

# *Multi-dimensional Analysis and Strategy of the Development of New Energy Vehicles*

Yilin Xian<sup>1,a,\*</sup>

<sup>1</sup>*School of Civil Engineering, Xi'an University of Technology, Shanxi, 710000, China*

*a. 13720431903@163.com*

*\*corresponding author*

**Abstract:** With the global emphasis on environmental protection and sustainable development, new energy vehicles have become crucial in addressing issues such as the over-exploitation of non-renewable resources, climate change, and reducing dependence on traditional fossil fuels. Currently, new energy vehicle technologies are being innovated and the market scale is expanding. However, there are also problems such as limited driving range, insufficient charging facilities, and the lack of unified standards for vehicle performance and safety. This paper focuses on the current situation of the development of new energy vehicles and puts forward suggestions for future development. This research is structured around three key areas: new energy technologies, infrastructure, and market promotion. Using a combination of qualitative analysis, case analysis, and comparative analysis, this paper explores technological breakthroughs, with a focus on improving battery performance and developing new battery technologies; infrastructure development, emphasizing the layout and expansion of charging facilities; and market promotion, which addresses consumer demands and marketing strategies.

**Keywords:** Technological innovation, battery performance, infrastructure, marketing strategy, market

## 1. Introduction

The promotion of new energy vehicles is a critical strategy for reducing smog and urban ecological pollution, while also addressing social significance and economic value in getting rid of human dependence on oil energy [1]. At present, the continuous innovation of new energy vehicle technology and the expansion of the market scale have promoted the rapid development of this market. However, several challenges persist, such as limited driving range, insufficient charging facilities, and the lack of consistency in performance and safety of vehicles produced by different enterprises, which have caused certain obstacles to the development of the market.

This article focus on the following aspects: First, technological breakthrough plate, research and improve battery performance, development of new battery technology and other content. Second, the infrastructure construction section, focusing on the analysis of the layout and construction speed of charging facilities. Third, the marketing sector, focusing on consumer demand and marketing strategies that fit the actual situation. This paper employs qualitative analysis, case analysis and comparative analysis to explore these areas. By examining the technological development and market promotion of existing NEVs and comparing them to traditional fuel vehicles, this paper provides

insights into the development prospects of NEVs. This study helps new energy vehicles find the direction of sustainable development, understand the needs of the public, formulate marketing strategies that fit the actual situation, and promote the further development of the new energy vehicle market.

## **2. Development status of new energy vehicles**

### **2.1. Significant technological innovations**

At present, new energy vehicles have made many achievements in the field of technology. Policy support, technological upgrading, and gradual infrastructure improvement have contributed to the rapid development of the new energy vehicle market in the past five years [2]. When compared to traditional fuel vehicles, the advantages of NEVs become even more apparent. New energy vehicles have the advantages of environmental protection and pollution-free, low operating costs. In terms of environmental protection, NEVs produce almost zero exhaust emissions, which has great benefits for improving air pollution.

In terms of battery technology, major car companies and scientific research institutions have increased investment in research and development, making battery technology constantly updated and iterated, and the driving range has also been correspondingly improved. For example, Tesla has continuously optimized its battery management system and developed new battery materials, resulting in models with extended driving ranges that meet the daily needs of most consumers. Some models even perform excellently in long-distance travel scenarios, demonstrating the advancements made in battery technology. In addition, new energy vehicles have also made great progress in intelligent driving assistance technology. Many vehicles are equipped with advanced autonomous driving assistance features such as adaptive cruise, automatic emergency braking, lane-keeping assistance, and intelligent parking. These innovations not only improve the safety of driving, but also bring a more convenient and comfortable driving experience to the driver.

### **2.2. Continuously expanding market scale**

Consumers' pursuit of environmental protection and comfortable consumption concepts, coupled with strong government support, for the new energy vehicle industry have made the market size of new energy vehicles show a trend of continuous expansion. In recent years, the global sales of new energy vehicles have continued to rise, and in some countries and regions, the market share of new energy vehicles has reached a considerable proportion. Take Tesla as an example. As a global leader in the field of new energy vehicles, Tesla has a lot to learn from in terms of technological innovation and marketing. In terms of marketing, Tesla has improved the visibility and recognition of its products by holding large-scale test driving activities and participating in international auto shows. Tesla has addressed the common issue of charging infrastructure, making it easier for users to charge their vehicles and further boosting product sales.

In China, the new energy vehicle market is developing rapidly. The government has introduced a series of subsidy policies and industrial support measures to encourage enterprises to increase research and development and production efforts, while also stimulating consumers' desire to buy. As a result, China has become the world's largest production and sales market for new energy vehicles. Many Chinese domestic car companies are emerging in the field of new energy vehicles, such as BYD, NIO, and Xiaopeng, offering a wide range of NEV products that have been met with strong market demand and consumer enthusiasm.

### **3. Problems Faced in the Development of New Energy Vehicles**

#### **3.1. Limited Driving Range**

With the increasing popularity of new energy vehicles globally and the significant improvement of related technologies such as battery technology, the new energy vehicle insurance industry will face unprecedented opportunities [3]. Despite the continuous progress of battery technology, the driving range of new energy vehicles remains a prominent issue. Especially in low-temperature environments, the performance of batteries will decline significantly, resulting in a substantial reduction in the driving range. This causes many consumers to have considerable range anxiety when traveling long distances, worrying that the vehicle will run out of power during the journey and cannot be charged in time. For example, in the winter in the northern regions, the actual driving range of some pure electric vehicles may be only half or even less than the officially stated driving range, which poses significant challenges to the daily travel and long-distance trips of vehicle owners.

#### **3.2. Insufficient Charging Facilities**

The imperfection of charging facilities is another key factor restricting the development of new energy vehicles. Currently, the number of charging piles is still seriously insufficient compared to the number of new energy vehicles, and the distribution of charging piles is not reasonable enough. Charging piles are mainly concentrated in a few places such as urban central areas and highway service areas, while the coverage rate of charging piles in some remote areas and old residential communities remains extremely low. As a result, new energy vehicle owners often having to spend a lot of time and energy looking for charging piles when charging, and they may also face situations of queuing up during the charging process, which seriously diminish the user experience. To meet the growing charging needs of new energy vehicles, in addition to regulating the occupation of charging parking spaces, improving the construction of new energy vehicle charging infrastructure is a top priority [4].

#### **3.3. Non-uniform Performance and Safety Specifications**

There is a lack of uniform specification standards for the performance and safety of new energy vehicles produced by different enterprises, which is also a serious problem in the development of the industry. Currently, the market lacks unified testing and evaluation standards for new energy vehicles, especially for the testing and evaluation of power batteries [5]. This lack of standardization leads to substantial variation in critical areas such as vehicle power performance, battery life, and safety features, making it difficult for consumers to make informed comparisons when choosing between different models. For example, some enterprises may focus on battery capacity in order to pursue a higher driving range, but in doing so, they may neglect the safety of batteries, resulting in certain potential safety hazards. Conversely, other enterprises may perform poorly in vehicle power performance, affecting the driving experience of consumers. The lack of clear, consistent standards in both performance and safety creates confusion in the market and undermines consumer confidence in NEVs.

### **4. Strategies for the Development of New Energy Vehicles**

#### **4.1. Technological Breakthroughs**

One of the primary challenges in the development of new energy vehicles is to improve battery performance, particularly to address the issue of limited driving range. Key to this challenge is enhancing not only the energy density of batteries but also their charging and discharging efficiency,

as well as their overall service life. Researchers are actively exploring various ways to achieve the improvement of battery performance.

A promising area of development is the advancement of new types of battery materials, particularly solid-state battery materials. Compared with liquid batteries, solid-state batteries have the advantages of high safety, high energy density, wide operating temperature range, and numerous charging and discharging cycles. They can be widely used in fields such as new energy vehicles, new energy storage, and green aviation, and are regarded as one of the ultimate technologies to solve the driving range problem of new energy vehicles at present [6]. Meanwhile, by optimizing the battery management system, the charging and discharging process of batteries can be controlled more precisely, reducing battery losses, thus improving the overall performance of batteries.

In addition to enhancing existing battery technologies, developing new battery technologies is also an important direction for promoting the development of new energy vehicles. For example, hydrogen fuel cell technology, which offers a long driving range and quick refueling times, presenting significant advantages over traditional battery electric vehicles, has received extensive attention in recent years. While hydrogen fuel cell vehicles currently face challenges, including the high costs of hydrogen production, storage, and transportation, advances in technology could make them a vital component of the NEV sector in the future.

## 4.2. Infrastructure Construction

This section mainly focuses on two issues: the layout of charging facilities and the construction speed.

A reasonable layout of charging facilities is crucial for the popularization of new energy vehicles. Governments and enterprises should strengthen cooperation and formulate scientific charging facility layout plans to ensure that charging piles can ensure comprehensive coverage across urban areas, including residential, commercial and industrial areas. Moreover, the coverage rate of charging piles in rural and remote areas should also be gradually increased. For example, the installation location and number of charging piles can be reasonably determined according to factors such as population density and vehicle ownership in the city. The density of charging piles can be appropriately increased in densely populated areas to meet the charging needs of users.

Accelerating the construction speed is also an important measure to promote the development of new energy vehicles. Currently, the construction speed of charging piles is far behind the growth speed of new energy vehicles. The state has introduced supporting policies to promote the construction and use of charging and swapping infrastructure, further improving the development environment of transportation energy infrastructure [7]. Additionally, simplifying the approval process can improve the construction efficiency. For example, local governments could offer financial subsidies to companies constructing charging stations or provide preferential land-use policies to expedite the development of charging infrastructure.

## 4.3. Market Promotion

Understanding consumer needs is the basis of market promotion. New energy vehicle enterprises should conduct market research and other means to deeply understand the characteristics of consumers' needs for new energy vehicles. Unique product and service experience is an important factor for new energy vehicles to attract customers. Enterprises should continue to strengthen this advantage in dimensions such as product innovation design, application of intelligent technologies, test drive experience, and customer service [8].

Currently, consumer needs are mainly concentrated in the following aspects. Consumers hope that new energy vehicles have sufficient driving range to meet daily travel and a small amount of long-distance travel needs. For urban office workers, a comprehensive working condition driving range of

300 - 500 kilometers can basically meet the travel needs for a week of work. For users with long-distance travel needs, they expect the driving range to reach 600 kilometers or even higher, and the labeling of the driving range should be real and reliable, avoiding significant shrinkage in different environments (such as high temperature, low temperature) and under different driving conditions. They also require that charging piles be widely distributed and reasonably laid out. In addition, the compatibility of charging piles should be good, allowing different brands of vehicles to be charged smoothly. At the same time, the maintenance of charging equipment should be timely to avoid the situation where faulty charging piles remain unrepaired for a long time. Battery safety is also a key concern of consumers, such as not catching fire or exploding under extreme conditions such as high temperature and collision. Moreover, consumers hope that new energy vehicles have a reasonable price and are cost-effective. In the case of the gradual withdrawal of subsidies, vehicle enterprises can maintain price competitiveness by reducing costs, etc., and there should be a rich variety of vehicle models in different price ranges to meet the budgets and needs of different consumers.

Formulating effective marketing strategies is also crucial for the market promotion of new energy vehicles. Tesla enjoys a high reputation in the new energy vehicle industry and occupies an important position. Tesla's marketing strategies for new energy vehicles are diverse. In terms of brand building and positioning, Tesla shapes a high-end image and is positioned in the high-end electric vehicle market, emphasizing technology and performance. Through word-of-mouth marketing, it relies more on high-quality products to stimulate customers to spontaneously promote. Elon Musk uses his influence to create momentum for Tesla on platforms such as Twitter and also conducts activities on other social platforms. In terms of advertising marketing, it has gone from small-scale trials to adjusting strategies to expand publicity. Its innovative marketing models include launching paid unlocking services and creating a children's version of Tesla. In terms of channel marketing, it not only sets up experience stores in core business districts but also cooperates with enterprises such as Panasonic and actively participates in industry activities to display product and technology advantages and enhance its influence in the industry, expanding the market from multiple dimensions.

It can be seen that the marketing strategies for new energy vehicles should be carried out from multiple aspects. First, positioning should be carried out according to the characteristics and advantages of the brand to create an image in the minds of consumers, and then promotion should be carried out from both online and offline multiple dimensions. For new energy vehicles that are still in the initial development stage, the advantages of new media should be utilized to seize the Internet trend. On the basis of deeply understanding the needs of target users, targeted marketing communication plans should be formulated [9]. Use social media platforms for promotion, such as posting wonderful car test drive videos, displaying the unique technological configurations and environmental protection advantages of vehicles on platforms such as Weibo and Douyin to attract users' attention and sharing. Establish official websites and online showrooms, and through 3D display, virtual test drive and other functions, allow consumers to fully understand the details of vehicles. Conduct online live broadcasts, invite car experts, Internet celebrities, etc. to explain the knowledge of new energy vehicles and the highlights of vehicle models, and answer consumers' questions. Offline, set up experience stores in the core business districts of major cities to allow consumers to get close contact and experience with vehicles. Participate in various auto shows, create cool booths to display the innovative designs and technologies of new energy vehicles. Cooperate with dealers and conduct professional training for sales personnel to enable them to deeply understand the characteristics and advantages of new energy vehicles so as to better promote to consumers.

At the same time, in response to the issues of driving range, charging, etc. that consumers are concerned about, a complete after-sales service guarantee plan should be launched, such as free roadside assistance, battery warranty, etc. A referral mechanism for old users to recommend new users can also be established to expand the customer base.

## 5. Conclusion

Although new energy vehicles face many problems in the development process, the continuous progress of technology, improvement of infrastructure, and ongoing market promotion indicate promising prospects for their future growth. Technologically, with the gradual maturity of new battery technologies such as solid-state batteries and hydrogen fuel cell batteries, the driving range of new energy vehicles will be significantly improved, and the charging time will be greatly shortened, thus completely solving the problem of consumers' range anxiety.

In terms of infrastructure, governments and enterprises will continue to increase the construction intensity of charging facilities. It is expected that in the next few years, the number of charging piles will increase significantly, and the distribution will be more reasonable. Not only will urban areas achieve full coverage of charging piles, but rural and remote areas will also gradually popularize charging piles, providing more convenient conditions for the travel of new energy vehicles.

Regarding market promotion, with the continuous improvement of consumers' awareness and acceptance of new energy vehicles, the market share of new energy vehicles will continue to expand. Enterprises will continue to optimize product design and marketing strategies, launch more products that meet consumers' needs, and further promote the market sales of new energy vehicles.

In conclusion, while challenges remain, NEVs are poised to play a central role in the future of the automotive industry. Through collaborative efforts, NEVs will experience healthier, more rapid development, contributing significantly to global environmental protection and sustainable development.

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