Analyzing the Determinants Affecting Chinese Consumers Willingness to Adopt Electric Vehicles

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Abstract: The transition to electric vehicles (EVs) is at the forefront of global efforts to combat environmental challenges and revolutionize the future of transportation. In the context of this transformative shift, understanding the factors influencing consumers' willingness to embrace EVs is paramount. This research delves into the intricate web of determinants that shape Chinese consumers' attitudes and preferences towards electric vehicles, a critical market given China's prominence in the automotive industry and its commitment to sustainability. Drawing upon a comprehensive survey methodology, this study navigates the multifaceted landscape of consumer behavior, dissecting the key determinants that steer the course of EV adoption. The research investigates the nuanced interplay between price sensitivity, performance expectations, environmental consciousness, and brand influence, collectively illuminating the paths that lead Chinese consumers towards or away from electric mobility.

Keywords: New Energy Vehicle, Intention Purchase, Electric Car

1. Introduction

1.1 Background of the Study

Firstly, the Chinese government has implemented policies and regulations to encourage the use of electric vehicles[1]. For instance, it offers subsidies to consumers who purchase electric vehicles, and has implemented stricter emissions standards for traditional gasoline-powered vehicles.These policies have increased consumer awareness of electric vehicles and their benefits, making them more attractive to potential buyers.

Secondly,As shown in Table 1, Economic incentives such as lower maintenance and fuel costs, as well as the availability of charging infrastructure, have also contributed to the rising popularity of electric vehicles in China. The cost of electric vehicles has also decreased over time, making them more affordable for consumers.[2]

Overall, The study will examaine factors that will contributed to an increase in consumers' intentions to acquire electric vehicles in China, with many individuals now seeing them as a viable and attractive alternative to traditional gasoline-powered vehicles.

Table 1: New energy vehicle subsidies over the years. Graphic: Tram Resources

	New Energy Vehicle Subsidy Policy Over the Year:Endurance Subsidy for Pure EVs					
	80<R<100	100<R<150	150<R<200	200<R<250	25<R<300	300<R<400
2015	3.5	3.5	5	5	6	6
2016	2.85	2.83	4.75	4.75	5.7	5.7
2017	3.15	3.15	4.5	4.5	5.4	5.4
2018	0	2.5	4.5	4.5	5.5	5.5
2019	0	2	3.6	3.6	4.4	4.4
2020	0	0	1.5	2.4	3.5	4.5
2021	0	0	0	1.5	2	2.7

1.2 Problem Statement

The problem statement for the examination of Chinese consumers' intentions to acquire electric vehicles in China is to investigate the factors that influence Chinese consumers' decisions to purchase electric vehicles.Specifically, the study aims to identify the key determinants of electric vehicle adoption, including consumers' attitudes towards electric vehicles, their perception of the benefits and drawbacks of electric vehicles, and price on their purchase intentions.

In essence, studying the factors that influence people to buy trams goes beyond the surface of consumer behavior. It has far-reaching implications for urban planning, transportation policy, environmental sustainability, and economic development[3].

By understanding the factors that drive Chinese consumers' decisions to acquire electric vehicles, the study aims to provide insights that can inform policy and marketing strategies to promote the adoption of electric vehicles in China.[4]

1.3 Research Objectives

To analyse if price influence consumer buying behavior for electric vehicles.

To examine if performance influence consumer buying behavior for electric vehicles.

To find out if purchase intention influence consumer buying behavior for electric vehicles.

To survey if brand name recognition influence consumer buying behavior for electric

1.4 Hypothesis

H1: There is a positive relationship between price and consumer buying behavior for electric vehicles.

H2: There is a positive relationship between Performance and consumer buying behavior for electric vehicles.

H3: There is a positive relationship between Purchase intentions and consumer buying behavior for electric vehicles.

H4:There is a positive relationship between brand name recognition and consumer buying behavior for electric vehicles.

1.5 Significant of The Study

This topic focuses on the influencing factors of Chinese consumers' purchase intention of new energy vehicles, and the direct and indirect effects of these factors on the purchase intention of new energy vehicles. Specifically, it has the important Practical significance.

Under China's "One Belt, One Road" initiative, "Internet Plus" initiative and "Made in China 2025" strategy, it is crucial for enterprises to focus on sustainable development and green growth if they want to seize opportunities and seek new development space.[5]

This paper studies the factors influencing consumers' willingness to buy new energy vehicles.

1.6 Glossary

"Electric vehicles"refers to the vehicles that use clean energy such as Electric energy to replace fossil energy. Electric vehicles rely entirely on batteries as power.

"Purchase intention"refers to how often a consumer is willing to take a particular purchase action.Consumers' attitude towards a certain product or brand, combined with the effect of external factors, constituted consumers' purchase intention, which could be regarded as consumers' subjective tendency to choose a specific product and proved to be an important indicator to predict consumer behavior.

"Purchase decision" refers to all individuals and families who purchase goods to meet the needs of individual life. It is the ultimate market for which the organization market and even the whole economic activities serve, and also the market for the final direct consumer goods for individuals.

2. Literature Review

2.1 Introduction

This section will explained all the variables that will influence the consumers' intentions to acquire electric vehicles in China.
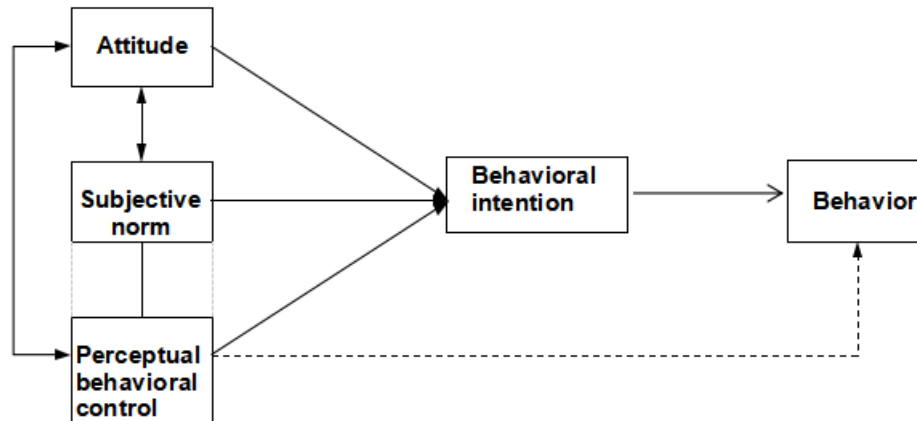
2.2 Underpinning Theory

Figure 1: Theory of Planned Behaviour

As shown in Figure 1, Theory of Planned Behaviour. People's perception of ease or difficulty in performing an action of interest[6]. In general, positive attitude, support from significant others, and accurate perceived behavioral control should have positive effects on behavioral intention. The resources and opportunities available to a person must to some extent determine the possibility of behavioral achievement. However, a greater psychological interest than actual control is the perception of behavioral control, as well as the effect on intent and behavior.

2.3 Review of Prior Empirical Research

IDV1: Price

Langga A,Kusumawati A(2021)analyzed the intensive distribution and promotion activities carried out by HM Company in the United States on the basis of a survey on clothing products,in order to improve the influence between customer-based brand equity(CBBE)and repurchase intention and word-of-mouth(word of mouth).It is pointed out that appropriate promotion activities to reduce the price will greatly improve consumers'purchase intention.

IDV2 : Performance

Davis(1986)proposed the Technology Acceptance Model(TAM),which combined the relevant theories of management information system(MIT)and psychology to analyze external factors,perceived ease of use, perceived usefulness, attitude of use,behavioral intention and system use.It is pointed out that Performance will greatly affect the"perceived usefulness"of users and influence their willingness to buy products.Under the condition of other conditions being equal,products with better Performance will improve users'purchase intention of the products.

IDV3: Purchase Intentions

Li,J&C(2022)took cabinet products in the industry as an example.Through data analysis and interview research,they compared and analyzed that users with green marketing concept were more inclined to choose environment-friendly wooden cabinets by images of their purchasing intention,while consumers with fashion intention would buy cabinets with appearance characteristics and advanced design elements such as plastic.It is pointed out that consumers' Subjective Norm will greatly influence their choice of products[7].

IDV4:Brand

The role of the brand on the producer helps the sales of the product and occupies the market, and once

the brand has formed a certain popularity, the enterprise can use the brand effect to expand the market.The role of the brand contribute to stabilizing product prices, reducing price elasticity, and enhancing adaptability to dynamic markets; Contribute to the development of new products, use its certain brand awareness, develop and research new products; It helps companies resist competitors and maintain a competitive edge. Brand is very important to the development of enterprises.

DV :Influencing Factors of Consumers Purchase Intention

To sum up, through my research on relevant factors and theories that influence consumers' shopping choices at home and abroad, I find that Price, Promotion and Consumers' purchase intentions 、 Brand are important factors that influence consumers' shopping choices in general. The theoretical knowledge in these literature's also conforms to the research subject of this paper.
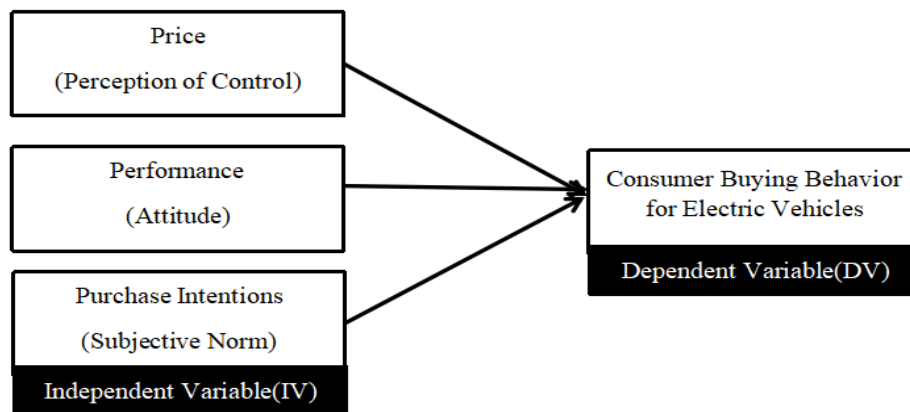
2.4 Conceptual Framework(Figure 2)

Figure 2:Adapted from Ajzen (1991)

3. Research Methodology

3.1 Introduction

This chapter outlines the proposed methodology for examining consumers' intentions to acquire electric vehicles in China. The research approach, target respondents, sampling strategy, data collection methods, research instrument, proposed data analysis, ethical issues, and research limitations are discussed in detail.

3.2 Research Design

Saunder, Lewis and Thornbill (2009) [8]defined research design as a framework utilized to collectand analyze data in order to answer research questions. The research approach chosen for this study is quantitative.Quantitative research is a research method that involves the collection of numerical data to test hypotheses and answer research questions. This approach will allow for the use of statistical analysis to identify patterns and relationships between variables.

3.3 Population and Sampling Design

3.3.1 Population

According to Saunders, Lewis and Thornhill (2009), population is the full set of cases fromwhich a sample is derived. The population in this study comprised of are Chinese consumers who are potential buyers of electric vehicles. The target population will include individuals aged 18 years and and should have a valid driver's license.The target respondents will also have an interest in electric vehicles, either as potential buyers or existing owners.

3.3.2 Sampling Design

The purpose of sampling is to enable the researcher draw conclusion about a population from a

sample .

Sampling Frame

According to Saunders, Lewis and Thornhill (2009), in a probability sample will be that list ofall cases from which a sample can be obtained. The sample will be limited to individuals who live in urban areas, as these areas are more likely to have a developed electric vehicle charging infrastructure.

Sampling Technique

Convenience sampling is a non-probability sampling technique that involves selecting participants based on their accessibility and availability.This sampling technique will be used because it is cost-effective and efficient in recruiting participants for the study. Convenience sampling is particularly useful when the target population is difficult to access, as is the case with Chinese consumers who are interested in electric vehicles.

The sampling technique will involve posting the study advertisement on social media platforms and online communities related to electric vehicles. Potential participants who meet the inclusion criteria and are interested in participating in the study will be asked to complete the online survey.

Sample Size

The proposed sample size for this study is 370 respondents. The sample size was determined using a sample size calculator, which considered the level of precision desired, the confidence level, and the population size. The sample size is deemed sufficient to obtain reliable and valid data for analysis.

The sampling size for this study will be determined using the sample size calculation formula proposed by Krejcie and Morgan (1970). The sample size calculation will be based on a confidence level of 95% and a margin of error of 5%. The target population for this study is difficult to estimate; therefore, the sample size will be calculated based on a conservative estimate of the population size (N=1,0000).

3.4 Data Collection Methods

The data collection method chosen for this study is an online survey. The survey will be designed using a web-based survey platform and will be administered to participants through social media platforms, forums, and online communities related to electric vehicles in China.The survey will include closed-ended questions to measure consumer attitudes, perceptions, and intentions towards electric vehicles.

The survey questionnaire will include closed-ended questions, such as Likert-scale questions, multiple-choice questions, and demographic questions. Closed-ended questions will allow for the collection of standardized data, which can be easily analyzed using statistical software.

3.5 Research Procedures

The research Procedures for this study will be a quantitative survey questionnaire. The questionnaire will consist of a combination of Likert scale and multiple-choice questions. The questionnaire will be developed based on a review of the literature and will be designed to measure consumer attitudes, perceptions, and intentions towards electric vehicles. The questionnaire will be pre-tested among a small group of individuals to ensure its reliability and validity.

Cronbach alpha < 0.05, it meets the reliability test. Validity needs to be considered in this aspect. Tepthong (2014) stated that the Cronbach's alpha measures the degree of dependability, consistency of a scale. It indicated whether items are measuring the same construct and if not, then the superfluous ones could be deleted to improve the coefficient. The reliability test was conducted and repeated severally to ensure that the variable achieve the acceptable alpha resulting in dropping of one variable in the measuring of mission achievement. The validity tests outcome as presented in Table 2 will verify that the measurement instrument is effective in describing the variable it is measuring.

Table 2: Cronbach Alpha Test

Name of Indicator	Cronbach's Alpha	No of Items	Conclusion
price	α < or > 0.05	a	Reliable/Not
performance	α < or > 0.05	b	Reliable/Not
purchase intention	α < or > 0.05	c	Reliable/Not
brand name	α < or > 0.05	d	Reliable/Not
Consumer buying behavior	α < or > 0.05	e	Reliable/Not

3.6 Data Analysis Methods

The proposed data analysis for this study will involve the use of descriptive and inferential statistics.[9] Descriptive statistics will be used to summarize the data, while inferential statistics will be used to determine the relationship between variables.The statistical tests that will be used include correlation analysis, regression analysis, and t-test. The data will be analyzed using the Statistical Package for the Social Sciences (SPSS) software.Descriptive statistics such as means, frequencies, and standard deviations will be used to summarize the data.The results of the data analysis will be presented using tables and charts to facilitate understanding and interpretation. The findings will be discussed in the context of the relevant literature and theoretical framework.In summary, the proposed data analysis will involve both descriptive and inferential statistics, and statistical software, such as SPSS or R, will be used to analyze the data collected from the survey questionnaire. Descriptive statistics will be used to summarize the data, while inferential statistics will be used to test hypotheses and identify relationships between variables.

4. Research Results and Discussion

4.1 Analysis of Pre-Test Questionnaire

In the pursuit of rigorous research and precise insights, the foundation is often laid by the very instruments we employ to collect data. A Likert 7-point scale was thoughtfully adopted as the framework for this questionnaire, offering respondents a nuanced spectrum of response choices, ranging from 1 (indicating strong disagreement) to 7 (indicating strong agreement). To enhance the reliability of the research results, two critical analyses were conducted on the pre-test questionnaire: a reliability analysis and a project analysis. These two complementary processes aimed to achieve several key objectives:

Removing Unstable Questions: Within the vast landscape of survey questions, some may exhibit inconsistencies or generate unreliable responses. The reliability analysis was instrumental in identifying such questions and promptly removing them from the questionnaire. By eliminating unstable questions, the research team ensured that the data collected remained consistent, credible, and dependable.

Establishing Reliability: Reliability is the bedrock upon which sound research stands. It denotes the consistency and stability of measurement tools. Through rigorous statistical analysis, the research team ascertained the reliability of the questionnaire. This entailed evaluating the internal consistency of the questions to confirm that they were measuring the same underlying constructs effectively. High internal consistency is indicative of reliable questions that measure what they are intended to measure.

4.2 Descriptive Analysis of Questionnaire: Unraveling Consumer Perspectives

Leveraging Digital Channels: The era of digital connectivity has revolutionized the way research is conducted. Leveraging this transformation, the research team utilized a questionnaire promotion system and personal social networking software to reach out to potential respondents. These digital tools served as conduits for engaging with individuals living in developed regions, allowing for efficient and wide-reaching data collection.

Formal Questionnaire Distribution: To ensure the reliability and structured nature of data collection, formal questionnaires were meticulously crafted and sent out to consumers who expressed an interest in electric cars. These questionnaires represented a pivotal phase in the research process. They were not merely data collection tools; they were instruments of inquiry that communicated the purpose and significance of the study to respondents.

4.3 Hypothesis Explanation

The purpose of this study is to establish a theoretical framework of the factors influencing consumers' intention to purchase electric vehicles, then to identify the key factors influencing behavioral intention through a structural equation model, to draw conclusions, and to provide reference design recommendations for subsequent new energy automakers.

As can be seen from the table, all four hypotheses proposed in this paper are significant. Figure3 shows the significant relationships between variables in the structural model.
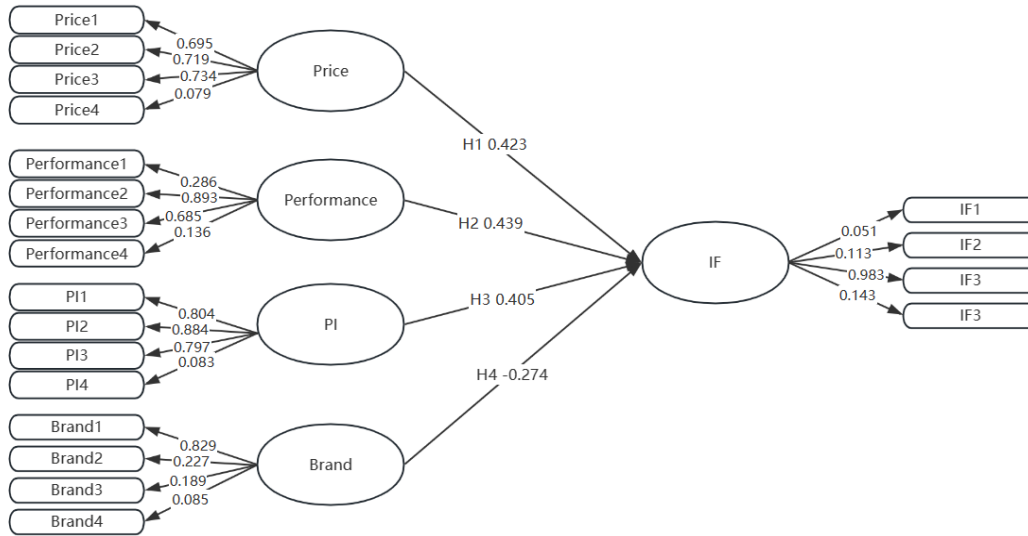
Figure 3 Significant relationships between variables in the structural model.

4.4 Path Coefficients

Introduction to Path Coefficients in SEM:

In structural equation modeling, researchers aim to understand the relationships between observed variables and latent constructs. Path coefficients are key components of SEM and represent the strength and direction of these relationships. Path coefficients are often used to test hypotheses about how different variables influence one another.

Interpreting the Path Coefficients in this Model:

In the model, we have several path coefficients connecting various variables to the latent construct "Influencing Factors of Consumers' Purchase Intention." Let's break down each one (Table 3):

Table 3: Variable correlation data

	path coefficients
Price→IF	0.423
Performance→IF	0.439
PI→IF	0.405
Brand→IF	-0.274

Price → Influencing Factors of Consumers' Purchase Intention (0.423):

- This path coefficient of 0.423 indicates a positive relationship between "Price" and "Influencing Factors of Consumers' Purchase Intention."

- In simpler terms, as the price of a product increases, it positively influences the factors that contribute to consumers' purchase intentions. This suggests that consumers may perceive higher prices as indicative of higher quality or prestige, which positively impacts their purchase intentions.

Performance → Influencing Factors of Consumers' Purchase Intention (0.439):

- This path coefficient of 0.439 suggests a positive relationship between "Performance" and "Influencing Factors of Consumers' Purchase Intention."

- When the performance of a product improves (e.g., better features or quality), it has a positive influence on the factors contributing to consumers' purchase intentions. Consumers are more likely to consider purchasing products with better performance.

Purchase Intentions → Influencing Factors of Consumers' Purchase Intention (0.405):

- This path coefficient of 0.405 indicates that "Purchase Intentions" have a positive impact on "Influencing Factors of Consumers' Purchase Intention."

- In other words, when consumers already have the intention to purchase a product, it further strengthens the factors that influence their purchase decisions. This could include factors like positive reviews, recommendations, or personal preferences.

Brand → Influencing Factors of Consumers' Purchase Intention (-0.274):

- This path coefficient of -0.274 represents a negative relationship between "Brand" and "Influencing Factors of Consumers' Purchase Intention."

- When the perception of a brand becomes less favorable or negative, it negatively affects the factors contributing to consumers' purchase intentions. A weaker brand image can deter consumers from making a purchase.

5. Conclusions and Suggestions

5.1 Motivation for research

Under the global trend of developing green travel mode, we have to realize that conventional cars will be replaced by EVs in the coming future.Countries around the world are actively popularizing EVs. I think there are the following reasons why the development of global new energy trams is urgent:

1) Environmental Concerns:Conventional trams and trains often run on fossil fuels, contributing to air pollution and greenhouse gas emissions. New energy trams, powered by renewable sources such as electricity or hydrogen, have the potential to significantly reduce carbon emissions and help combat climate change.

2) Air Quality Improvement:Trams running on electricity or hydrogen produce zero tailpipe emissions, improving air quality in urban areas. This is crucial for reducing respiratory and other health issues related to air pollution.

3) Energy Security:The dependence on fossil fuels for transportation poses energy security challenges due to their limited availability and geopolitical instability. New energy trams can rely on locally available renewable sources, enhancing energy security and reducing reliance on imported fuels.

5.2 Conclusions of the Methodology and Survey Design

The research methodology employed in this study centers around a comprehensive survey designed to delve deep into the minds of Chinese consumers. This survey aims to unearth their perceptions and preferences regarding electric vehicles (EVs). Through a structured questionnaire, the study intends to quantitatively and analytically assess the intricate relationships between key variables such as price sensitivity, performance expectations, environmental awareness, and brand influence.

Quantifying Complex Interplay: The findings derived from this survey represent a mosaic of insights that collectively shed light on the multifaceted decision-making process of Chinese consumers when it comes to electric cars. These insights transcend mere statistics; they provide a nuanced understanding of how various factors intertwine to influence consumer choices.

Price Sensitivity: The Changing Paradigm: Price sensitivity, a cornerstone in consumer behavior, emerges as a prominent factor. Notably, the study reveals that while price remains a significant consideration, the decreasing cost of electric vehicles and government incentives have significantly altered consumer perceptions of EV affordability. This transformation signifies a shift in mindset – one that increasingly views electric mobility as a financially viable option.

Environmental Awareness: A Strong Motivator: Environmental considerations surface as a potent motivator propelling Chinese consumers toward electric cars. The heightened awareness of the ecological impact of conventional gasoline vehicles has spurred an increased willingness to transition to cleaner alternatives.

5.3 Conclusions of the Study

In recent years, the Chinese government has provided substantial financial subsidies and welfare policies for the promotion of EVs. However, sales of EVs have seen cliff-like drop as subsidy declines. Hence, it is necessary to explore influence factors of consumers' adoption of EVs. The conclusions of this study are as follows:

Price Sensitivity and Consumer Behavior

Performance and Technological Advancements

Purchase Intention and Environmental Awareness

Brand Identity and Consumer Perception

5.4 Implications and Future Trends

The implications and future trends arising from the research findings presented in this study are poised to reshape the electric vehicle (EV) market not only in China but also on a global scale. With the constant evolution of EV technology and consumer preferences, these insights offer a valuable guide for stakeholders in the automotive industry to understand the present dynamics and anticipate the future landscape.

Cost Reduction and Performance Enhancement: One of the most significant implications of this research is the continuing trend of cost reduction in electric cars and the simultaneous enhancement of performance. As battery technology improves and economies of scale are realized, the cost of EVs is steadily decreasing. This shift in the cost-performance curve is critical as it makes EVs more financially accessible to a broader audience.

Innovation and Research: The study's emphasis on technological advancements suggests that research and innovation in battery technology, charging infrastructure, and alternative propulsion systems are critical for staying competitive. These advancements can have broader applications beyond EVs, potentially leading to breakthroughs in other industries.

As we look to the future, the electric vehicle market holds the promise of revolutionizing transportation, reducing emissions, and contributing to a more sustainable world. The insights presented in this research are guiding lights for stakeholders on this journey towards a cleaner and more sustainable future of mobility.

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