

Transformation and Development of New Energy Vehicle Industry Based on Social Policy Inquiry

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Abstract: The new energy vehicle industry has drawn the interest of international attention with the growing global demand for sustainability and reduction of carbon footprint. The growth of the New Energy Vehicle (NEV) industry is profoundly influenced by global policies aimed at driving technological innovation, meeting environmental requirements, and facilitating economic transformation. Multiple stakeholders, from policymakers to companies, from consumers to technology developers, are working together to drive the rapid growth of this industry. By analyzing research and practices from various nations and areas, insights can be gained on strategies for successfully advancing the growth of the new energy vehicle sector. From a social point of view more environmentally friendly, reducing the pollution of the traditional class of oil vehicles on the environment; from the consumer point of view, due to the fierce competition in the growth of the automotive new energy sector, the businessman will provide more tempting products to attract consumers, to promote the consumer to pick the price is more suitable for the quality of the product better, and further increase customer satisfaction. The future development of the new energy vehicle industry relies on progress on multiple fronts: policy, technology, and market. The healthy development and environmental sustainability of the industry can be more effectively promoted through international cooperation, technological innovation, and a deeper understanding of consumer needs. Policymakers need to take these factors into account to ensure that policies are both relevant to current market and technological realities and adaptable to future changes.

Keywords: New Energy Vehicle, policy, market

1. Introduction

Promoting technological innovation, meeting environmental requirements, and facilitating economic transformation are policies that have profoundly affected the growth of the market for new energy vehicles [1]. This study is important for how to effectively promote the development of the new energy industry. This study emphasizes policy making, companies, technology developers, and consumers as stakeholders who choose and believe in the innovation of new energy vehicles. Literature analysis was used to find and read relevant information and literature, and the advantage of this method is that it can well analyze the key role played by policies in the market, such as enterprises obtaining funds for research and development, and consumers obtaining subsidies for car purchases, which is favorable to the research. The ultimate research goal of this study is the transformation and development of the new energy vehicle industry based on social policy inquiry,

and to reach this goal, research and practices from different countries and regions were conducted and analyzed.

2. Social Policies

The impact of policy formulation on the new energy vehicle industry is huge, and the role of policy promotion is also obvious. The industry's financial assistance program for new energy vehicles can be roughly divided into three stages:

Phase I (2001-2008): Industrial planning period, the state gradually formulated policies, including documents such as the National High Technology R&D Program. Overall industrial planning period. At this stage, the new energy automobile industry is still in its infancy, and the State has begun to give policy attention and financial support to new energy automobiles. The main policy documents include:

National High Technology R&D Program (863 Program): This program is designed to support the research and development of new energy vehicle technologies, including electric vehicles, hybrid vehicles, and fuel cell vehicles.

National Medium - and Long-Term Science and Technology Development Plan (2006-2020): emphasizes the importance of R&D and industrialization of new energy vehicles, and puts forward specific development goals and support measures.

Phase II (2009-2015): Rapid Growth Period, Government Issues Automotive Industry Adjustment and Revitalization Plan. During this phase, the Chinese government vigorously promoted the development of the new energy vehicle industry by implementing a series of more specific and stronger financial subsidy policies to promote rapid industry growth. Key policies include:

Adjustment and Revitalization Plan for the Automobile Industry: New energy vehicles are explicitly regarded as the strategic focus of China's automobile industry, and financial support in various aspects such as subsidies for vehicle purchases and the building of infrastructure for charging is provided.

Energy-saving and New Energy Vehicle Demonstration and Promotion Project: Promoting the use of electric vehicles through the implementation of a demonstration city project that provides subsidies and tax incentives for vehicle purchases.

New Energy Vehicle Purchase Subsidy: A certain amount of direct subsidy is given to individuals and units for the purchase of new energy vehicles.

Phase III (2016-present): Rectification Stage, the government issued the Notice on Adjustment of Financial Subsidy Policies for the Popularization and Application of New Energy Vehicles in 2016. With the gradual maturation of the new energy vehicle market and the adjustment of subsidy policies, the focus of the policies in this stage shifted to the gradual regression of subsidy policies and market-oriented adjustments. Important policy adjustments include:

Notification of changes to the financial support scheme for the use and marketing of new energy cars, which clarifies the subsidy regression plan, gradually reduces the reliance on subsidies for vehicle purchases, and enhances market competitiveness. The double integral policy, requires automakers to produce a certain percentage of new energy vehicles to meet environmental and energy-efficiency requirements and promote the sustainable development of the industry. Localization of the subsidy policy refers to the setting of subsidy standards by each local government according to the local actual situation, to better adapt to the local market demand.

Such a timeline reflects in detail the development of China's policy of financial subsidies for new energy vehicles, showing the whole process of the policy from initial exploration to rapid promotion to market-oriented adjustment.

2.1. Policy-Driven Market Formation

In Europe, government incentives such as tax breaks and direct subsidies have been successful in promoting market acceptance of electric vehicles. Hildermeier and Villareal reveal how France and Germany have shaped their electric markets through policy support, highlighting the key role of policy in market formation [1]. This policy-driven market not only accelerates the commercialization of the technology but also enhances customer loyalty, all of which will make new energy vehicles grow more rapidly in the future. A study by Qu and Li also shows how Shenzhen, China, utilizes demand innovation policies to promote the development of new energy vehicles [2]. Through the active intervention of the local government, Shenzhen has become one of the most popular cities for the use of new energy vehicles. These policies, which include providing subsidies for vehicle purchases and building charging infrastructure, have effectively stimulated the market and technological innovation.

2.2. New Energy Vehicle Late Transition

Ma et al. use game theory to analyze the interactions between firms, governments and consumers, showing how policies can be aligned with corporate strategies and consumer demand to drive the industry's transition to sustainability [3]. Regarding the "dual-carbon" objective, government policy support and market demand are driving companies to adopt greener and more sustainable business models.

For example, through the provision of R&D subsidies and tax incentives, firms are incentivized to develop new technologies and improve existing ones to increase energy efficiency and reduce environmental pollution. Li explores how government policies have promoted technological innovation and increased market acceptance of new energy vehicles, highlighting the key role of policies in promoting industrial upgrading [4]. Policies such as financial support for research and development (R&D), environmental standard-setting, and consumer purchase incentives have greatly contributed to technological progress and market expansion. R&D funding supports this policy to hasten the creation of automobiles powered by new energy related technology, improve such as range time is not long enough and other shortcomings; environmental standards set this policy to make new energy vehicles than ordinary oil cars more unimpeded, because some of the often traffic jams in large cities will be through the number of license plate to limit the traffic to achieve the maintenance of the environment, the purpose of traffic; The policy of consumer purchase incentives also helps consumers to solve the problem of money. Li studied the key role of policy in promoting product upgrading in the article, but there is not much involved in how to attract consumers, this paper will not only start from the aspect of policy making but also from advertising or publicity policy to supplement the existing research gaps so that most consumers can overcome the initial barrier of fear of new energy vehicles. overcome the initial barrier of worrying about new energy vehicles [4].

3. Case Study

To analyze the specific impact of policy changes on the the number of new energy vehicle sales, it is possible to observe the changes in the annual sales of BYD Qin (including plug-in hybrid (PHEV) and all-electric models (EV)).

Phase I: 2001-2008 (policy inception phase)

At this stage, the policy of new energy vehicles is still in its initial formation, mainly focusing on technology R&D and industrial planning, with less direct impact on market sales, so there is no data on the sales of Qin PHEVs and EVs.

Phase II: 2009-2015 (policy promotion and market expansion phase)

In 2013, Qin PHEV was launched with sales of 142 units. This was the first market performance of Qin PHEV, reflecting initial market acceptance. 2014 saw a significant increase in sales of Qin PHEV to 14,747 units with the introduction of the Government's Plan for the Restructuring and Revitalization of the Automobile Industry and other subsidy policies. The impact of incentives of the policy was significant and accelerated the market promotion of new energy vehicles.

Phase III: 2016-present (policy adjustment and market optimization phase)

In 2016, the Qin EV was first launched and annual sales reached 10,182 units, while Qin PHEV sales amounted to 22,097 units. That year, the Chinese government began implementing a more refined financial subsidy policy aimed at supporting new energy models with more mature technology and better performance, driving market acceptance of the Qin EV. In 2020, with the gradual retreat of the subsidy policy, the market began to gradually transition to a stage that relies more on its own competitiveness. Qin EV sales reached 36,525 units, becoming the main sales model, while Qin PHEV sales dropped to 16,599 units, reflecting consumer preference for higher energy efficiency and environmental standards. In 2022, Qin EV sales amounted to 29,742 units and Qin PHEV sales declined further to 2,086 units. During this phase, the progressive elimination of subsidy programs and the natural selection of the market contributed to the growth in sales of EV models with higher technological and performance requirements.

Policy changes have significantly affected the sales of new energy vehicles, as shown in Figure 1. From the initial subsidy push to the later market self-regulation, the role that policies have a key driving role in the promotion of new energy vehicles. In particular, the implementation and adjustment of the subsidy policy have directly promoted the sales growth of new energy vehicles, especially electric models, and also guided the purchasing behavior of consumers and the development direction of the market.

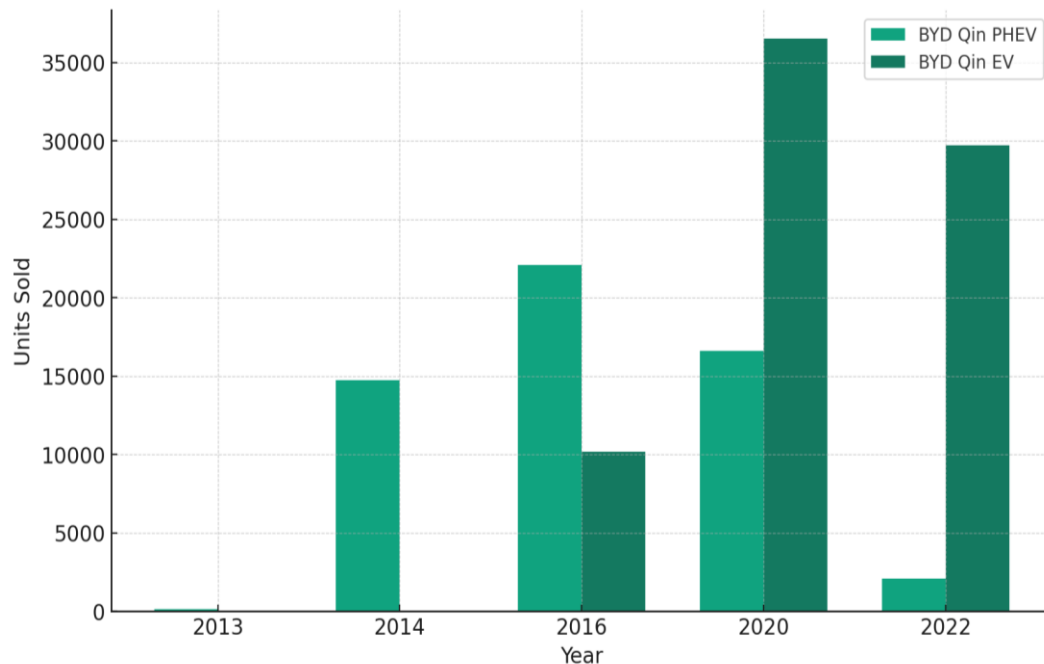


Figure 1: Annual Sales of BYD Qin PHEV and EV (2013-2022).

4. Discussion

Policy coherence and adaptation: Helveston and Li's study emphasizes the role of policies in achieving the SDGs and suggests that governments should pay more attention to their long-term

impacts and adaptation when formulating policies Policymakers need to take into account the rapid changes in technological advances and the evolution of market and consumer demand to formulate policies that can support the development of new energy vehicles in a lasting and effective way [4,5]. The policy should be formulated so that it can effectively support the development of new energy vehicles in a lasting manner. At the same time, the Government should continue to invest in the research and development of technologies related to new energy vehicles, including battery technology, electric drive systems, and charging facilities. In addition, the provision of R&D tax incentives, innovation funds, and technical support services can encourage more enterprises and research institutions to participate in technological innovation for new energy vehicles.

Influence of Consumer Behavior: Mdpi Author emphasizes the importance of understanding consumer preferences in developing effective marketing strategies by systematically reviewing public perceptions and purchasing behaviors of new energy vehicles [6,7]. Consumer acceptance is influenced by various factors such as herd mentality, The government and enterprises should jointly conduct publicity campaigns to popularize the environmental benefits and economic advantages of new energy vehicles, while providing experiential activities, such as test drives, to increase consumers' first-hand experience. Strengthening market regulation to ensure that new energy vehicles meet environmental and safety standards is essential to maintaining consumer confidence and protecting the public interest.

International cooperation and technical standards: Research by the University of Aberdeens suggests that in the context of the rapid development of electric vehicle technology, international cooperation, and harmonized technical standards are essential for the globalization and sustainable development of the industry [8]. Different countries and regions should strengthen cooperation and jointly develop technical standards and policy frameworks to promote international compatibility and interoperability of new energy vehicle technologies. This will not only accelerate the global popularization of the technology but also facilitate the expansion of the market and the rapid adoption of new technologies, making the development of new energy vehicles faster and more efficient.

This study provides many valuable references for future research in this direction, and several key development trends can be foreseen as new energy vehicle technology continues to advance and the market becomes more mature:

Technology integration and innovation in future new energy vehicles will be more intelligent and networked, and integration with other areas such as information technology, artificial intelligence, and big data will revolutionize the driving experience and vehicle management [9]. Integrating autonomous driving technologies will further promote the popularization and market acceptance of electric vehicles.

Battery technology breakthrough. The battery is the main part of modern energy cars., and the progress of battery technology will have an immediate impact on the cost and performance of electric vehicles. In the future, the market competitiveness of new energy vehicles will be significantly enhanced through the development of high energy density, fast charging, and long-life battery technology [10].

Policy shift to long-term and comprehensive. As the market for new energy vehicles becomes more developed, the policy will shift from initial market incentives to more comprehensive support measures, including the strengthening of infrastructure, integration of energy and transportation policies, and the promotion of environmental awareness, to provide a solid policy guarantee for the long-term development of new energy vehicles.

Consumer education and public awareness-raising. Enhancing consumer awareness of the advantages of new energy vehicles is an important step toward increasing market acceptance. The Government and enterprises should jointly conduct publicity campaigns to popularize the

environmental benefits and economic advantages of new energy vehicles while providing experiential activities such as test drives to increase consumers' first-hand experience.

International cooperation and policy coordination. In the context of globalization, transnational cooperation plays a key role in technology exchange, environmental standard-setting, and market access policies. Sharing best practices, coordinating technical standards, and mutual recognition and certification through international organizations and bilateral or multilateral platforms can successfully encourage the robust growth of the worldwide market for new energy vehicles.

The above measures can provide solid support for the sustained growth of the new energy vehicle industry while promoting the realization of global environmental protection goals. In addition to revolutionizing the business, new energy vehicles play a significant role in the worldwide drive to combat climate change and transition to a low-carb future.

5. Conclusion

The findings of this study are that sustained policy support and global cooperation will be key to moving the new energy vehicle industry forward. It is further concluded that by considering both the economic and social dimensions, it is possible to ensure that new energy vehicles are not just a transitional technology, but a long-term solution for the shift to cleaner and more sustainable modes of transportation. This will require consensus and action from across the globe to ensure that technological advances, market demand, and the policy environment combine to drive the future development of the automotive industry.

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