

# Problems and Countermeasures in the Development of New Energy Vehicle Industry in Nanning City under the Target of "Double Carbon"

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**Abstract:** *With growing concerns about global climate change and environmental conservation, the importance of green development and a low-carbon economy has gained significant recognition worldwide. To propel the advancement of new energy vehicles, which are environmentally friendly and energy-efficient means of transportation, China has set forth the dual-carbon goal. However, Nanning City, as an important hub for new energy vehicle production and consumer market, faces several developmental challenges. These include a small industrial scale, an unbalanced industrial structure, low industrial aggregation, and insufficient product sales. To overcome these challenges, it is imperative for Nanning to increase investment and attract new energy vehicle enterprises. Additionally, there is a need to enhance support for structural adjustments within the industry. Moreover, efforts should be made to bolster the construction of the new energy vehicle industry and expedite the development of charging infrastructure. By doing so, Nanning can actively promote the growth of the new energy vehicle sector, contributing toward achieving the ambitious "double carbon" goal.*

**Keywords:** *"Double Carbon" Target; Nanning; New Energy Vehicle*

## 1. Introduction

In September 2020, China explicitly put forward the goal of achieving carbon peak by 2030 and carbon neutrality by 2060 in order to protect the increasingly damaged environment. To achieve these goals, China has undergone industrial restructuring and energy transformation, actively seeking low-pollution energy sources. The emergence of renewable energy has played a significant role in this process. Furthermore, the development of new energy vehicles has also met the growing demand for cars while reducing environmental damage. Nanning City, as the capital of Guangxi Zhuang Autonomous Region, has shown a strong awareness of environmental protection and has attached great importance to the development of the new energy vehicle industry, which is the focus of this paper.

## 2. Analysis of the current situation of the development of new energy vehicle industry in Nanning

Nanning is the capital city of the Guangxi Zhuang Autonomous Region and one of the most important cities in Southwest China. In order to solve the problems of traffic congestion and environmental pollution, the Nanning Municipal Government has been actively promoting the development of new energy vehicles to improve the city's traffic environment and promote economic development, as well as to play an active role in the city's achievement of its dual-carbon" goal.

### 2.1. Scale of the Nanning New Energy Vehicle industry

Nanning City plans to build Nanning New Energy Vehicle City and develop it into a manufacturing base for exporting new energy vehicles to ASEAN. By the end of 2022, Nanning has more than 116,000 new energy vehicles and 16,452 charging piles.<sup>[1]</sup> The city also boasts well-known brands such as BYD and CK Auto, and has established a complete automotive production and supporting industry chain. The industry employs nearly 25,000 people and has an output value of more than 10 billion yuan.<sup>[2]</sup> The Nanning municipal government will continue to increase its support and investment in the new energy vehicle industry to promote its further development. These initiatives will help enhance the competitiveness of the new energy vehicle market in Nanning and promote the sustainable development of the new energy vehicle industry.

## 2.2. Industrial Structure of New Energy Vehicles in Nanning

The structure of new energy vehicle industry in Nanning City has been gradually improved, showing a diversified development trend. At present, the industrial structure of new energy vehicles in Nanning mainly includes new energy vehicle manufacturing, batteries and parts battery recovery and recycling, and new energy vehicle maintenance and service. In terms of new energy vehicle manufacturing, there are a number of new energy vehicle manufacturers in Nanning, such as BYD. Yangtze River Motors and other brands are actively involved in the automotive industry. In terms of battery and parts manufacturing, the manufacturing of core parts for new energy vehicles, such as AC charging piles, DC charging piles, power batteries, motors vehicle control systems, etc., has also become an important part.<sup>[3]</sup> For the above the new energy vehicle industry chain in Nanning areas, Nanning City also has many companies involved in them, committed to promoting the core technology development and application.

## 2.3. Aggregation Level of New Energy Vehicle Industry in Nanning City

The analysis of the aggregation level of new energy automobile industry in Nanning City uses the method of Location Quotient (LQ) to calculate the level of industrial agglomeration, and the value of location Quotient is greater than 1 for the aggregation of new energy automobile industry.<sup>[4]</sup> The calculation formula is:

$$LQ_i = (E_{ij} / E_i) / (E_{kj} / E_k)$$

As can be seen from the results in Table 1, it can be that the seen that the location quotient of new energy automobile industry in Nanning City is less than 1 in 2021 and 2022, which indicates that for the development of new energy automobile industry in Nanning City, the industrial aggregation aspect does not promote its development. Compared with Liuzhou City, the location quotient of new energy automobile industry in Nanning City is obviously much lower than that of Liuzhou City. Nanning should increase the promotion of new energy vehicle industry aggregation.

Table 1: New Energy Vehicle Industry Location Merchants in Nanning and Related Cities, 2021-2022

No.	City	Location Quotient (2021)	Location Quotient (2022)	Annual Growth Rate	Average
1	Guilin	0.59	0.74	25.40%	0.66
2	Liuzhou	2.82	3.40	20.56%	3.11
3	Nanning	0.68	0.72	19.56%	0.70

Source of data: compiled on the basis of public data from the National Bureau of Statistics, the China Association of Automobile Manufacturers, municipal statistical bureau, etc.

## 2.4. Sales of new energy vehicle products in Nanning

In Nanning, the sales channel for new energy vehicles is primarily composed of automobile dealers, accounting for 60 percent of the market. Additionally, brand authorized agents make up 30 percent of the sales channel, while online platforms contribute 10 percent of sales. Renowned automotive brands like BYD and Geely operate directly-managed shops in Nanning, allowing them to sell new energy vehicles directly to consumers. There is a gradual increase in the proportion of brand authorized agents in the sales channel, with some shops representing specific new energy vehicle brands and achieving significant offline sales volume. The sales areas are concentrated in Nanning's core business district, surrounding counties and cities, as well as coastal areas in Guangxi. Nanning has also emerged as a significant city for exporting new energy vehicles to ASEAN countries. In fact, between January and February 2023, Nanning exported new energy vehicles worth 220 million yuan to ASEAN countries. This highlights the city's growing importance as a hub for new energy vehicle exports in the region.

## 3. Problems in the Development of New Energy Vehicle Industry in Nanning City

With the increasing global environmental awareness, new energy vehicle industry has become an important development direction of the global automotive industry.<sup>[5]</sup> As the capital city of Guangxi Zhuang Autonomous Region, Nanning City has a strong environmental awareness and attaches great importance to the development of new energy vehicles. However, in the process of development, its industrial development also some problems. This part will analyse the problems in the development of new energy vehicle industry in Nanning.

### ***3.1. The scale of new energy vehicle industry in Nanning is relatively small***

In terms of per capita ownership of new energy vehicles Nanning's per capita ownership of new energy vehicles is 0.01, that is, one in a hundred people owns a new energy vehicle, which is significantly smaller than Liuzhou's 0.035, and only slightly larger than Guilin's per capita ownership of new energy vehicles, which is 0.008. From 2019 to 2022, both per capita ownership of vehicles and per capita ownership of new energy vehicles in Nanning have shown a steady increase, albeit not significant. It can be observed that the per capita ownership of new energy vehicles is considerably lower compared to traditional cars. This indicates that the current scale of new energy vehicles in Nanning is insufficient to meet the effective market demand.

### ***3.2. Industrial Structure of New Energy Vehicles in Nanning Singl***

Nanning new energy vehicle industry chain is relatively single, the upstream supply chain is not perfect, especially the battery, motor and other core parts production capacity and technology level needs to be improved. There are also problems in the midstream link, fewer vehicle manufacturers are smaller in scale, and the product quality and technology level need to be improved. Compared with Liuzhou City and Guilin City, Nanning City has more employees and manufacturing units in the new energy automobile industry, but the scale of the industry is relatively single, and the output of automobiles is limited. In order to promote the development of the industry, Nanning should strengthen the cooperation between upstream and downstream enterprises improve the industrial chain, enhance the overall technical level and the market competitiveness, and achieve diversification and sustainable development of the industry.

### ***3.3. The level of aggregation of new energy vehicle industry in Nanning is not high***

In the section of status analysis, it can be seen that the average location quotient of Nanning City in 2021 and 2022 is 0.7, indicating that the level of industrial agglomeration of new energy vehicles in Nanning City limits the development of its industry. Most enterprises stay in the imitation stage and lack core technology break throughs. The supply chain system is not perfect, and the matching degree of upstream and downstream links is low. In terms of market expansion, the coverage of sales channels is narrow, and the market has not been fully developed. Nanning should promote industrial agglomeration, cultivate leading enterprises, strengthen technological innovation and improve the supply chain system. At the same time, broaden sales channels and expand market share. The government can introduce policy support to attract external investment and talent introduction, promote industrial transformation and upgrading, and promote the new energy automobile industry to high-quality development.

### ***3.4. Limited sales of new energy vehicle industry products in Nanning City***

The development of new energy vehicles in Nanning still faces great challenges in terms of market demand. The share of new energy vehicles in vehicle ownership in Nanning is 26% and 4.4% in 2021 and 2022 respectively, while the share of new energy vehicles in vehicle 10.5% in 2021 and 2022, and the ownership in Liuzhou is 8.1% and corresponding share of new energy vehicles in vehicle ownership in Guilin is 2.2% and 3.3% in 2021 and 2022, which shows that the share of new energy vehicles in Nanning is lower than that of Liuzhou but higher than that of Guilin. New energy vehicle share is lower than Liuzhou City, but higher than Guilin City. Meanwhile, in terms of vehicle ownership, in the period of 2021-2022, the vehicle ownership of Nanning City is 2.104million and 2.619million, the vehicle ownership of Liuzhou City is 1.335 million and 1.298 million, and the vehicle ownership of Guilin City is 817,000 and 872,000.

## **4. Analysis of the Causes of the Development Problems of the New Energy Vehicle Industry in Nanning**

The development problems of new energy vehicle industry in Nanning need to be analysed in depth for their causes. Multiple factors such as technology, policy, market and supply chain interact to cause problems. In solving these problems, understanding the causes will guide the development of effective solutions.<sup>[6]</sup> Through sustained efforts Nanning's new energy vehicle industry will better meet the public's demand for environmentally friendly mobility and make a positive contribution to the city's sustainable development.

#### ***4.1. Insufficient investment in the new energy automobile industry, resulting in a relatively small industrial scale***

The government has not invested enough in infrastructure, resulting in lagging infrastructure construction. New energy vehicles need special charging piles, supporting equipment and other infrastructure, which and Nanning City is relatively lagging behind in this regard, has brought certain difficulties to the development of new energy vehicles. At present, consumers in Nanning City still have a relatively low degree of knowledge and acceptance of new energy vehicles, many people do not understand the advantages and operation of new energy vehicles, and do not realise the environmental and economic advantages. Insufficient policy support, purchasing new energy vehicles. Compared with other cities, Nanning City needs to strengthen its policy support for new energy vehicles. For example, there is a lack of special financial tax incentives and other measures, which make it difficult for new energy vehicle enterprises to obtain support. This situation is not conducive to the development of the new energy vehicle market and hampers the expansion of the new energy vehicle industry.

#### ***4.2. Insufficient support of relevant policies and difficulties in structural adjustment of new energy vehicle industry***

The Nanning government should pay close attention to the production costs and technological innovation capacity of the new energy vehicle industry to avoid rising costs that make it difficult for new energy vehicles to compete with traditional vehicle prices. The government should increase support for the industry, launch preferential policies for new energy vehicles, reduce manufacturing costs and promote industrial development. At the same time, it should strengthen its support for technological innovation, establish technology research and development bases and co-operation platforms, and promote technological progress.<sup>[7]</sup> The government should also introduce better policies to guide industrial restructuring, promote the optimal development of the new energy vehicle industry, provide incentives and promote the rationalisation of the industrial structure. The Nanning government should pay attention to the development of the new energy vehicle industry, increase policy and financial support, promote industrial development, promote the rapid development of the new energy vehicle industry in Nanning.

#### ***4.3. The new energy vehicle industry is fragmented and the level of industrial agglomeration is not high***

New energy vehicle technology bottlenecks in Nanning City, Nanning City, the new energy vehicle industry chain, the key technology and core parts and components of the R & D and production capacity is relatively weak, it is difficult to meet the market demand. The concentration of the industrial chain of new energy vehicles is not enough, and in the industrial chain of Nanning City, there is a lack of synergy and cooperation between various links, which leads to the dispersion of the industrial chain and makes it difficult to form a complete industrial chain.<sup>[8]</sup> For Nanning City, the economy is not developed, there is a shortage of funds, Nanning City, new energy vehicle industry chain, the lack of funds is a constraint to the development of the industry chain, the lack of sufficient capital investment, it is difficult to promote the development of the industry chain. In the policy is not perfect, the Nanning government's policy support for the new energy vehicle industry chain is insufficient, the lack of incentives, it is difficult to attract more enterprises and capital to participate in the construction of the industry chain.

#### ***4.4. Insufficient investment in the construction of charging facilities , affecting the sales of new energy vehicles***

The number of charging stations for new energy vehicles in Nanning is not enough, and the distribution of charging facilities is not balanced enough, which brings some inconvenience to the use of new energy vehicles.<sup>[9]</sup> By comparing the average vehicle-to-pile ratio of Guilin and the whole country in 2022, Nanning, Liuzhou, we can see from the data in the table that there will be 116,000 new energy vehicles in Nanning in 2022, and the charging piles of new energy vehicles will only be 16,000, and the vehicle-to-pile ratio will be 7.1:1, which means that 7 new energy vehicles will share one charging pile. Meanwhile, in Liuzhou City, Guilin City, and the national average, the ratio of new energy vehicles to charging piles is 3:1, 3.7:1, and 2.6:1, respectively. The more desirable ratio is 2:1, meaning that two new energy vehicles would share a charging pile. It is evident that in the city of Nanning, there is a shortage of charging facilities for new energy vehicles, posing a challenge for residents when it comes to charging their vehicles.

## **5. Nanning new energy vehicle industry development countermeasures recommendations**

After an in-depth analysis of the causes of the problems of the new energy vehicle industry in Nanning City, it is necessary to put forward corresponding development countermeasure proposals to solve these problems, which will help to solve the problems and promote the development of the new energy vehicle industry in Nanning City toward smore healthy and sustainable direction,<sup>[10]</sup> and make a positive contribution to the green mobility and economic development of the city.

### ***5.1. Increase investment in and introduction of new energy vehicle enterprises to expand the scale of the industry***

Nanning should adopt practical preferential policies to support the new energy vehicle industry, including tax incentives, financial subsidies and the construction of specialised industrial parks. <sup>[11]</sup> At the same time, it should actively attract foreign investment and bring infamous foreign new energy automobile enterprises to improve the industrial level and technical management. To support the development of the new energy automobile industry, it is crucial to establish R&D bases that can provide technical support and resources to enterprises. This initiative will facilitate the enhancement of innovation capabilities and the overall growth of the industry. Furthermore, it is encouraged to foster partnerships between enterprises, colleges, universities, and scientific research institutions. Through such collaborations, there can be joint efforts to develop new materials and technologies, ultimately elevating the manufacturing standards and nurturing independent core technologies. Nanning will use this to support the rapid development of the new energy vehicle industry and promote the city's economic transformation and sustainable development.

### ***5.2. Improvement of structural adjustment support for the new energy vehicle industry level***

To bolster the new energy industry, Nanning can enhance its support through strategic policy guidance. This can include implementing tax incentives, subsidy investments, and providing technical support. The government can also facilitate increased financial support and establish industrial alliances and synergistic organizations. By adopting these measures, the government can encourage enterprises to invest more in research, development, production, and promotion of new energy vehicles, thereby improving their competitiveness and market share. Moreover, it is crucial to strengthen publicity efforts to raise public awareness and foster trust in new energy vehicles. Creating personalized consumer experiences can further enhance consumer acceptance and willingness to purchase these vehicles. Achieving the restructuring of the new energy vehicle industry necessitates cooperation among the government, enterprises, and the public, including joint resource investment and collaborative efforts.

### ***5.3. Strengthening the construction of the new energy automobile industry and improving the aggregation level of the whole industry***

Nanning should focus on developing the new energy vehicle industry chain in order to improve overall efficiency and competitiveness. Firstly, it is important to enhance the development of the upstream industry chain by focusing on research and development as well as production of core components. This should be accompanied by efforts to optimize quality, technology levels, and cost-effectiveness. Secondly, it is necessary to strengthen the development of the midstream industry chain, which involves improving the performance and overall quality of the entire vehicle. By meeting consumer demands and expanding market share, the industry can thrive. Lastly, there should be a focus on reinforcing the construction of the downstream industry chain. This includes building more charging facilities, promoting the trading of used cars, and enhancing the quality and efficiency of services provided. The government should strongly vehicle industry, support the development of new energy introduce enterprises and professionals, improve the industry chain, improve efficiency, and accelerate the development of new energy vehicles.

### ***5.4. Accelerating the pace of construction of charging facilities for new energy vehicles and increasing the sales of new energy vehicles***

The Nanning government can encourage enterprises and individuals to invest in the construction of charging facilities through a series of policy measures and increase financial support for the construction of charging facilities. The government should also strengthen the planning and management of charging facilities to ensure wide coverage and balanced distribution, and improve the satisfaction of use. In

addition, the government should strengthen the maintenance and management of charging facilities, establish a sound management mechanism to ensure the normal operation and safe use of the facilities and strive to realise the ideal state of a vehicle-to-pile ratio of 2:1, so that consumers can gain the freedom of charging.

## 6. Conclusions

In conclusion, this study aimed to analyze the issues and propose strategies for the development of the new energy vehicle industry in Nanning City. Through our research, we have identified several challenges, including the relatively small scale, limited product diversity, low industry concentration, and restricted sales volume.

To address these challenges, it is recommended to enhance investments and attract new energy vehicle enterprises to expand the industry's scale and enhance its competitive advantage. Furthermore, supporting structural adjustments within the industry is crucial. This can be achieved by facilitating the transformation and upgrading of existing enterprises, promoting diversification, and fostering innovation. Additionally, efforts should be made to strengthen the overall industry's concentration by encouraging collaboration, resource sharing, and establishing a well-connected industry chain. To stimulate sales, accelerating the construction of charging infrastructure is essential, ensuring convenient and reliable charging services for consumers. Furthermore, promoting favorable policies, raising public awareness, and educating the community about the benefits of new energy vehicles can boost consumer confidence and acceptance.

While Nanning's new energy vehicle industry faces challenges, we remain optimistic about its future development. By leveraging government support and collaborative efforts, this industry will undoubtedly thrive. Furthermore, we recommend exploring further opportunities for technological innovation, international cooperation, and knowledge exchange to propel Nanning's new energy vehicle industry to new heights.

During the course of this research, we acknowledge certain limitations and areas for improvement. We encourage scholars and practitioners to contribute their wisdom and efforts to the sustainable growth of Nanning's new energy vehicle industry.

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