

The Impact of The Electric Vehicle Industry in China and Russia on Their Existing Markets

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Abstract. In recent years, the electric vehicle (EV) sector has experienced swift advancement, captured substantial attention and showcased promising developmental prospects. This research endeavors to undertake a comprehensive comparative and analytical study of the influence exerted by the EV industry on the markets of China and Russia. It does so by evaluating various dimensions: geographical resource disparities, divergent national policies, and the societal awareness prevalent in both nations. The examination encompasses insights from both domestic and international perspectives, facilitating a well-rounded understanding of the subject matter. Ultimately, this paper aims to distill the myriad findings into a cohesive narrative, summarizing the future trajectories, potential growth avenues, and overarching directions that the EV industry is poised to undertake within the unique contexts of China and Russia. Through this holistic exploration, we aspire to offer valuable insights into the evolving landscape of electric vehicles within these two distinctive markets.

Keywords: Electric vehicles; comparison; future development.

1. Introduction

With growing global concern for environmental protection, repeated environmental incidents have drawn significant attention toward new energy development. This has, in turn, accelerated the rapid advancement of new energy vehicles. In contrast to conventional fuel vehicles, new energy vehicles offer notable environmental advantages. New energy vehicles encompass a variety of power sources beyond conventional fuels, including pure electric vehicles, hybrid electric vehicles, fuel cell electric vehicles, and hydrogen engine vehicles. This article will predominantly focus on analyzing the impact of pure electric vehicles on the markets of China and Russia. Pure electric vehicles, exemplified by trams in particular, have emerged as significant players in the realm of new energy vehicles, especially in China. China, striving to achieve its "double carbon" objective, regards pure trams as a preferred option due to their zero emissions, pollution-free nature, and exceptional energy efficiency. Given these attributes, promoting pure tram development is a pivotal choice for the automotive sector. Similarly, the Russian government has actively endorsed clean energy and environmental conservation industries, which include embracing electric vehicles. As early as 2013, Russia formulated the "Energy Saving Plan of the Russian Federation," outlining goals for new car sales in 2020. Against the backdrop of diminishing petrochemical resources and escalating environmental degradation, electric vehicles have progressed towards industrialization, supported by state subsidies, national policies, ecological conservation, reduced noise levels, and economical travel costs. However, it's important to note that China, the world's largest new energy vehicle market, commenced the phased withdrawal of ground subsidies on June 25, 2019, and other regions were poised to follow suit by the end of 2020. This shift reflects a transition from direct government support to more market-driven dynamics. In summary, the drive for environmental protection has spurred the rapid growth of new energy vehicles, with pure electric vehicles, particularly trams, playing a vital role in this landscape. Both China and Russia are actively fostering the development of electric vehicles through policies, incentives, and conservation initiatives, while the changing subsidy landscape signifies a shift towards a more market-oriented approach in the new energy vehicle sector.

According to statistics from the China Association of Automobile Manufacturers, China's new energy vehicle production and sales reached record highs from January to November 2021. Cumulative production exceeded 3 million units, while sales approached 3 million units. In November, the market penetration rate for new energy vehicles was 17.8%, continuing to surpass the previous month. New energy passenger vehicles achieved a market penetration rate of 19.5%. This progress marks a significant stride toward China's emergence as a dominant player in the automotive industry. China ingeniously integrated the advancement of new energy vehicles with objectives such as enhancing industrial competitiveness, safeguarding energy security, improving air quality, and addressing climate change during a pivotal phase in the automotive industry's transformation. On a global scale, China stands as the largest electric vehicle market, accounting for 45% of worldwide sales of electric passenger cars and over 90% of electric bus and truck sales. The nation boasts a greater number of public charging stations than the combined count in the United States, Europe, and Japan. China's leadership extends to mass-produced power battery technology and pioneering innovations in electric mobility business models. This automotive revolution catalyzes a parallel energy revolution. As China transitions from fossil fuels to renewables, it anticipates wind power generation to encompass more than 80% of installed capacity and over 40% of power generation by 2035. Photovoltaic and wind power costs are projected to decrease to 0.1-0.2 yuan per kilowatt-hour. The role of energy storage is pivotal in overcoming the challenge of high utilization costs associated with these renewable sources. By 2030, the electric vehicle count is anticipated to exceed 80 million, with an energy storage potential of 5,800 GWh. Electrochemical energy systems within new energy vehicles will contribute significantly to renewable energy development, facilitating large-scale energy storage. Through the lens of a dual-carbon strategy, the progression of new energy vehicles aids in achieving the preeminent carbon peak and carbon neutrality. The escalating share of renewable energy generation is expected to reduce carbon emissions per unit mile of electric passenger vehicles to 20 g/km by 2035, signifying a reduction of more than 70% from 2021 levels. By 2035, new energy vehicles are projected to curtail carbon emissions by approximately 200 million tons within the road transportation sector, delivering substantial carbon reduction benefits. In contrast, Russia's electric vehicle market is nascent. In 2020, only 687 electric vehicles were sold, with a total of around 11,000 registered electric vehicles amid a passenger car fleet of 46 million. The majority of Russia's electric fleet is concentrated in the Far East, Siberia, and the European areas, predominantly Moscow and St. Petersburg. The Nissan Leaf model constitutes more than 80% of the Russian electric vehicle market, primarily as used cars imported from Japan. The Russian government focuses on boosting electric vehicle sales to achieve a 2.5% share of new car sales, approximately 40,000 electric vehicles annually. Meeting this goal within the next few years would position Russia among the top 20-25 global markets for electric vehicles, paving the way for dealership and service center development, and the potential future local production of Russian and foreign electric vehicles like KAMAZ.

2. Domestic Market

As key technologies in the electric vehicle sector continue to advance and infrastructure undergoes continuous enhancement, nations across the globe are increasingly focusing on capturing opportunities in electric vehicle technology and market development [2]. As major economies, China and Russia share common interests in energy resources, trade cooperation and cross-border investment. The two countries have opportunities for cooperation in a number of economic fields, including energy and resource exchanges and cooperation on infrastructure projects. Despite the opportunities for collaboration, there are also some challenges to business cooperation due to cultural, legal and market differences.

In the past two decades, the rapid development and rise of the global electric vehicle industry, quickly into the public vision, and received the attention and attention of many countries, and in developed countries and China and other places, the market and sales are further improved.

China is the world's largest electric vehicle market. According to the relevant information, in accordance with the requirements of China's automobile industry development plan, a more reasonable and feasible goal for China's electric vehicle industry is that by 2010, the number of electric vehicles will account for 5%-10% of the total number of vehicles, and the annual production and sales of electric vehicles will exceed 1.5 million. By 2030, the number of electric vehicles will account for more than 50% of the total number of vehicles, and the annual production and sales of electric vehicles will range from 10 million to 19.5 million [3]. Since 2010, the Chinese government has actively formulated policies to vigorously support the electric vehicle industry, including but not limited to providing financial subsidies for electric vehicles, reducing taxes on electric vehicles and popularizing the construction of basic charging facilities. It is the implementation of these policy measures to stimulate the sales of electric vehicles in China and promote the rapid growth of the market. In terms of technology, in the past decade, China has made significant progress and improvement in electric vehicle manufacturing technology. The development momentum of its electric vehicle technology was once comparable to that of the United States, which is strong in science and technology. Many Chinese local car brands such as Xiaopeng, NIO, BYD, etc., have emerged, and a variety of electric models have been launched to further broaden the market positioning crowd. It further strengthens the long-term development of the company's industry. The incubation and achievement of these brands cannot be separated from a series of policy support measures taken by China for electric vehicles. These brands symbolize the diversity of China's electric market and today's developed achievements, and successfully promote the rapid and powerful development of China's electric vehicle industry. China's electric vehicle industry is expected to continue booming.

In contrast to China's rapid advancement, Russia's electric vehicle sector has remained relatively stagnant, with electric vehicle research, development, and production showing minimal progress since the introduction of the first pure electric vehicle in 1970. Recent years, however, have witnessed a growing recognition in Russia that energy conservation and emissions reduction are pivotal directions for future automotive technology. Consequently, the electric vehicle industry's development in Russia has begun to gain momentum. While the potential of electric vehicles is considerable, several challenges persist. Present power supply technologies fall short of meeting the performance and cost prerequisites for the widespread commercialization of electric vehicles. The establishment of large-scale supporting infrastructure necessitates meticulous planning and substantial investment. Additionally, China's coal-based power supply framework contributes to the limited discernible energy-saving and environmental benefits offered by electric vehicles. The outlook for electric vehicle development largely hinges on the breakthrough of battery technology. However, technological innovation isn't easily predictable or planned. Furthermore, the industrialization and commercialization of electric vehicles must be propelled by market demand and reliant upon continual technological advancements and cost reduction efforts [5]. Russia has rich natural resources, especially energy resources, so the demand for electric vehicles will be low compared to other countries. The climate in Russia is cold and dry, which also has different effects on the life and performance of the battery. The Russian government has formulated relevant policies for the electric vehicle market and the charging infrastructure is relatively vacant, which makes the development and demand of electric vehicles in Russia subject to corresponding restrictions, and it has not been as successful as China. But the growing environmental awareness of the Russian people and the masses has led more consumers to consider electric cars as a purchase option.

At the national level, both China and Russia are trying to reduce their environmental impact and emissions, and the presence of electric vehicles can be a powerful means of implementing these plans. Russia's vast land area brings diverse market demand, making Russian electric vehicles have market prospects in many regions. The development of the electric vehicle industry can make Russia's economic structure more diversified, reduce its dependence on traditional energy industries, and reduce economic risks.

2.1. The Comparison of the Influence of the Electric Vehicle Industry

China's electric vehicle market is the largest in the world, with more than 1 million new energy vehicles sold in 2019 and 2020, including pure electric vehicles and plug-in hybrid models. The rapid growth of electric vehicle sales in China is mainly due to strong government policy support, such as financial subsidies, exemption from purchase taxes, compulsory sales quotas, and increasing consumer recognition of new energy vehicles [6]. Thanks to the government's strong policy support, such as financial subsidies, exemption from purchase tax, compulsory sales quotas, etc., as well as consumers' increasing recognition of new energy vehicles. The Chinese government has taken active policy measures for the electric vehicle industry, such as financial subsidies, exemption from purchase tax, and compulsory sales quotas, which have promoted the rapid growth of the electric vehicle market. In addition, China's rapid urbanization process and increasing environmental awareness have contributed to the development of the electric vehicle market. The Chinese government has invested heavily in the construction of charging infrastructure, which has improved the charging convenience of electric vehicles, further stimulating market demand [7].

The market size of electric vehicles in Russia is relatively small, and the demand for electric vehicles is low due to the abundance of resources. Russia has not introduced too many powerful policies to support the development and research and development of the national electric vehicle industry, which has limited the development of the domestic electric vehicle market, so Russia is relatively lagging behind in terms of electric vehicle manufacturing technology and innovation. Russia's charging infrastructure is also relatively backward, which is not conducive to the promotion of electric vehicles, and it participates in less international cooperation and is not as competitive as manufacturers in other countries.

Overall, the difference between China and Russia's electric vehicle industry mainly comes from the market size, policy formulation, production technology, national conditions, energy structure, internal environment and many other factors under the comprehensive impact of the difference, these factors jointly determine the two countries' market impact on the development of their respective electric vehicles.

2.2. Analyze the Impact of the Electric Vehicle Industry

China is the second-best economy in the world, while Russia is Mired in war and sanctions. The previous article describes the development of China and Russia's electric vehicle industry in their own markets, and the following will focus on the performance of the two countries' electric vehicle industries in the international market and will reflect their import and export decisions, and the impact on the world.

2.3. Import and Export Capacity

To begin with, building an electric car requires a variety of complex materials and processes. The process of making an electric car is the secret of every electric car company, but the materials are available from open sources. In a global market, this open channel can be either domestic or foreign. China is a vast country with a lot of resources, but focusing on the production process of electric vehicles, China's resources cannot cover all the needs, and many resources need technology to assist. For this reason, China's electric vehicle companies will seek to import resources from abroad. The core of an electric car is its battery, and at present, lithium-ion batteries are the best kind of battery. [1] The required process and materials are also the most complex, and China's electric vehicle companies have also imported some materials under the premise of independent innovation. For example, in the field of high-performance membrane materials for batteries, Chinese electric vehicle companies mainly rely on imports. China's domestic technology in this area is still in its infancy. Such as proton exchange membranes, electrocatalysts, carbon paper diffusion layer and other major raw materials, because China's technical reserves are insufficient, electric vehicle companies need to import a large number of foreign countries. Russia, by contrast, has plenty of resources and does not need to worry about the possibility of losing any of them. But technically they are in a worse position

than China because their research investment is so low. Moreover, due to the start of the war in 2022, the Russian Federation government has to invest a lot of money in the military industry. Although the military industry can feed back into the civilian industry, it will have to wait until the war is over. At the same time, because of the war, it is difficult for Russia to import technology from Western countries [8].

Second, after making an electric car with the right materials and technology, the electric car company will find a way to export it, and the government will help in this process. As a socialist country, the Chinese government has made great help to the export of electric vehicles. [2] But because direct subsidies can create unfair competition, the Chinese government prefers to help build the supporting facilities needed by electric vehicle companies, such as overseas marketing and after-sales service networks. At the same time, the Chinese government is also good at communicating with various departments and requires relevant departments and units to formulate corresponding preferential policies for the export of electric vehicles, such as encouraging overseas institutions of Chinese banks to provide financial products for overseas Chinese electric vehicle enterprises. The Russian government can provide too little help to its own companies, and now the identity of Russian enterprises may be negative for the simple export of electric vehicles.

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There are many reasons for the difference between Chinese and Russian electric vehicle companies in the international market, and the Russian-Ukrainian war is an inescapable point. Despite Russia's historically uneasy relations with the West, the Russian government, formed in 1991, started off on good terms. But for a variety of reasons, the conflict between Russia and the West erupted when they

invaded Crimea in 2014, which has since led to a lot of sanctions, and reached a peak in 2022 when the Russia-Ukraine war began. Since then, the Russian electric vehicle industry has forever lost technical support and market from the West until the end of the war. In China, none of these drawbacks exist. Despite the general trend of confrontation between China and the United States, the people-to-people exchanges between the two countries are still normal and the markets are open to each other.

In addition, Russian society's willingness to produce electric cars is not sufficient. In general, electric vehicles are produced because electric vehicles are the future, and the electric vehicle market is certainly broad. [3] For Russia, however, there is no benefit to producing electric cars beyond the goal of carbon neutrality in a few decades. And they don't want the rest of the world to be carbon neutral when Russia's industrial transformation is so difficult. Russia's economic oligarchs are all key national lifeblood holders, and none of them have anything to do with new energy.[4] The temperature in Russia is also very low and they have traditionally preferred fuel vehicles. By contrast, China, which has never relied on energy exports for its government budget, has enough incentive and money to invest in electric vehicles. Moreover, the Chinese government has a sense of security. During the Cold War, this was reflected in Beijing's desire to keep the latest weapons at hand; After the turn of the century, when China's economy took off, this awareness was reflected in the need for Beijing to have the best technology at its disposal. In addition, in the era of fuel vehicles, China's auto industry is far less than Western countries, and even Russia [9]. As a new technology, the Chinese government is not too far behind Western countries in preparing to develop electric vehicles for the first time, which means that all countries are starting at the same time. With the help of the socialist system, China's electric vehicle technology can succeed. With some success, this success could in turn support Beijing's continued development of electric vehicles [10].

3. Summary

As two big countries, China and Russia have their own characteristics and advantages in terms of automobile manufacturing and market. The following will compare the automobile manufacturing industry and market of China and Russia from four perspectives: market size, industrial chain development, technological innovation ability, brand influence and export situation. First of all, in terms of industrial chain development, China's automotive industry chain is relatively complete, from parts manufacturing to vehicle production has a high independent research and development and production capacity. The development of China's automobile industry chain has benefited from the long-term support and guidance of the government, forming a huge industrial cluster, and also attracting the investment and cooperation of many multinational automobile manufacturers and parts suppliers. The Russian automobile industry chain is relatively weak, relying on imported parts and components, and the vehicle manufacturing capacity is relatively low. There is still room for Russian car manufacturers to improve the level of autonomy in the industrial chain. Second, China has made great progress in automotive technology innovation, emerging a number of advanced technologies and core components with independent intellectual property rights. For example, China's electric vehicle technology is in a leading position in the world, and its self-developed new energy vehicles are competitive in the market. Russia lags behind in automotive technology innovation and still needs to increase investment in technology research and development and the introduction of innovative technologies to enhance the competitiveness of the automotive industry. In addition, the influence of Chinese automobile brands has gradually increased, and their share in the domestic market has gradually increased, while they also have a certain share in overseas markets. The rise of Chinese auto brands benefits from the comprehensive effect of multiple factors such as quality improvement, technological innovation and market expansion. In contrast, Russian car brands have a smaller global presence and are mainly concentrated in their home market. Finally, in terms of export, China's automobile export volume has steadily increased, becoming one of the world's important automobile export countries. China's automobile exports are mainly concentrated in the middle and low-end

markets, including Asia, Africa and Latin America. Russia's car exports are relatively low, mainly concentrated in neighboring countries and CIS countries. Russian car manufacturers still face challenges in expanding export markets and improving the competitiveness of their products.

Authors Contribution

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

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