

Study on the Development Status and Impact of New Energy Vehicles in China

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Abstract:

The purpose of this study is to study whether new energy vehicles can be widely popularized under the present economic development situation, as well as extending more advanced technology. It explores the impact of new energy vehicles on various aspects of China's economy, environment and society. This study adopts research methods such as literature research method and time series modeling, and finds that nowadays new energy vehicles are over-utilized in big cities. We have recently found that the digital economy has been of considerable help to the development of new energy vehicles, such as promoting the transformation of the traditional automobile industry and improving its innovation ability. On the other hand, the green economy has become a major trend in global economic development, the new energy industry, as a core component of the green economy, has experienced rapid growth and significant changes globally, its research results are good or bad, involving the state, society and consumers (Zhao Yuki et al., 2024). This study discusses about the current situation of the development of new energy vehicles in China and its influencing factors from multiple perspectives, and combines economics, sociology, environmental protection and other fields to conduct diversified categorization research.

Keywords: New energy, Environmental protection, Society, Material

1. Research background

1.1 Background

Traditional energy sources are facing a shortage crisis, like oil, coal and natural gas which are non-renewable resources. Non-renewable resources refers to natural resources that cannot be regenerated for a

long time, and these traditional energy sources will produce a lot of pollution when they are used, such as the combustion of coal will produce carbon dioxide, which will lead to the greenhouse effect, which will bring some harm, such as an increase in the number of diseases and pests on the earth, sea level rise, climate anomalies, the increase of ocean storms and desertification area increases, and so on. In re-

cent years, the emergence of “new energy” can temporarily solve part of the problem.

1.2 The current situation

Today’s society, the economy and science and technology in the continuous rapid development of energy consumption is too large at the same time, resulting in the continuous depletion of energy and environmental pollution and other serious problems are becoming more and more obvious. Now all parts of the world are advocating energy saving, emission reduction. Green has become the mainstream of today’s society. Nowadays, the automobile industry has become one of the world’s largest energy-consuming and polluting industries. To solve the problem of energy consumption and environmental pollution can start from the automobile industry to reduce energy consumption and pollution. Although the new energy market is expanding nowadays, the technology still has bottlenecks. And the basic power supply device has not been popularized.

1.3 Research framework

Starting from the literature about the data types of new energy vehicle production and use in previous years, through different aspects of research and summarize the shortcomings of new energy vehicle development and urban planning, as well as put forward some solutions. Through the time series model to compare the sales of new energy vehicles in the past, innovation and other different data, used to explore the prospects for the development of new energy vehicles in China.

2. Significance of the study

Environment: (Society) The promotion and application of new energy vehicles have had a significant positive impact on environmental protection in China. Firstly, by replacing traditional fossil fuel vehicles, they effectively reduce the emission of harmful gases produced during fuel combustion, which include carbon monoxide, nitrogen oxides, particulate matter, etc., and they are the main source of air pollution. With the reduction of these pollutants, air quality improves and the negative impact on human health and the ecosystem is reduced. Secondly, the popularization of new energy vehicles helps to reduce carbon dioxide emissions, one of the main greenhouse gases contributing to the worsening of the global greenhouse effect. By reducing CO₂ emissions, we can slow down the rate of global warming and reduce the frequency and intensity of extreme weather events, thereby protecting the global ecosystem and the sustainable development of human society.

In addition, new energy vehicles reduce exhaust emissions from traditional fuel vehicles, and the sulfur oxides and nitrogen oxides contained in these exhausts are the main ingredients in the formation of acid rain. Acid rain has a serious damaging effect on soil, water bodies and crops. Long-term acid rain will lead to soil acidification, destroy soil structure, affect the growth of crops, and even lead to crop yield reduction or crop failure. The popularization and use of new energy vehicles can help reduce the occurrence of acid rain, thus protecting the soil and crops and maintaining the ecological balance. Finally, reducing the use of traditional fuel vehicles can also reduce the risk of soil erosion. Traditional fuel vehicles produce large amounts of exhaust emissions during driving, and the pollutants in these exhausts can wash into rivers and soil with rainwater, leading to soil erosion and soil degradation. The use of new energy vehicles reduces the emission of these pollutants, which helps to maintain the stability and fertility of the soil, reduce the phenomenon of soil erosion, and protect and improve land resources. In summary, the promotion of new energy vehicles is of great significance in improving air quality, slowing down climate change, protecting soil and crops, and reducing soil erosion.

Economy: (National) green economy has been developed to a certain extent. Because the world is now vigorously promoting the protection of the environment, enterprises can get national support by creating new green industries, while more consumers will buy new energy vehicles. As can be seen from the data, China’s electric vehicle production ranks among the world’s top, from which many products are oriented to the world, which makes the new energy vehicle exports increase, and also shows a strong competitiveness in the international market, and the export volume and export value of the new energy vehicles have realized a substantial increase. These achievements not only reflect China’s progress in the field of green economy, but also make positive contributions to global environmental protection and sustainable development.

Energy: (World) Reducing the extraction of fossil energy sources, such as oil and coal, is of great significance to the transformation of China’s energy structure and environmental protection. This action will not only help to improve our diesel-to-steam ratio structure and slow down the rising trend of crude oil dependence on foreign countries, but also effectively address the accelerated depletion of energy brought about by the uncontrolled exploitation of fossil energy. China is vigorously promoting the use of renewable energy to gradually replace non-renewable resources in order to solve the problem of energy depletion, and has achieved remarkable results. Under the prerequisite of ensuring energy security and continuing to promote a green and low-carbon transformation of energy sources,

the total consumption of fossil energy should be gradually reduced. This transition will help reduce dependence on traditional energy sources such as oil and coal and reduce the environmental impact of energy consumption. Second, China is actively improving the diesel-to-gasoline ratio structure, i.e., the ratio of diesel to gasoline consumption. In summary, by reducing the extraction and use of fossil energy, improving the diesel-vapor ratio structure, and vigorously promoting renewable energy, China is effectively coping with the problem of energy depletion.

3. Research problems

3.1 Shortcomings in the development of new energy vehicles

In recent years, the world's major automobile markets have been vigorously developing new energy as an important measure for the country's sustained and healthy development, and as an important initiative to improve the value capacity of the industry. New energy vehicle technology is becoming an important direction for the development of the automobile industry and market economy. The application of new energy automobile technology is conducive to optimizing the structure of the automobile industry and continuously promoting the leapfrog development of China's automobile industry (Ma Yinyu, 2024). So the scope of influence of new energy automobile in the country is relatively large, and it is helpful for China's economic development. In my opinion, over the years of the development of new energy vehicles, it has accounted for a considerable share of the automobile market in China. To the community of human destiny to do the discussion, this is also a good product to help us protect the environment on which we live, and our country also has strong support for research and development personnel to innovate science and technology, research and development of new energy products with more impact. Because the traditional fuel cars for the destruction of the environment we are also witnessed, so we will slowly to new energy vehicles to replace it.

The leapfrog development of new energy vehicles leads to traffic congestion, as well as people focus on the impact of new energy vehicles on urban pollution, while there are some limitations in traffic congestion (Zhang Haoran et al., 2024). For example, the snowstorm in Hubei was blocked on the highway for 5 or 6 days, and the new energy trams could not be charged in time, resulting in blocking the normal operation of other cars, can the new energy trams only be used as a means of transportation in the city? I think for the present may be so, but in the future if the basic charging facilities construction is perfect, new

energy vehicles can also become our universal transportation. However, the congestion caused by the temporary lack of equipment is now called external cost or congestion cost. Heterogeneity-the scale of development of new energy vehicles in China's north and south shows a significant imbalance, which may lead to differences in the degree of traffic congestion.

Characterization of traffic accidents of new energy vehicles - According to the severity, accidents of new energy vehicles are divided into three categories: property damage, injury and death. The results show that from the point of view of severity, the proportion of new energy vehicle accidents resulting in casualties is as high as 78.7%, of which the proportion resulting in death is close to one-fifth; from the point of view of collision type, new energy vehicle accidents are dominated by collision with sports vehicles (65.0%) and collision with pedestrians (24.3%), with the latter's proportion of fatal accidents as high as 46.7%. In addition, new energy vehicle accidents mostly occurred on urban road sections, but did not show significant time distribution characteristics. After comprehensively considering various factors such as person-vehicle-road-environment-collision, the accident severity was modeled and analyzed using ordered logistic regression model to identify the key factors affecting accident severity (Su Meiling et al., 2022). The severity of casualties leads to a decrease in the reputation of new energy vehicles in China, and may lead to a reduction in the market for new energy vehicles.

3.2 Influencing factors and solutions

3.2.1 Higher cost of materials and production technology

[Cost factors] New energy vehicles is a new market industry, we are sure to meet a variety of problems in the development of new energy vehicles, to achieve the cost reduction of the new energy automobile industry, to achieve the improvement of the infrastructure related to new energy vehicles so that we have a common goal, and ultimately to achieve the goal of improving the level of efficiency and the construction of the battery's raw material cost is high, and has not yet formed a certain economies of scale, so the purchase price is high (Xiao Xiao, 2017). And now most of the families and enterprises in China use traditional cars, it is difficult to make most people accept in a short time, because not most people in our country have the money to buy a new car to respond to the call of the state.

3.2.2 Battery technology to be improved (range)

[Weather influencing factors] There are four main reasons

why electric cars consume power fast in winter: the decline in stored power, reduced battery activity, electrolyte cooling and charger charging inefficiency. First, when the temperature drops below 10°C, the storage power of the battery will drop by 20%, and when the temperature drops below 0°C the storage power will drop by 30% or more. As a result, the range will also be greatly reduced in cold weather. Secondly, lead-acid batteries are widely used in electric vehicles, and their power generation principle is to generate electricity through chemical reaction. When the temperature drops in winter, the temperature of the solution in the lead-acid battery decreases, the activity of the substances in the solution decreases, the conversion efficiency decreases, and the resistance increases, resulting in a lower discharge voltage of the battery, which reduces the usable capacity of the battery and increases the power consumption. Thirdly, the internal structure of lead-acid batteries is mainly composed of lead plates, insulation cotton and electrolyte. When the weather becomes cold in winter, the electrolyte, as a liquid, will experience different degrees of cooling, and after being cooled, it will not cover the whole lead plate. When the battery is in the charging project, the lead plate is not covered by distilled water, it will lead to a decrease in the activity of the active substance, an increase in the resistance of the chemical reaction, a decrease in the diffusion capacity, and the charging becomes slow, resulting in a decrease in the capacity of the battery, and the range will naturally decrease. Finally, when the weather is cold, the charger will also be affected.

3.2.3 Smaller degree of popularization and limited charging due to insufficient coverage of charging piles

[Infrastructure factors] Electricity is the main power of new energy vehicles, so charging piles also affect the development of new energy vehicles. The charging stations in China are limited, resulting in a limited driving range (Zhang Shuran et al., 2019). For electric vehicles due to the high cost of construction and infrastructure can not be completed by an independent enterprise, it is necessary for various enterprises to join forces with local government departments to work together, so that large-scale promotion is possible.

3.2.4 Financial risks associated with the digital transformation of traditional automotive companies

[Financial Risk Factors] As the automotive industry's demand for digitization rises, traditional automotive enterprises face financial risks. Such as single financing channel, wrong investment direction, cash flow break and credit risk (Fan Decheng et al., 2022). For the investment of each product there is a certain risk, so we can do risk

prediction to reduce the cost of trial and error, and take corresponding countermeasures.

4. Objectives

The biggest goal of researching new energy vehicles is to visualize the benefits, not only for the automobile companies to obtain dividends, but also to reduce the exploitation of traditional energy sources and thus protect the nature on which people depend. What we need to do together is to research new energy batteries suitable for long-term use and plan the layout of charging piles for new energy vehicles in cities or make replaceable batteries to reduce the inconvenience of traveling in response to technological development. In addition, we should replace traditional energy vehicles with trams as called for by the state, so as to achieve real energy saving and emission reduction, and realize the concept of carbon emission and carbon neutrality.

5. Research methods

The term "cost control" originates from the Accounting Control Act of the United States. Through the system engineering team in the production and operation process so that the reasonable cost of regulation, in order to reduce the production and operating costs by all legitimate and reasonable means for the purpose. In short, the ultimate goal of cost control in the enterprise is to prevent the waste of resources, to reduce the cost to the lowest possible water bottle, and to maintain a reduced cost level (Ding Pei, 2022). In my opinion the new energy automobile industry in order to control the cost, should be carried out from the technical point of view. By investing in education specialized in materials, looking for a large number of talents, to carry out technological innovation, to break through the current bottlenecks and so on.

I think that if we need to popularize this new energy technology and products, then we need to innovate to make the products more popular with the public, because consumer support also has a great impact on the development of new energy vehicles: the impact of consumer perception on the willingness to buy medium and high-end new energy vehicles, of course, this is also an important factor in the development of new energy vehicles (Wang Lili et al., 2024). For example, appearance, practicality, with the continuous development of the times, we can also use the Internet to publicize our new energy vehicles. Following the trend of the times is easier to be found. Enterprises can also use time series modeling to observe the development of new energy vehicles in the past 10 years, and predict the future development, these methods provide help to

enterprises to choose whether to invest in or develop new energy vehicles.

For the environmental impact on the battery, we can improve the battery device by adding a vacuum-like protec-

tive cover outside the engine to minimize air convection to avoid heat loss. This is through physical material science to avoid smaller battery savings in our electric cars. Or increase the capacity of the battery itself.

Table 1 Sales of new energy vehicles in China in the last 10 years

Year	Sales (10,000 cars)	Market share	Remarks
2014	7.5	3.2%	Annual sales of new energy vehicles began to grow significantly
2017	No specific data provided	Not provided	Monthly sales data recorded from the beginning of the year
2018	125.6	Not provided	Not available Specific market share not available
2020	136.7	5.4%	Sales exceeded 1 million units for the first time
2021	352.1	Not provided	Significant sales growth realized
2022	688.7	25.6%	Nearly doubled sales and significantly increased market share
2023	949.5	31.6%	No. 1 in the world for 9 consecutive years, with market share exceeding 30 percent
2024(Jan-July)	593.7	Not provided	2024, cumulative sales in the first 7 months

6. Characteristics of the development trend of new energy vehicles in China

New energy vehicles are experiencing a rapid development trend in China, and their market penetration continues to rise, displaying the following characteristics:

Market scale growth: China's new energy vehicle production and sales have grown significantly since 2014, with annual production reaching 7,058,000 units and sales of 6,887,000 units in 2022, representing year-on-year growth rates of 96.9% and 93.4%, respectively, showing strong growth momentum.

Policy promotion: The Chinese government has promoted the development of the new energy vehicle industry through policy support, such as providing subsidies for vehicle purchases, tax breaks and accelerating the construction of charging infrastructure and other measures.

Technological innovation: the industry that is about new energy vehicle has continued to make breakthroughs in battery technology, motor control systems, lightweight materials and intelligent driving technology, improving product performance and market competitiveness.

Export growth: the competitiveness of China's new energy vehicles in the international market is increasing, and China is a major exporter of new energy vehicles. exports reached 1.735 million units in 2023, showing excellent international market performance. It has a significant impact on China's economic development.

Regional development differences: the penetration rate of new energy vehicles in first-tier cities has been relatively high, while third- and fourth-tier cities, although the penetration rate is low, the market potential is huge, and

it has become a new growth point of the new energy vehicle market. As the market in first-and second-tier cities is gradually saturated, new energy vehicle companies are beginning to expand to third- and fourth-tier cities, which have become important incremental markets and the largest stock market for the new energy vehicle market.

Infrastructure construction: China is accelerating the construction of charging piles and urban parking facilities to support the further popularization and application of new energy vehicles.

To summarize, China's new energy vehicle industry is in a period of rapid development, with technological innovation and industrial chain improvement providing a solid foundation for the market, and policy support and market demand jointly promoting the prosperity of the industry. Meanwhile, with the market gradually sinking to third-and fourth-tier cities, the industry is expected to achieve wider popularization and growth in the future.

7. Conclusion

This study unfolds the development, impact, future status, and some current shortcomings in the development of new energy vehicles, and proposes relative solutions. The impact of new energy vehicles is outlined in the economic and social fields. For the current development of new energy vehicles I think the status quo is very fast in progress, and to a certain extent is considered to be good. Even in the battery, influence and so on the development of a larger space, so our country strongly support the development of new energy products as well as to encourage green environmental protection, I believe that in the future

new energy vehicles will be high-speed development, new energy vehicles may become the mainstream in the future.

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