



**THE EFFECT OF ATTITUDE, SUBJECTIVE NORMS, PERCEIVED
BEHAVIORAL CONTROL AND ENVIRONMENTAL CONCERN ON
ELECTRIC VEHICLE ADOPTION INTENTION****Fajar Satria Darma¹****Universitas Muhammadiyah Surakarta, Surakarta, Indonesia**b100200487@student.ums.ac.id**Sri Padmantyo²****Universitas Muhammadiyah Surakarta, Surakarta, Indonesia**

Abstract

The primary objective of this research is to examine how individuals' intentions to adopt electric vehicles are shaped by their personal attitudes, the perceived expectations of others (subjective norms), their sense of control over the behavior (perceived behavioral control), and their level of environmental consciousness. Adopting a quantitative methodology, the research focuses on Indonesian citizens who express a willingness to shift toward electric vehicle usage. A purposive sampling technique was applied to recruit 220 respondents, with data collected through a structured Likert-scale questionnaire. The analysis employed PLS method using SMARTPLS version 4.0, covering both measurement and structural model assessments. The results indicate that positive attitudes, perceived behavioral control, and environmental concern significantly enhance the intention to adopt electric vehicles. In contrast, subjective norms did not show a statistically meaningful effect. On a theoretical level, this research extends TPB by applying it to the context of electric vehicle adoption in Indonesia. From a practical standpoint, the findings offer important guidance to policymakers and relevant stakeholders in formulating effective strategies to encourage widespread adoption of electric vehicles throughout the country.

Keywords: Attitude, Subjective Norm, PBC, Environmental Concern, Adoption EV Intention



INTRODUCTION

The escalating challenges posed by global climate change and the intensifying air pollution associated with fossil fuel consumption have emerged as pressing concerns across numerous sectors, notably in transportation (Yusuf et al., 2024). In Indonesia, this sector stands out as one of the leading sources of greenhouse gas emissions, driving both governmental and institutional initiatives to seek environmentally friendly alternatives. One notable approach is the encouragement and adoption of EVs as a more sustainable option (Chaturvedi et al., 2023). EVs are widely recognized for their environmental benefits, particularly their zero tailpipe emissions and superior energy efficiency in contrast to traditional vehicles (Brückmann et al., 2021).

Despite the introduction of various governmental initiatives ranging from fiscal incentives and price subsidies to investments in charging infrastructure the penetration of electric vehicles among Indonesian consumers remains limited. This discrepancy suggests that barriers to EV adoption extend beyond merely technical or financial dimensions, encompassing psychological and sociocultural factors that influence individuals' willingness to transition (Piarna et al., 2020).

To analyze the key drivers behind people's intentions to embrace electric vehicle adoption, numerous studies have drawn upon behavioral frameworks, notably TPB. According to this model, behavioral intentions are chiefly determined by three factors: subjective norms, attitude toward the behavior, and PBC. In the area of tech innovation, TPB helps to clarify how people's perceptions affect their behavior in shaping adoption decisions (Mehra et al., 2022).

An initial factor warranting attention is the individual's evaluative disposition toward electric vehicles (EVs). This disposition encapsulates both



favorable and unfavorable assessments of EVs, encompassing perceived advantages such as environmental sustainability, convenience, cost-effectiveness, and practical functionality. In the Indonesian context, public sentiment regarding EVs remains diverse, and scholarly exploration into consumer attitudes is still relatively nascent. Consequently, further empirical investigation is essential to understand how such attitudes influence adoption intentions within the cultural and economic milieu of Indonesia (Shaikh et al., 2023).

A second influential component is the subjective norm, relating to a person's internalization of perceived social expectations or pressures from meaningful others concerning the adoption of electric vehicles (Nasir Ansari & Irfan, 2023). In collectivist societies like Indonesia, such normative beliefs substantially shape individual decision-making. The behavioral intentions of individuals may be shaped either positively or negatively through the views and behaviors of family members, peers, community networks, or influential public figures. Despite this, the precise impact of subjective norms on EV adoption within the Indonesian setting remains underexplored in existing academic literature (Waskito et al., 2019).

The third element derived from TPB is PBC, showing a person's interpretation of their capacity or autonomy to engage in EV adoption (Naufal et al., 2024). PBC includes considerations such as how accessible and adequate the charging infrastructure is, the price, and users' technical competencies regarding operation and maintenance. In Indonesia, infrastructural deficiencies still pose significant challenges that can undermine perceived control. This aspect is critical, as positive attitudes and normative support alone may not suffice if individuals believe they lack the practical means to adopt electric vehicles.



Beyond the core constructs of TPB, Environmental issues have risen to prominence as a critical external influence on individuals' preferences for electric vehicle adoption (Rachmawati & Rahardi, 2023). Indicates how much people recognize and pay attention to ecological issues, environmental concern often motivates engagement in environmentally responsible behaviors. Individuals with heightened ecological awareness tend to exhibit stronger preferences for sustainable technologies, including EVs. Nevertheless, existing empirical investigations predominantly focus on developed countries, leaving a significant research gap in contexts such as Indonesia, where socio-economic and cultural dynamics differ considerably (Gungaphul & Devi Heeroo, 2022).

The incorporation of environmental concern into the TPB framework introduces a valuable theoretical extension in this study. By embedding this ecological variable, the model enhances explanatory power regarding pro-environmental behavioral intentions, particularly in the adoption of green technologies. This enriched framework captures underlying moral and value-driven motivations that conventional TPB variables might overlook. Empirical evidence addressing all four variables subjective norm, attitude, PBC, also environmental concern within the Indonesian EV context remains scarce. Yet, analyzing these factors collectively is essential to formulating a detailed and holistic comprehension of what influences EV adoption. Such comprehensive investigations are crucial for aligning theoretical behavioral models with policy and practical implementation strategies.

Moreover, this research stands out due to its concentration on Indonesia as the setting, a developing country characterized by distinct infrastructural, cultural, and economic conditions. Most prior studies have been conducted in



regions with advanced EV infrastructure and higher adoption rates. Thus, this research contributes not only to local policy development but also enriches the global discourse on EV adoption in emerging economies.

Practically, the outcomes of this research offer actionable insights for designing targeted public communication strategies to foster EV adoption. For instance, should subjective norms prove influential, leveraging social figures or communities to cultivate normative pressure could enhance adoption rates. Similarly, if PBC emerges as a key predictor, addressing infrastructural barriers and improving accessibility should become policy priorities. By integrating all relevant constructs, this study aims to advance both theoretical knowledge and applied approaches in supporting Indonesia's transition toward sustainable energy systems. Academically, it extends the TPB by integrating an external, context-sensitive variable. From a policy standpoint, the findings serve as a foundation for more effective, contextually grounded interventions to accelerate EV adoption.

LITERATURE REVIEW

TPB Theory

TPB, developed by Icek Ajzen in 1991 as a continuation of TRA, is commonly employed to understand and forecast individual behaviors across diverse domains, such as technology adoption, health-promoting practices, and environmentally responsible actions (Praswati et al., 2022; Bhutto et al., 2021). Central to TPB is the premise that behavioral execution is primarily driven by behavioral intention, which itself is shaped by three fundamental factors: An individual's disposition regarding a particular action, the normative expectations



perceived from their social environment, and the individual's evaluation of the level of control they possess in executing the action whether it is considered manageable or challenging are key determinants influencing behavioral intention.

Attitude

Yeğın and Ikram (2022) define attitude toward behavior refers to how much a person view a particular behavior in a negative or positive way. Within TPB model, such attitudes are influenced by the person beliefs concerning the outcomes of engaging in the behavior, as well as their judgment regarding these outcomes (Jung Moon, 2020). Attitude, in the context of electric vehicle adoption, encompasses how an individual evaluates the benefits and potential downsides of using such vehicles. For instance, those who perceive electric vehicles as energy-efficient, environmentally sustainable, and cost-effective are more likely to develop favorable attitudes toward them.

Subjective Norm

Subjective norm denotes the perceived social pressure experienced by an individual regarding whether to take part in a certain behavior. This concept arises from the individual's beliefs about the expectations held by significant others in their social environment, including family members, peers, or community figures (Shalender & Sharma, 2021). Within the realm of electric vehicle adoption, subjective norm pertains to the degree that an individual believes encouragement or support either explicitly or implicitly from their social circle toward the use of electric vehicles. Particularly in collectivist cultures such as Indonesia, social influence exerts a considerable impact on personal decision-



making processes, especially in relation regarding the acceptance of emerging technologies (Wang et al., 2016).

Perceived Behavioral Control (PBC)

PBC encompasses an individual's assessment of their capability to execute a particular of behavior, which involves their evaluation of potential obstacles or facilitators associated with performing that behavior (Wu et al., 2022). This concept aligns closely with notions such as self-efficacy and perceived actual control. Regarding electric vehicles, PBC pertains to the confidence individuals hold in their capacity to acquire, operate, and maintain such vehicles. Critical factors shaping this perception include the accessibility of charging infrastructure, the cost of the vehicle, and the ease with which relevant technological information can be obtained (Feola et al., 2019).

Environmental Concern

Environmental concern pertains to an individual's consciousness or valuation of environmental protection and conservation, demonstrated through their focus, mindset, and tangible efforts to minimize detrimental environmental effects (Han, 2021). More precisely, It reflects the extent to which a person recognizes and interprets a situation through a moral lens or ethical framework and social obligation to participate in eco-friendly practices, including minimizing plastic consumption, saving energy, engaging in recycling activities, and embracing sustainable technologies like electric cars (Shair et al., 2021).

Electric Vehicle Adoption Intention

Intention serves as a measure of an individual's readiness to engage on specific behavior. Within TPB, intention is regarded as the immediate antecedent of actual conduct. It emerges from the dynamic interplay among subjective



norms, attitude, and perceived behavioral control (Ajzen, 1991). Specifically, the intention to adopt electric vehicles refers to the degree to which an individual plans or desires to purchase and utilize an electric vehicle in the foreseeable future. This construct is central to numerous technology adoption studies, as it functions as a predictive indicator that can be assessed prior to the manifestation of actual behavior (Higuera-Castillo et al., 2023). Empirical evidence consistently demonstrates that robust intentions tend to correlate positively with actual behavior, particularly when individuals possess adequate control to execute their intended actions (Alwadain et al., 2024).

RESEARCH METHOD

This research employed a quantitative approach, characterized by its systematic, deliberate, and well-organized framework from inception through the research design phase (Sekaran & Bougie, 2016). The sampling procedure utilized in this study was non-probability sampling, specifically adopting a purposive sampling technique. The research population is understood as the entire set of objects or psychological elements confined by specific criteria. In this investigation, the population comprised Indonesian individuals who demonstrate an intention to adopt electric vehicles. The criteria for sample selection included respondents who intended to adopt electric vehicles and were aged above 17 years.

Primary data served as the principal source of information for this study, collected through respondents' completion of a closed-ended questionnaire. Primary data pertains to information gathered firsthand by the researchers from original sources concerning the variables under investigation to fulfill the

research objectives. The closed questionnaire format required participants to select responses from predetermined alternatives provided by the researchers (Bougie & Sekaran, 2017).

The data was analyzed through Structural Equation Modeling using SEM-PLS approach, which encompasses two key components. The initial phase involved outer model assessment to verify the validity and reliability of the measurement instruments, ensuring their suitability for accurately capturing the targeted variables. The subsequent phase focused on inner model evaluation, that examines the relationships among latent constructs to determine the degree of influence or association between variables that are not directly observable within the model framework (Achmad & Kuswati, 2021).

RESULTS AND DISCUSSION

Outer Model Analysis

This research employed hypothesis testing through the application of PLS data analysis technique, implemented using SmartPLS software version 4.0. Below is the schematic representation of the PLS model examined in the present study.

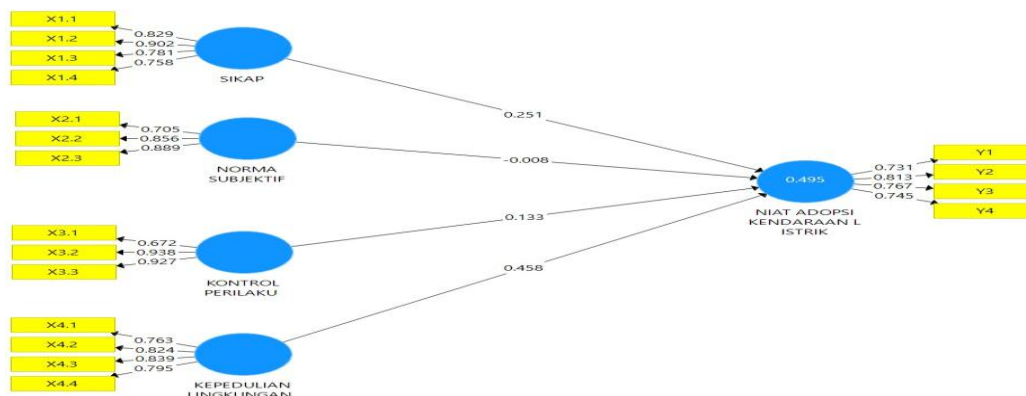


Figure 1
Outer Model

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The purpose of conducting the outer model assessment is to examine the associations between latent constructs and their corresponding indicators. This procedure encompasses the analysis of validity, reliability, and the presence of multicollinearity

Convergen Validity

An indicator is deemed to possess satisfactory convergent validity if its outer loading exceeds the threshold of 0.7. Below are the outer loading values corresponding to each indicator within the examined variables.

Table 1.
Outer Loading Value

Variable	Indicator	Outer Loading
Attitude (X ₁)	X _{1.1}	0,829
	X _{1.2}	0,902
	X _{1.3}	0,781
	X _{1.4}	0,758
Subjective Norms (X ₂)	X _{2.1}	0,705
	X _{2.2}	0,856
	X _{2.3}	0,889
PBC (X ₃)	X _{3.1}	0,672
	X _{3.2}	0,938
	X _{3.3}	0,927
Environmental Concern (X ₄)	X _{4.1}	0,763
	X _{4.2}	0,824
	X _{4.3}	0,839
	X _{4.}	0,795
Intention to Adopt EV(Y)	Y.1	0,731
	Y.2	0,813
	Y.3	0,767
	Y.4	0,745

Source: Processed primary data (2025)

As evidenced by the statistical information detailed in Table 1, it is evident that the majority of the indicators within the study variables exhibit outer loading values exceeding 0.7. Nonetheless, as noted by Chin (1998), measurement scales



with loading values ranging from 0.5 to 0.6 are considered to satisfy the criteria for convergent validity. The results demonstrate that none of the variable indicators have outer loading values below the 0.5 threshold. Consequently, it can be inferred that all indicators fulfill the validity requirements and are suitable for subsequent analysis.

Discriminant Validity

Discriminant validity is assessed through the analysis of AVE indicators, which are required to exceed 0.5 to confirm the construct's validity regarding convergent validity (Fornell and Larcker, 1981). Presented below are the AVE values corresponding to each variable utilized in this research.

Table 2.
Average Variance Extracted

Variable	AVE	Description
Attitude (X ₁)	0.671	Valid
Subjective Norms (X ₂)	0.673	Valid
PBC (X ₃)	0.731	Valid
Environmental Concern (X ₄)	0.649	Valid
Intention to Adopt EV(Y)	0.595	Valid

Source: Processed Primary Data (2025)

As evidenced by the statistical information detailed in Table 2, all variables examined in this research exhibit AVE values exceeding the threshold of 0.5. Specifically, the AVE values are 0.671 for attitude, 0.673 for subjective norms, 0.731 for PBC, 0.649 for environmental concern, and 0.595 for the intention to adopt electric vehicles. These findings confirm that each variable satisfies the requirements for discriminant validity.

Reliabilitas Test

In this research, reliability assessment was conducted through the application of Composite Reliability and Cronbach's Alpha methods. Composite



Reliability serves as an indicator to evaluate the dependability of the variables' indicators. A variable is considered dependable when its Composite Reliability value surpasses 0.7. In contrast, Cronbach's Alpha serves as a statistical indicator used to assess the internal coherence of measurement instruments or psychometric data in reliability testing. As stated by Cronbach (1951), a construct is considered reliable when its Cronbach's Alpha coefficient surpasses 0.60.

Table 3.
Composite Reliability

Variabel	Composite Reliability	Cronbachs Alpha
Attitude (X ₁)	0.890	0.835
Subjective Norms (X ₂)	0.860	0.751
PBC (X ₃)	0.889	0.803
Environmental Concern (X ₄)	0.881	0.819
Intention to Adopt EV(Y)	0.849	0.765

Source: Processed primary data (2025)

Based on the data presented in Table 3, it is evident that the composite reliability values for all variables examined in this research surpass the accepted benchmark of 0.7. Specifically, the composite reliability coefficients are 0.890 for the attitude construct, 0.860 for subjective norms, 0.889 for PBC, 0.881 for environmental concern, and 0.849 for adoption intention. These results confirm that each variable satisfies the predetermined composite reliability criteria, thereby demonstrating a high degree of reliability across all constructs within this study.

Moreover, Table 3 also reveals that the Cronbach's alpha values for every variable exceed the threshold of 0.6, indicating that the internal consistency of the constructs adheres to established standards and that all measures employed are reliable.

Inner Model Analysis

The outcomes of the goodness of fit assessment, the analysis of path coefficients, and the evaluation of hypotheses will be presented in this study.

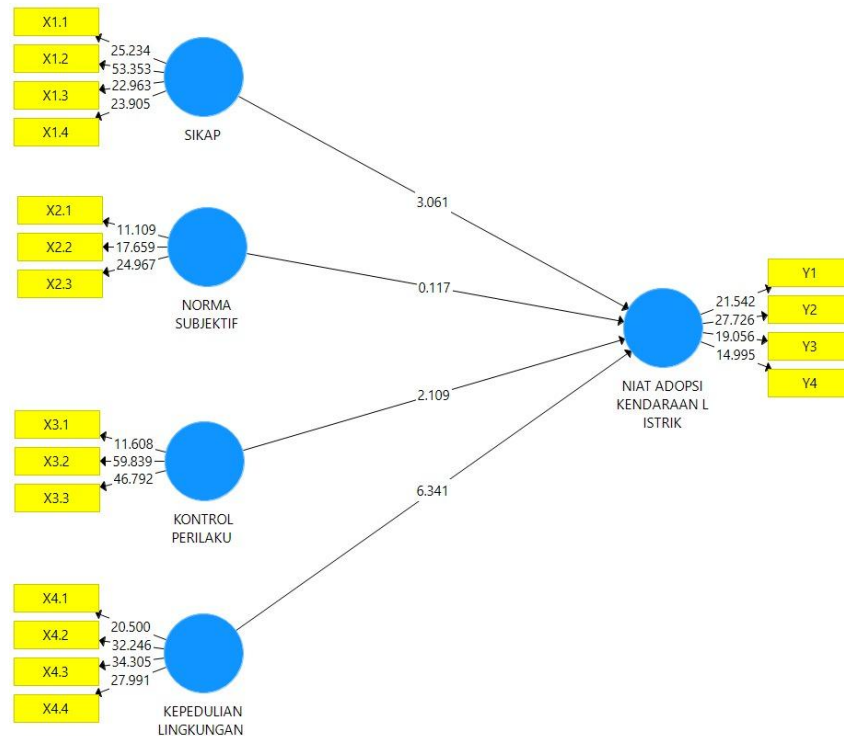


Figure 2.
Inner Model

The inner model serves to examine the associations between latent variable. Evaluation of the inner model involves three analytical methods: assessing the R^2 (R-square) statistic, determining the Goodness of Fit (GoF), and analyzing the path coefficients.

Goodness of fit

The structural model was analyzed to explore the interconnections between observable indicators and the underlying latent constructs that embody the principal predictor variables within complex model framework. As part of the model evaluation process, particular emphasis was placed on assessing the



coefficient of determination (R-Square). A higher R-Square value signifies that a greater proportion of the endogenous variance is explained, thereby reflecting a model of superior explanatory power. Following the classification criteria outlined by Ghozali (2015), a model is considered robust when its R-Square reaches 0.75, moderate at 0.50, and weak at 0.25. The R-Square values obtained in this research are detailed on the following section.

Table 4.
Nilai R-Square

	<i>R-Square</i>	<i>R-Square Adjusted</i>
Intention to Adopt EV	0,595	0,584

Source: Processed primary data, (2025)

Based on the data presented in Table 4, the R-Square coefficient serves as a metric to assess the degree to which the independent variables namely subjective norms, attitude, PBC, and environmental concern explain the variance in the dependent variable, adoption intention. The analysis reveals an R-Square value of 0.595, or 59.5%, suggesting a moderate explanatory power of the model in capturing the relationship between the outcome variable and the predictors.

Hypothesis Testing

The research of hypotheses in this research was carried out by analyzing path coefficient values to assess the relationships among variables, employing the bootstrapping technique. And To evaluate the statistical significance of these relationship, the t-statistic and p-value were utilized, with significance determined at a threshold of p-value < 0.05 or t-statistic > 1.96 ($\alpha = 0.05$). that analysis was performed using SmartPLS version 4.0, and the subsequent section presents the findings related to the path coefficients.

Direct Effect



Table 5.
Path Coefisient (Direct Effect)

	Hypothesis	Original Sample	t-Statistics	P Values	Description
Attitude -> Intention to Adopt EV	H1	0,251	3,061	0,002	Positive Significant
Subjective Norm -> Intention to Adopt EV	H2	-0,008	0,117	0,907	Negative Not Significant
PBC -> Intention to Adopt EV	H3	0,133	2.109	0,035	Positive Significant
Environmental Concern -> EV Intention to Adopt EV	H4	0,458	6,341	0,000	Positive Significant

Sumber : Data primer yang diolah, (2025)

Referring to Table 5, the findings indicate that the first, third, and fourth hypotheses are statistically supported, as evidenced by t-statistic values exceeding 1.96, p-values below 0.05. These results suggest that attitude, PBC, and environmental concern exert a significant and positive influence in individuals' intentions to adopt electric vehicles (EVs). Conversely, the second hypothesis is not supported, given that subjective norms do not demonstrate a statistically significant impact on EV adoption intention, as reflected by a t-statistic of 0.117 and a p-value of 0.907.

DISCUSSION

The Influence of Attitude on Intention to Adopt Electric Vehicles

The initial hypothesis of this research seeks to determine whether individuals' attitudes exert a statistically positive and significant effect on their intention to adopt electric vehicles (EVs). The empirical findings reveal a t-statistic of 3.061, an influence coefficient of 0.251, and a p-value of 0.002. Given that the t-value exceeds the critical threshold of 1.96 and the p-value falls below the 0.05

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significance level, the hypothesis is supported by the data. These results indicate that favorable attitudes toward electric vehicles substantially contribute to the formation of behavioral intentions to adopt them. Specifically, individuals who perceive EVs positively considering aspects such as environmental sustainability, energy efficiency, and modern appeal tend to demonstrate a stronger inclination toward future adoption.

This outcome aligns with prior theoretical and empirical research. According to Ajzen's (1991) Theory of Planned Behavior (TPB), attitude toward a behavior constitutes a central predictor of an individual's behavioral intention. Empirical studies reinforce this framework; for example, Rezvani et al. (2020) demonstrated that a positive disposition toward electric vehicles significantly enhances adoption intentions. Similarly, Moons and De Pelsmacker (2021) observed a strong positive correlation between attitudes toward electric cars and purchase intentions. Kim et al. (2020) further explained that the perceived advantages of EVs, which help cultivate positive attitudes, also reinforce intention to adopt. In light of this, targeted promotional and educational efforts that nurture and reinforce positive public attitudes toward EVs are crucial for fostering greater adoption on a broader scale.

The Influence of Subjective Norms on Intention to Adopt Electric Vehicles

The second hypothesis of this research investigates the extent to which subjective norms exert a significant and positive influence in individuals' intentions to adopt electric vehicles (EVs). Nonetheless, empirical findings indicate otherwise; the analysis yields a t-statistic of 0.117, an influence coefficient of -0.008, and a p-value of 0.907. Given that the t-statistic falls well below the critical value of 1.96 and the p-value substantially exceeds the 0.05 threshold, the



hypothesis is statistically rejected. This implies that subjective norms do not meaningfully contribute to shaping intentions to adopt EVs within the framework of this study. Moreover, the negative coefficient suggests that social influence or peer pressure does not sufficiently support or may even hinder the adoption of EVs.

These findings diverge from the theoretical expectations grounded in the Theory of Planned Behavior (Ajzen, 1991), which posits subjective norms as a key determinant of behavioral intention. However, it is important to recognize that in certain situational contexts, the influence of subjective norms may diminish or become negligible. This phenomenon is likely when individuals place greater emphasis on personal beliefs and internal evaluations rather than external social influences, particularly in decisions involving emerging technologies such as electric vehicles. Comparable conclusions were drawn by Haustein and Jensen (2020), who reported that subjective norms may be less influential among consumers exhibiting greater independence in value orientation. Similarly, Jansson et al. (2021) observed that when individual preferences and environmental consciousness are more salient, the role of subjective norms in driving intentions to adopt eco-friendly vehicles tends to be limited. Thus, the current study suggests this the intention to adopt EVs is more strongly driven by intrinsic factors such as individual attitudes and perceived utility than by external social pressures.

The Influence of PBC on Intention to Adopt Electric Vehicles

The result of this research suggest that individuals who perceive themselves as capable of purchasing and operating electric vehicles considering



financial feasibility, infrastructure accessibility, and user convenience is more likely to exhibit a stronger intention to adopt such technology.

Empirical evidence from prior research further supports this relationship. For instance, Wang et al. (2018) demonstrated the significant influence of PBC on consumers' intentions to acquire new energy vehicles. Likewise, Li et al. (2019) highlighted that perceptions of control regarding charging infrastructure, ownership expenses, and vehicle maintenance play a pivotal role at shaping adoption intentions. Zhang et al. (2021) also underscored that greater perceived accessibility and control are positively correlated with stronger intentions to adopt electric vehicles.

Collectively, The results highlight the fundamental importance of advancing and strengthening enabling infrastructural systems to foster improved outcomes, disseminating consumer knowledge, and ensuring user-friendly access to EV technologies to boost individuals' perceived control and, consequently, foster broader adoption.

The Influence of Environmental Concern on Electric Vehicle Adoption Intention

The present finding reinforce the perspective that ethical considerations and ecological consciousness significantly influence consumer choices in embracing sustainable technologies. Specifically, within the electric vehicle (EV) domain, motivations such as concerns over air pollution, greenhouse gas emissions, and the ongoing energy crisis emerge as primary factors driving the intention to adopt. This pattern is consistent with prior empirical studies. For instance, Barbarossa et al. (2019) identified environmental concern as a salient determinant in shaping consumer preferences for green products, including EVs.



Similarly, Nguyen et al. (2020) highlighted that individuals exhibiting heightened environmental awareness are more inclined to select EVs as alternatives to traditional internal combustion engine vehicles. Furthermore, Wang et al. (2021) demonstrated that the perceived risks associated with environmental degradation can prompt proactive consumer behavior in favor of more sustainable consumption practices.

Consequently, the current study underscores the necessity of designing adoption strategies for EVs that extend beyond technical specifications and economic incentives. It is imperative to also address affective and value-driven dimensions, particularly by fostering and enhancing environmental consciousness among the public. Informative and persuasive educational campaigns that elucidate the environmental benefits of EVs may serve as a powerful mechanism to boost widespread adoption intentions.

CONCLUSION

The findings of the research reveal that multiple determinants substantially affect individuals' intentions to adopt electric vehicles. Firstly, a favorable perception of electric vehicles is positively correlated with adoption intent; individuals who hold more supportive attitudes toward these vehicles are more inclined to consider their use. Secondly, subjective norms were found to have no statistically significant influence, suggesting that societal expectations or peer influence play minimal role in shaping adoption decisions within the scope of this study. Thirdly, The perception of one's capacity to perform a behavior was identified as a crucial determinant in forecasting behavioral intention, implying that when individuals believe they possess the necessary resources and



capabilities to operate and access electric vehicles, their intention to adopt increases accordingly. Lastly, environmental concern was identified as both a significant and positive factor, indicating that those with heightened environmental awareness are more motivated to adopt EV as a means of supporting ecological sustainability.

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