

## **FACTORS INFLUENCING THE MARKET SHARE OF NEW ENERGY VEHICLES ON CHINA: A CASE STUDY OF BYD**

**Yun Jiang <sup>1\*</sup>**

<sup>1</sup> Graduate School, Siam University

\* Corresponding Author, E-mail: 392294745@qq.com

**Abstract:** The new energy vehicle market is transitioning from policy-driven to market-led. To expand the market share of new energy vehicles, it is crucial to fully consider the factors influencing their market share. Only by doing so can the market transformation and sustainable development of the new energy vehicle industry be achieved.

To explore how to increase China's new energy vehicle market share, this study takes BYD as a case and conducts an in-depth analysis of the key factors influencing market share. The study aims to 1) To verify whether environmental awareness has a positive impact on the market share of new energy vehicles; 2) To verify whether government policies have a positive impact on the market share of new energy vehicles and 3) To verify whether technical characteristics have a positive impact on the market share of new energy vehicles.

This study is based on Rational Action Theory and employs quantitative analysis methods, using statistical software SPSS for data processing and analysis. By distributing online questionnaires, 200 valid responses were successfully collected to assess the factors influencing the market share of new energy vehicles. The findings indicate that: 1) Environmental awareness has a positive impact on the market share of new energy vehicles; 2) Government policies have a positive impact on the market share of new energy vehicles and 3) Technical characteristics have a positive impact on the market share of new energy vehicles.

The research conclusions can help companies enhance the rationality of their marketing strategies for new energy vehicles, facilitating faster and more effective market entry and development. Additionally, these insights can guide companies in optimizing product design, improving technology, adjusting pricing strategies, and formulating more attractive marketing plans. This, in turn, will help companies secure a more advantageous position in the competitive market and achieve steady growth in market share.

**Keywords:** New Energy Vehicle, Market Share, BYD, Environmental Awareness, Government Policies, Technical Characteristics

## **Introduction**

Climate change and air pollution are serious global challenges, prompting countries worldwide to change their energy consumption patterns and strive to build a clean, safe, and stable energy supply system. As the number of automobiles increases and their usage expands, the negative environmental impacts grow significantly. New energy vehicles (NEVs), employing innovative technological solutions, effectively reduce harmful gas emissions caused by fossil fuels (Chen et al., 2015). Therefore, NEVs have become the future direction of the automotive industry.

As the world's largest emitter of carbon dioxide, China officially announced its energy conservation and emission reduction plan in 2015, committing to peaking carbon emissions by 2030 or earlier. New energy vehicles (NEVs) are regarded as an effective strategy to address air pollution, mitigate climate change, and achieve carbon neutrality (Rao et al., 2022). Simultaneously, the high-quality development of the NEV industry is crucial for enhancing the international competitiveness of the automotive industry and achieving efficient coordination among urban transportation, energy, and environment (Prateek et al., 2016). The global NEV market is rapidly expanding, with China being a major market and leading manufacturer of NEVs worldwide.

The widespread application of new energy vehicles (NEVs) is a strategic initiative in a new stage of development aimed at promoting high-quality economic growth in China. It serves as a crucial driver and engine for deepening the integration of China's digital economy with the traditional economy. Therefore, the Chinese government has introduced a series of incentive policies to promote the development of the NEV industry. For instance, the "Made in China 2025" strategy launched in 2018 continues to support the development of electric and fuel vehicles, clearly positioning NEVs and energy-saving vehicles as the future direction of the automotive industry. The "13th Five-Year Plan" further emphasizes the promotion of industrial upgrading and support for the development of emerging industries, providing robust policy support for accelerating the adjustment and transformation of the automotive industry.

The market for new energy vehicles (NEVs) is gradually shifting towards market-led development. However, compared to traditional vehicles, NEVs still hold a relatively low market share, and consumer enthusiasm for purchasing NEVs remains subdued (Li et al., 2022). Therefore, to increase the market share of NEVs, it is essential to start from the perspective of consumers and fully consider the factors influencing NEV market share. Only by doing so can the market transformation and sustainable development of the NEV industry be achieved.

## **Research Objective**

- (1) To verify whether environmental awareness has a positive impact on the market share of new energy vehicles.

- (2) To verify whether government policies have a positive impact on the market share of new energy vehicles.
- (3) To verify whether technical characteristics have a positive impact on the market share of new energy vehicles.

## **Literature Review**

### *Theory of Rational Action*

The Theory of Reasoned Action (TRA), proposed by American scholars Fishbein and Ajzen in 1975, provides a novel analytical perspective for cross-sector data sharing. This theory is primarily used to analyze how attitudes consciously influence individual behavior, elucidating the causal relationships between behavioral attitudes, subjective norms, and behavioral intentions. The TRA model predicts individual behavior directly through behavioral intentions, which are influenced by two main factors: behavioral attitudes and subjective norms (Long, 2014).

The Theory of Reasoned Action posits that people's behavior is influenced by rational thinking and calculation, rather than by emotions, biases, or other irrational factors (Duan et al., 2020). The theory primarily includes the following three assumptions: people's behavior is based on the pursuit of goals and interests, and they will choose the behavior that best aligns with their goals and interests among different options; people evaluate various available behavioral options based on their beliefs and values to determine the optimal choice; and people engage in rational thinking and calculation when making decisions to select the best course of action (Fishbein, 1977).

The Theory of Reasoned Action has a broad range of applications, including fields such as marketing, finance, and healthcare. In marketing, the theory can be used to study the consumer decision-making process, helping businesses design better marketing strategies. In finance, it can be applied to study investor decision-making processes and market behavior, aiding investors in making more rational investment decisions.

### *Environmental Awareness*

Environmental awareness can be defined as an individual's ability to understand and evaluate issues related to human consumption activities and behaviors that can have either positive or negative impacts on the environment. Generally, environmental awareness positively influences consumers' attitudes toward eco-friendly products, thereby leading to changes in their own behaviors (Nguyen et al., 2019).

Generally, the higher consumers' awareness and concern for environmental protection, the more likely they are to develop a green purchase intention (Netemeyer et al., 2005). This means that when buying goods or services, consumers tend to choose products that are environmentally friendly or have sustainable features. It reflects consumers' environmental awareness, attitudes, and behavioral intentions, serving as a crucial foundation for their purchasing decisions. It also demonstrates the

increasing concern for environmental issues among consumers, as well as a sense of social responsibility and awareness of sustainable development (Li et al., 2018).

Consumers with stronger environmental awareness and greater knowledge of household energy-saving practices are more likely to achieve energy conservation and environmental protection goals by changing their own behavior. However, when consumers are uninformed, possess incorrect environmental knowledge, or are entirely unaware of green ecological information, they find it challenging to engage in environmentally friendly behaviors (Chen & Chang, 2013).

By enhancing consumers' environmental awareness and knowledge, companies can boost the acceptance and adoption of eco-friendly products, such as new energy vehicles, thereby capturing a larger market share (Li & Deng, 2019). Conversely, failing to address these informational gaps may hinder market penetration and growth in the eco-friendly product segment.

#### *Government Policies*

Government policies on new energy vehicles refer to legislative, policy, and fiscal measures aimed at promoting and supporting the development, production, sale, and use of new energy vehicles. Government helps enhance companies' technological capabilities and competitiveness through relevant policies, aiding them in seizing market opportunities, increasing sales, and accelerating the development of the new energy vehicle industry (Xiong & Qin, 2023).

Lucas et al. (2019) identified the driving factors of the new energy vehicle market by analyzing data from 200 major metropolitan areas in the United States in 2016. The results indicate that the most significant factors include financial incentives, charging infrastructure, and the availability of new energy vehicle models.

Li and Deng (2019) studied the effects of sales incentives and subsidies for charging infrastructure development, revealing that sales incentive measures have a substantial impact on new energy vehicle sales, but the effect is even greater when subsidies are directly allocated to charging infrastructure.

#### *Technical Characteristics*

When users are more inclined to embrace emerging technologies, their intention strengthens to reshape their behavioral patterns and invest more effort and time in adopting cutting-edge technologies.

According to Gautam and Bolia (2023), the driving range of electric vehicles is still a key consideration for consumers, which is of great significance for reducing emissions and promoting sustainable urban development. In addition, Lu and Li (2019) discussed the trade-offs between fuel vehicles and new energy vehicles, fuel consumption reduction, and the impact of digital technology in automobile industry decision-making.

The limited driving range is a well-known technological constraint of new energy vehicles, which can be overcome through consumer awareness of charging convenience. However, factors such

as insufficient charging infrastructure, vehicle safety concerns, and "range anxiety" continue to hinder widespread adoption of new energy vehicles. Consumers are primarily concerned about driving range and charging time (Gao et al., 2023), with the limited driving distance causing consumer apprehension.

## Methodology

The questionnaire employs a commonly used measurement tool, the five-point Likert scale, which divides the evaluation into five levels, ranging from strongly disagree to strongly agree, this questionnaire has passed reliability and validity tests. This study selects consumers in the Chinese market who already own BYD new energy vehicles as samples, focusing primarily on their environmental awareness, government policies, and perceptions of the technical performance of BYD new energy vehicles. A total of 200 questionnaires were distributed in this survey, and all 200 valid questionnaires were successfully retrieved, resulting in a 100% response rate. Through quantitative analysis of the collected data, we can gain deeper insights into consumer preferences. These analytical findings can also serve as scientific evidence for policymakers and business decision-makers, enabling them to better understand market trends and changes in consumer demand. To accurately assess the factors influencing the market share of new energy vehicles, the collected data was statistically analyzed using SPSS software. SPSS is a widely used statistical software capable of performing various complex data processing and analysis tasks. Through SPSS analysis, this study aims to deeply understand and identify the key factors driving the market share of new energy vehicles.

## Results

### 1. Descriptive Statistical

**Table 1:** Descriptive Analysis

| Survey Items    | Category                               | Number of people | Percentage (%) |
|-----------------|--|------------------|----------------|
| Gender          | Male                                   | 143              | 71.5           |
|                 | Female                                 | 57               | 28.5           |
| Age             | 18-24                                  | 98               | 49             |
|                 | 25-34                                  | 81               | 40.5           |
|                 | Over 35 years old                      | 21               | 10.5           |
| Education Level | High school/Technical secondary school | 19               | 9.5            |
|                 | Junior college                         | 7                | 3.5            |
|                 | Bachelor's degree                      | 102              | 51             |
|                 | Master's degree or above               | 72               | 16             |

In Table 1, in item of gender distribution, 143 men participated in the survey, accounting for 71.5%, while 57 women participated, accounting for 28.5%. In terms of age distribution, there are 98 people aged 18-24, accounting for 49%, 81 people aged 25-34, accounting for 40.5%, and 21 people over 35 years old, accounting for 10.5%. In terms of education level distribution, there are 19 people with a high school/technical school degree, accounting for 9.5%, 7 people with a college degree, accounting for 3.5%, and 102 people with a bachelor's degree, accounting for 51% , and 72 people have a master's degree or above, accounting for 16%.

### 2. The Impact of Environmental Awareness on the Market Share of New Energy Vehicles

According to the correlation analysis (Table 2), there is a significant positive relationship between environmental awareness and market share ( $r=0.723$ ,  $p<0.01$ ). This result indicates that higher levels of environmental awareness are associated with a greater market share of new energy vehicles.

**Table 2:** Correlation Analysis of the Environmental Awareness on the Market Share of New Energy Vehicle

| Dimension               | Environmental Awareness | Market Share |
|-------------------------|-------------------------|--------------|
| Environmental Awareness | 1                       |              |
| Market Share            | 0.723**                 | 1            |

The regression analysis (Table 3) of environmental awareness on the market share of new energy vehicles shows that the  $R^2$  value of the regression model is 0.695. This indicates that the environmental awareness variable can explain approximately 69.5% of the variation in the market share of new energy vehicles. This suggests that environmental awareness is an important factor influencing the market share of new energy vehicles. Additionally, the B is 0.892, and the significance level (p-value) is 0.000, indicating that this relationship is statistically significant.

**Table 3:** Regression Analysis of the Environmental Awareness on the Market Share of New Energy Vehicle

|                         | Non-standardized coefficient |                | Standardized coefficient | t      | p     | $R^2$ | Adjusting $R^2$ | F      |
|-------------------------|------------------------------|----------------|--------------------------|--------|-------|-------|-----------------|--------|
|                         | B                            | Standard Error | Beta                     |        |       |       |                 |        |
| (Constant)              | 0.721                        | 0.073          | -                        | 5.751  | 0.000 | 0.695 | 0.621           | 171.65 |
| Environmental Awareness | 0.781                        | 0.068          | 0.872                    | 13.413 | 0.000 |       |                 |        |

### 3. The Impact of Government Policies on the Market Share of New Energy Vehicles

According to the correlation analysis in Table 4, there is a significant positive relationship between government policies such as economic incentives and the construction of charging infrastructure, and market share ( $r=0.883$  and  $0.729$ ,  $p<0.01$ ). This suggests that government

economic incentives and the development of charging infrastructure play a crucial role in promoting the growth of market share for new energy vehicles.

**Table 4:** Correlation Analysis of Government Policies on the Market Penetration of New Energy Vehicles

| Dimension                               | Economic Incentives | Construction of Charging Infrastructure | Government Policies |
|---|---------------------|---|---------------------|
| Economic Incentives                     | 1                   |   |                     |
| Construction of Charging Infrastructure | 0.779**             | 1                                       |                     |
| Government Policies                     | 0.883**             | 0.728**                                 | 1                   |

The regression analysis (Table 5) of government policies on the market share of new energy vehicles shows that the R<sup>2</sup> value of the regression model is 0.642. This indicates that the government policies variable can explain approximately 64.2% of the variation in the market share of new energy vehicles. This suggests that government policies is an important factor influencing the market share of new energy vehicles. Additionally, the B is 0.731, and the significance level (p-value) is 0.000, indicating that this relationship is statistically significant.

**Table 5:** Regression Analysis of the Government Policies on the Market Share of New Energy Vehicle

|                     | Non-standardized coefficient |                | Standardized coefficient | t      | p     | R <sup>2</sup> | Adjusting R <sup>2</sup> | F       |
|---------------------|------------------------------|----------------|--------------------------|--------|-------|----------------|--------------------------|---------|
|                     | B                            | Standard Error | Beta                     |        |       |                |                          |         |
| (Constant)          | 0.677                        | 0.069          | -                        | 4.383  | 0.000 | 0.624          | 0.647                    | 169.565 |
| Government Policies | 0.731                        | 0.054          | 0.683                    | 13.250 | 0.000 |                |                          |         |

#### 4. The Impact of Technical Characteristics on the Market Share of New Energy Vehicles

**Table 6:** Correlation Analysis of the Technical Characteristics on the Market Share of New Energy Vehicle

| Dimension                 | Battery Technology | Range Anxiety | Technical Characteristics |
|---------------------------|--------------------|---------------|---------------------------|
| Battery Technology        | 1                  |               |                           |
| Range Anxiety             | 0.750**            | 1             |                           |
| Technical Characteristics | 0.821**            | 0.771**       | 1                         |

According to the correlation analysis in Table 6, there is a significant positive relationship between technical characteristics such as battery technology and range anxiety, and market share (r=0.821 and 0.771, p<0.01). This indicates that advancements in technical features, particularly

improvements in battery technology, and effective management of range anxiety, significantly influence the growth of market share for new energy vehicles.

**Table 7:** Regression Analysis of the Technical Characteristics on the Market Share of New Energy Vehicle

|                               | Non-standardized coefficient |                | Standardized coefficient | t      | p     | R <sup>2</sup> | Adjusting R <sup>2</sup> | F       |
|-------------------------------|------------------------------|----------------|--------------------------|--------|-------|----------------|--------------------------|---------|
|                               | B                            | Standard Error | Beta                     |        |       |                |                          |         |
| (Constant)                    | 0.732                        | 0.057          | -                        | 5.309  | 0.000 | 0.561          | 0.574                    | 170.306 |
| Technological Characteristics | 0.677                        | 0.074          | 0.712                    | 31.589 | 0.000 |                |                          |         |

The regression analysis (Table 7) of technical characteristics on the market share of new energy vehicles shows that the R<sup>2</sup> value of the regression model is 0.561. This indicates that the technical characteristics variable can explain approximately 56.1% of the variation in the market share of new energy vehicles. This suggests that technical characteristics is an important factor influencing the market share of new energy vehicles. Additionally, the B is 0.677, and the significance level (p-value) is 0.000, indicating that this relationship is statistically significant.

## Discussion

### *1) Environmental Awareness Has a Positive Impact on the Market Share of New Energy Vehicles*

The data analysis results indicate that consumers' environmental awareness significantly and positively impacts the market share of new energy vehicles. This further underscores that heightened environmental awareness among consumers significantly drives their decisions to purchase new energy vehicles. As consumers' environmental awareness increases, their inclination to purchase new energy vehicles also grows, highlighting the crucial role of fostering environmental consciousness in expanding the market share of new energy vehicles.

### *2) Government Policies Have a Positive Impact on the Market Share of New Energy Vehicles*

Government policies have a significant impact on the market share of new energy vehicles, demonstrating a potent effect in enhancing their market penetration. Specifically, there is a strong correlation between economic incentives and the construction of charging infrastructure, highlighting the importance of well-designed government policies. These policies not only incentivize the purchase of new energy vehicles but also create a favorable market environment conducive to the growth of the new energy vehicle industry.

### *3) Technical Characteristics Have a Positive Impact on the Market Share of New Energy Vehicles*



Technological characteristics significantly influence the expansion of market share for new energy vehicles, with technological advancements playing a key role in driving consumer choice towards these vehicles. This emphasizes the ongoing need for innovation and development in the new energy vehicle sector to address consumer concerns, enhance vehicle performance, and ultimately promote widespread adoption of these environmentally friendly transportation options.

## Conclusions

This study is based on Rational Action Theory and employs quantitative analysis methods, using statistical software SPSS for data processing and analysis. By distributing online questionnaires, 200 valid responses were successfully collected to assess the factors influencing the market share of new energy vehicles. The findings indicate that: 1) Environmental awareness has a positive impact on the market share of new energy vehicles; 2) Government policies have a positive impact on the market share of new energy vehicles and 3) Technical characteristics have a positive impact on the market share of new energy vehicles.

Based on the above conclusions, government policies and technological advances can be utilized to support the market. For example, Encourage the formulation and implementation of policies that are conducive to the expansion of new energy vehicle charging infrastructure and provide more convenience for potential and existing new energy vehicle users. Continue to invest in research and development to improve new energy vehicle battery technology to achieve longer driving range, shorter charging time and longer battery life. This addresses one of the main concerns consumers have about NEV adoption.

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