

Research on the Development of New Energy Vehicle Industry from the Perspective of ESG

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Abstract: Against the backdrop of increasingly prominent global environmental issues, the importance of ESG concepts is becoming more apparent. The new energy vehicle industry is thriving due to its crucial role in addressing climate change. This article believes that the new energy vehicle industry is making significant progress in the environmental dimension. In the production process, enterprises actively adopt energy-saving and pollution-reduction measures to reduce their impact on the environment. In terms of usage, new energy vehicles become an important force in promoting green travel due to their efficient and clean characteristics; In the recycling process, the potential for the recycling and utilization of new energy vehicle batteries is enormous, providing strong support for the advancement of the circular economy. These efforts promote the green and circular development of the new energy vehicle industry. At the level of social responsibility, the new energy vehicle industry focuses on safeguarding employee rights, optimizing consumer services, and actively engaging in public welfare undertakings, which effectively promotes employment and environmental awareness. In terms of corporate governance, the internal structure of the enterprise continues to be optimized, risk management is effective compliant operations are good, and information disclosure is proactive. Furthermore, ESG performance exhibits a notable positive influence on corporate innovation outcomes, the stability of supply chains, as well as financial performance.

Keywords: ESG, new energy vehicles, industrial development.

1. Introduction

Under the rapid development of the global economy, the significance of environmental, social, and governance (ESG) concepts is growing more and more prominent. ESG emphasizes a comprehensive evaluation of the three dimensions of corporate environment, social responsibility, and corporate governance. It breaks the previous single assessment standard that only focuses on the financial performance of the company, and becomes an essential consideration for advancing the sustainable development of enterprises [1]. Faced with the intensification of global climate change challenges, countries are actively taking measures to reduce greenhouse gas emissions and accelerate the transition to green energy. New energy vehicles, as a keyway to reduce carbon emissions and alleviate environmental pollution, are showing great potential.

The new energy vehicle industry is thriving globally. Many countries identify ESG as a national strategic industry and support it through a series of incentive policies such as subsidies, tax incentives,

and car purchase quotas. At the same time, automobile manufacturers increase their research and development investment in the field of new energy vehicles, constantly launching innovative products.

In China, the new energy vehicle industry also receives high attention from the government. In recent years, the Chinese government has introduced a series of policies and measures to vigorously promote the development of the new energy vehicle industry. From subsidy policies to dual credit policies, from the construction of charging infrastructure to the deployment of new energy vehicles to rural areas, the Chinese government has provided strong support in various aspects of the new energy vehicle industry. According to the latest statistics from the China Association of Automobile Manufacturers, China's new energy vehicles will continue to experience explosive growth in 2022, with production and sales of 7.058 million and 6.887 million vehicles respectively, an increase of 96.9% and 93.4% year-on-year, maintaining the world's first place for eight consecutive years.

The ESG (Environmental, Social, and Governance) performance of enterprises, as a rich and extended concept of green investment and responsible investment, is an important way to practice the concept of green development and solve social problems [2]. Existing research has confirmed that good corporate ESG performance can significantly enhance a company's innovation level [3]. Partial studies have analyzed the spillover effects of supplier ESG on customers and customer ESG on suppliers [1], as well as exploring the relationship between ESG ratings and corporate financial performance [4]. At present, there is relatively little research on the impact of ESG on specific industries. This study will start from the ESG perspective and assess the effect of ESG performance on new energy enterprises from three aspects: innovation performance, supply chain analysis, and financial performance. The purpose is to construct a theoretical framework and provide empirical support for subsequent scientific research.

Secondly, this study helps companies better understand the importance of ESG concepts for their development, clarifies the specific impact paths of ESG in innovation performance, supply chain management, and financial performance, and provides guidance for companies to formulate sustainable development strategies. At the same time, understanding the role of ESG factors in industrial development can help the government formulate more targeted and effective policy measures to promote the healthy and sustainable development of the new energy vehicle industry, thereby reducing carbon emissions, lowering environmental pollution, improving the overall environmental quality of society, and promoting coordinated development of the economy, environment, and society.

2. Comprehensive Analysis of the Development of China's New Energy Vehicle Industry

2.1. Overview of the Development Status of New Energy Vehicles in China

From the perspective of new energy vehicle categories, pure electric vehicles dominate, accounting for a relatively high proportion of the total sales of new energy vehicles from January to October 2024. Meanwhile, plug-in hybrid vehicles also maintain a stable growth trend, providing consumers with more choices. This article further uses the market penetration rate to measure the market share of China's new energy vehicles. Market penetration rate refers to the proportion of a company's actual sales volume to its potential sales volume in the market. It reflects the coverage of a product or service in a specific market and is a vital indicator to measure the acceptance and use of the product or service in the market. By analyzing Figure 1, the market penetration rate of new energy vehicles in China has increased from 4.70% in 2019 to 39.60% in 2024, indicating that the market for new energy vehicles in China is developing rapidly.

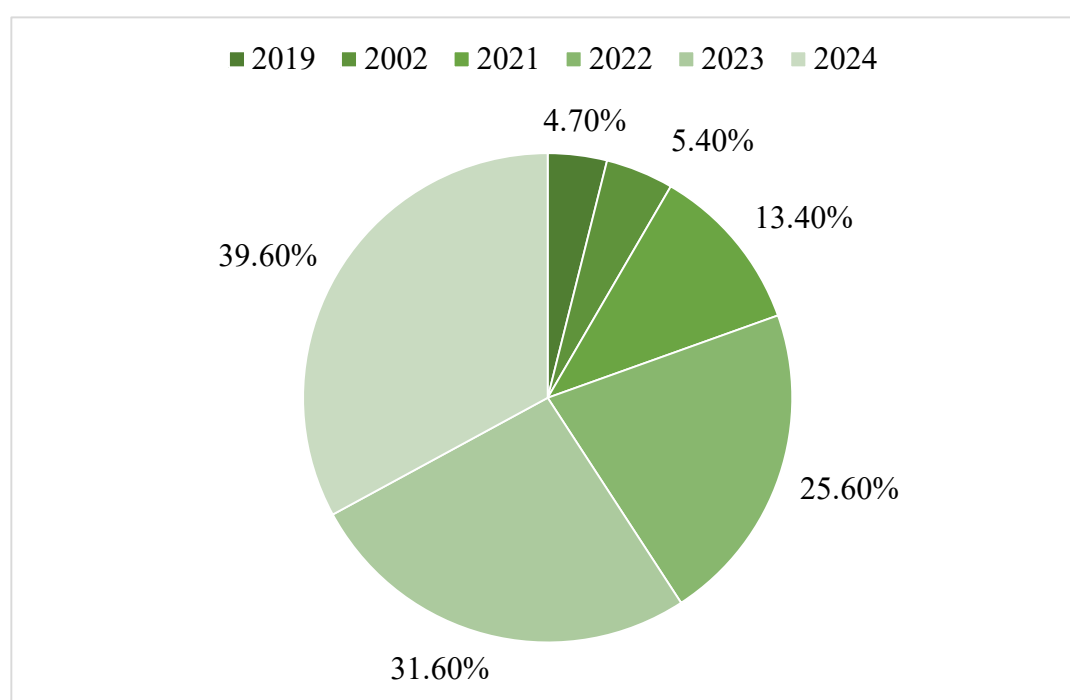


Figure 1: Analysis of the penetration rate of China's new energy vehicle market from 2019 to October 2024.

Data source: Compiled from China Association of Automobile Manufacturers and China Commerce Industry Research Institute

2.2. In Depth Analysis of the Development of China's New Energy Vehicle Industry

2.2.1. Market size and Growth Rate

In recent years, the Chinese new energy vehicle market has shown a vigorous development trend, with the market size continuously expanding and the growth rate maintaining a high level. According to data from the China Association of Automobile Manufacturers, from January to October 2024, the production and sales of new energy vehicles reached 9.779 million and 9.75 million respectively, as shown in Figure 2, an increase of 33% and 33.9% year-on-year, respectively. The proportion of new energy vehicle sales accounted for 39.6% of all new vehicle sales, clearly indicating the swift momentum of growth within the new energy vehicle industry. In October 2024, the production and sales of new energy vehicles reached 1.463 million and 1.43 million respectively, an increase of 48% and 49.6% year-on-year. The sales of new energy vehicles accounted for 46.8% of the total sales of new cars. In the long run, the yearly output of new energy vehicles in China was only 13000 units in 2012, reaching 1.15 million units in 2018, and an expected annual production of 12 million units in 2024. It took only 12 years to achieve the leap from an annual production of over 10000 units to millions of units, and the growth from millions to millions of units took only 6 years, demonstrating strong development momentum. This swift expansion not only mirrors the market's acknowledgment and escalating appetite for new energy vehicles, but also underscores China's pioneering status within the global new energy vehicle sector.

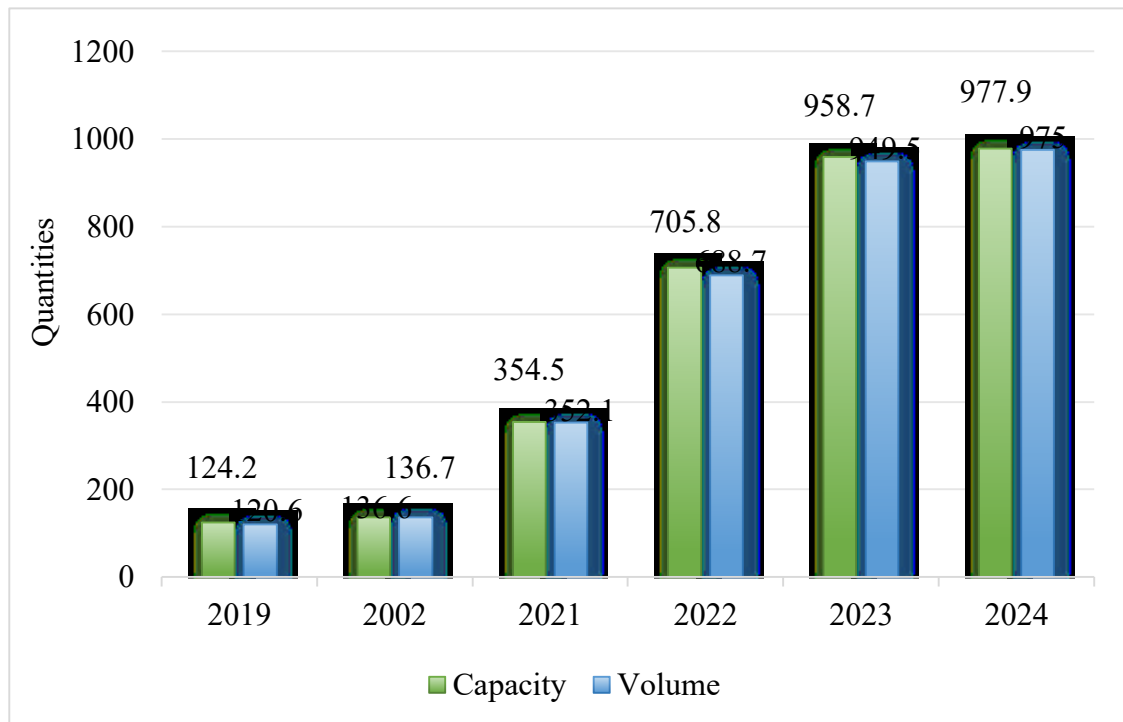


Figure 2: Analysis of production and sales of new energy vehicles in China from 2019 to October 2024.

Data source: Compiled from China Association of Automobile Manufacturers and China Commerce Industry Research Institute

2.2.2. Policy Environment and Regulations

The Chinese government has implemented a range of robust policies and regulations to foster the growth of the new energy vehicle industry. In terms of subsidy policies, the government provided high subsidies to consumers who purchased new energy vehicles during the early stages. Although the subsequent subsidy intensity has decreased, it still plays a positive guiding role in the market. For example, stimulated by subsidy policies, many consumers have reduced their car purchase costs and therefore choose new energy vehicles. The dual credit policy requires automobile companies to produce a certain proportion of new energy vehicles, prompting traditional automobile manufacturers to increase research and development and production investment. To meet the dual credit requirements, traditional car companies have increased their research and development funds for new energy vehicles and accelerated the launch speed of new energy vehicle models. In addition, the "Promotion Law of New Energy Vehicles" clarifies the national support policies and legal responsibilities for new energy vehicles, and the "Automobile Product Quality Law" puts forward clear requirements for the product quality and safety of new energy vehicles, ensuring the healthy development of the industry.

2.2.3. Enterprise Technological Innovation and Market Performance

Chinese new energy vehicle companies achieved remarkable results in technological innovation and performed well in the market. Taking BYD as an example, it has successfully gained mastery over pivotal technologies, encompassing batteries, motors, and electronic control systems and possesses advanced digital platform technologies such as the "Ei Sifang" and DMO super hybrid off-road

platform. In 2023, BYD's sales of new energy vehicles will increase significantly by 67% year-on-year, ranking first in global sales of new energy vehicles [5]. From the perspective of the industry, Chinese automobile companies have also achieved excellent results in overseas patent layouts. For example, Jingjin Electric ranks first in the disclosure of new energy vehicle invention patents by component innovation entities in overseas patent offices. Its cumulative patent applications have exceeded 1000, more than 670 patents have been granted, and more than 170 overseas patent authorizations have been granted, demonstrating the continuous improvement of China's new energy vehicle companies' technological strength and innovation capabilities on a global scale.

3. Analysis of the New Energy Vehicle Industry from an ESG Perspective

3.1. Environmental (E) Aspect

In the production process, new energy vehicle enterprises reduce energy consumption and pollutant emissions by adopting advanced production processes and equipment. For example, Tesla's factory roof is equipped with solar panels for power and hot water supply, effectively reducing dependence on traditional energy sources. However, the production process of new energy vehicle batteries still generates certain environmental pollution, such as heavy metal pollution. This requires enterprises to strengthen environmental management, continuously promote technological innovation, and reduce environmental risks. In terms of usage, new energy vehicles are powered by electricity and achieve zero exhaust emissions, which is of great significance for improving air quality and mitigating climate change.

In terms of usage, new energy vehicles use electric energy as their power source to achieve zero exhaust emissions, which is of great significance for improving air quality and mitigating climate change. Hybrid electric vehicles use electronic control technology, electric drive technology, etc. Hybrid electric vehicles save 40% of fuel consumption compared to traditional fuel vehicles [6]. Additional studies have revealed that pure electric vehicles do not necessitate fuel tanks, engines, transmissions, cooling systems, or exhaust systems. When compared to the internal combustion gasoline engine power systems of traditional vehicles, the electric motors and controllers involved in pure electric vehicles incur lower costs, while their energy conversion efficiency is superior, reaching over 90% [7]. The energy conversion efficiency of traditional fuel vehicles is generally only 20% - 30%.

In the recycling process, as the number of new energy vehicles continues to increase, the issue of battery recycling is becoming increasingly prominent. To address this challenge, China has introduced relevant policies to actively encourage enterprises to strengthen the recycling and utilization of waste power batteries, to improve resource recycling efficiency. According to the White Paper on the Development of China's Waste Lithium-ion Battery Recycling, Dismantling, and Tiered Utilization Industry (2022), the theoretical amount of waste lithium-ion battery recycling in China has reached 591000 tons in 2021, climbed to 762000 tons in 2022, is expected to reach 894000 tons in 2023, and will reach 2.312 million tons by 2026.

3.2. Social Responsibility (S) Aspect

New energy vehicle companies attach great importance to the protection of employee rights and are committed to providing superior working environments and generous benefits for their employees. For example, Tesla provides employees with competitive compensation and benefits, as well as vast career development opportunities. At the same time, the enterprise also strengthens the training and education of employees, improves their professional skills and comprehensive qualities, and provides a talent guarantee for the sustainable development of the enterprise.

From the perspective of consumers, new energy vehicle companies are dedicated to delivering high-quality, secure, and dependable products and services tailored to consumers' requirements. For example, companies such as BYD and NIO have established a comprehensive after-sales service system to provide consumers with timely and convenient after-sales services, thereby improving consumer satisfaction and loyalty. In addition, new energy vehicle companies actively participate in community construction and public welfare undertakings, making contributions to community development. For example, Xiaopeng Motors launched the "Xiaopeng Charity Walk" activity, donating books and learning supplies to schools in impoverished areas to support the development of education.

The promotion and application of new energy vehicles not only helps to enhance public awareness of environmental protection but also promotes the popularization of green travel concepts. With the gradual popularization of new energy vehicles, more and more consumers are paying attention to environmental protection and sustainable development issues, choosing to purchase new energy vehicles as a tool for green travel. In addition, the development of the new energy vehicle industry has also created many employment opportunities for society. From research and development, production, and sales to after-sales service, the new energy vehicle industry chain involves multiple links and requirement of professional talents and technical workers. According to data from the China Association of Automobile Manufacturers, the direct employment in China's new energy vehicle industry has exceeded 1 million people, and the indirect employment has exceeded 5 million people.

3.3. Corporate Governance (G) Aspect

In terms of internal governance structure, new energy vehicle companies continuously improve their board structure, increase the proportion of independent directors, strengthen internal supervision mechanisms, and ensure the scientific and rational decision-making of the company. Taking NIO as an example, independent directors account for over 50% of its board members and can provide independent and objective opinions and suggestions to the company.

In terms of risk management strategies, new energy vehicle enterprises face various risks such as technological risks, market risks, and policy risks, and need to establish a sound risk management system to strengthen risk identification, assessment, and control. For example, Xiaopeng Motors has reduced its financial risks by strengthening financial management and internal production and sales control, optimizing its capital structure.

In terms of compliance measures, new energy vehicle companies need to adhere to pertinent regulations and industry standards at home and abroad, strengthen compliance management, and ensure the legal and compliant operation of the enterprise. For example, when Chinese new energy vehicle companies go global, they need to face complex and changing international trade regulations, as well as technical standards and safety performance requirements from various countries. They must strengthen the construction of compliance frameworks to ensure that their export business complies with local laws and regulations.

With the continuous popularization of ESG concepts, more and more new energy vehicle companies are paying attention to ESG information disclosure, actively disclosing their ESG performance and related information to the public. According to a report by the ESG Research Center in the financial industry on November 7, 2024, as of June 1, 2024, 61 listed companies in the A-share new energy vehicle industry chain voluntarily disclosed their 2023 ESG-related reports. In terms of investor relations management, new energy vehicle companies enhance communication and exchange with investors, improve their awareness and trust in the company, and attract more investors to pay attention to and invest in the new energy vehicle industry. For example, companies such as BYD and CATL regularly hold investor exchange meetings to introduce their development strategies,

business performance, ESG practices, and other information to investors, enhancing their confidence in the company.

4. The Impact of ESG Performance on the New Energy Vehicle Industry

4.1. ESG Performance and Corporate Innovation Performance

In new energy vehicle companies, those with excellent ESG performance often integrate sustainable development concepts into their core values, focus on long-term development strategies, and demonstrate higher investment and enthusiasm in innovation. These types of enterprises tend to increase their research and development investment in environmentally friendly technologies such as clean energy and battery recycling to meet increasingly stringent environmental requirements. At the same time, in terms of social responsibility, they tend to focus more on consumers' needs for safety, comfort, and other aspects of new energy vehicles, and promote product innovation. Research has shown that ESG information disclosure significantly improves the green innovation performance of new energy companies. For example, by collecting data from A-share listed companies of new energy enterprises from 2020 to 2022 and using DEA model calculation, it was found that the effectiveness of ESG information disclosure on corporate green innovation performance is influenced by the nature of the enterprise, but overall, it shows a positive promoting effect [8]. This means that by improving ESG performance, companies can gain greater motivation and resource support in research and development investment, technological innovation, and other aspects, thereby enhancing their core competitiveness and market share.

4.2. ESG Performance and Supply Chain Risk

The supply chain of the new energy vehicle industry involves multiple links, including the acquisition of raw materials, component production, and vehicle assembly. Any ESG issue at any stage may pose risks to the entire supply chain. For example, environmental violations by raw material suppliers may lead to interruptions or quality issues in raw material supply. Labor rights issues may trigger social public opinion pressure, affecting corporate reputation and product sales. Poor ESG performance of the enterprise itself may also lead to a decrease in supplier confidence in its cooperation, affecting the stability of the supply chain. Improving ESG performance helps companies establish a more comprehensive supply chain management system and reduce supply chain risks. Enterprises can strengthen their ESG due diligence on suppliers, select suppliers that meet ESG standards, and establish long-term stable cooperative relationships. In addition, the good performance of enterprises in environmental management, social responsibility fulfillment, and corporate governance can also enhance the confidence of stakeholders such as suppliers, customers, and investors, stabilize supply chain cooperation relationships, and improve the overall stability of the industry.

4.3. ESG Performance and Corporate Financial Performance

The impact of ESG performance on the financial performance of new energy vehicle companies is reflected in multiple aspects. Firstly, in terms of the environment, enterprises that adopt environmentally friendly production methods and technologies can reduce energy consumption and environmental pollution costs, and improve product quality and reputation, thereby increasing consumer loyalty and market share, and ultimately promoting sales revenue growth. Secondly, from a societal standpoint, companies that actively embrace their social responsibilities are more inclined to earn consumer acknowledgment and confidence and bolster their brand value and market competitiveness, thereby positively influencing their financial performance. Finally, in terms of corporate governance, a sound corporate governance structure can improve the decision-making

efficiency and operational management level of enterprises, reduce agency costs and business risks, lay the foundation for the long-term stable development of enterprises, and help enhance their financial performance. According to statistics, the average issuance interest rate for green bonds is 1.5% lower compared to that of conventional bonds, indicating that companies with excellent ESG performance can obtain lower financing costs when raising funds, thereby reducing their financial expenses. Furthermore, PwC's research indicates that more than 40% of global end-consumers are prepared to pay up to a 10% premium for products and services that exhibit ESG characteristics. Chinese consumers are more attracted to brands with social responsibility awareness and are willing to pay a premium of up to 20% for ESG products and services that are trustworthy and in line with their value proposition. This undoubtedly helps companies improve product-added value and profitability.

5. Conclusion

This study conducted an in-depth analysis of the new energy vehicle industry from an ESG perspective and found that the industry is developing rapidly and showing positive trends in multiple aspects. The scale and penetration rate of China's new energy vehicle market continue to rise, driven by strong policies and regulations, and the technological innovation achievements of enterprises are remarkable. In ESG practice, new energy vehicle companies have promoted the green transformation of the industry through energy conservation, pollution reduction, and effective resource utilization from an environmental perspective. Although there are still pollution problems in the battery production process, the clean and efficient use of batteries and the huge potential for recycling provide strong support for the sustainable development of the industry. In terms of social responsibility, new energy vehicle companies have not only created many job opportunities, but also raised public awareness of environmental protection and promoted sustainable development by safeguarding employee rights, optimizing consumer services, and actively participating in public welfare undertakings. At the level of corporate governance, new energy vehicle companies continuously improve their internal structure and strengthen risk management and compliance operations. Many companies actively disclose ESG information, enhance interaction with investors, and improve their corporate reputation. ESG performance has had a profound and positive impact on a company's innovation performance, supply chain stability, and financial performance, injecting strong impetus into its long-term development.

In the future, academia should further explore the internal mechanism of ESG's impact on the new energy vehicle industry, accurately quantify its role in innovation investment and supply chain risk transmission, build scientific models, and provide strong support for decision-making. On the other hand, scholars should expand their research perspectives, compare the ESG practices of different countries, regions and various enterprises, sum up the experience and lessons learned, and promote the coordinated development of industrial globalization.

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