Analysis of the Development of China's New Energy Vehicle Industry and Its Export Market Expansion to the UK

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Abstract: In response to intensifying global climate change and environmental pollution, considerable attention has been directed to the new energy vehicles industry due to its environmentally friendly and sustainable attributes. This article investigates the export situation and development prospects of China's new energy vehicles in the UK market by employing the SWOT analysis framework along with other ways. It is revealed that both the export volume and export value of China's new energy vehicles in the UK market are steadily rising. Substantial progress has been achieved in battery technology, intelligence, and networking by China's new energy vehicles, leading to a comprehensive industrial chain and growing UK market recognition. However, insufficient brand awareness, limited core technology autonomy, and elevated certification and compliance costs remain the primary challenges confronting China's new energy vehicles. In addition, the UK's environmental requirements, infrastructure expansion, and heightened consumer acceptance are creating significant market opportunities for China's new energy vehicles. Recommended measures include strengthening R&D and infrastructure, reinforcing compliance management, and advancing technological innovation to enhance brand presence.

Keywords: New Energy Vehicles; UK Market; Export Market; Technical Trade Measures; Green Development

1. Introduction

The increasingly severe issues of global climate change and environmental pollution have led China to propose strategies to reduce carbon emissions and promote green development. As an important means of reducing greenhouse gas emissions and promoting sustainable development, new energy vehicles (NEVs) have attracted wide attention from the international community. Currently, China's NEVs industry has made remarkable achievements in technological progress, industrial chain improvement, and policy support. Digital technology has been generally applied in the automobile industry, which has promoted technological innovation and industrial upgrades. However, there are still challenges in key core technology autonomy, international brand influence, market certification, and compliance costs. Green is the foundation of the "Belt and Road" initiative. Promoting the "Belt and Road" green development is an internal need for practicing development concepts and advancing the construction of ecological civilization as well as an important carrier for establishing a community of life between humans and nature. The UK joined the "Belt and Road" initiative in 2015, and the export of China's NEVs to the UK market has shown a growing trend. However, market competition is becoming increasingly fierce and affected by many factors, such as technical trade barriers and anti-subsidy investigations, and whether export volume can carry on increasing in the future still needs further discussion. For China's future NEVs exports, this article examines whether the UK's support for green growth and new energy resources will affect China's NEVs exports and whether the UK's protection of local NEVs industries will affect export shares. As a current emerging industry, how will policy support affect the subsequent development of China's energy vehicles? How should China's NEVs develop further to increase the share of the export market?

The literature closely related to this article can be classified into two categories. The first category of literature discusses the development of China's NEVs, focusing on policy support and market performance in the

domestic market. As the world's largest NEVs market, China has made the development of NEVs a priority in its national strategy, aiming to transform from a technology follower to an industry leader [1]. In addition, with the growing demand for energy resources, support from relevant departments in terms of policy systems has further promoted the development of the NEVs industry [2,3]. Some scholars have analyzed the strategic position of the NEVs industry in the global automotive industry by using the ANP-SWOT model, pointing out that the next decade will be an important strategic window for the transition and upgrading of the automotive industry [4]. China must seize this opportunity to accelerate industrial progress and add new growth points to the national economy. In addition to domestic policy support and market performance, some studies have also analyzed the important position and influence of China's NEVs in the international market. With the continuous improvement of China's production capacity and market size in the NEVs field, since 2015, China's NEVs have always ranked at the forefront in terms of global sales and ownership [5]. Some literature points out that China's NEVs have made significant contributions in promoting renewable energy utilization, reducing greenhouse gas emissions, and alleviating environmental pollution, which indicates that China's NEVs have good export opportunities and development potential in the international market [6-8].

The second category of literature closely related to this article mainly concentrates on the development of China's NEVs in the UK market. With the intensification of the global energy crisis and transportation pollution problems, the transition from traditional fossil-fuel vehicles to NEVs is coming. According to the Paris Agreement and the UK's domestic climate policy, the UK is committed to reducing greenhouse gas emissions in the transportation sector, especially carbon dioxide [9,10]. Therefore, the UK government actively promotes the development of new energy-cooled vehicles, especially electric vehicles, to reduce greenhouse gas emissions and improve energy security [11]. China's NEVs may have a good market outlook in the UK due to their advantages in environmental protection. However, the UK market also faces the gap between consumers' attitudes and actual purchase behavior towards low-carbon vehicles, and the UK has taken a range of ways to reduce purchase barriers and promote the popularization of NEVs [12].

The marginal contributions of this article, as compared to the existing literature, are manifested in the following several aspects. On the one hand, existing studies focus more on the performance of China's NEVs in the national market, while this article evaluates its competitiveness in the international market, especially the specific performance in the UK market, which is crucial for understanding the international status and influence of China's NEVs. On the other hand, although existing research has discussed the overall prospects of China's NEVs industry, this paper comprehensively evaluates the strengths, weaknesses, opportunities, and threats of Chinese NEVs exports in the UK market through the SWOT framework, and provides theoretical support for the formulation of corresponding market strategies. This article mainly evaluates the specific performance of China's NEVs in the UK market, combining the development process and status of China's NEVs industry, including technological innovation, policy support, and market size. It analyzes the export of China's NEVs to the UK market, using the SWOT analysis framework to assess development prospects, explores market opportunities and potential threats, provides strategic guidance for companies, and offers decision support for policymakers. The article analyzes the strengths, weaknesses, opportunities, and threats of China's NEVs in the UK market and proposes corresponding suggestions to help China's NEVs better establish and develop in the UK market.

2. Development of China's NEVs Industry

2.1 Market Performance and Policy Support

As an important means to deal with traditional energy imports and high-carbon economic development, NEVs have been attached to great importance by China. As shown in Table 1, since 2009, the government has adopted a range of policy support measures, which are mainly divided into three stages: promotion period, policy support period, and

market-oriented transition period, to drive the rapid rise of the new energy industry.

The government mainly carries out fiscal policies and industrial policies to lower the costs of consumers and enterprises, promotes technological innovation and market popularization, and lays a solid foundation for the improvement and sustainable development of the NEVs industry chain. Fiscal policy is reflected in the fiscal subsidy policy and the preferential tax policy. Fiscal subsidies mainly include car subsidies and operating subsidies. Since 2009, the central government has begun to offer financial support for buying NEVs. The specific amount of purchase subsidies has changed with policy adjustments, with the highest subsidies reaching 50,000 yuan. The purchase subsidies have eased the burden on consumers and expanded the influence and consumer base during the early market promotion stage of the new energy industry. In addition, the government provides subsidies for the operation of NEVs in the public transportation sector, such as buses and taxis, and the subsidy amount is determined according to the driving mileage and service life of the vehicles. Preferential tax policies include vehicle purchase tax exemption and value-added (VAT) tax preferences. The government has implemented the purchase tax exemption policy for NEVs, and the purchase of NEVs can enjoy the full exemption from vehicle purchase tax, which is extended multiple times during its validity period. At the same time, the government gives VAT preferences to the production and sales links of NEVs to reduce the tax burden on enterprises and help enterprises continue to research in the new energy direction

Table 1. Summary of Policies for NEVs in Three Stages and Key Points of Policies

Stage	Policy Name	Policy Type
Promotion Period (2009-2013)	Notice on Carrying Out the Pilot Work of Energy-saving and NEVs Demonstration and Promotion	Promotion and Application
	Notice on the Tax Policy for Saving Energy and Using NEVs	tax preferences
	Notice on Continuing to Carry Out the Promotion and Application of NEVs	Promotion and Application
Policy Support Period (2014-2016)	Guiding Opinions on Accelerating the Application of NEVs	Strategic Planning
	Announcement on the exemption of NEVs from vehicle purchase tax	tax preferences
	Implementation plan for government agencies and public agencies to purchase NEVs	Promotion and Application
	Notice on the Financial Support Policy for the Promotion and Application of NEVs from 2016 to 2020	Promotion and Application
	Notice on the "13th Five-Year" NEVs charging infrastructure incentive policy and strengthening the promotion and application of NEVs	Infrastructure awards and subsidies
Market-oriented transition period (2017-2021)	Parallel management method of average fuel consumption of passenger vehicle enterprises and NEVs credits	Code standard
	Special Administrative Measures for Access to Foreign Investment (Negative List) (2018 edition)	Code standard
	Notice on adjusting and improving the financial subsidy policies for the promotion and application of NEVs	Promotion and Application
	Notice on improving the financial subsidy policies for the promotion and application of NEVs	Promotion and Application
	Notice the development of NEVs to the countryside in 2021	Promotion and Application
	Notice of the financial subsidy policies for the promotion and application of NEVs in 2022	Promotion and Application

Data Source: Author's Compilation.

Industrial policies mainly include technology R&D support and other supportive measures for market access. The government has encouraged enterprises and research institutions to increase R&D investment through the establishment of national science and technology major projects such as the "863 Plan" and the "973 Plan". The government also encourages enterprises, universities, and research institutes to form industrial alliances to promote closer cooperation between industry, universities, and research institutes to accelerate the transformation of scientific and technological

achievements. The "China NEVs Industry Technology Innovation Alliance" established in 2017 has brought together many leading enterprises and research institutions to promote technological innovation and industrialization of NEVs. The government has also taken other related policies such as infrastructure construction and market access and supervision, improving the market access and supervision system to ensure the healthy development of the NEVs industry. In addition, the government has strongly supported the construction of NEVs charging infrastructure through fiscal subsidies, tax preferences, and land use policies, to resolve the charging problems of NEVs.

According to Table 1, relevant departments have supported the NEVs industry through a series of fiscal subsidies, tax incentives, technology R&D support, and other policy support measures in three different stages, promoting the rapid and efficient development of this emerging industry. At present, China has formed a relatively integrated NEVs industry system and has made significant progress in technology, manufacturing capabilities, and market size. Moreover, China's NEVs have been on the rise in terms of market penetration, reaching 31.6% in 2023, and it is expected to reach 40% in 2024. With technological innovation and market share expansion, China's NEVs market development prospects are very broad.

2.2 China's NEVs Industry Chain

Since 2009, China's NEVs industry has been making rapid progress, building the world's largest new energy market. Under the strong promotion of relevant departments, the new energy automobile industry chain has a relatively complete system. According to Table 2, the NEVs industrial chain ranges from upstream raw material supply to midstream component manufacturing, to downstream vehicle production and sales, also subsequent vehicle recycling, all steps closely connected. With continuous technological breakthroughs and market environment optimization, the NEVs industry chain will usher in broader development space.

Table 2. Overview of China's NEVs Industry Chain

Industry Chain	Key Materials, Components, Activities	Representative Chinese Enterprises	Main Advantages
Upstream: Raw Material Supply	Lithium, cobalt, nickel, graphite, steel, aluminum alloy, rare earth, etc.	Tianqi Lithium, Ganfeng Lithium, Huayou Cobalt	China leads in key resource reserves
Midstream: Component Manufacturing	Batteries, motors, controllers, on-board chargers, DC-DC converters	Ningde Times, BYD, Guoxuan high-tech, Jinjin electric, ocean motor	Leading industrial cluster, significant technological innovation
Downstream: Vehicle Production and Sales	R&D, brand building, market promotion, sales, and services	BYD, NIO, Xiaopeng, and others	Continued investment, diversified product lines

Data Source: Author's Compilation.

In terms of upstream raw material supply, lithium, cobalt, nickel, graphite, steel, aluminum alloy, and rare earth are key materials for NEVs. China has significant advantages in the production and supply of raw materials for lithium batteries, especially in terms of lithium resources, occupying a considerable part of the global lithium resource reserves. In addition, steel, aluminum alloy, and rare earth, which are used for vehicle body and motor manufacturing for NEVs, can also be supplied in sufficient quantities. Local raw material supply can ensure resource security and effectively control costs, to some extent, stabilizing the supply of China's raw materials and industry chain. Against the backdrop of global NEVs demand leading to unstable fluctuations in raw material prices, it brings severe challenges of resource security and cost control to important enterprises such as Tianqi Lithium, Ganfeng Lithium, and Huayou Cobalt, which need to take some measures to cope with these challenges and ensure supply chain stability and reduce the risk of cost increases.

Midstream parts manufacturing can be divided into three parts: battery manufacturing, electric motor control, and other parts production. Batteries are the key component of NEVs, and China has formed a world-leading industrial

cluster in the field of power batteries. The main enterprises are Ningde Times, BYD, and Guoxuan High-tech, which have made significant progress in technological innovation and capacity expansion and have played a significant part in the development of NEVs. Motor and electronic control systems are key technologies for energy vehicles. Chinese enterprises continue to make efforts, steadily improve, commit to mastering the key technologies in local enterprises, and gradually narrow the distance with advanced international technology; however, the main enterprises are advanced electric, ocean motor, and BYD. On-board chargers, DC-DC converters, vehicle controllers, and other components are also indispensable in the NEVs. While upgrading key technologies, China's NEVs industry should also focus on the production of small parts. In terms of downstream vehicle production and sales, China's manufacturers of NEVs are diverse, covering the transformation of traditional automakers and emerging electric vehicle enterprises. Vehicle manufacturers such as BYD, NIO, Xiaopeng, and SAIC continue to invest in technology research and development, brand building, and marketing, constantly enriching their product lines and improving their market competitiveness. With the rise of the Internet and intelligent technology, NEVs are constantly innovating in sales and service. There are not only traditional 4S stores, but also online direct sales and experience stores and other modes. The user experience is gradually improved, and the after-sales service system is becoming more and more perfect. In the future, enterprises need to pay attention to the recycling and disposal of abandoned cars, strengthen the whole life cycle management of products, and enhance corporate social responsibility.

2.3 Challenges in China's NEVs Industry

Under the influence of the strong support of national policies, the continuous innovation and creation of enterprises, the improvement of their technology, and the coordinated progress of all links of the industrial chain, China's NEVs industry has developed rapidly. Nonetheless, the NEVs industry still faces lots of challenges as an emerging industry, such as insufficient autonomy in key core technologies, policy dependence greater than market motivation, structural overcapacity on the supply side, and tariff and non-tariff trade barriers.

First, the key core technology of power battery, motor, and electric drive systems lacks autonomy and technical innovation. China's NEVs have not broken through the bottleneck of power battery technology, and the key materials still rely on imports, such as electrolytes and diaphragms. In addition, the risk of battery fires and explosions still exists. The weakness of China's NEVs technology is also reflected in the differences and instability of the integration of various functional modules, and the technology of the electric drive system is not comprehensive and mature enough. The progress of China's NEVs is restricted by technology dependence, and to a certain extent, it has an impact on the competitiveness of the local new energy industry in the international market, Secondly, over-reliance on policies will also limit the development and innovation momentum of enterprises themselves. Since 2009, the government has carried out a range of measures to help the progress of the energy vehicle industry. Such as, since 2013, relevant departments have strongly supported the development of NEVs, through fiscal subsidies, tax relief, technology research and development, and other measures. A long period of large government subsidies has made the industry highly dependent on it, leading to the lack of internal motivation of some enterprises, low research and development initiatives, slow progress in the development of NEVs, and thus slow the development of the industry, affecting consumers' trust and sales of the industry. In the meantime, the internal competition in China's NEVs industry is very fierce. NIO, AITO, and other NEVs brands are all outstanding in the Chinese industry. However, due to strong government support, many new domestic NEVs brands have emerged, making market competition increasingly fierce. And some enterprises even radically seize market share by cutting prices and promoting sales. These malicious competitive business tactics may cause internal profits to be compressed, impacting the industry and affecting the healthy development of the industry.

Thirdly, with the continuous breakthrough and innovation of China's NEVs technology, the

contradiction between the strong product production capacity of the NEVs industry and the purchasing power of the countrymen to pay creates a surplus of NEVs. With the support of the early government policy, NEVs enterprises have caused low quality and low price competition, which seriously disrupted the market, leading to the existence of product quality problems in the NEVs industry, and the phenomenon of lack of high-end production and low-end overcapacity coexist. At the same time, structural overcapacity on the supply side is also reflected in the overcapacity of various links in the industry chain.

Finally, China's NEVs will also face a new round of competition and more challenges after entering the international market. On the one hand, in the international market, tariff barriers make it difficult for China's NEVs industry. In addition, the tariff changes have greatly increased the export costs of China's NEVs, severely suppressed the international competitiveness of China's NEVs, and increased the market risks and operational difficulties for Chinese enterprises. On the other hand, technical trade measures (TBT) among non-tariff barriers bring challenges to China's new energy resources automobile industry. The standard and certification requirements of the exporting country are strict, different countries have different environmental laws and standard deviations. The safety testing standards of importing countries are strict, vehicles need to pass several safety performance tests, and other non-tariff barriers such as quota restrictions, complex administrative licensing, and local protection measures will also cause export restrictions.

3. China’s NEV Exports in Major Markets: A Case Study of the UK

3.1 Overall Export Trend

China's NEVs export industry has shown a fleetly increasing trend. The improvement of brand competitiveness, increased policy support, technological innovation, the improvement of the industrial chain, and market diversification are the main factors driving this trend. At the same time, the global focus on the environment and the increase in consumer demand have also brought a positive impact on the development of NEVs. The following will analyze three types of NEVs: pure electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and non-plug-in hybrid vehicles (NPHEVs) from the proportion of export amount, export quantity, and market share.

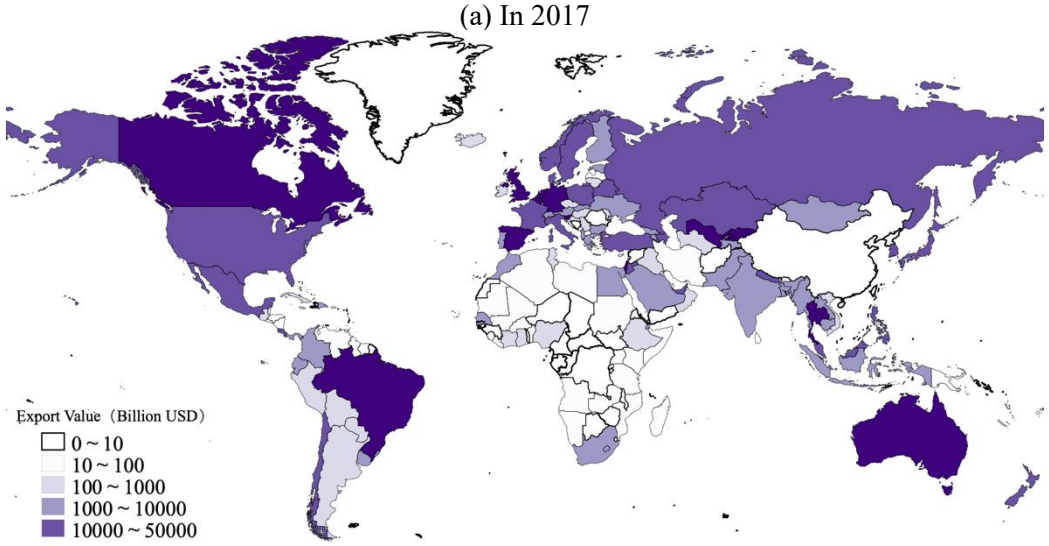
In terms of export amount, BEVs, PHEVs, and NPHEVs all have sustained growth, especially the export amount of BEVs models, which has shown a rapid growth trend and an obvious rate, from almost negligible exports in 2017 to nearly 20 billion US dollars in 2022. For the NPHEVs model, the export volume increased significantly from 2021 to 2022. For the PHEVs model, every year from 2017 to 2022, the export amount has grown steadily at a rate of double or more. In terms of export quantity, the export quantity of BEVs increased from less than 100,000 units in 2021 to 700,000 units by 2022. In terms of export quantity, the export quantity of BEVs has increased significantly from less than 100,000 vehicles before 2021 to 700,000 vehicles in 2022. PHEVs has also been growing year by year, breaking through 100,000 vehicles in 2022, and showing good market performance. NPHEVs has seen a rapid increase in export quantity, but the export quantity is less than that of BEVs and PHEVs. In terms of market share, China's NEVs exports have increased from less than 1% of the global market in 2017 to 8.76% in 2022, indicating that the position of China's NEVs exports in the global market is gradually improving. Overall, the export amount and quantity of China's NEVs are growing rapidly and continuously, accounting for more and more shares of the global market, indicating that the overall trend is stable and positive, and has a strong development trend. These trends indicate that the export market for BEVs is expanding rapidly as the global focus shifts towards reducing carbon emissions and improving energy efficiency. At the same time, PHEVs also maintains a certain market demand, while the market position of NPHEVs may be weakening.

3.2 Export Market Distribution

With the improvement of technology, the support of government policies, and the need for industrial environmental friendliness, more and more automobile manufacturers are committed to developing and exploring the transformation of NEVs. The world has paid

unprecedented attention to NEVs. Meanwhile, China continues to encourage more and more manufacturers to develop overseas markets so that China's NEVs can go international. The following will discuss the export market distribution of China's NEVs from three aspects: geographical distribution, income level, and market ranking.

(a) In 2017



(b) In 2023

Figure 1. Distribution of China's NEVs Export Markets (2017 and 2023)

Data Source: Global Trade Flow database.

Figure 1 shows the perspective of export market spatial distribution in 2017 and 2023. Over six years, China's NEVs exports have evolved from limited coverage, weak export capacity, and relatively low export amount to a situation where they cover many countries, have strong export capacity, and high export amount, with a gradually weakening dependence on the export countries' automotive markets and comprehensive national strength. In 2017, most of the countries mainly exporting in the range of 10 million to 100 million were countries with more developed traditional automobile industries, such as Brazil, Chile, Thailand, Germany, France, Italy, Sweden, etc. Countries with export amounts ranging from 1,000 million to 10,000 million US dollars usually have their automotive industries, such as Japan, the United States, Bangladesh, etc. There were no country export amounts exceeding 10,000 million US dollars. The export values for Mexico, Australia, Russia, Canada, the UK, and other countries were only 10 million to 100 million US dollars. By 2023, China's NEVs exports were mainly concentrated in the range of 10,000 million to 50,000 million US dollars, especially in some European countries like the UK, Spain, and Germany, where the export values were

considerable, and most regions of the world had accepted Chinese NEVs.

In terms of the economic development level of the export markets, export regions are divided according to regions and income levels. According to Table 3, when divided by region, the export amount of each region has increased significantly in 2022 compared with 2017. Europe and Central Asia exported first and most in both 2017 and 2022, significantly surpassing South Asia, which ranked second in 2017, and East Asia and Oceania, which ranked second in 2022, while sub-Saharan Africa had the lowest exports in 2017 and 2022. When divided by income level, the export number of high-income countries was the highest in both 2017 and 2022, and the export number of low-income countries was the lowest, with a difference of 19.73 million US dollars and 1867.99 million US dollars between high-income countries and low-income countries. However, the exports of countries at each level of income are rising, indicating that China's exports of NEVs are very strong in the global market.

Table 3. Regional Distribution of China's NEVs Exports

Region	Amount (million USD)	
	In 2017	In 2022
East Asia and Oceania	45.27	4049.95
Europe and Central Asia	103.48	12847.43
Latin America and the Caribbean	17.68	808.33
Central Asia and North Africa	25.56	2683.50
North America	31.14	560.72
South Asia	72.45	147.16
Sub-Saharan Africa	0.51	90.49
High-income countries	198.62	18724.14
Upper-middle-income countries	12.26	1766.59
Lower-middle-income countries	83.92	652.70
Low-income countries	1.29	44.15

Data Source: CEPII BACI database.

From the perspective of export market size, countries like Belgium, France, Spain, and Germany have shown strong potential for new energy consumption. In 2017, Belgium, France, the Netherlands, and other countries were among the top ten export markets, with Belgium ranking third. By 2020, Belgium's export scale had increased nearly tenfold, ranking first. But at the same time, the UK's exports are also expanding, with 2022 topping the list, increasing its size nearly tenfold compared to 2020. From this, the rapid growth of China's export market and the improvement of global competitiveness. At the same time, the UK is one of the important markets for China's export of NEVs.

3.3 China's NEVs Export Performance in the UK Market

From 2017 to 2022, China's export of NEVs to the UK generally showed a rising trend, and the share of the UK market increased significantly. The British government issued a range of laws, such as research and R&D support, car subsidies, tax incentives, and infrastructure construction, and introduced a series of policies, including the Climate Change Act established a net zero emissions target in 2050, and the road to zero emissions strategy, these laws and policies not only for the British market provides a good market environment, also help to improve China's position in the global market. With the progress of China's NEVs technology and the improvement of the industry chain, China's NEVs industry has met the needs of consumers worldwide for green travel, and its global competitiveness will be further enhanced.

During the period from 2017 to 2022, both the export amount and quantity of China's NEVs to the UK have been increasing year by year. Especially from 2020 to 2022, the export quantity increased by more than a thousand vehicles, and the export amount increased by more than 3.5 billion US dollars, reflecting the vigorous development of NEVs in China and the recognition of the UK market. This indicates that the demand for China's NEVs in the UK market is continuously increasing.

According to Figure 2, the proportion of the UK market in China's exports has increased year by year from 2018 to 2022, with a large growth rate, indicating that the UK's position in China's NEVs exports has significantly improved. The UK government's support policies for NEVs have promoted this growth, such as subsidies and tax incentives for NEVs. The UK market's share in the global market is also increasing slightly, which shows that the continued development of the UK et and helps enhance the competitiveness of China's NEVs in the global market, China's status is also rising. Overall, China's NEVs are becoming more competitive in the UK market, with significant progress in technology and market promotion. In the future, with technological progress and market expansion, China's NEVs will play an increasingly important part in the global market.

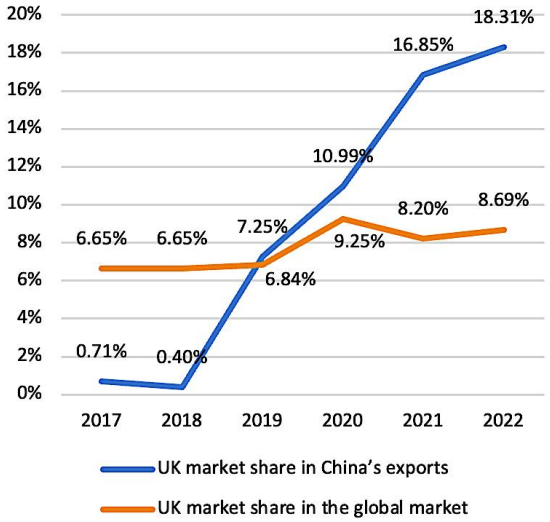


Figure 2 Share of the UK Market in China's and Global NEVs Exports

Data Source: Compiled from the CEPII BACI database.

4. China's NEV Market Expansion in the UK: A SWOT Analysis

4.1 SWOT Analysis Framework

The global automobile industry is experiencing unprecedented changes. As the pioneer of this change, NEVs are gradually replacing traditional fuel vehicles and are favored by the market. Driven by multiple policy support, technological progress, and market demand, China's NEVs industry has made remarkable development achievements. However, facing a complex international market environment, China's NEVs industry has both advantages and challenges in exporting to the UK market. The SWOT framework is a strategic planning tool used for assessing an organization's strengths, weaknesses, opportunities, and threats. Through the SWOT analysis framework, we can more clearly understand the development of China's NEVs in the UK market. By taking advantage of advantages, actively responding to disadvantages, and seizing many opportunities, Chinese NEVs enterprises are expected to achieve greater success in the UK market. However, companies must also be alert to threats and maintain their competitiveness in the international market through continuous technological innovation and market strategy adjustments. According to Table 4, the export prospects of China's NEVs in the UK market can be understood more quickly.

Table 4 SWOT Analysis Matrix of China's NEVs Industry

Strengths	**Weaknesses**
Advanced technology Complete industrial chain Policy support Environmental advantages Market demand	Lack of brand recognition Certification and compliance costs are high Insufficient autonomy of core technologies
Opportunities	**Threats**
Technical cooperation and innovation Infrastructure construction Consumer environmental awareness The market penetration rate has increased	Technical barriers Market competition is fierce Anti-subsidy investigation

Data Source: Author's Compilation.

4.2 Strengths

The advantages of China's NEVs for the UK market are primarily evident in: First, China's NEVs have made significant progress in battery technology, intelligence, and connectivity. The battery density of pure electric vehicles is constantly improving, the charging infrastructure is constantly accelerating, and the product performance is constantly improving. Plug-in hybrid vehicles combine electric and internal combustion

engines to work together for optimal fuel efficiency and lowest emissions, reducing the inability to use due to incomplete charging facilities, improving overall energy efficiency, reducing fuel consumption and emissions, and new energy commercial vehicles' electrification technology achieves zero emissions in commercial operations, while hydrogen fuel cell technology provides longer driving ranges and shorter refueling times, improving operational efficiency. These technological advancements have gradually won recognition in the UK market; China's NEVs have changed the traditional automotive industry chain structure, from upstream raw material supply to midstream component manufacturing and downstream production and sales, forming a relatively complete industry chain with collaborative development in all links. Second, the UK government places high importance on environmental protection and implements strict emission standards, planning to gradually eliminate traditional fuel vehicles, and has introduced a series of policies, such as the Ultra-Low Emission Zone plan launched by the London government in 2016, encouraging the use of low-emission vehicles and vigorously promoting the use of electric buses. The UK government encourages the purchase of NEVs through tax incentives and subsidies. These policies have promoted the growth of market demand for NEVs, expanding the consumer group and creating favorable external conditions for the export of NEVs. China’s NEVs are expected to gain a place in the UK market with their environmentally friendly characteristics and increase their market share. Third, the global competitiveness of companies has significantly increased. Traditional car companies represented by BYD have formed a large scale in the production process of NEVs, and emerging forces in car manufacturing such as NIO, XPeng, and Xiaomi have developed rapidly, achieving an increase in product-added value and market positioning.

4.3 Weaknesses

China's NEVs face disadvantages in the UK market, including insufficient brand effect, high certification and compliance costs, and insufficient core technology autonomy. Although Chinese car brands have made progress in recent years, British consumers are more conservative in choosing car brands, tending to choose familiar European or Japanese brands, indicating that Chinese car brands have poor recognition and influence in the UK market, resulting in low sales of Chinese cars in the UK. The UK's technical standards and safety regulations are highly consistent with the EU, and entering the UK market requires a complex certification and compliance process, which is complex and changeable, taking a long time and involving many certifications. Entrants must strictly comply with these standards to qualify for market access, which may lead to product entry delays, increased time costs, missed market opportunities, and reduced competitiveness. Chinese NEVs, although continuously improving and enhancing their technology, still have gaps in key areas such as power battery technology, with some key components still dependent on imports. For example, there is still a gap with the world's advanced level in power batteries, which may cause consumer concerns about the driving range of NEVs. To achieve better development, Chinese car brands must make technological breakthroughs in this area. In addition, Brexit and market competition will affect the development of China's NEVs in the UK market. There are also issues with China's NEVs themselves, such as excessive dependence on government policies leading to insufficient innovation motivation, insufficient charging infrastructure, low recognition and influence in rural and remote areas, and high maintenance costs.

4.4 Opportunities

China's NEVs face multiple opportunities in the UK market, including technology cooperation and innovation, infrastructure construction, increased consumer environmental awareness, and increased market penetration rate. Firstly, Chinese NEVs companies can accelerate technological progress and innovation through cooperation with local British companies and research institutions, enhancing the competitiveness of Chinese NEVs in terms of driving range and charging speed, thereby expanding the reputation of Chinese brands in the UK market, increasing market share, and forming brand effects. Secondly, the UK government's vigorous promotion of charging infrastructure

has provided support for the popularization of NEVs and created favorable conditions for the export of NEVs in China. For example, Tesla, a leading global pure electric vehicle manufacturer, has not only achieved success in vehicle production and sales but also established a wide supercharging network in the UK, solving the problem of insufficient charging infrastructure and further promoting its sales. In addition, as UK consumers' acceptance of environmental protection and NEVs gradually increases, the demand for NEVs in the UK market also increases. Traditional fuel vehicles emit a large amount of exhaust pollutants, which seriously affect air quality and the environment, while NEVs are driven by electricity or other clean energy sources to reduce exhaust emissions. The UK has enacted some environmental protection laws, such as the London government's plan to achieve zero-emission targets for all buses by 2030, striving to reduce carbon emissions and achieve green development, or gradually phasing out traditional fuel vehicles and supporting the development of NEVs. This proves that the environmentally friendly characteristics of NEVs are in line with the UK's development philosophy, and NEVs are more and more accepted by consumers. The expansion of the consumer group increases market demand for NEVs, showing that there is still a lot of room for improvement in the penetration rate of the UK tram market. These measures are conducive to the further development of new energy commercial vehicles, bringing market opportunities for China's NEVs with a perfect industrial chain and technological progress, providing a broad market space for China's NEVs, and helping them to improve their importance in the UK market.

4.5 Threats

The market prospect of China's NEVs export in the UK presents both opportunities and challenges. The challenges to China's NEVs' exports to the UK market are mainly reflected in insufficient charging infrastructure, high costs, technical trade barriers, market competition, and anti-subsidy investigations initiated by the EU.

Firstly, PHEV and NECVs have made certain progress in the UK market, but both face the challenge of a lack of charging infrastructure, especially in rural and remote areas, which will affect the sales of NEVs; and the cost and purchase costs of these three types of vehicles remain generally high, limiting the purchasing group. Secondly, technical trade barriers are one of the main factors affecting China's NEVs' exports to the UK market. The UK has extremely high environmental and safety standards for vehicles, and these strict regulations pose higher technical requirements for Chinese NEVs. Companies need to continuously improve product technology to meet these standards, otherwise, they may face market access barriers. Thirdly, traditional car manufacturers in Europe and the United States are accelerating the transformation to NEVs, which will increase the intensity of competition in the market. As competition in the global NEVs market intensifies, Chinese NEVs are facing competitive pressure from brands in other countries in the UK market. China's NEVs enterprises need to continuously improve their technology level and launch more competitive products to occupy a place in the market. Finally, the EU's announcement of anti-subsidy investigations against Chinese NEVs, as well as the EU's "New Battery Law," which poses higher requirements for Chinese NEVs exports, may affect subsequent UK policy formulation, posing export risks for Chinese NEVs. Chinese car companies should be prepared to reduce losses caused by uncertain factors.

5. Conclusion and Enlightenment

Globally, the reduction of greenhouse emissions and the promotion of sustainable development have become common goals of governments and international organizations. Against this backdrop, China's NEVs industry is experiencing rapid development and transformation. In this article, the SWOT analysis framework evaluates the export prospects and market expansion analysis of Chinese NEVs in the UK market through the strengths, weaknesses, opportunities, and threats, and draws the main conclusions:

In the last few years, China has made rapid progress in the following areas: battery technology, intelligence, and connectivity. It has a complete industry chain from upstream raw material supply to downstream vehicle production and sales and has achieved collaborative development of all links,

enhanced international competitiveness, improved product quality and performance, and won recognition in the UK market. The purchase subsidies and tax incentives introduced by the UK government have created favorable conditions for the export of NEVs in China, and the strict emission standards and plans to phase out traditional fuel vehicles have further expanded the market demand. Chinese enterprises represented by BYD, Nio, and Xiaopeng have achieved good performance in the European market through technological progress and market positioning, but there is still a gap in key fields such as power battery technology, motor and electric drive systems, and some core materials and components rely on imports. Industry dependence on government policy, lack of internal motivation, and overseas markets, also to further expansion, Chinese enterprises need to continuously technology research and development and improvement, overcome tariff barriers, technical trade measures and non-tariff barriers, continue to enhance international influence and consumer trust.

In this context, from 2017 to 2023, China's NEVs exports achieved significant growth, especially in the fields of BEVs and PHEVs. China's share of NEVs in the global market increased from less than 1% in 2017 to 8.76% in 2022; the UK market share increased from 0.40% in 2018 to 16.85% in 2021, with export quantities growing from less than 200 vehicles in 2020 to over 1,200 vehicles in 2022, and export amount increasing from less than 500 million US dollars to over 4 billion US dollars. As the export market scope continues to expand, the UK has emerged as a key target market for China's NEVs exports. Chinese companies have not only achieved rapid growth in quantity and value in the UK market but also continuously expanded their share in the global market, showing a good development trend. However, China's NEVs still face challenges in powertrain, key components, and overseas brand recognition. Only through continuous innovation and global layout can they maintain and expand their advantages in the rapidly developing international competition for NEVs.

To sum up, for China's NEVs industry to further expand in the UK market, continuous efforts are still needed in many aspects. At the government level, we should increase support for the research and development of core technologies, and help enterprises understand and respond to the latest technical requirements and regulatory changes by setting up special funds and building research and evaluation bases for technical trade barriers; at the same time, use fiscal subsidies, tax incentives, and land use policies to encourage public and private capital investment in charging infrastructure, and use big data and cloud computing to optimize charging operations, improve coverage and service quality, thereby alleviating consumer endurance anxiety. In addition, the government should further improve the market access and supervision system for NEVs and continue to implement vehicle purchase tax exemption policies to reduce the purchase cost of NEVs and stimulate consumer demand. At the industry level, it is necessary to strengthen compliance management and set strict quality supervision standards to enhance the safety and reliability performance of NEVs. Companies should continue to promote technological innovation and improve the industry chain, focusing on key areas such as power batteries, motors, and electric drive systems, reducing dependence on imported core materials, striving to overcome tariff, technical trade measures, and other non-tariff barriers, and improving competitiveness and influence in the international market, and winning more consumer trust. At the same time, international exhibitions, brand promotion network marketing, and other multi-channel in-depth understanding and adapting to the regulations of the UK market and consumer needs help to enhance brand awareness and recognition. Faced with increasingly fierce global competition and a changing certification and compliance environment, these measures will effectively enhance the competitiveness of China's new energy industry in the international market and further promote its sustainable development in the UK market.

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