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Analysis of the Influence of Perception and Operational Services on Electric Car Purchase Decisions in Jabodetabek

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ABSTRACT

***Objectives**: The objective of this study is to examine how attitudes, subjective norms, behavioral control, perceived utility, and convenience of use, as mediated by operational services, affect decisions to buy electric cars in the Jabodetabek region.*
***Methodology**: This study falls under the area of quantitatively based explanatory research. Customers who deal with different brands of electric automobiles in Jabodetabek make up the research population. 105 responders made up the sample under analysis. Smart PLS software version 3.0 was used to analyze the data using the Structural Equation Modeling (SEM) approach.*
***Finding**: The results of the study demonstrate that people's decisions to purchase electric vehicles are considerably and favorably influenced by their attitudes, behavioral control, and perceived usefulness. However, subjective norms and perceived ease of use do not have a favorable and significant impact on the decision to purchase.*
***Conclusion**: Furthermore, even while operational services are thought to be more than sufficient, they neither mediate nor affect the relationship between the decision to purchase an electric car and behavioral control, attitude, subjective norms, perceived utility, and ease of use. Operational services cannot mediate the relationship between perceived usefulness, ease of use, attitude, subjective norms, and behavioral control with electric car purchase decisions. However, operational services remain an important aspect to ensure consumer satisfaction.*

***Keywords**: Purchase Decision; Perceived Ease of Use; Perception of Usefulness; Subjective Norm; Behavioral Control*

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INTRODUCTION

Since the Industrial Revolution, the increasing use of fossil fuels has led to significant carbon dioxide (CO_2) emissions, a major contributor to climate change (Matenda et al., 2024). In Indonesia, the transportation sector contributes around 24% of total CO_2 emissions, with fossil fuel-powered motor vehicles being one of the main causes of air pollution (Damanik et al.,

2024; Qian, 2024). Electric vehicles (EVs) are emerging as a potential solution to reduce carbon emissions and support environmental sustainability (Rauf et al., 2024). By switching to EVs, especially when combined with the use of renewable energy, the transportation sector can contribute significantly to reducing the impact of climate change (Chen & Ma, 2024). EVs have higher energy efficiency than conventional vehicles and can support environmental sustainability by reducing urban air pollution (Ahmed et al., 2024).

The trend of electric car sales in Indonesia has continued to increase in recent years, reflecting public interest in environmentally friendly vehicles (Hakam & Jumayla, 2024). Awareness of the environmental impact of fossil fuel vehicles is a major driver of electric vehicle adoption (Pirmana et al., 2023). The application of the concept of green business and green marketing is able to attract consumers who care about the environment through marketing strategies that focus on sustainability, while increasing the Company's competitiveness (Apaza-Panca et al., 2024; Huang et al., 2024; Nusraningrum et al., 2021; Raihan & Ramli, 2024). EV also supports the achievement of the green economy program, which has been part of the concept of sustainable development since the UN Conference in Brazil in 1992 (Niri et al., 2024; Nusraningrum et al., 2022; Schiavo et al., 2021).

EV purchasing decisions have become an interesting research topic in the fields of marketing, consumer behavior, and sustainability (Yin et al., 2022).Various factors such as perceived ease of use (He et al., 2025), utility (Pamidimukkala et al., 2024), attitude towards the product (Ardheta & Shiratina, 2024; Ehsan et al., 2024; Shakeel, 2022), subjective norms (Buhmann et al., 2024; Kresnanto & Putri, 2024), and perceptions of behavioral control (Hull et al., 2024; Majhi et al., 2024) has an important role in influencing EV purchasing decisions. The Last Supper (2024) demonstrated that customer attitudes were greatly impacted by perceived usefulness and convenience of use, with behavioral control and subjective norms also having an impact on decision-making (Hansaram et al., 2024). added that price factors, perceived risk, and financial incentives also influence the adoption of electric cars (Mohamed, 2024). Nguyen et al. (2024) highlights the role of lifestyle and electronic word of mouth (E-WOM) in shaping opinions and purchasing decisions (Imaningsih et al., 2024), reinforcing the influence of digital media on modern consumer behavior (Krishna, 2021).

Numerous studies demonstrate that factors including attitude, subjective standards, behavioral control, perceived utility, and usefulness do not necessarily have a favorable and significant impact on purchasing decisions. The Greatest Showman (2024) found that subjective norms have a positive influence on electric vehicle purchase intentions, but other variables do not show a significant influence. Astuti & Susanto (2024)proves that perceived usefulness does not have a direct effect on purchase intention. Sun & Lee (2024) and Amanda & Marsasi (2024) found that perceived behavioral control was not significant to purchase intention. Alfiani & Priantina (2024) shows that subjective norms do not have a significant influence on consumer purchasing interest. Ghaazi et al (2024) and Fuadi et al. (2022) concluded that the decision to buy a pure electric car is not greatly influenced by perceived utility or simplicity of usage. These results demonstrate that these factors have a contextual influence, meaning that the particular circumstance and market conditions determine how effective they are.

LITERATURE REVIEW

Perceived Ease of Use

Perceived ease of use refers to the belief that a technology or information system can be used without much effort and helps make user tasks easier (Luo et al., 2024). According to Yao & Wang (2024), this convenience provides benefits in the form of time savings and minimal complications during installation and operation. Wilson et al. (2021) mentions five indicators of ease of use: easy to learn, easy to understand, without heavy effort, easy to use, and increasing trust in technology (Ayanwale & Ndlovu, 2024).

Perception of Usefulness

Perception of usefulness or benefits refers to an individual's belief that the use of technology or information systems can improve their performance, efficiency, and effectiveness in carrying out their tasks (Ayanwale & Molefi, 2024). If someone believes that the technology is relevant and useful, they are more likely to use it, whereas if they do not, the technology is likely to be ignored (Albayati, 2024). Mican & Sitar-Taut (2023) identified four main indicators of perceived usefulness, namely improved job performance, effectiveness, fulfillment of information needs, and efficiency (Kurniawan & Nugroho, 2021).

Attitude Towards Purchasing

Attitude towards a purchase is the overall evaluation an individual has towards a particular purchasing action (Majeed et al., 2024), which reflects positive, neutral, or negative feelings toward the decision (Rivera et al., 2024). One of the key psychological elements influencing consumer behavior during the decision-making process for purchases is this attitude (Macheka et al., 2024). Attitudes towards purchasing consist of three main dimensions: cognitive, affective, and conative (Ding & Lee, 2024). The cognitive dimension includes consumers' beliefs or knowledge about the product, such as its quality or benefits.

Subjective Norms

Subjective norms are people's opinions about social pressure from significant others in their lives, such friends and family, which can affect what they buy (Mizana & Albari, 2024). In the context of electric vehicles, subjective norms play an important role in shaping consumer purchase intentions, especially when social support from close people drives the decision (Phang, 2024). Bi & Gu (2024) added that subjective norms not only influence purchase intentions, but also actual behavior, where social support can help consumers overcome barriers such as price or infrastructure.

Behavior Control

Behavioral control is an individual's assessment of how simple or complex a task is, like buying a car, might affect their intentions and real conduct (Buhmann et al., 2024). Behavioral control includes factors such as access to information, financial capability, and previous experience (Liang et al., 2024). Consumers who feel they have sufficient information and resources tend to be more confident and have a stronger intention to purchase.

Operational Services

Operational services are a series of activities or processes designed to ensure that business operations run efficiently, effectively and consistently in accordance with organizational goals

(Ajiga et al., 2024). This service includes all efforts to manage resources, infrastructure, technology, and workforce that support the smooth running of daily operational activities in an organization (Adama et al., 2024). The goal is to provide added value to customers, increase productivity, and maintain business sustainability.

Buying Decision

Purchasing decisions are the process of selecting and determining by consumers to purchase a product or service from various available alternatives, based on an evaluation of needs, preferences and information obtained (Arviya & Ramli, 2024; Kotler & Keller, 2023). According to Kotler & Armstrong (2021) Purchasing decisions are the outcome of a consumer decision-making process that includes identifying needs, gathering information, weighing options, making judgments about what to buy, and assessing the purchase after it has been made. Following the completion of the decision-making process, the buyer must decide whether or not to proceed with the purchase (Fazmi & Imaningsihi, 2024).

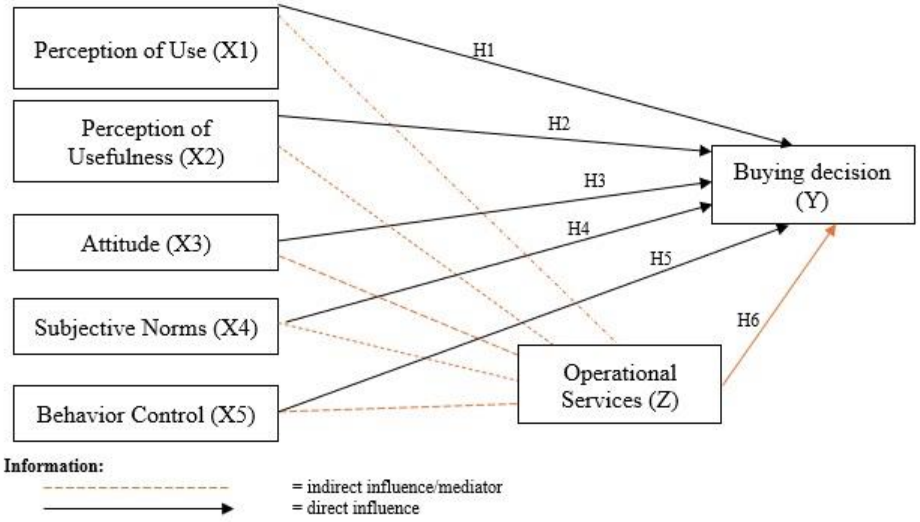

Figure 1. Theoretical Framework

H1 : Perception of Use has a positive and significant influence on Buying Decision.
H2 : Perception of Usefulness has a positive and significant influence on Buying Decision.
H3 : Attitude has a positive and significant influence on Buying Decision.
H4 : Subjective Norms has a positive and significant influence on Buying Decision.
H5 : Behavioral Control has a positive and significant influence on Buying Decision.
H6 : Operational Services mediates the influence of Perception of Use, Perception of Usefulness, Attitude, Subjective Norms, and Behavioral Control on Buying Decision positively and significantly.

METHOD

This study uses an explanatory research method with a quantitative approach to test the causal relationship between independent variables and dependent variables according to the definition Sekaran & Bougie (2016). The research population is potential consumers or users of electric cars in Jabodetabek, with a sample of 105 respondents calculated using the formula Hair et al.

(2019) based on 21 research indicators. Data were collected through an online questionnaire using a Likert scale of 1–5, then analyzed with smartPLS to check the validity, reliability, and feasibility of the variables. Indicators are considered valid if the outer loading ≥ 0.7, and meet the Cronbach's Alpha, Rho_A ≥ 0.7, and AVE > 0.5 (Hair et al., 2019). This technique allows simpler hypothesis testing compared to multiple linear regression, by measuring the effect of independent variables on dependent variables through t-tests and R-squared.

RESULTS AND DISCUSSION

Results

Table 1. Description of Respondent Characteristics

Deskripsi	*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Jenis Kelamin				
Pria	31	29.5	29.5	29.5
Wanita	74	70.5	70.5	100.0
Usia				
> 55 Tahun	6	5.7	5.7	5.7
17 - 25 Tahun	7	6.7	6.7	12.4
26 - 35 Tahun	53	50.5	50.5	62.9
36 - 45 Tahun	27	25.7	25.7	88.6
46 - 55 Tahun	12	11.4	11.4	100.0
Pendidikan Terakhir				
Diploma	7	6.7	6.7	6.7
Pascasarjana (S2/S3)	34	32.4	32.4	39.0
Sarjana (S1)	46	43.8	43.8	82.9
SMA/SLTA	18	17.1	17.1	100.0
Pendapatan				
5-10 Juta	45	42.9	42.9	42.9
> 30 Juta	3	2.9	2.9	45.7
10 - 20 Juta	24	22.9	22.9	68.6
20 - 30 Juta	3	2.9	2.9	71.4
< 5 Juta	30	28.6	28.6	100.0
Total	105	100.0	100.0	

Source: Processed Data (2024)

The characteristics of respondents in this study showed a dominance of women (70.5%) and the productive age group of 26–45 years (76.2%), which is a potential market segment for electric cars in Jabodetabek. The majority of respondents have a high level of education, with 43.8% being Bachelor's graduates and 32.4% being Postgraduate graduates, reflecting that potential users of electric cars tend to come from educated circles who have better access to technological information. In terms of income, the majority of respondents (71.5%) earn below 10 million rupiah, indicating the challenge of affordability even though interest in electric cars is quite high.

Table 2. Discriminant Validity Test Results

Variables	AVE	AVE Value Limit	Decision
Buying decision	0.769	0.500	Fulfilled
Behavior Control	0.649	0.500	Fulfilled
Operational Services	0.669	0.500	Fulfilled
Subjective Norms	0.670	0.500	Fulfilled
Perception of Usefulness	0.608	0.500	Fulfilled
Perception of Use	0.692	0.500	Fulfilled
Attitude	0.581	0.500	Fulfilled

Source: Processed data (2024)

It may be inferred from Table 2's discriminant validity test findings that each tested construct's Average Variance Extracted (AVE) value satisfies the validity requirements.

Table 3. Composite Reliability Test Results

Variables	*Cronbach's alpha*	*Composite reliability (rho_a)*	*Composite reliability (rho_c)*
Buying decision	0.957	0.959	0.964
Behavior Control	0.932	0.937	0.943
Operational Services	0.938	0.939	0.948
Subjective Norms	0.917	0.921	0.934
Perception of Usefulness	0.838	0.838	0.885
Perception of Use	0.925	0.926	0.940
Attitude	0.879	0.881	0.906

Source: Processed data (2024)

All of the constructs in this study had a composite reliability of greater than 0.7, indicating that each construct has strong internal consistency, according to the composite reliability test findings shown in Table 3. As a result, every construct examined in this study may be regarded as trustworthy and has a high degree of reliability, making them suitable for use in additional research.

Structural Model or Inner Model Test

R-Square

The variety of endogenous constructions that can be concurrently explained by exogenous constructs is explained by R-square (Mariani et al., 2024). A model with an R-Square value of 0.75 is considered strong, one with a value of 0.50 is considered moderate, and one with a value of 0.25 is considered weak (Hamid & Anwar, 2019)

Table 4. R-Square Test Results

Variables	*R-square*	*R-square adjusted*
Buying decision	0.851	0.842
Operational Services	0.833	0.825

Source: Processed data (2024)

Based on the results of the R-square test, it shows that the Purchase Decision variable has a value of 0.851, while Operational Services is 0.833, with adjusted R-squares of 0.842 and 0.825, respectively. This shows that the research model has very good power in explaining endogenous variables, such as electric car purchasing decisions, based on perceptions of use, usefulness, attitudes, subjective norms, and behavioral control mediated by operational services. This model can be trusted to describe the influence of these variables well.

Table 5. Q^2 Predictive Relevance Test Results

Variables	Q^2predict
Buying decision	0.832
Operational Services	0.808

Source: Processed data (2024)

Based on the results of the Q^2 Predictive Relevance test, the Q^2 predict value for Purchasing Decisions was 0.832 and for Operational Services was 0.808. Both values are greater than 0, indicating that this research model has good predictive relevance. In other words, the model used in this study is able to predict endogenous variables effectively and relevantly, so it can be trusted to explain the relationship between variables in electric car purchasing decisions in Jabodetabek.

Direct Effect Hypothesis Testing

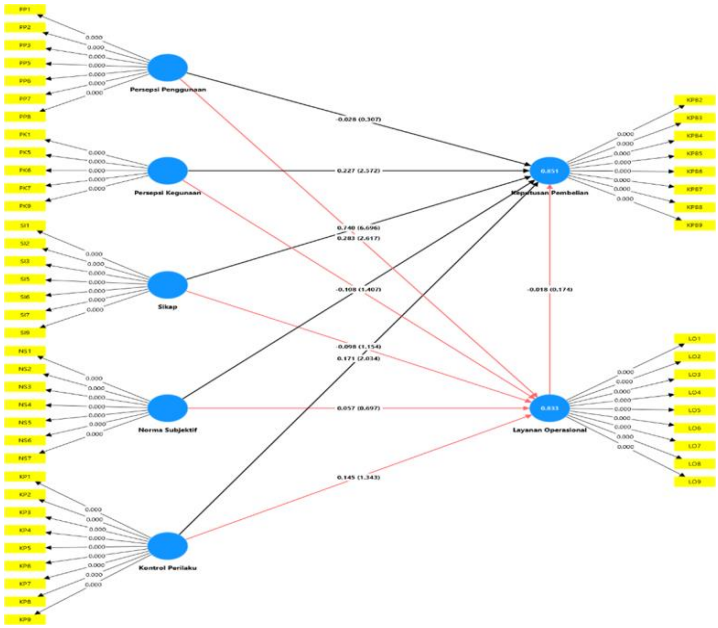

Figure 1. Results of Direct Effect Hypothesis Testing
Source: Processed data (2025)

The findings of a hypothesis test on the direct relationships between the variables in the study model are shown in Figure 1. The direction and magnitude of the effects between the variables under test are shown graphically in the results. The original sample value, sample mean, standard deviation, T statistics, and P values for each tested hypothesis are all included in Table 5, which provides more comprehensive findings of the direct impact hypothesis test.

Table 6. Results of Direct Effect Hypothesis Test

Hypothesis	Variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Results
H3	Attitude -> Purchase Decision	0.740	0.756	0.111	6,696	0.000	Accepted
H2	Perceived Usefulness -> Purchase Decision	0.227	0.220	0.088	2,572	0.010	Accepted
H5	Behavioral Control -> Purchase Decision	0.171	0.171	0.084	2,034	0.042	Accepted
H4	Subjective Norm -> Purchase Decision	-0.108	-0.112	0.077	1,407	0.159	Rejected
H1	Perception of Use -> Purchase Decision	-0.028	-0.042	0.092	0.307	0.759	Rejected

Source: Processed data (2024)

Discussion

The Influence of Perceived Use on Purchasing Decisions

This path shows a negative insignificant effect with O = -0.028 and p = 0.759, which is far above the significance threshold of 0.05. The T-statistics value (0.307) is far below the threshold of 1.96, so the hypothesis is rejected. These results confirm that Perceived Use, namely customer perceptions of the ease of using a service, does not have a direct effect on Purchase Decisions.

The Influence of Perceived Usefulness on Purchasing Decisions

The analysis findings indicate that perceived usefulness significantly influences the decision to purchase electric cars in Jabodetabek (p = 0.010, t = 2.572). Higher perceived usefulness increases the likelihood of purchasing, supported by descriptive responses with an average score of 4.00–4.21, particularly on energy efficiency and reduced consumption. Fuel cost savings also received positive responses, albeit slightly lower. These results align with Maf'ula et al. (2024) which reveals that perceived usefulness has a positive and significant influence on purchasing decisions.

The Influence of Attitude on Purchasing Decisions

The analysis findings show that attitude significantly influences the decision to purchase electric cars in Jabodetabek (p = 0.000, t = 6.696). Positive attitudes play a crucial role, supported by descriptive results with average scores of 4.08–4.27. Respondents strongly

endorse electric cars as environmentally friendly vehicles (4.27) with significant user benefits (4.26). These results align with Setiawan et al. (2023) which reveals that attitude has a positive and significant influence on purchasing decisions.

Influence Subjective Norms on Purchasing Decisions

The analysis findings show that subjective norms do not have a significant influence on electric car purchasing decisions in Jabodetabek, with a p-value of 0.159 (>0.05) and a t-statistic of 1.407 (<1.96), so the hypothesis is rejected. Although social norms, such as support from family, friends, and society, have high average values (4.14–4.32), their influence on purchasing decisions is not proven to be significant. Respondents showed a positive perception of subjective norms, with family support (4.27) and friends (4.24) as the highest. This finding is in line with research Aphrodite et al. (2023), subjective norms do not influence repurchase interest.

The Influence of Behavioral Control on Purchasing Decisions

The analysis findings show that behavioral control positively and significantly influences the decision to purchase electric cars in Jabodetabek (p = 0.042, t = 2.034). Respondents perceive sufficient control, particularly in financial capacity (4.13), purchasing confidence (4.04), charging infrastructure availability (4.16), and technical knowledge (4.29). This indicates their ability to manage factors supporting the purchase and use of electric cars. These results align with Mukaromah et al. (2023) which reveals that behavioral control has a positive and significant influence on purchasing decisions.

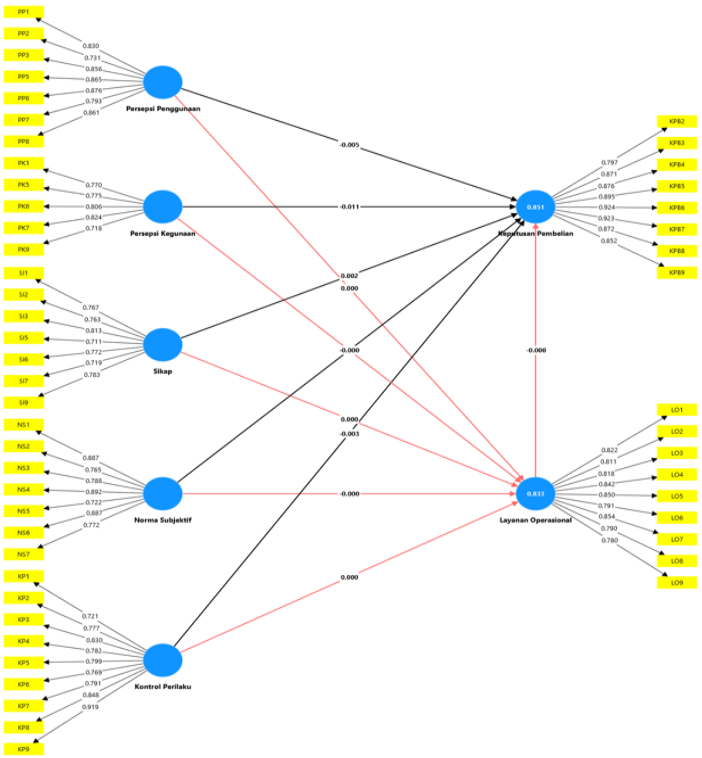

Figure 2 Results of Indirect Effect Hypothesis Testing
Source: Processed data (2025)

Table 7. Results of Indirect Effect Hypothesis Test

Hypothesis	Variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Results
H6	Perceived Usefulness -> Operational Services -> Purchase Decision	-0.011	-0.008	0.067	0.169	0.865	Rejected
	Perception of Usage -> Operational Services -> Purchase Decision	-0.005	-0.004	0.032	0.162	0.871	Rejected
	Behavioral Control -> Operational Services -> Purchasing Decisions	-0.003	-0.001	0.020	0.135	0.893	Rejected
	Attitude -> Operational Service -> Purchasing Decision	0.002	0.002	0.015	0.122	0.903	Rejected
	Subjective Norms -> Operational Services -> Purchasing Decisions	-0.001	-0.001	0.010	0.102	0.918	Rejected

Source: Processed data (2024)

According to the analysis's findings, Operational Services does not significantly mediate the association between purchase decisions and the independent variables of perceived usefulness, perceived use, behavioral control, attitude, and subjective norm. The associated hypothesis is rejected since all indirect effect paths have p-values above 0.05 and T-statistics below 1.96. Very slight and negligible indirect affects are shown by Perceived Use (O = -0.005, p = 0.871), Perceived Usefulness (O = -0.011, p = 0.865), Behavioral Control (O = -0.003, p = 0.893), Attitude (O = 0.002, p = 0.903), and Subjective Norm (O = -0.001, p = 0.918). As a result, operational services don't play a big role in mediating decisions about buying electric cars.

CONCLUSION

With an emphasis on perceived usage, usefulness, attitude, subjective norm, behavioral control, and operational services, this study examines the variables that affect Jabodetabek residents' decisions to buy electric vehicles (EVs). The findings indicate that whilst perceived use and subjective norm have no discernible impact on purchasing decisions, behavioral control, positive attitude, and perceived usefulness do. Despite being sufficient, operational services don't play a major mediating role.

These findings emphasize the importance of enhancing perceived usefulness, positive attitudes, and behavioral control to encourage EV purchase. Strategies should focus on enhancing practical value, affordability, and accessibility of infrastructure and finance. Further research is recommended to explore the influence of government policies and market incentives and enhance the role of operational services in EV adoption.

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