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Sustainable Development of New Energy Vehicle Industry in the Post-Subsidy Era

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Abstract: Because of the increasingly serious ecological and environmental problems, it has become a trend to explore the path of sustainable development. The vehicle industry has seized this opportunity to vigorously develop research on new energy vehicles, while the state also vigorously supports the development of new energy vehicle industry. But all kinds of problems in the process of policy implementation have led to the gradual decline of policy strength. The state subsidy has entered the post-subsidy era, which has had an important impact on consumers' subjective attitude, acceptance degree and purchase intention towards new energy vehicles. To further explore the sustainable development path of new energy vehicle industry under the background of subsidy withdrawal, a variety of research methods were comprehensively used in this paper to correctly analyze the government and enterprises in the post-subsidy era, and finally the countermeasures and suggestions for the sustainable development path of new energy vehicle industry were put forward.

1. Introduction

With the shortage of energy, the aggravation of environmental pollution, and the increasing emphasis on green, coordinated and sustainable development, the new energy vehicles have received more and more attention from the state and has become one of the strategic emerging industries in China owing to its advantages of environmental protection and energy saving. Besides, the promulgation and promotion of the government subsidy policy for new energy vehicles promote them to replace the traditional ones as the "new favorite" of consumers.

With the rapid development of the industry, however, its disadvantages gradually appear. For example, industrial development has lost the power to enhance its competitive advantage in the market due to its strong dependence on subsidies. The risk of overcapacity in new energy vehicles is gradually accumulating and worsening. Some enterprises cheat the state subsidies, causing adverse consequences. As a result, the burden of fiscal expenditure is increased and the overall

economic development is affected. The technological level is still far from that in developed countries. In view of these problems, the central government began to gradually decline subsidies in 2017. Consequently, it has become an important research topic how the new energy vehicle industry will continue to move towards the road of sustainable development in the post-subsidy era of new energy vehicles.

2. Literature review

According to the existing research, the way that the state supports the development of new energy vehicle industry is mainly consumption promotion policy, including government purchase and consumption subsidy (government subsidy) [1] (Xiong Yongqing et al., 2018). To put it another way, the increase of private demand and public demand from the perspective of market demand, is stimulated to promote the sales of new energy vehicle industry and promote its sustainable development. Government subsidies play a dual role in influencing the development of new energy vehicle enterprises, which can both promote and hinder.

The promotion effect of government subsidies on new energy vehicles is mainly manifested in two aspects: First, the government increases subsidies to the new energy vehicle industry, thus reducing the production cost of new energy vehicles. Second, the government's R&D subsidy for new energy vehicle enterprises has prompted the new energy vehicle industry to increase investment, thus promoting technological progress and finally achieving the effect of cost reduction[1] (Xiong Yongqing et al., 2018).

The obstruction of government subsidies to the new energy vehicle industry is manifested in two ways. First, due to the low market entry threshold in the process of government subsidies' role in the development of new energy vehicles, some enterprises enter only to cheat the government's subsidy dividends for new energy vehicle enterprises, and even some rent-seeking behaviors are included. Second, the government subsidy has become the benchmark for measuring the vehicle technical indicators of new energy vehicle enterprises. More new energy vehicle enterprises only pay attention to the mileage indicators in the manufacturing process because of the government's larger subsidies for vehicles with stronger endurance, while ignoring other related indicators, resulting in the comprehensive indicators of the produced new energy vehicles not reaching the standard, which leads to the reduction of consumers' trust in the quality of new energy vehicles, thus reducing their purchase willingness. Thus, the production of new energy vehicle industry has mistakenly changed from customer orientation to government orientation. [2] (Chen Zhou et al., 2021)

3. Overview of the Development of the New energy vehicle Industry

3.1. Development status of international new energy vehicle industry

3.1.1. A fast-growing global electric vehicle market

Despite the influence of the COVID-19 outbreak, the global sales and ownership of electric vehicles are still growing rapidly. Global sales of electric vehicles reached 6.75 million in 2021, up 108% from 2020. The global share of BEV&PHEV in global sales of light vehicles increased to 8.3% from 4.2% in 2020.

3.1.2. A fast-growing global electric vehicle market

China, Europe and North America are the main manufacturers and sellers of electric vehicles in the global market, among which China has a rapidly developed new energy industry and has occupied a large share in the global market and expanded year by year since 2014, followed by

Germany, the United States and the United Kingdom. In 2021, China sold 3.52 million electric vehicles, accounting for 56% of the global market.

3.2. The development trend of domestic new energy vehicle industry

1). The technology of the new energy vehicle industry keeps improving. The endurance, charging speed and thermal stability of the power battery, which is the core of electric vehicles, will surely attract attention and be improved and developed.

2). The supporting infrastructure and service system of the new energy vehicle industry will be further improved. The rapid growth in sales of new energy vehicles has gradually exposed the lack of infrastructure construction such as charging piles and the unsound after-sales system. Thus, the state and society will continue to strengthen related construction in order to realize the rapid development of new energy vehicles.

3). Develop intelligent network connection and move towards intellectualization. As one of the development trends of today's society, the application of intelligent technology, combined with new energy vehicles, can not only optimize the performance of vehicles, but also cater to the needs of customers and promote the development of the industry to a higher level.

4. Analysis on Subsidy Policies for the New Energy Vehicle Industry

4.1. Overview of subsidy policy

Government subsidy policy is mainly aimed at promoting consumers' purchasing intention and promoting the development of new energy vehicle market based on the main factors that affect consumers' purchasing psychology (the factors of commodities themselves, the influence of publicity, the factors of consumer services and the influence of external environment, etc.). The price of new energy vehicles is slightly higher than that of fuel vehicles for the same performance, but the subsidy policy makes up for this. However, industrial development is more dependent on subsidies and has lost its momentum. The risk of overcapacity of new energy vehicles is increasing day by day. Individual enterprises abuse state subsidies, resulting in adverse consequences. As a result, subsidies have gradually declined since 2017.

State financial subsidies are mainly divided into monetary subsidies and tax relief. Financial subsidies will be granted quarterly by the central government to new energy vehicle production enterprises, which will be liquidated annually. After the product is sold, the manufacturer shall submit an application for subsidy funds to the local finance and science and technology departments at the end of each quarter, which shall be reported to the Ministry of Finance and reviewed by the Ministry of Science and Technology step by step. After the review by the four ministries and commissions, the subsidy funds will be allocated to the relevant enterprises in advance so as to settle the subsidy funds according to the approved results by the end of the year. The tax relief refers to the gradual transfer of subsidies for the purchase of new energy vehicles from 2018 to support the construction and operation of charging infrastructure and the use and operation of new energy vehicles. Financial and tax preferential policies such as vehicle purchase tax reduction and new energy vehicle purchase tax subsidy should be implemented, and the construction of urban parking lots and new energy vehicle charging facilities should be strengthened.

4.2. Other supporting policies

It is not enough to give financial subsidies alone. To regulate the market of new energy vehicles, prevent enterprises from cheating and abusing subsidies and accelerate the popularization of new

energy vehicles, other policies have been introduced to bridge the policy gap and promote the development of new energy vehicles, such as policies to speed up the charging infrastructure of electric vehicles and policies to crack down on cheating. For example, the policy of increasing the number of charging piles has made charging piles more and more popular, which has also dispelled consumers' concerns about charging difficulties and brought consumers a better consumption experience.

5. Investigation on Sustainable Development Path of New Energy Vehicle Industry

In this paper, a new energy vehicle enterprise was investigated by questionnaire to understand its development momentum and existing problems in the post-subsidy era.

5.1. New energy vehicles with high competitive advantages

Different groups have different perceptions of the company's new energy vehicles with high competitive advantages. 24.07% of the respondents believed that battery-powered vehicles (BEV) were the most competitive, 20.37% believed that hybrid electric vehicles (HEV) had the most competitive advantage, and less than 20% believed that plug-in hybrid electric vehicles, extended-range electric vehicles and fuel cell vehicles had competitive advantages. Therefore, different people have different views on different cars, so it is the key to improve the competitive advantage of new energy vehicles by developing high-tech and integrating all advantages.

5.2. Development resistance of new energy vehicles

Regarding the development resistance of new energy vehicles, 39.51% of the respondents believed that the core technologies of new energy vehicles needed to be improved, and 26.54% believed that the recognition degree of new energy vehicles needed to be improved, requiring the guidance of the state and enterprises.

5.3. Bottlenecks in the development of new energy vehicles

According to the questionnaire about the bottleneck in the development of new energy vehicles, 33.33% of the respondents believed that their battery life and service life are the bottlenecks that need to be broken urgently in the production of new energy vehicles, followed by the reliability and safety of batteries. The survey results showed that the battery life of new energy vehicles is generally 5-6 years, and the charging time is generally 2-5 hours. The endurance and service life of electric vehicles and the reliability and safety of batteries are also the weaknesses of new energy vehicles when compared with fuel vehicles.

5.4. The range of a vehicle on a full charge

The mileage of a fully charged electric vehicle can be roughly between 200 and 500 kilometers, which is the key reason why most consumers don't choose to buy it, because it is not as convenient and low-risk as a fuel vehicle when going out.

5.5. Safety hazards of new energy vehicle batteries

The development of new energy vehicles still has some obstacles in modern times. For example, the security risks of batteries-tightness, anti-electric shock, anti-collision, self-ignition and battery aging are all key indicators for consumers to consider when choosing new energy vehicles among

many vehicles.

5.6. The supportability of new energy vehicle industry support policies

For the question of “do you support more preferential policies for the purchase of new energy vehicles than traditional energy vehicles”, 69.9% of the respondents expressed their support, which clearly showed that consumers have a high awareness of environmental protection, and the factors of not purchasing new energy vehicles include high price, large potential safety hazard and less research and development by enterprises, etc.

However, only 40.12% of consumers are satisfied with the current government's support policies for the new energy vehicle industry, which is slightly lower. To some extent, this indicates that there are some problems in the formulation and implementation of the government’s support policies for the new energy vehicle industry. Therefore, the government’s industrial support policy for new energy vehicles needs further investigation and improvement.

5.7. Problems of supporting policies for new energy vehicle industry

The most important issues for the research on the support policies of the new energy vehicle industry are to increase investment in research and development of new energy vehicle related technologies, increase infrastructure construction such as charging and replacing power stations, and increase subsidies to new energy vehicle enterprises. Therefore, in the process of financial subsidy, the government needs to change its direction from the original tax adjustment to the financial subsidy for the R&D module of new energy vehicles, etc., so as to indirectly improve the people’s sustainable dependence on new energy vehicles.

6. Countermeasures and Suggestions for Sustainable Development of New Energy Vehicle Industry

At the juncture of the post-subsidy era, the national policy direction needs to be gradually shifted from subsidies to other ways, and enterprises should adapt to the status quo of reducing subsidies as soon as possible, and make full use of innovation and R&D to improve their coping ability. This paper, based on this, provides some suggestions from the two main bodies of the state and enterprises:

6.1. At the national level

6.1.1. Withdrawing subsidies in a reasonable and orderly manner [3]

Most entrepreneurs believe that the COVID-19 outbreak has hit enterprises hard, increasing their costs, losses and difficulties. Regarding the decline in sales volume, the delay of subsidy policy and purchase tax can help boost the confidence of consumers and enterprises against the backdrop of the falling car market and the impact of the COVID-19 outbreak. To alleviate the pressure of enterprises, the state subsidies can be postponed for one to two years to reduce the losses of small enterprises, so that they have enough money to invest in the innovation and development of new energy vehicles.

6.1.2. Accelerating the construction of infrastructure

The subsidy policy should be tilted towards infrastructure construction in order to accelerate the supporting construction of new energy vehicles (such as charging, electricity exchange, etc.). The

inclusion of charging piles in the new infrastructure will greatly promote the further popularization and promotion of new energy vehicles in China. The postponement of the subsidy policy for new energy vehicles also gives the charging pile enterprises more confidence in investing. Speeding up the infrastructure construction of new energy vehicles not only reflects the country's emphasis and determination on energy conservation and environmental protection strategy, but also makes it more convenient for consumers.

6.1.3. Boosting consumer confidence

To expand the consumption of new energy vehicles market, the subsidy policy can be tilted to consumers to encourage them to buy new energy vehicles and boost consumer confidence. For example, consumers can save part of the car purchase cost through subsidy policy, and they can buy their favorite models for new energy vehicles without spending the full amount. For the later use of the vehicle, it is also a certain benefit. In this respect, a two-year delay in subsidies and purchase taxes is good for consumers.

6.2. At the level of enterprise strategy

6.2.1. Increasing research investment, improving vehicle performance, enhancing core competitiveness

In view of the current battery and charging technology problems, it is necessary to continue to increase research and development efforts to improve the safety [4] and reliability of domestic vehicles, and produce high-quality and high-quality products to become the best choice for consumers, so as to fundamentally reduce the impact of subsidy withdrawal.

6.2.2. Strengthening international cooperation and learning from the successful experience of other countries [5]

As developed countries such as the United States, Japan, in the Europe etc. have a long history of developing new energy vehicle industry, they have a lot to learn from in key technologies and operational experience. Therefore, it is of positive significance for the development of China's new energy vehicle industry to try to realize the sharing of achievements through transnational scientific research cooperation and learn from its operation experience.

6.2.3. Understanding consumers' needs and playing the role of marketing

As the new energy vehicle is a new product, it is more necessary to increase research efforts and fully understand the psychology of users. Particularly, after the subsidy is declining or even withdrawn, the new energy vehicle industry will face the market and consumers directly, and only when it is recognized by the market and consumers can it gradually mature and realize real independent development.

7. Conclusions and Outlook

As the development of new energy vehicle industry not only realizes the overtaking development of China's automobile industry, but also realizes the reshaping reform of energy structure [6], getting rid of the heavy dependence on fossil fuels and giving full play to the advantages of coal, electricity and energy, it is an important industrial approach for the transformation and upgrading of industrial economy and the construction of energy revolution. However, in the new era, under the promotion of environmental protection and green development concept, problems such as how will the

sustainable development of new energy vehicle enterprises continue, how should the government support policies for the new energy vehicle industry be transformed and implemented, and how should the new energy vehicle enterprises continue to promote the sustainable development process by using their own advantages in technology and how to strengthen the promotion of consumers' purchase intention from the aspects of infrastructure and other hardware facilities need to be continuously discussed.

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