direct, the structure is simple which is suitable for the control of vehicles. Most companies use the technology to develop electric vehicle motors. Digital intelligent control systems are becoming more intelligent and computer as drive systems developed. Besides various intelligent control ways also be applied to the controller system of electric vehicles, which makes electric vehicles smarter and easier to control. The development of NEVs can successfully reduce reliance on petroleum resources while allowing limited resources to be used for more essential industries. Coal, natural gas, hydro, nuclear, solar, wind, tidal, and other energy sources can be transformed into energy to charge the battery. Furthermore, if the battery is charged at night, it can avoid the peak of electricity usage, which benefits the grid's load balance and lowers costs. Electric vehicles have been demonstrated to be more efficient than internal combustion vehicles in studies. When stopped, some electric vehicles do not consume energy, and when braking and decelerating, the vehicle can automatically change into a generation to reuse energy.

3. COMPARISON BETWEEN A MOTOR VEHICLE AND NEW ENERGY VEHICLE

3.1 Related Technology Development

As the typical oil fuel engine can efficiently limit the speed range of the power generated to a limited range, the traditional oil fuel engine vehicle requires a huge and complex operating system. For electric vehicle driving, there is no need to shift the gear transmission device, and the operation is convenient and easy. Electric vehicles replace internal combustion engines with electric engines instead of automatic transmissions. Furthermore, when compared to hybrid power vehicles, pure electric vehicles use only electric energy, and the electronic controller greatly reduces the vehicle's internal mechanical transmission system as well as the energy consumption and noise caused by engine operation, which increases internal space and reduces the weight of the vehicle. The fundamental distinction between electric vehicles and internal combustion vehicles is that three components of the vehicle are distinct: the speed controller, the power battery, and the onboard charger. The electric vehicle's beginning speed is determined by the

power and efficiency of the driving system.

3.2 Sales

Global car sales fell 14% in 2020 which is the third consecutive year of declining demand. After the 2020 coronavirus pandemic, sales dropped even more. The chart shows below is the motor vehicle sales worldwide from 2015-to 2020 [11].

With the pandemic, global vehicle production decreased which put millions of jobs and industries worldwide at risk. Supply and demand for new vehicles increased after the lockdown was lifted later this year. The electric vehicle market has experienced a record year, with global electric vehicle sales is increasing. The chart below shows electric vehicle sales worldwide from 2015 to 2020 [12].

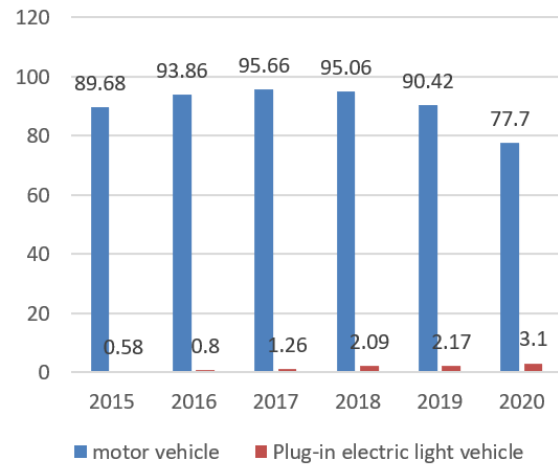


Figure 1 Worldwide motor vehicle sales compared with Plug-in electric light vehicle sales from 2005 to 2020 (in million units)

The sale of electric vehicles is significantly less than motor vehicles. As internal combustion engine vehicles consume gasoline, which is the most common resource worldwide. The sale of electric vehicles cannot surpass motor vehicles in a short period.

3.3 Related Facilities Construction and Maintenance

New energy vehicles, like traditional automobiles, require the construction of facilities that can offer energy. However, the number of charging stations is still quite limited. Even though the government supports the building of charging piles, the current charging station is difficult to meet the demands, and it is also difficult to meet the standard of easy and convenient charging. Additionally, the current charging infrastructure is distributed unequally, as the majority of facilities are concentrated in major cities and roads, making it difficult to satisfy the need for the rapid growth of new energy vehicles. What is more, there are certain issues with the

building and operation of charging stations, and the government needs to implement the necessary policies to manage them. There are several important facilities for traditional fuel vehicles that can adequately satisfy the regular demands of traditional fuel vehicles. Gas stations have already been built in large numbers, and the range of gas stations has already spread to towns and cities, which means no more development is necessary.

For the repair of some traditional fuel vehicles, maintenance workers can rest assured that repair will not cause electric shock accidents. However, the voltage of new energy vehicles on the market today is around 750V during operation, which is very high compared to the battery of traditional fuel vehicles. The repair of electric vehicles may cause an electric shock accident, which in turn endangers the life of maintenance workers, with the rapid development of new energy vehicles, the development of the market requires more professional workers to repair the new energy vehicles

4. DEVELOPMENT TRENDS

4.1 Obstacles to the future development of new energy vehicles

In the process of marketing promotion of new energy vehicles, the main issue is the price. Most people will have concerns about price, and when compared with fuel vehicles, they will generally choose motor vehicles as motor vehicles cost less than new energy vehicles. In addition, for practical use, the cost of new energy vehicles is significantly higher than motor vehicles, as the core components of new energy vehicles need to consume electricity to generate kinetic energy, which will cost a period. Besides, the battery replacement also needs to spend a huge amount of money to ensure the normal operation of new energy vehicles. What is more, maintenance requires a lot of money. These issues slow down the marketing promotion of new energy vehicles. Besides, although the government has given strong support in terms of funds and policies, it is not comprehensive in the construction of equipment and facilities that provide new energy vehicle needs. For the construction of new energy vehicles facilities, it is necessary to increase the budget for the invested equipment and facilities, which will bring great challenges to the capital operation of enterprises if the budget is not sufficient, it is impossible to update the equipment and facilities in time, which has a huge impact on the marketing promotion of new energy vehicles.

4.2 Solutions to issues related to new energy vehicles

The new energy vehicles industry has just been initially developed, the output and sales of new energy vehicles are growing rapidly, and the amount of

production and sales have expanded rapidly, but the new energy vehicle products still do not have strong competitiveness. New energy vehicle-related enterprises are still facing problems such as weak technical foundation, low original innovation ability, lack of core technology, insufficient brand influence, and other issues. With the gradual decline of subsidies for new energy vehicles in various regions, the impact of these problems will gradually increase. What is more, the entry of mature vehicle brands and joint ventures has a huge impact on the development of new energy vehicles. Only by uniting relevant enterprises in various industries to increase product research and development and fix core technical problems can new energy vehicle products improve the quality of products and adapt to consumer demand from multiple levels such as energy consumption level, power performance, endurance time, and vehicle comfort. The breakthrough of battery technology will also greatly enhance the safety guarantee of new energy vehicle products and avoid spontaneous combustion or combustion accidents of new energy vehicles. Besides, enterprises should increase their brand publicity and actively play a leading role in branding such as increasing the budget of advertisement and introducing more promotions. Enterprises can establish a brand image by creating an iconic corporate product line and improving their brand capabilities, For example, strengthening advertising operation management and improving after-sales service.

5. CONCLUSION

This research discussed the competition between traditional motor vehicles and new energy vehicles by making comparisons on sales, technology development, and after-sale issues. The main finding is the competition between motor vehicles and new energy vehicles can promote the development of the new energy industry. As there are many uncertainties in worldwide trade, global energy prices may become unstable with the improvement of the international peaceful environment. In the future, the instability of the international petrol market and the fluctuation of fossil energy prices will seriously affect the fuel supply and cause a great impact on the economy and society. Therefore, the development of renewable energy can relatively reduce the proportion and dependence of fossil energy in energy demands. In addition, the most important difference between renewable energy compared with fossil energy is that it causes less environmental pollution, which can efficiently protect the environment.

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