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Research on the Development of China's New Energy Vehicle Industry in the New Economic Environment

Pengyan Wang [1], Zian Wang [2, *], Chenglu Yang [3]

[1] New Channel, Qingdao, China

[2] School of Economics and Social Welfare, Zhejiang Shuren University, Hangzhou, China

[3] St. John Henry Newman Catholic High School, Toronto, Canada

* Corresponding Author Email: 202204312244@stu.zjsru.edu.cn

Abstract. As China's new energy vehicle industry continues to grow, it is becoming more and more important to the country's economic development. After comprehensively considering the in-depth research results of many scholars on the relationship between new energy vehicles and China's economy, combined with the current stage characteristics of China's new energy industry and the overall economic development, this paper aims to comprehensively and systematically analyze the important role of this industry in China's economic development, as well as the challenges and opportunities it faces. China's new energy automobile industry has had a significant positive impact on many aspects of China's real economy, export economy and low-carbon economy. However, the development of this industry is also affected and restricted by many factors. It also drives the development of various industries at the same time. It currently acts as a practical catalyst for China's economic growth. Even though the new energy vehicle sector will encounter several obstacles in the future, overall, the sector is trending forward. It will also have a long-lasting favorable effect on China's economy going forward.

Keywords: New energy vehicles; new economic environment; China; technology.

1. Introduction

Prior to 2030, China aims to reach a carbon peak and become carbon neutral by 2060. maintaining the "dual carbon" approach while encouraging low-carbon and environmentally friendly development. Encourage the continued growth of the new energy vehicle sector while integrating carbon peak and carbon neutrality into the broader economic and social development. In today's era of green and low-carbon economic development, the new energy industry is experiencing explosive growth in China. China's new energy vehicle industry has seized opportunities and developed rapidly. Many competitive domestic brands have emerged, for example: Geely, NIO, Xiaopeng, Ideal, etc. As it develops, not only does it drive the development of various other industries. It also provides new growth points for China's real economy. In the context of enterprise promotion and government support, China's new energy vehicle industry has become a new key industry development direction.

With the increasing recognition of new energy vehicles from consumers, the impact of its industrial development on the Chinese economy has also received increasing attention from the academic community. Scholars Li Wei, Zou Yue, and Zhu Caihua proposed in their article that automobile manufacturing is a symbol of a country's industrial strength [1]. As the lifeline of a country's economy, the real economy not only influences China's industrial strength, but also profoundly influences the overall development of the Chinese economy. Guo Wenjia's research on the improvement of consumer products for new energy vehicles has found its important role in promoting consumption and expanding domestic demand [2]. Research by Ji Xijun and Mo Miaomiao shows that under the low-carbon economy, the development structure of new energy vehicles is optimized, and their industries are continuously improved with policy support [3]. Due to limited research on the overall development of the new energy vehicle industry, this article will combine the impact of new energy vehicles on China's export economy and low-carbon economy, and comprehensively elaborate on the

development of China's new energy vehicle industry in new economic environment by combining its own industry development, influencing factors, and industries.

This article focuses on the current development of the new energy vehicle industry, analyzes the current development status of the new energy vehicle industry in China's new economic environment by integrating its industry situation and influencing factors. From the current situation, it can be seen that its essence has an impact on China's macroeconomic development. This article will be divided into three parts to elaborate. Firstly, the current status of the new energy vehicle industry will be studied, and the development status of new energy vehicles and the factors affecting their development will be analyzed. Secondly, discuss the impact of new energy vehicle development on China's economic development and its driving role in other industries. Finally, explore the future development of new energy vehicles and even the new energy industry. Through research, it has been found that the current new energy vehicle industry has driven the consumption of China's automotive economy, import and export trade, and the implementation of green economic policies, indirectly promoting the development of the real economy, export economy, and low-carbon economy. Academic research on the new energy vehicle industry's influence on China's macroeconomic development can be integrated, and studies of the industry's current state can serve as a guide for the development direction of new energy vehicle enterprises. It can also be used to analyze and forecast the industry's long-term effects.

2. The Current Situation of the New Energy Vehicle Industry

2.1. Industry Situation

In recent years, under the promotion of the "dual carbon" policy, China's new energy vehicle industry has been vigorously developed. The latest data shows that in 2023, China's sales of new energy vehicles reached 9.495 million units, a year-on-year increase of 37.9%, ranking first in the world for nine consecutive years. The market share of new energy vehicles is 31.6%, which is 5.9 percentage points higher than the same period last year. In 2023, the delivery volumes of BYD Automobile, Ideal Automobile, NIO Automobile, Zero Run Automobile, and Xiaopeng Automobile were 3.0244 million, 376000, 160000, 144000, and 142000, respectively, with year-on-year growth of 61.86%, 182.2%, 30.7%, 29%, and 17%.

Table 1. Production and sales of new energy vehicles in China

year	2018	2019	2020	2021	2022	2023
Production volume (10000 vehicles)	127.0	124.2	136.6	354.5	705.8	958.7
Sales volume (10000 units)	125.6	120.6	136.7	352.1	688.7	949.5

Table 1 shows the changes in production and sales in China from 2018 to 2023. As shown in the table above, China's new energy vehicle industry has experienced explosive development since 2021. Chinese policies, the development of new energy technologies, and changes in consumer attitudes are all influencing the development of its industry.

Table 2. Changes in china's new energy vehicle export volume from 2018 to 2023

year	2018	2019	2020	2021	2022	2023
Export volume (10000 vehicles)	14.71	25.4	22.4	31	104	120.3

China's GDP surpassed 126 trillion yuan in 2023, and new energy vehicles—one of the "new three types" of products—saw their export value surpass the trillion yuan threshold for the first time. In 2023, China's automobile exports reached 101.6 billion US dollars, with an export growth rate of 69%. As shown in table 2, the export of new energy vehicles was 1.203 million, a year-on-year increase of 77.6%. The total export volume of new energy vehicles accounts for about one-third of the total export volume of automobiles. According to the data of China's Belt and Road Network, in

the first quarter of 2023, China's automobile exports to Central Asian countries reached US $500 million, up 121% year on year. China's largest export market is Asian countries, especially Southeast Asian countries. Due to their emphasis on environmental protection and the need for economic development, the demand for new energy vehicles is gradually increasing. After European countries implemented fuel bans, the demand for new energy vehicles has been increasing year by year. According to statistics, Belgium, the United Kingdom, and the Philippines have become the three major export markets for China's new energy vehicles in 2022 [4]. The thriving export of new energy vehicles is driving the prosperity of China's foreign export economy. Although the new energy vehicle industry suffered setbacks in 2020 due to COVID-19, its future development trend shows a positive trend through research on the development in recent years.

2.2. Influencing Factors

In recent years, driven by a combination of technological advances, proactive policies, and strong scientific research, China has become a global leader in the new energy vehicle industry. Technological innovation in China's new energy automobile industry is advancing by leaps and bounds. Major advances include the development of high-performance batteries, efficient electric drivetrains, and cutting-edge charging infrastructure. For example, Build Your Dream’s (BYD) Tang DM-i electric SUV uses a 45.8-kwh battery pack. At the same time, China's charging facilities are also developing rapidly, and as of July 2023, Tesla has established more than 1,200 superchargers across the country [5].

At the same time, the key to the successful promotion of electric vehicles in China is the support of policies and regulations. The government has implemented a range of incentives, subsidies and mandates to incentivize consumers and manufacturers to embrace electric vehicles. New energy vehicle market penetration has been accelerated by measures like tax breaks, license plate quotas, and subsidies for electric vehicle purchases. According to the "New Energy Vehicle Industry Development Plan (2021-2035)" issued by the National Development and Reform Commission, it is expected that by 2025, the sales volume of new energy vehicles in China will reach 5 million, accounting for 20% of the total automobile sales. The Ministry of Commerce promoted the "hundred cities linkage" automobile Festival and the "thousands of counties and towns" new energy vehicle consumption season activities, and many places continued to promote consumption policies. In addition, a number of cities have implemented preferential policies for new energy vehicles, such as Shenzhen has fully implemented the policy of "all-electric buses within the city". Second, market demand continues to grow. China ranked top in the world for nine years running in 2023, with 9.587 million new energy cars produced and 9.495 million sold, according to a study by the China Association of Automobile Manufacturers. Concurrently, the cumulative export value of China's "new three" products—solar cells, lithium batteries, and electric cars—reached 1.06 trillion yuan, surpassing the trillion mark for the first time. It should be noted that BYD, Ideal, and other brands are dominating the market, and their market share is increasing.

China's push for new energy vehicles is also driven by economic demand. The government sees the electric vehicle industry as a strategic opportunity to gain a competitive edge in the global automotive market, reduce dependence on imported oil, and stimulate domestic innovation and manufacturing capacity. Therefore, a large amount of investment has been used to support the development of the new energy vehicle industry.

Electric vehicles are becoming a sustainable alternative to traditional internal combustion engine vehicles due to the increasing environmental concerns and the need to reduce air pollution and carbon emissions. The expansion of the new energy vehicle industry has been further promoted by China's ambitious targets for reducing greenhouse gas emissions and transitioning to clean energy.

China's New Energy Vehicle (NEV) industry is increasingly integrated into the global automotive ecosystem through partnerships, joint ventures, and technology transfer. Cooperation with international automakers, suppliers, and research institutions has facilitated knowledge exchange,

technology dissemination and market expansion, making China a strong player in the global electric vehicle market. The signing of the Paris Agreement and the EU's toughest new carbon emission regulations continue

Additional car purchase subsidies and tax incentives, and the ban on the sale of fuel vehicles have been issued, and economic stimulus policies in response to the new coronavirus pneumonia epidemic will drive the rapid development of the global new energy vehicle market. Affected by this, the export of new energy vehicles at Shanghai Port, which accounts for nearly 70% of the country's automobile exports, increased by four times year-on-year in 2020. Among them, SAIC Group exported and sold 390,000 vehicles overseas, and the independent brand of new energy was mainly exported to developed European countries such as Britain, the Netherlands, Norway, Denmark, France, and Germany [6].

Overall, the significant growth of China's new energy vehicle industry is driven by technological innovation, supportive policies, scientific research, economic needs, environmental considerations and global cooperation.

3. The Impact of China's New Energy Vehicles on the Real Economy

3.1. The Impact of the Development of New Energy Vehicles on the Current Economy

In recent years, the new energy vehicle industry has received more and more attention. The development of the automobile industry was mentioned many times in the Two Sessions in 2024, which shows that new energy vehicles have a great impact on China's economy in the current economic environment. The report of the Federation mentioned that at present, the production and sales of new energy vehicles in the world are growing rapidly, driving the demand for school-centric parts to rise. The general trajectory of the country's new energy vehicle industry chain, which started with the export of lithium batteries and then moved on to the export of electric vehicles before localizing the global new energy industry chain. The effects of two facets of the new energy vehicle development process on the economy will be summed up in this article.

In the 2024 Government Work Report, it was proposed: "Implement the digital transformation of the manufacturing industry and accelerate the large-scale application of the industrial Internet." The digital transformation of new energy vehicles will also become the general trend. From the perspective of enterprises, the economic benefits brought by digital transformation are obvious in marketing. The new digital marketing has greatly reduced the marketing cost of enterprise development, and also effectively expanded the marketing scope and marketing platform. In the process of digitalization, data processing and analysis is the core link of data-driven market analysis." Automotive manufacturers need to use advanced analysis tools and technologies to turn huge data into useful insights [7]. "Through these analyses, enterprises will be able to better formulate marketing strategies and understand the needs of users to promote the adjustment, improvement and improvement of the new energy vehicle industry. In the current marketing structure of new energy vehicles, media marketing has become the most important marketing method, and many domestic new energy vehicle companies have invested a lot of money in advertising and marketing [8]. Therefore, enterprises will greatly promote economic development in the process of digital marketing. In Li Jinying's report, it was proposed: "Due to the relatively short time for the digital transformation of new energy vehicles, the positive relationship between the digitalization and financial performance of enterprises in the new energy vehicle industry in this study is not very obvious, but with time, as the degree of digitalization becomes higher and higher, the improvement effect of financial performance will become more and more obvious [9]. In summary, the digital transformation of the new energy vehicle industry will become an important road for the development of the industry in the future, and will also greatly promote the sustainable development of China's economy.

From the perspective of green economic development, In the 2024 government work report, it was proposed: "Strengthen the construction of ecological civilization and promote green and low-carbon

development. Deeply practice the concept that green water and green mountains are golden mountains and silver mountains, and jointly promote carbon reduction, pollution reduction, green expansion, and growth, and build a beautiful China where man and nature coexist in harmony. In this context, the development of new energy is the general trend. At the same time, as an emerging strategic industry in China, it also has great development potential. Judging from the heterogeneity test results, there are differences in the impact of the concentration of new energy vehicle industries in the middle and lower reaches of the Yangtze River Economic Belt on the efficiency of the green economy [10]. Given the impact of the industrial agglomeration of new energy vehicles on the efficiency of the green economy, Yang Kaijun and other scholars also made a conclusion through modeling analysis and other studies: "New energy vehicle agglomeration has a positive spatial spillover effect on the efficiency of the green economy, which is conducive to the coordinated development of various regions, and the agglomeration of the new energy vehicle industry can directly significantly promote the green economy efficiency of the Yangtze River Economic Belt." According to the research of the above scholars, it can be concluded that the agglomeration development of new energy vehicles can greatly promote the development of the green economy. Wang Lei and other scholars have also built a model for the emission of new energy vehicles and automobile exhaust, which explains: "The increase in the output of new energy vehicles will accelerate the formation of a green and low-carbon circular economy and improve China's ecological environment. The behavior of residents to buy energy-saving cars reduces the number of old cars used by residents and greatly reduces car exhaust emissions, thus contributing to the construction of a green and low-carbon circular economy [11].

3.2. Driven by Other Industries

In the context of the development of China's new energy automobile industry, not only the development of a single industry, but also the cluster effect brought by its industrial development continues to promote the development of other aspects. In this paper, the impact of technology, enterprises, and employment are three aspects of a simple exposition.

For one of the key technologies of new energy vehicles, battery technology, China has a unique advantage. China has abundant resources such as nickel, cobalt, and lithium, which provide convenient conditions for the production of lithium batteries. At the same time, the synergy between Chinese industries provides a competitive advantage for the best-selling new energy vehicles. As countries around the world increase environmental protection, new energy vehicles have gradually become a trend, which also wins the world competitiveness of China's new energy vehicles with lower costs and faster production speed.

"Relying on the accumulation of more than 30 years in the ICT field, Huawei has helped the automotive industry build an autonomous and controllable, down to the root of the core technology, in the chip, operating system, algorithm, cloud, AI fields, our goal is to realize the Hongmeng operating system from the chip to the overall solution to realize the interconnection of people, cars and homes, and form an ecological intelligent cabin. [12] ". In the future development of China's new energy vehicles, through the connection with China's intelligent enterprises, while expanding the development advantages of China's new energy automobile industry, the development of China's intelligent manufacturing, AI and other digital economy.

In market transactions, supply chains are divided into two types according to the sources of the main driving forces of production and manufacturing: push supply chain (based on prediction) and pull supply chain (based on demand) [13]. The new energy vehicle supply chain is also a push-pull supply chain. The assembly point of a car is the push-pull boundary in a push-pull supply chain. In the pre-assembly push supply chain, suppliers produce parts through prediction, generating economies of scale and reducing costs. In a pull supply chain after assembly, manufacturers assemble according to order. While providing personalized services, we can provide customers with more personalized services. Each enterprise in the chain performs its own duties, forming the huge new energy vehicle supply chain in China at the present stage, and this supply chain also acts on the enterprise group on the chain, bringing economic benefits to it.

With the continuous development of new energy vehicles, the industry gap is also getting larger and larger, while bringing more employment Windows. The Manufacturing Talent Development Planning Guide issued by the Ministry of Industry and Information Technology and other three departments pointed out that by 2025, the net gap of new energy vehicle talents will be 1.03 million [14]. According to the 2023 Automotive Industry Talent Development Report released by Zhaopin.com and China Electronics and Information Industry Development Research Institute, from January to July this year, the number of recruitment positions in the automotive industry increased by 6% year-on-year, and the number of recruitment positions in the new energy vehicle business increased by 18% year-on-year [15]. The growing number of job openings brings more opportunities for China's working population and reduces manufacturing costs through China's demographic dividend. It will not only solve China's current employment problem but also bring more economic benefits to industrial development and promote China's new energy vehicle technology and economic development.

4. Future Development of New Energy Vehicles

4.1. Development Trend

Both domestic and foreign markets are expected to be dominated by new energy vehicles in the future due to their popularity. In recent years, with the continuous subsidies of new energy policies, China's new energy automobile industry has ushered in a golden window for development, and all regions have invested in the new and innovative energy automobile industry. The Chinese government has set up key special projects for new energy vehicles, involving six innovation chains, including power batteries and battery management systems, motor drives and power electronics, electric vehicle intelligence, fuel cell power systems, plug-in/extension-range hybrid power systems, and pure electric power systems, and deployed 38 key research tasks. As of December 2018, 52 auto-related colleges and universities had been established in China, and 42 scientific research institutions were conducting research and development on new energy vehicles [16]. With people's increasing attention to environmental protection and reducing air pollution, the demand for new energy vehicles is expected to continue to grow steadily. As part of China's commitment to reduce greenhouse gas emissions and become carbon neutral, the country has made a major push to electrify its automotive sector. This includes Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs), with BEVs expected to dominate the NEV market in the long run. The expansion of charging infrastructure across China is critical to supporting the growing number of new energy vehicles on the road. Building more public charging stations and promoting private charging facilities are critical to addressing range anxiety and encouraging consumers to adopt NEVs. Chinese automakers are diversifying their NEV product portfolios to meet different consumer preferences and market segments. This includes the development of electric sedans, SUVs, crossovers and commercial vehicles, as well as luxury new energy vehicles with advanced features and facilities.

Chinese NEV manufacturers are increasingly looking to expand their presence in the international market. With the growing global demand for electric vehicles and the increasing awareness of environmental protection, there is great potential for Chinese new energy vehicle companies to export their products to other countries. According to the statistics of the General Administration of Customs of China, from 2019 to 2022, the export scale of China's new energy automobile industry as a whole has shown a trend of rapid growth. As shown in Figure 1, in 2020, due to the impact of the global epidemic, the export volume declined compared with that of 2019, while the industrial situation improved in 2021, and 310,000 new energy vehicles were exported in the year. In 2022, the export volume continued to increase, with a total annual export of 764,000 vehicles, and China's new energy vehicle export volume reached a new high.

Chinese NEV manufacturers typically offer competitive pricing compared to their international counterparts, which is an attractive option for consumers in emerging markets and price-sensitive segments. This competitive advantage, coupled with improved product quality and brand reputation,

has enhanced the export potential of China's new energy vehicles. Research and development is being undertaken by Chinese NEV companies to enhance the performance, range, and economy of their vehicles. The global market will become more competitive for Chinese new energy vehicles as advances in battery technology, electric drivetrains, and autonomous driving systems progress. Government support at home and abroad will play a crucial role in promoting China's NEV exports. This includes trade agreements, tariff reductions, and incentives to promote the adoption of electric vehicles in foreign markets.

Overall, driven by technological innovation, government support and changing consumer preferences, the future development of NEVs in China is expected to involve continued growth in the domestic market and expansion of export opportunities.

4.2. Challenges

The current new energy industry still has great potential for economic development, but there are some problems in today's market. In terms of related industries, the charging facilities of new energy vehicles are insufficient. The demand for charging facilities for new energy vehicles has increased rapidly due to the increase in the number of new energy vehicles. This will also become an important consideration for consumers to choose new energy vehicles, and the improvement of supporting facilities will greatly promote the development of the industry and play a leading role in the economy. The new energy vehicle market still struggles with technical maturity issues in terms of technology. Although new energy vehicle technology has made significant progress, there are still some challenges, including range, charging speed, battery service life and availability of charging infrastructure. The purchase of new energy vehicles may have a negative impact on consumers' interest and confidence due to these problems. Technological innovation greatly benefits the new energy vehicle industry, which in turn drives economic development by adhering to the innovation-driven development approach. To sum up, if new energy vehicles want to play a better role in driving the economy in future development, they need to constantly challenge various difficulties, and the industry also has huge development potential.

5. Conclusion

After reviewing this article, it is found that China's new energy vehicle industry is developing well at this stage. The annual production and sales volume are gradually increasing. The export volume is also increasing, and its international influence is constantly expanding, promoting the development of China's export economy. Its industrial development is affected by many factors, including technological innovation, support policies, scientific research, economic needs, environmental considerations and global cooperation. In the process of industrial development, it has played an important role in the Chinese economy in terms of digital economy and green economy. Promote other economic development in other aspects, such as new energy technology, new energy enterprises, employment, etc. For the future development of new energy vehicles, although there are still technical problems that need to be solved, their overall development is showing an upward trend and has great potential. With the continuous growth of the demand for new energy vehicles, its industrial development will play a role in promoting the economy of China's electric vehicle and electric vehicle battery industry. At the same time, it is in line with China's low-carbon economic development strategy and supported by China's policies, which will contribute to China's green economic development. This article may not be comprehensive enough on the impact of China's new energy vehicle industry on China's economic development. In future research, it can be combined with the impact of its industrial development in the future.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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