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Market Demand, Policy Environment, and Future Trends: Analysis of New Energy Vehicle Industry in China

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Abstract: Under the complex and ever-changing global economic situation, the sales of new energy vehicles in China are facing many development opportunities and practical challenges. Market demand and policy environment impact the development of China's new energy vehicle industry. This research takes the new energy vehicle industry in China as the research object, adopts a combination of literature review and case analysis methods by combing and analyzing relevant literature, combined with practical cases, deeply discusses the development status and problems of China's new energy vehicle industry, and proposes improvement suggestions from two dimensions: market demand and policy environment. Research shows that insufficient market demand, insufficient technological innovation, and an unstable policy environment are the main factors that restrict industrial development. To solve these problems, measures need to be taken, such as increasing government support, enhancing technological innovation capabilities, and promoting reforms and innovations in marketing and other aspects, aiming to inspire China's new energy vehicle industry to go global.

Keywords: New energy vehicles, Consumers, Influencing factors

1. Introduction

With the increasing awareness of environmental protection and the development of the automotive industry, new energy vehicles, such as clean energy vehicles, have gradually gained favor among consumers. The sales situation of new energy vehicles not only reflects the improvement of consumers' awareness of environmental protection and their recognition of new energy vehicles but also is closely related to the social and environmental policies introduced by the government [1-3]. Compared with 2020, the number of new energy models at this year's Beijing International Auto Show reached 278, far exceeding the previous 160. The "top-tier" booths of new energy car companies such as BYD, Weilai, Xiaopeng, and Xiaomi Automobile attracted many media to stop and look. The intensive release of many new models and technologies has also raised market expectations. New energy vehicles have become the protagonists deservedly. Nowadays, the consumer market and policy environment are important factors affecting the new energy vehicle industry [4]. To help us better understand the current sales situation of new energy vehicles in the market and to formulate corresponding policies and measures to promote the promotion and popularization of new energy vehicles, as well as to provide a reference for automakers on market demand, helping them better formulate product strategies and promote new energy vehicles, we start

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from market demand and policy environment. This article combines a literature review and case study methods to carry out a detailed collation and analysis of relevant information, aiming to provide beneficial insight into the development of China's new energy vehicle industry.

2. The Sales Situation of New Energy Automobiles in China

The overseas export volume has significantly increased with the rapid development of China's new energy vehicle industry. According to a People's Daily Overseas Edition report, from January to July 2023, China's new energy vehicle exports reached 636,000 vehicles, a year-on-year increase of 1.5 times. Currently, the sales of new energy vehicles in China are mainly affected by market demand and policy environment. Regarding market demand, most consumers support replacing fuel vehicles with new energy vehicles, and there is a significant change in consumption trends. However, the current imperfection of supporting facilities for new energy vehicles will affect consumer rights [5].

Regarding policy environment, major countries have introduced green environmental protection policies to support developing and consuming the new energy vehicle industry. However, due to technical constraints, the market penetration rate of new energy vehicles is still low. According to KPMG's "China's New Energy Vehicles Dreaming in Europe", the global penetration rate of new energy vehicles in 2022 was 13%. Manufacturing new energy vehicles has reduced carbon emissions to a certain extent and alleviated the greenhouse effect and other climate issues. However, the waste batteries of new energy vehicles still contain heavy metals, harmful chemical components, etc. If appropriate measures are not taken, these batteries will cause pollution to soil, water resources, and the atmosphere and even pose a hidden danger to human health.

3. China's New Energy Automobile Consumer Market Demand

3.1. Automobile Charging Facilities

China's new energy vehicle industry is moving towards marketization. However, the construction of self-charging facilities (charging piles) poses significant challenges that limit the widespread adoption of new energy vehicles. Developing the new energy vehicle industry is crucial, as it affects key areas such as national energy security, energy conservation and emission reduction, technological progress, and economic growth. The convenience of charging facilities directly affects the use of new energy vehicles, but China has yet to establish a comprehensive network of such infrastructure. It is widely recognized that charging difficulties are a major issue, and China's current promotion of new energy vehicles has not met expectations. Although some cities have started to build public charging stations, the convenience of using these stations is still limited. Installing charging piles in residential areas and using them to charge vehicles when drivers return home at night is more convenient. Many consumers have given up on buying new energy vehicles because they cannot solve the problem of installing personal charging facilities. Therefore, equipping residential areas with home charging piles is the key to solving the charging problem for new energy vehicles [6].

To understand the awareness and acceptance of consumers towards new energy vehicles, analyze the factors considered by consumers when choosing new energy vehicles, evaluate the satisfaction of consumers with the use of new energy vehicles and their potential needs for improvement, and explore the attitudes of non-car owners towards new energy vehicles and their future purchase intention, the following is a summary of the "New Energy Vehicle Consumption Survey" conducted from March 1 to March 5, 2024 in six provinces: Shanxi, Heilongjiang, Hebei, Shandong, Yunnan, and Qinghai. Online questionnaire data statistics: 19,612 valid questionnaires were collected from this survey. Gender-wise, male respondents are the most numerous, accounting for 61%; age-wise, respondents aged 26-35 and 36-45 are the main participants, accounting for 77%; income-wise, respondents in this survey with annual incomes ranging from 50,000 to 200,000 are the main participants.

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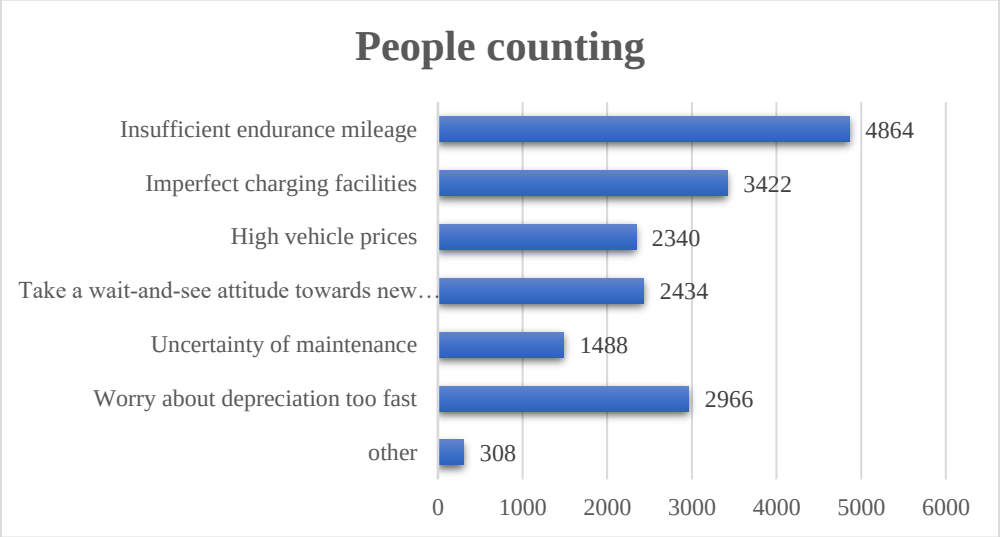

Figure 1: Shanxi Province Market Supervision Administration.

As shown in Figure 1, the survey results showed that 8,210 respondents had never bought new energy vehicles. The main reasons why they did not buy new energy vehicles were mainly focused on six aspects: “insufficient endurance”, “imperfect charging facilities”, “worried about depreciation too fast”, “wait-and-see attitude towards new technology”, “exorbitant vehicle prices”, and “uncertainty of maintenance”.

From this, it can be concluded that the adequacy of charging facilities is a decisive factor in promoting the popularization of new energy vehicles. The lack of charging piles will lead to range anxiety among consumers, affecting their willingness to purchase new energy vehicles [5].

3.2. Price and Cost

The price of vehicles, subsequent maintenance costs, and the concern about depreciation are the primary factors that affect consumers’ purchase intent. China has not yet formed a complete electric vehicle industry chain, which has led many complete vehicle manufacturers to rely mainly on imported batteries and control equipment to maintain production, thereby increasing production costs. Regarding the perception of new energy vehicle prices, 43% of the respondents (8412) believe that the prices are relatively high, 39% of the respondents (7676) believe that the prices are relatively reasonable, 2884 respondents (15% of all respondents) believe that the pricing is very reasonable, and 3% of the respondents (640) believe that the prices are significantly high. The prices that residents accept for purchasing vehicles vary depending on their income levels. Considering technological advancements and the upgrading and replacement of vehicles, their resale value and their ability to retain their value also need to be tested. New energy vehicles have high requirements for the batteries used, as they need to ensure both capacity and reliable durability. Otherwise, the subsequent maintenance costs will also be a major factor that hinders consumers’ purchase intent. At the same time, rising oil prices will limit consumers’ demand for traditional fuel vehicles, encouraging them to shift towards new energy vehicles. The traditional neoclassical economic perspective is that although environmental regulation can directly affect environmental protection, it may also impose certain restrictions on a company's production and development. Environmental issues have become a focal concern for governments worldwide with economic globalization and the information age. In cases where corporate funds are limited, some funds may be allocated for pollution control and emission reduction, which will lead to increased production costs for companies, reducing their

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profitability and industrial performance, and ultimately having a “crowding out effect” on corporate innovation, which is also known as the “cost effect” hypothesis [7-9].

4. Policy Environment of New Energy Automobile in China

4.1. Government Policy Support

For the current acceptance of the new energy vehicle consumer market, survey results (Figure 2) showed that the respondents were generally optimistic about the current new energy vehicle consumption market. 88.8% of the respondents (17,416) were optimistic, and only 11.2% (2,196) were not optimistic. Respondents who were optimistic about the new energy vehicle consumption market believed that there were certain advantages in the new energy vehicle consumption market, mainly: “strong policy support”, “rapid market growth”, “significant industrial development significance”, “significant technological progress”, “high public acceptance”, and “significant environmental benefits”. China’s government is actively promoting waste battery recycling policies, such as those mentioned in the “Energy-saving and New Energy Vehicle Industry Development Plan” issued by relevant national departments, which states that a series of regulations on battery recycling need to be formulated. Based on these regulations, a sound battery grading and recycling management system has been further established. According to the guidance of the “State Council General Office on Guiding Suggestions for Accelerating the Promotion and Application of New Energy Vehicles”, we should consider formulating battery recycling and reuse policies, encourage the recycling and reuse of batteries, and then establish an efficient battery recycling system. China’s relevant policies and regulations are continuously improving and optimizing, and relevant rules and systems are becoming increasingly clear. Enterprises profit by researching and producing new energy vehicles based on government subsidies. The number of subsidized automobile enterprises will increase when government subsidies increase. This means that if the government helps automobile enterprises bear the risks of technological research and development, they will be more likely to engage in technological research and development. The benefits they will obtain from technological research and development will be greater [10].

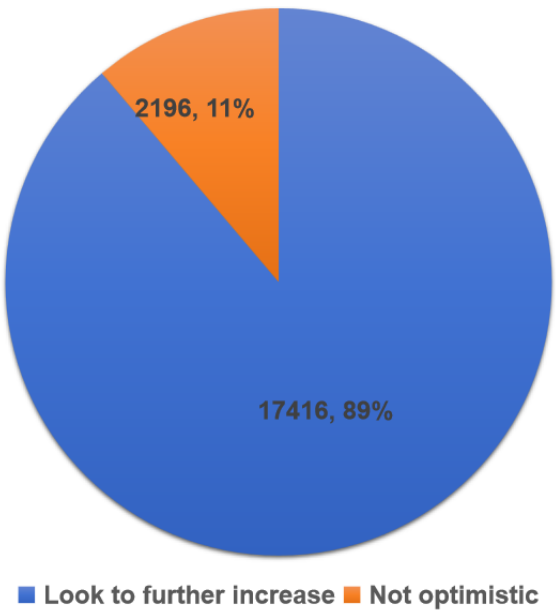

Figure 2: Acceptance of new energy vehicle consumption market

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4.2. Corporate Social Responsibility

In terms of the environment, from the perspective of environmental protection, the lithium-ion battery, due to its basic composition and production process, may cause environmental pollution. There are two main types of pollution: firstly, pollution caused by the positive electrode material, negative electrode material, and electrolyte; secondly, solid waste pollution generated when the battery is disassembled. Therefore, waste batteries need to be recycled thoroughly and handled properly by professionals to avoid potential safety issues arising from disassembly and assembly in such an environment. Overall, China's new energy vehicles still rely on imports in some key component industries, and their core technologies need to be further optimized. To encourage research and development by car companies, the government has adopted subsidy measures that can further promote the rapid growth of the new energy vehicle industry by reducing corporate losses and reducing their risks. The development of new energy vehicles is inseparable from the government's support, and financial subsidies are one of the main ways for the government to support the development of new energy vehicles. With the support of government subsidies, enterprises are committed to research, development, and production of new energy vehicles.

Consumers with a high level of environmental awareness tend to perceive the purchase of new energy vehicles as a "green" consumption method, and this awareness plays an important role in their purchasing decisions. Literature research on companies' green innovation and carbon emissions trading policies indicates that carbon emissions trading schemes may have a dual effect on corporate innovation strategies. On the one hand, although carbon emissions trading policies limit a company's total pollution emissions, if the company still adheres to outdated processes and technologies and increases or reduces carbon emissions, it will reduce its profitability. On the other hand, the market environment of carbon emissions trading may drive companies to adopt more environmentally friendly production methods and reduce the emission of pollutants. The fundamental idea of carbon trading is to use carbon emissions management and trading strategies to determine the price of carbon to enhance the competitiveness of the renewable energy industry in the market. In addition, given the high liquidity of carbon emissions rights on the market, there is a positive correlation between carbon trading and companies' green innovation actions. When the imbalance between market supply and demand causes changes in carbon prices, these fluctuations often accompany changes in carbon prices, thereby bringing additional risk compensation effects. Companies will focus more on implementing green technology innovation activities to mitigate carbon emissions risks. In addition, with the strengthening of environmental regulations, carbon emissions are gradually decreasing. Still, companies are more inclined to focus on environmental protection projects due to the scarcity of carbon emissions rights. Therefore, under these specific environmental conditions, major corporate organizations seeking profits are usually willing to increase their financial investment in green innovation, aiming to improve and optimize production processes while reducing the environmental burden. From a unique perspective, carbon trading policies may positively affect corporate green innovation strategies directly or indirectly by enhancing corporate cash flow and optimizing net income from assets. Companies can innovate in trading environments involving carbon emissions to generate various possible economic benefits. For example, green innovation can meet the company's demand for reducing pollution emissions and obtain additional emission reduction rewards through carbon market transactions when the company's total carbon emissions are reduced to no more than the upper limit. In addition, companies' main profit source in carbon trading is selling their emission reduction credits. Profits obtained through this means can be used to research and develop green and low-carbon technologies, further motivating companies towards a future path of green innovation. This also indicates that the innovative desire of corporate leadership will be enhanced [11].

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5. Suggestions and Future Development Trends

Market demand and policy environment play an important role in developing China's new energy vehicle industry, but they also bring some problems. Studies have found that the main factors restricting the industry's development are the lack of basic charging infrastructure, consumers' opinions on prices and later-stage costs, and an unstable policy environment. To solve these problems, measures need to be taken, such as increasing government support, enhancing technological innovation capabilities, and promoting reforms and innovations in marketing and other aspects. Through research and analysis, effective inspiration and suggestions can be provided for the further development of China's new energy vehicle industry.

5.1. Strengthening the Construction of Infrastructure

First and foremost, we should increase the number of charging piles and consider the limitations of new energy vehicles in medium- and long-distance driving, speeding up the development of charging piles in highway service areas to meet the travel needs of new energy vehicles. Next, we need to establish charging efficiency standards for charging piles. Currently, there are charging piles set up by the government and charging piles created by third-party companies. The charging efficiency of these devices varies, with some only reaching half or one-third of efficient devices, which poses a challenge for users relying on new energy vehicles, especially those using fully electric vehicles, who face the dilemma of spending a lot of time charging their vehicles. This study suggests establishing a charging efficiency standard for charging piles to promote the construction and layout of fast charging piles more quickly, aiming to improve the overall efficiency of charging piles. Our third aspect is maintaining and managing the completed charging stations more effectively. For those government-funded charging stations, selectively establish a dedicated management department or choose third-party companies to complete operations and management through services purchased by the government. In addition, to allow consumers to assess and evaluate the operation of charging stations comprehensively, we should also build a comprehensive evaluation system.

5.2. Breakthrough in Key Technologies

The demand for batteries in new energy vehicles is quite high to ensure the capacity of the battery and its reliability and durability. Therefore, it is recommended that car manufacturers focus on researching key technologies such as consistency, safety, durability, and low cost-of electric vehicles; focus on developing electric vehicle products with high-cost performance and market acceptance to produce comfortable and reliable urban vehicles and pure electric small passenger vehicles.

5.3. Increase Government Subsidies

According to the relevant regulations of financial subsidies, we should enhance support for new energy vehicles in key links such as charging and exchanging batteries, optimize their use environment, and accelerate the popularization and promotion of new energy vehicles. First, government subsidies should be reasonably adjusted to the new energy vehicle industry. From the perspective of sustainable development, it can reduce investment in this process to strengthen the research and development technology of new energy vehicles and achieve the rapid development of the new energy vehicle industry based on the market.

Secondly, subsidies should be increased, subsidies should be diversified, and subsidies should be rationally used to stimulate the research and development of new energy vehicles. Take reasonable measures to subsidize vulnerable enterprises, reduce the possibility of vulnerable enterprises adopting speculative and rent-seeking strategies, and achieve the goal of optimizing the industrial environment

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through subsidies. Encourage consumers to purchase and use new energy vehicles, such as fully utilizing the leading role of government procurement, increasing government procurement, and government procurement for official use of clean energy vehicles, which are preferentially procured in the category.

Finally, the preferential tax policy system for the new energy vehicle industry should be improved by prioritizing tax relief. According to the law, energy-saving and new energy vehicle enterprises can enjoy relevant preferential policies. The government should also raise the vehicle purchase tax, implement a zero-tax rate for new energy vehicles with obvious energy-saving and emission-reduction effects, and implement free license plates to attract consumers to purchase new energy vehicles.

6. Conclusion

By analyzing the market demand and policy environment of China's new energy vehicle industry, this study identifies a series of problems and makes recommendations. Firstly, China's new energy vehicle market is constrained by a lack of basic charging facilities, consumer concerns about prices and later costs, and an unstable policy environment. To solve these problems, there is a need to increase government support, enhance technological innovation, and reform and innovate in marketing and other areas. Specifically, infrastructure needs to be strengthened to increase the number of charging piles and charging efficiency standards must be established to improve the overall efficiency of charging piles. In addition, completed charging stations should be better maintained and managed, and a comprehensive evaluation system should be established. Breakthroughs in key technologies such as battery consistency and low cost are needed to develop cost-effective and market-acceptable electric vehicle products. In addition, government subsidies should be rationally adjusted to increase support for the new energy vehicle industry and optimize subsidies to stimulate the development and promotion of new energy vehicles. Finally, preferential tax policies for the new energy vehicle industry should be improved to attract consumers to buy and use new energy vehicles by providing tax breaks and other incentives.

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