



A Comparative Analysis of the Export Trade Situation and Innovative Approaches in China's New Energy Automobile Industry

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Abstract. The international automotive sector is experiencing a remarkable shift, and new energy vehicles (NEVs) have become a central issue because of environmental considerations and technological progress. In the NEV market, China has risen to be a front - runner when it comes to production and export. This paper looks into China's present export trade situation in the NEV field and makes a comparison with major competitors like the United States, the EU, and Japan. Moreover, it looks into the innovative approaches that China could utilize to strengthen its international competitiveness. The research makes a comparative study of export amounts, market share, and policy systems, and then looks into technological, financial, and supply-chain innovations that could further promote exports. It is indicated by the research that although China has a firm position in this market, continuous innovation in areas such as battery technology, intelligent manufacturing, and international trade policies is crucial for maintaining growth. This research offers some advice regarding the export trade of new energy automobiles.

Keywords: New Energy Vehicles' Export Trade of China, Electric Vehicles, Comparative Analysis, Innovation Strategies.

1 Introduction

Over the past few years, there has been a growing emphasis among countries on environmental protection and climate change matters. The NEV industry, which can be regarded as a symbol of clean energy, has been widely noticed and highly valued by the international community. China, being among the world's largest new energy cars markets, enjoys rich resources and technological innovation edges in the new energy vehicle industry. Consequently, China's competitive edge in the foreign trade of this industry has emerged increasingly and shown a prosperous scenario with the industry's rapid growth [1]. In recent years in particular, the Chinese government has offered strong support to the development of the new energy vehicle industry, rolling out a series of favorable policies and measures such as financial subsidies, tax breaks, and technological innovation. In 2021, the Chinese government issued an action plan focused on

peaking carbon emissions, which was mainly for the purpose of cutting carbon emissions. In China, it is expected that by 2030, over 40% of the vehicles in the automobile market will be powered by new energy [2]. In addition, China's new energy vehicles possess great production capacity and technological capabilities in terms of market and resources. As electrification progresses, China has been gradually reducing the technological gap with traditional auto-making powers and has boosted the innovative edge and technological capabilities of its new energy vehicles.

Furthermore, China has achieved great strides in technological innovation and industrialization regarding new energy vehicles, possessing a substantial technological reserve and industrial base. In areas such as battery technology, electric motor technology and intelligent connected vehicle technology, China has also achieved a great deal. China's new energy vehicle companies keep making innovations and achieving breakthroughs. As a result, China's new energy vehicles gain a distinct competitive edge in overseas markets, fulfilling the requirements and wishes of various countries for new energy vehicles.

The research mainly aims to probe into the competitive edges of China's EVs in international trade, to study the influence and function of the development of China's new energy vehicle foreign trade, and to offer theoretical support and policy suggestions for the overseas development of the industry.

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2 The Examination of the Development Situation of China's EVs Industry in Foreign Trade

2.1 The Development of EVs in China: Policy Support and Foreign Trade Situation

In the initial decade of the 21st century, China has established its own arena for the EVs industry. For instance, a number of domestic automobile manufacturers like BYD, Li Auto, and NIO have come to the fore. At that time, new energy vehicle exports also started to develop, yet the scale was not large. Nevertheless, in recent years, as China's energy vehicle industry has been growing rapidly and the technological innovation level has been constantly improving, more Chinese automobile enterprises have started to actively plan for overseas markets and quicken their pace of internationalization. Some of them have set up production bases and sales networks in Europe, North America, Southeast Asia and other regions, attaining a stable expansion in overseas markets.

Figure 1 shows the export volume and growth rate of EVs in China from 2018 - 2023 (including both passenger cars and commercial vehicles).

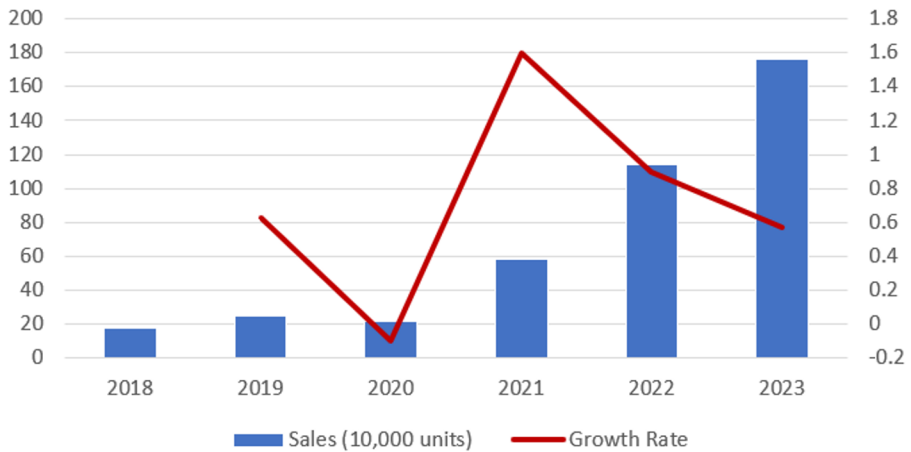


Fig. 1. Export volume and growth rate of new energy vehicles in China from 2018 to 2023 (including passenger cars and commercial vehicles).

Data source: General Administration of Customs, CheBaidu Think Tank

As be seen from the above Figure1, the exports have witnessed a continuous yearly growth, with a particularly notable increase in 2023. China's new energy vehicles are seeing a rising trend in their export volume over the years, and the year 2023 is a notable example. This growth indicates that these vehicles are gaining more and more popularity in overseas markets. China's new energy vehicles' export to Southeast Asia has witnessed a remarkable growth, and they are swiftly making inroads into the crucial automotive markets in Southeast Asia like Indonesia, Thailand, Vietnam, the Philippines, and Malaysia, with a coverage rate as high as 75% [3]. It shows that China's new energy vehicle enterprises are vigorously exploring overseas markets.

In the year 2024, the production and sales volume of new energy vehicles hit 11.345 million. There's an increase of 34.6% and 35.6% year-on-year. There were 1.141 million units in the export of new energy vehicles, which had a year-on-year growth of 4.5% [4].

2.2 An Examination of the Export Features of China's EVs Industry

With the growth in the export volume of EVs in China, its technological innovation level and industrial system have also been enhanced, showing the following features.

First, the exported vehicle models are of high-end intelligence. In the initial phase, China's new energy vehicles for export were mainly characterized by low prices, low technological sophistication and an emphasis on quantity. Recently though, China's EVs exports have been gradually shifting towards medium-to-high-end models with greater added value. Product technology keeps enhancing, and the domestic new energy vehicles keep getting better in terms of quality, function and appearance, gradually approaching international brands. Meanwhile, new energy vehicle enterprises in China

are also enhancing their R & D investment, introducing more innovative and competitive high-end models [5].

Second, there is a diversification in export destinations. In recent years, China's new energy vehicles have managed to be sold to numerous countries and regions across the globe and have won the favor of many. Their prices are reasonable, and they have advanced technology. New energy vehicle firms are even capable of providing a variety of products and services to fulfill the travel requirements of different markets, which is more significant. China's car manufacturers have a number of main export markets such as Europe, Southeast Asia and North America, among which Europe and Southeast Asia are the main export markets for China's new energy vehicles, accounting for the majority of China's foreign trade in new energy vehicles. Among these, Europe and Southeast Asia are the principal export destinations for China's new energy automobiles, taking up the largest share of China's new energy vehicle foreign trade. A number of domestic auto manufacturers like BYD, Xiaopeng and NIO, etc. They have entered overseas car markets, promoting local infrastructure construction as they actively blend into the local market, thus becoming a crucial impetus for the electrification transformation and upgrading of the local automotive industry.

Finally, the export method chain. China's new energy vehicle industry has generally shown a trend of going global, shifting from "electric vehicle exports + lithium battery exports" to "localization of overseas new energy industry chains" [6]. It shows that China's new energy vehicle enterprises should not only be active in overseas exports but also take root in foreign markets for promoting internationalization. The export of completely new energy vehicles is growing rapidly, which has promoted the export growth of the core parts of EVs. As new energy vehicle production capacity keeps increasing, some domestic auto parts firms have started to expand their global layout and production capacity to meet the demands of auto companies in regions such as North America and Europe. This export approach is beneficial for cutting down the cost of vehicle exports in their entirety and enhancing the profitability of automobile enterprises.

3 Analysis of the Comparative Advantage of China's EVs Market in Comparison with Those of Other Major Countries

3.1 Analysis of the Comparative Advantages of The Policies in China and Other Major Nations

China enjoys remarkable advantages over other countries in terms of policy support for EVs and infrastructure construction. To begin with, China offers powerful policy backing for this industry. China's EVs sector has been under subsidy policies for years, which offers financial assistance in multiple areas like new energy vehicle purchase, R & D, and production. This subsidy policy significantly cuts down the cost of new energy vehicle purchases and boosts consumers' purchase intentions. Next, the pace of infrastructure construction has picked up. The Chinese government places great em-

phasis on the building of the charging infrastructure and spurs a rapid growth of charging facilities via financial subsidies, policy guidance and other methods. Currently, a convenient and efficient charging network has been set up in China, covering both urban and rural areas, which has laid a firm foundation for the popularization of new energy automobiles [7,8].

When it comes to policy continuity and infrastructure, the United States lags behind China in some respects. In the United States, there are policies mainly involving support at federal and state government. At the federal level in the United States, measures like federal tax incentives, energy subsidies and fuel economy standards have been carried out. State governments also take various measures to promote the development of EVs. For example, California has adopted policies like the zero - emission vehicle quota system and free parking as preferential measures [5]. Since state - level policies for promoting new energy vehicles vary from place to place, it is hard to create a single, comprehensive policy plan. As for infrastructure, charging stations are mostly found in certain urban areas while being nearly absent in urban and rural areas, and the distribution is unbalanced. Also, the cost of charging new - energy vehicles is rather high.

In the fields of new energy vehicle popularity and carbon emission reduction, China has an edge over the European Union. The main focus of the EU in new energy vehicle policies lies in popularizing new energy vehicles, decreasing carbon emissions and driving technological innovation. Some EU countries also offer subsidies for the public charging facilities to enhance the network of new energy vehicles and improve charging convenience. Nevertheless, when it comes to infrastructure, China has a more comprehensive situation compared to the EU and is able to gradually expand to rural areas.

Japan has a new energy vehicle policy which mainly includes aspects like subsidies for vehicle purchases, construction of infrastructure, tax preferences and technology R & D. To start with, as for the car - buying subsidies, there are differences in the subsidy quantities for various electric vehicles in Japan, and the upper and lower limits of the subsidies vary greatly. Vehicle performance, such as driving range, will be factored into the calculation of subsidy amounts, and the new policy places special emphasis on vehicle performance. The higher the vehicle's performance is, the more subsidy it will get. Subsidy policies will also consider the capacity of new energy vehicles to serve as charging devices during disasters. This demands that electric vehicles possess certain emergency charging capabilities to offer power assistance in emergency circumstances.

3.2 Comparative Advantage Analysis of China's New EVs Market Size with Other Major Countries

The EVs market in the United States is on an expanding trend, yet it is not as large as that in China. Wards Intelligence indicates that the share of plug - in hybrid electric vehicles (LDVs) within total light vehicle sales in the United States in the first quarter of 2024 has declined in comparison to the fourth quarter of 2023; nevertheless, the overall market still exhibits a growth tendency. The sales of pure electric vehicles, which had been growing at a double - digit rate for 13 quarters in a row, witnessed a 7% increase at the end of March of 2024 as compared to 2023[4].

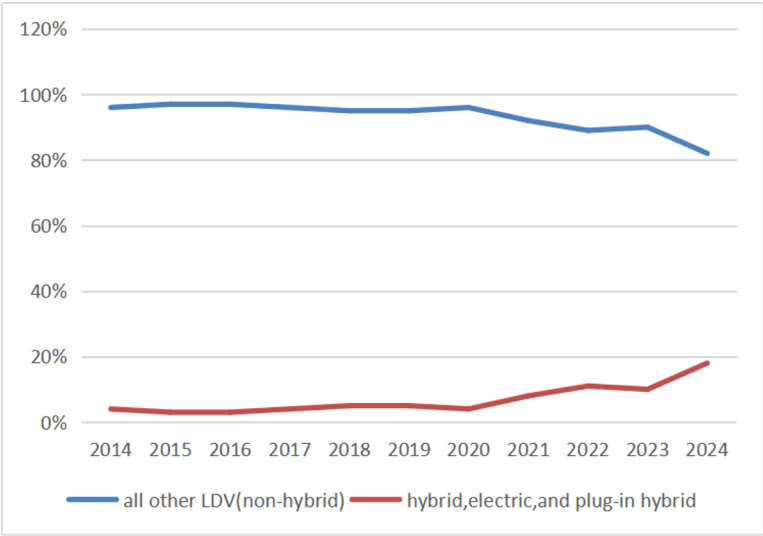


Fig. 2. Quarterly Sales Proportion of Light Duty Vehicles (LDVs) in the United States by Power System (January 2014 March 2024).

Data source: Ward Intelligence

Figure 2 shows the US EVs market is anticipated to keep its growth trend, and its sales will keep rising. Nevertheless, one should note that while the US EVs market is expanding all the time, its proportion in the overall automotive market remains fairly low. Even though it has risen in comparison to the past, it remains relatively low when contrasted with China.

The EU's new energy vehicle market is seeing continuous growth in scale. With the continuous increase in EVs models, the market share of all - electric vehicles in the European Union is projected to rise from 2023 to 2024[4]. Moreover, certain statistical data indicate that the overall sales volume of electric vehicles in Europe surpassed 2 million in 2022, demonstrating robust growth potential. Some statistical data also show that in 2022, the total sales volume of electric vehicles in Europe was over 2.7 million units, which presented a strong growth trend. In the European Union, markets like Germany, the United Kingdom and France are among the mainstream ones. These countries have much bigger market scales compared to others, and the proportion of new energy vehicles in these nations is relatively large, approximately 20% [3]. Nevertheless, while the portion of electric automobiles in the new car market is on a continuous upward trend, they remain a relatively minor part in the entire vehicle market. Moreover, Chinese brands' market share in the EU new energy vehicle market is relatively low. Companies like BYD, NIO and Geely from China, etc., although they have already entered the European market, their market share is only about 2%. Domestic firms like BYD, NIO and Geely have already accessed the European market, yet their market share is only around 2%.

Toyota, Honda, Nissan and other local brands have long dominated the Japanese automotive market. These local brands have also made arrangements in the new energy

vehicle sector. At present, Japan takes about 30% of the world market share in the electric vehicle fuel cell market, making it the largest in the world. All in all, Japan's new energy vehicle market is in a state of continuous expansion, driven by domestic brands and underpinned by government policies [9,10]. As technology progresses and the market keeps on growing, Japan's new energy vehicle market is anticipated to develop more rapidly in the future.

China's EVs market has a huge potential considering its population of 1.4 billion, which gives it significant comparative advantages compared to other major countries. China has a population of 1.4 billion, which gives its new energy vehicle market great potential and distinct comparative edges compared to other major nations. Regarding the competitive situation, Chinese new energy vehicle enterprises are vigorously occupying overseas markets [1]. The sales of BYD's EVs ranked first in the world. Meanwhile, Neza, Ideal, NIO, Xiaopeng, and Chery, which are also Chinese new energy vehicle brands, have managed to gain a foothold in European and Southeast Asian markets like Belgium, the UK, Thailand, and Malaysia.

3.3 Analysis of the Technological Strength of New Energy Vehicles in China in Comparison to other Major Countries

When it comes to the international new energy vehicle market, China shows remarkable comparative advantages in battery, electric motor and intelligent technology in comparison with other countries in the study of comparative advantages. These aspects can be used to analyze the comparative advantages of new energy vehicle technology strength.

When it comes to battery technology, China has achieved remarkable advancements in this area. There are a number of battery - manufacturing enterprises in China that are world - leading, and they possess independent intellectual property rights as well as core technologies in new energy battery technologies like lithium batteries and lithium cobalt oxide batteries [11]. Moreover, China has achieved remarkable advancements in electric vehicle drive motor technology. There are a number of renowned motor - making enterprises in China, and they are at the international forefront in aspects like motor power density, energy conservation, and emission reduction. Moreover, China enjoys great superiority in aspects like new energy vehicle intelligent manufacturing and charging infrastructure construction, which offers powerful assistance for the development of new energy vehicles. Germany and France mainly represent the EU's new energy vehicle technology. In terms of battery technology and automotive manufacturing processes, Germany has its own strengths; as for France, it has achieved breakthroughs in electric vehicle design and intelligent driving technology. However, when compared with China as a whole, they still lag behind to a certain extent.

China has advanced manufacturing technology in electric motors. In particular, certain types of motors, like those with synchronous magnets and induction motors, possess remarkable advantages in the field of electric motor technology. Thanks to their high-efficiency, compact size and great reliability, permanent magnet synchronous motors have been increasingly becoming the main driving solution for electric vehicles and are extensively utilized in new energy automobiles in China. Meanwhile, in the

United States, there are still some core technologies in the electric field that have not witnessed breakthroughs, and it fails to fulfill the requirements for motors in terms of miniaturization, high density and lightweight. This can be attributed, to some extent, to the lack of sufficient investment in technological R & D and innovative capabilities.

4 Creative Countermeasures for Chinese New Energy Vehicle Enterprises to Expand Export Trade

4.1 Creating a Diversified Market Layout

Promote the development of the "local production" pattern. Employing "technology licensing + production in the local area" to evade tariffs in the European market [3]. Take BYD's cooperation with the Debrecen factory in Hungary for example. Their factory, which will have an annual production capacity of 150,000 vehicles by the end of 2025, along with Geely's factory layout in Spain, can cut tariff costs by producing within the European Union. BYD's factory in Brazil (scheduled to start operation in 2025) covering the South American supply chain is an example of establishing a local production base. This can effectively cut down tariff sensitivity, limit the influence on product costs to a minimum, and enhance the product's market competitiveness.

Work together to lobby the ASEAN Association of Automobile Manufacturers for promoting member countries to make the tariffs on pure electric vehicles unified at 0% [1]. They hope to lower or remove tariff barriers via policy lobbying, endeavor to obtain better market conditions for plug - in hybrid vehicles and build a more beneficial policy environment for China's new energy vehicles to enter the Southeast Asian market.

In response to the United States' high - tariff policy, a third - country layout can be adopted. One can set up assembly plants under the Canada or Mexico Free Trade Agreement (USMCA). By doing so, they are able to utilize the USMCA Free Trade Agreement terms and IRA regulations to evade high tariffs in the United States, thus cutting down on the cost of entering the North American market.

4.2 Strengthening International Cooperation

Through this, companies are able to take advantage of the USMCA Free Trade Agreement terms and IRA regulations to evade high tariffs in the United States. This, in turn, cuts down on the cost of accessing the North American market. When confronted with market access barriers, the key lies in resolving technical standard matters.

To begin with, speed up the unification of green industry chains. Build battery recycling systems in cooperation with European enterprises together. Adopt block-chain technology for tracking carbon footprints and cut down compliance risks. Next, create a model of "standard mutual recognition + technology authorization + construction of regional certification center". First of all, promote the connection between China and Europe and get involved in formulating the ENCAP collision testing regulations. Secondly, supply battery technology to native new energy vehicle enterprises in North America for export. Third, in order, set up a joint laboratory in Dubai for the one - stop completion of GCC certification and Gulf Standard certification.

When expanding the market, one should not merely concentrate on technical matters but also take into account the present development situation of new energy industries in different countries. In view of the slow progress in the construction of charging facilities in Brazil, the Brazilian national power company Eletrobras has cooperated to build a public charging network, with the government covering 50% of the cost. The construction of charging facilities via cooperation between the government and enterprises can relieve the current situation of slow - paced charging facility construction, enhance charging convenience and promote the consumption of all - electric vehicles.

4.3 Enhancing Brand Building

While the construction of charging infrastructure by government - enterprise cooperation is important for alleviating the backward situation of charging facilities, improving charging convenience and promoting vehicle consumption, brand building can play a complementary role. It can attract more consumers through establishing a good brand image, and then further promote the consumption of pure electric vehicles.

In the Southeast Asian market, initiate a cost - effective competition: introduce models with a price lower than \$20000 (for example, the Wuling Hongguang MINIEV) to capture the low-end market [6]. Launching cost - efficient vehicle models can satisfy the demands of low-and middle-income consumers in the Southeast Asian market, thus increasing market share.

In the Japanese and Korean markets, the approach of 'product differentiation + cultural promotion' is to introduce intelligent vehicle models targeting the high- end market, emphasizing the strengths of AI- powered intelligent driving. Unique products are able to satisfy the requirements of high-end consumers in the Japanese and Korean markets and boost the brand image and market competitiveness of China's new energy vehicles [7]. Simultaneously, by collaborating with key opinion leaders (KOLs) and running localized advertisements, the brand image gets reshaped, which boosts Japanese and Korean consumers' awareness of and trust in Chinese new energy vehicle brands, thus driving market sales.

The North American commercial vehicle market has a relatively high demand and relatively low competition. Chinese new energy vehicle firms are able to utilize their technological and cost strengths in the commercial vehicle area to introduce electric trucks (for instance, BYD T5) for logistics enterprises. In this way, they can bypass the highly competitive passenger vehicle market, make headway in the commercial vehicle market, build up brand fame and market share, and then gradually expand into the passenger vehicle sector [12].

In the Middle East, luxury brands are chosen to be collaborated with. Local well-known distributors like Ali&Sons are partnered with to introduce high - end brands. These brands can offer customized services and products, which helps to improve the high - end image and brand premium ability of Chinese brands.

5 Conclusion

New energy, as a clean energy type, represents the future trend in energy development, and vehicles powered by new energy are the future of the automotive industry. China is making active arrangements and promoting the development of EVs and has obtained certain accomplishments in technology research and industrialization. In addition, in the development of foreign trade, it possesses a great deal of international competitiveness as well as distinct comparative advantages. Among them, BYD - like new energy vehicle companies-are speeding up their overseas market penetration. Apart from enhancing their technological capabilities, they are also vigorously adjusting policies and getting in line with the global development trend. Second, the new energy vehicle industry chain in its entirety, covering various areas like battery, motor and control system, is helpful for the formation of industrial clusters and the enhancement of overall competitiveness. Furthermore, a series of policies have been actively introduced by the Chinese government to back the development of new energy vehicles, like export subsidies, export tax rebates and other favorable policies. These policies have efficiently spurred the market demand for new energy vehicles, propelled the new energy vehicle industry to develop rapidly, and created a favorable climate for the development of this industry.

New energy vehicles are distinct from traditional fuel vehicles in that they are environmentally friendly and energy-saving. This aligns with the current global environmental protection awareness and is likely to obtain more international market acceptance. Simultaneously, new energy vehicles witness rapid technological updates and contain high technological elements, which are conducive to increasing product value-added and intensifying international competitiveness. Furthermore, substantial investment has been made in the new energy vehicle industry in China, with the production capacity gradually expanding to satisfy the increasing international market demand.

Nevertheless, one should realize that the new energy vehicle industry in China still has technological and market challenges. Going forward, greater efforts should be made in technological innovation and production improvement.

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