Eduvest – Journal of Universal Studies
Volume 5 Number 11, November, 2025
p- ISSN 2775-3735- e-ISSN 2775-3727

# Understanding Indonesians' Intentions to Adopt Electric Vehicles: A Combination of Social Factors and Knowledge in the Theory of Planned Behavior and Technology Acceptance Model

**Angga Adhiguna*, Jennisa Junus HM, Rian Fajar Isnaeni, Sri Vista Limbong, Indria Handoko**
Universitas Prasetiya Mulya, Indonesia
Email: anggaadhiguna@gmail.com, jennisayunusmoniq@gmail.com, vista.limbong@gmail.com, rian.isnaeni@gmail.com, indria.handoko@prasetiyamulya.ac.id

**ABSTRACT**

Environmental damage caused by carbon emissions is driving various countries to seek sustainable solutions, one of which is through electric vehicle (EV) innovation. Electric vehicles are considered capable of reducing dependence on fossil fuels and lowering greenhouse gas emissions. However, in Indonesia, the adoption rate of electric vehicles by the public is still considered low. This study aims to empirically examine the influence of factors in the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM) on Indonesians' intention to adopt electric vehicles. The approach used is quantitative with a survey method, involving 311 respondents who have knowledge or interest in electric vehicles. Data was collected through online questionnaires and analyzed using SPSS through multiple linear regression analysis. The results indicate that only moral norms, knowledge, and ease of use have a positive and significant influence on the intention to adopt electric vehicles. In contrast, subjective norms, perceived behavioral control, usefulness, and risk show no significant effect, while environmental concern has a negative influence, contrary to the proposed hypothesis. These findings highlight that personal factors are more dominant than social or environmental factors in driving the intention to adopt electric vehicles.

**KEYWORDS** Adoption intention, electric vehicles, Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Indonesia.

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## INTRODUCTION

Global warming has caused climate change to be a common threat to all countries in the world. This phenomenon has a direct impact on the environment, also bringing great challenges to the sustainable development efforts of the global community (Bolan et al., 2024). This condition encourages various countries, especially those that are trying to improve their economic conditions, to look for alternative energy-based solutions that are low in carbon emissions as part of an environmentally friendly development strategy. One of the main issues that emerged was related to the transportation sector, which is known to be a significant contributor to greenhouse gas emissions (Wang et al., 2024).

Transportation activities, both on land and sea, have caused the consumption of refined petroleum products such as gasoline, diesel, and kerosene to increase drastically. The overuse of fossil fuels has an impact on the energy crisis and worsens global environmental conditions. For this reason, many countries are starting to turn to more environmentally friendly transportation solutions, in response to the energy crisis and the global push to suppress the rate of global warming (Pamidimukkala et al., 2024). Relevant to this issue, electric vehicles (EVs) are present as one of the important innovations that are considered potential in reducing dependence on fossil fuels and reducing carbon emissions (Zhao et al., 2023). Electric vehicles are seen as an adaptive solution to the challenges of climate change because they can significantly reduce carbon dioxide emissions when compared to conventional vehicles fueled by gasoline or diesel. Having much lower levels of pollutants, electric vehicles are increasingly

expected to be able to support the achievement of zero greenhouse gas emission targets in the future (Requia et al., 2018).

In Indonesia, although the government has issued various policies to encourage the development of electric vehicles, such as providing tax incentives and building charging infrastructure, the adoption rate of electric vehicles by the public is still relatively low. Data shows that sales of electric vehicles in Indonesia between 2019 and 2021 only reached less than 500 units, which reflects the slow public acceptance of this technology (Nugroho & Widianto, 2024). When compared to the development of electric vehicles in other countries, progress in Indonesia is still far behind (Candra, 2022).

One of the important aspects in understanding the low adoption of electric vehicles is the intention to adopt or user adoption intention. This intention refers to a person's tendency to start using a particular system, product, or technology. As a predictive factor, adoption intention is key in determining whether a person will actively accept and use these innovations in daily life (Yanto et al., 2025). Therefore, understanding the intention of users in adopting electric vehicles is very important as a first step to increase the penetration of this technology in Indonesian society.

To understand the factors that influence people's intentions in adopting electric vehicles, a comprehensive approach is needed by considering psychological, social, and technological aspects. Two theoretical frameworks that are often used to explain technology adoption behavior are the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM) (Wei et al., 2025).

The *Theory of Planned Behavior* developed by Ajzen in 1991 provides an understanding of how an individual's attitude towards a behavior such as *Norma Subjektif* (NS), perceived behavioral control (PBC), and social pressure from the surrounding environment (*Sikap terhadap Perilaku* or ATB), together form the intention to carry out such behavior. Meanwhile, the *Technology Acceptance Model* introduced by Davis in 1989 emphasizes two main factors, namely perceived ease of use (PEOU) and perceived usefulness (PU). The combination of these two theories provides a strong foundation for analyzing people's behavior in accepting technological innovations such as electric vehicles.

Several studies have shown that the TPB and TAM models are effective in explaining the intention of technology adoption. Research by Sufyan and Mas'ud (2022) found that the variables of the TPB had a positive and significant effect on the interest in using the kitabisa.com platform, while from the TAM only Perceived Ease of Use was significant, while Perceived Usefulness had no effect. Research by Primaroni et al. (2024) on online food shopping behavior in Pekanbaru shows that Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) have a significant effect on attitudes, while behavioral intentions are influenced by attitudes, subjective norms, and perceived behavioral control.

A study by Suryanto et al. (2023) on the use of Google Classroom shows that behavioral intentions are influenced by PEOU, PU, and Subjective Norms, and are strengthened by Actual Behavioral Control. Meanwhile, research by Thamrin et al. (2024) related to Onshore Power Supply (OPS) in the port of Java Island found that all variables tested had a positive and significant effect on behavioral intentions and actual use, with Subjective Norm being the most dominant factor on the attitude of using OPS.

Meanwhile, on the issue of electric vehicle adoption, research conducted by Ray & Harito (2023) has expanded the SDG framework to explain the intention to adopt electric vehicles in Indonesia by adding environmental concern variables and moral norms. The results showed that although attitudes did not have a significant effect, other factors such as subjective norms, perceived behavioral control, environmental concern, and moral norms had a significant effect on the intention to adopt electric vehicles. However, this study has not considered the

technological and cognitive aspects covered by TAM, such as the perception of usability, the perception of ease of use, as well as the factors of knowledge and perceived risks.

Meanwhile, research by Jaiswal et al. (2022) emphasizes the importance of consumer knowledge in influencing the intention to adopt electric vehicles in emerging markets. This study integrates the TAM model with knowledge factors and perceived risks, and found that knowledge is the strongest predictor of adoption intention, followed by perceived usefulness, perceived ease of use, and perceived risk. However, this study did not examine the social-psychological factors as covered in the SDG model, such as attitudes, subjective norms, and perceived behavioral controls. In addition, the research was also conducted in the context of emerging markets in general, so it did not fully reflect the social and cultural characteristics of consumers in Indonesia.

Based on the difference in focus and limitations of the two studies, it can be seen that there is a research gap that until now there has been no research that comprehensively combines TPB and TAM in explaining the intention to adopt electric vehicles, as well as including cognitive factors in the form of knowledge about electric vehicles and perceived risk. Thus, this study offers novelty by integrating the two models and adding these cognitive variables to provide a more comprehensive understanding of the factors influencing the intention to adopt electric vehicles in Indonesia.

This study aims to analyze the influence of socio-psychological factors within the framework of the Sustainable Development Goals (SDGs)—including attitudes, subjective norms, and perceived behavioral control—on consumers' intention to adopt electric vehicles in Indonesia; to examine the effect of technological factors based on the Technology Acceptance Model (TAM), namely perceived usefulness and perceived ease of use, on adoption intention; to assess the role of cognitive factors, particularly consumer knowledge about electric vehicles, in shaping their attitudes, beliefs, and adoption intentions; and to investigate whether perceived risk affects consumers' attitudes and intentions to adopt electric vehicles.

The results of this study are expected to provide a deep understanding of consumer behavior in environmental sustainability. In addition, the results are expected to be a source of strategic information useful for policymakers, electric vehicle manufacturers, and various other related parties in formulating effective measures to accelerate the acceptance and use of environmentally friendly vehicles in Indonesia. This approach also aims to support national transportation transformation efforts towards cleaner and more sustainable solutions.

## METHOD

This study employed a quantitative approach using a survey method to analyze factors affecting Indonesians' intention to adopt electric vehicles. This method allowed for systematic and objective measurement of relationships between variables based on data collected directly from respondents via a structured questionnaire (Sofya et al., 2024). The research focused on how individual perceptions, attitudes, social norms, and knowledge influenced the intention to adopt environmentally friendly electric vehicle technology.

The study population consisted of Indonesians who were aware of or interested in electric vehicles, including active and potential users. Purposive sampling was used to select respondents relevant to electric vehicle issues, such as those living in urban areas, owning private vehicles, and showing interest in sustainable technology. Although a minimum of 100 respondents is generally required for structural analysis, data from 311 respondents were collected, providing a more representative analysis of electric vehicle adoption behavior in Indonesia.

Data were collected through an online questionnaire distributed via social media and digital platforms. The questionnaire measured respondents' perceptions of social, cognitive, and technological factors likely to influence the intention to adopt electric vehicles in Indonesia. Based on a conceptual framework integrating the Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM), and incorporating cognitive variables such as knowledge and risk perception, eight research hypotheses were proposed. Each item was measured using a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree," to assess respondents' approval of statements related to each variable.

**Table 1. research variables**

| Independent Variable | Dependent Variable | Hypothesis | Reference Journal |
|---|---|---|---|
| H1 | Subjective Norms | Adoption Intention | Subjective norms have a positive effect on the intention to adopt EVs |
| H2 | Perceived Behavioral Control | Adoption Intention | Perceived behavioral control has a positive effect on the intention to adopt EVs |
| H3 | Environmental Concern | Adoption Intention | Environmental concern has a positive effect on the intention to adopt EVs |
| H4 | Moral Norm | Adoption Intention | Moral norms have a positive effect on the intention to adopt EVs |
| H5 | Knowledge about EV | Adoption Intention | Knowledge has a positive effect on the intention to adopt EVs |
| H6 | Perceived Usefulness | Adoption Intention | Perceived usefulness has a positive effect on the intention to adopt EVs |
| H7 | Perceived Ease of Use | Adoption Intention | Perceived ease of use has a positive effect on the intention to adopt EVs |
| H8 | Perceived Risk | Adoption Intention | Perceived risk has a positive effect on the intention to adopt EVs |

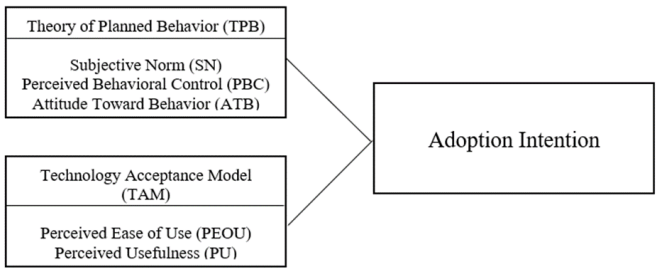


**Figure 1. Research Framework**

The data collected in this study was analyzed using SPSS software. The analysis began with validity and reliability tests to ensure the research instrument measured accurately and consistently. Multiple linear regression analysis was then conducted to examine the relationships between independent and dependent variables. The t-test was used to determine the partial influence of each variable. Additionally, the coefficient of determination ($R^2$) was calculated to measure how much the independent variables explained the variation in the intention to adopt electric vehicles.

## RESULT AND DISCUSSION

### Descriptive Analysis

**Table 2. Results of descriptive analysis**

| Construct | Mean | Std. Dev. | PE | EE | SI | FC | EC |
|---|---|---|---|---|---|---|---|
| Performance Expectancy (PE) | 4.09 | 0.69 | 1 | | | | |
| Effort Expectancy (EE)* | 3.59 | 0.55 | 0.689** | 1 | | | |
| Social Influence (SI) | 4.09 | 0.75 | 0.558** | 0.428** | 1 | | |
| Facilitating Conditions (FC) | 4.18 | 0.69 | 0.639** | 0.590** | 0.707** | 1 | |
| Environmental Concern (EC) | 4.35 | 0.62 | 0.491** | 0.493** | 0.428** | 0.497** | 1 |
| Behavioral Intentions (BI) | 3.92 | 0.79 | 0.689** | 0.587** | 0.671** | 0.700** | 0.519** |

Based on the results of the descriptive analysis in Table 2, each variable studied showed a fairly diverse mean value (mean) and standard deviation. The X1 variable (*Subjective Norm*) has an average of 9.96 with a standard deviation of 2.625 which indicates that respondents' perception of subjective norms towards EV adoption tends to be at a moderate level with a fairly varied distribution of data. X2 (*Perceived Behaviour Control*) had an average of 11.80 and a standard deviation of 2.726, indicating that respondents relatively had a fairly good behavioral control of the intention to adopt EVs. Meanwhile, X3 (*Environmental Concern)* obtained the highest average among the initial variables, which was 12.32 with a standard deviation of 2.412, which indicates that the respondents' environmental concern was quite high and relatively consistent in the data.

Furthermore, X4 (*Moral Norm*) has an average of 10.00 with a standard deviation of 2.869, indicating that moral norms are quite playable, albeit with considerable variation in answers. X5 (Knowledge) got the highest average of 17.87 with a standard deviation of 4.197, which means that respondents' knowledge of EVs is relatively high but with a more diverse distribution of answers. X6 (*Perceived Usefulness*) had an average of 7.52 with a standard deviation of 1.980, indicating that respondents viewed the benefits of EV use at a moderate level. Meanwhile, the X7 (*Perceived Ease of Use*) has an average of 11.64 with a standard deviation of 2.697, which indicates that the perception of EV ease of use is quite positive. X8 (*Perceived Risk*) has an average of 10.83 with a standard deviation of 3.006, which indicates that the perceived risk of respondents related to EV adoption is at a moderate level with considerable variation.

The dependent variable Y (EV Adoption Intention) has an average of 6.64 with a standard deviation of 2.332. This shows that respondents' intentions to adopt electric vehicles are still moderate and tend to vary between individuals. Overall, these descriptive results illustrate that factors such as subjective norms, behavioral control, environmental concern, moral norms, knowledge, perception of benefits, ease of use, and perceived risks provide a strong enough starting basis to support the hypothesis (H1–H8) that these factors have a positive effect on EV adoption intentions.

### Normality Test

The normality test is a statistical procedure used to determine whether the research data is normally distributed or not. This test can be performed using graphing methods, such as histograms or normal *probability plots* (P-P Plot), or statistical tests such as *Kolmogorov-Smirnov* or *Shapiro-Wilk* (Isnaini et al., 2025).

**Table 2. Normality Test Results**

| Construct | Variable Code | Cronbach's α | Factor Loadings | KMO | Bartlett's Sphericity Test |
|---|---|---|---|---|---|
| Performance Expectancy | PE1 | 0.869 | 0.814 | 0.796 | 0.000 |
| | PE2 | | 0.887 | | |
| | PE3 | | 0.827 | | |
| | PE4 | | 0.629 | | |
| Effort Expectancy | EE1 | 0.842 | n/a* | 0.500 | 0.000 |
| | EE2 | | n/a* | | |
| Social Influence | SI1 | 0.928 | 0.855 | 0.854 | 0.000 |
| | SI2 | | 0.864 | | |
| | SI3 | | 0.930 | | |
| | SI4 | | 0.824 | | |
| Facilitating Conditions | FC1 | 0.866 | 0.837 | 0.725 | 0.000 |
| | FC2 | | 0.898 | | |
| | FC3 | | 0.758 | | |
| Environmental Concern | EC1 | 0.804 | 0.698 | 0.697 | 0.000 |
| | EC2 | | 0.874 | | |
| | EC3 | | 0.737 | | |
| Behavioral Intentions | BI1 | 0.869 | 0.940 | 0.691 | 0.000 |
| | BI2 | | 0.681 | | |
| | BI3 | | 0.891 | | |

Based on the results of the normality test in Table 2 using Kolmogorov-Smirnov, it can be seen that all variables have a significance value (Sig.) below 0.05. This shows that the distribution of data on each variable is normally distributed.

## Reliability Test

Reliability test is a process to assess the consistency or stability of a research instrument in measuring the same variable. One of the most commonly used methods is *Cronbach's Alpha*, where a $\alpha \geq$ value of 0.70 generally indicates good reliability (Utami, 2023).

**Table 3. Reliability Test Results**

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .722 | 9 |

Based on Table 3, the results of the reliability test showed that Cronbach's Alpha value was 0.722 for 9 items. This value is above the minimum limit of 0.70 which is commonly used as an indicator of acceptable reliability in social and behavioral research. This means that the research instrument used is considered reliable, because the question items in the questionnaire have a fairly good internal consistency in measuring the same construct.

## KMO and Bartlett

The KMO and Bartlett test is a statistical test used to assess the feasibility of data before factor analysis is performed; The KMO test measures the adequacy of a sample with a value ideally above 0.5 to indicate that the data is suitable for analysis, while the Bartlett test tests the significance of the correlation between variables so that if the results are significant ($p < 0.05$), the data is considered to have a strong enough correlation to be analyzed further.

**Table 4. Results of the KMO & Bartlett Test**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .834 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1124. 79 |
| | df | 36 |
| | Sig. | <.001 |

Based on Table 4, the results of the KMO (*Kaiser-Meyer-Olkin Measure of Sampling Adequacy*) test showed a value of 0.834. This value is above the minimum limit of 0.50 and is even in the "merit" (good) category, which means that the data has an adequate level of sample adequacy for factor analysis. Thus, the correlation between variables is considered strong enough to be explored further. In addition, *the results of Bartlett's Test of Sphericity* showed a *Chi-Square* value of 1124.579 with a degree of freedom (df) = 36 and a significance of < 0.001. A significance value of less than 0.05 indicates that the correlation matrix between variables is not identical, so the variables in this study are indeed correlated and deserve further analysis through factor analysis. With these results, it can be concluded that the research instrument is eligible for confirmatory and exploratory factor analysis, so that it can be used in testing hypotheses related to EV adoption intentions.

## Correlation

Correlation testing is a statistical method used to measure and determine the strength and direction of the relationship between two numerical variables. In addition, the correlation test also produces a significance value (sig value) that indicates whether the relationship is statistically significant or not. If the sig value is less than 0.05 ($p < 0.05$), then the relationship between the two variables is considered statistically significant, meaning that the likelihood of the relationship is not due to chance. Conversely, if the sig value is greater than 0.05, then the relationship is considered insignificant.

**Table 5. Correlation Results**

| Correlations | | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | Y |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Pearson Correlation | 1 | .191** | .131* | .516** | .405** | .298** | .469** | -.304** | .467** |
| | Sig. (2-tailed) | | <.001 | .021 | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| 2 | Pearson Correlation | .191** | 1 | .018 | .164** | .537** | .440** | .235** | -.165** | .266** |
| | Sig. (2-tailed) | <.001 | | .752 | .004 | <.001 | <.001 | <.001 | .004 | <.001 |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| 3 | Pearson Correlation | .131* | .018 | 1 | .357** | .217** | .159** | .284** | .050 | .049 |
| | Sig. (2-tailed) | .021 | .752 | | <.001 | <.001 | .005 | <.001 | .380 | .393 |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| 4 | Pearson Correlation | .516** | .164** | .357** | 1 | .497** | .408** | .609** | -.366** | .640** |
| | Sig. (2-tailed) | <.001 | .004 | <.001 | | <.001 | <.001 | <.001 | <.001 | <.001 |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| 5 | Pearson Correlation | .405** | .537** | .217** | .497** | 1 | .692** | .556** | -.362** | .558** |
| | Sig. (2-tailed) | <.001 | <.001 | <.001 | <.001 | | <.001 | <.001 | <.001 | <.001 |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| 6 | Pearson Correlation | .298** | .440** | .159** | .408** | .692** | 1 | .501** | -.322** | .457** |
| | Sig. (2-tailed) | <.001 | <.001 | .005 | <.001 | <.001 | | <.001 | <.001 | <.001 |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| 7 | Pearson Correlation | .469** | .235** | .284** | .609** | .556** | .501** | 1 | -.337** | .636** |
| | Sig. (2-tailed) | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 | | <.001 | <.001 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Correlations** | | | | | | | | | |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| 8 | Pearson Correlation | -.304** | -.165** | .050 | -.366** | -.362** | -.322** | -.337** | 1 | -.411** |
| | Sig. (2-tailed) | <.001 | .004 | .380 | <.001 | <.001 | <.001 | <.001 | | <.001 |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| | Pearson Correlation | .467** | .266** | .049 | .640** | .558** | .457** | .636** | -.411** | 1 |
| | Sig. (2-tailed) | <.001 | <.001 | .393 | <.001 | <.001 | <.001 | <.001 | <.001 | |
| | N | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 | 311 |
| | **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | |
| | *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | |

Based on Table 5, the results of the correlation test showed a significant relationship between most of the independent variables (X1–X8) and the dependent variable Y (EV Adoption Intention). The Subjective Norm variable (X1) was positively and significantly associated with EV adoption intention ($r = 0.467$; $p < 0.001$), which supports the H1 hypothesis. Perceived Behaviour Control (X2) was also positively and significantly associated with EV adoption intention ($r = 0.266$; $p < 0.001$), in line with H2. Meanwhile, Environmental Concern (X3) has a very weak and insignificant correlation with EV adoption intentions ($r = 0.049$; $p = 0.393$), so H3 is not supported at this correlation stage.

Furthermore, the Moral Norm (X4) showed a positive and fairly strong correlation with EV adoption intentions ($r = 0.640$; $p < 0.001$), supporting H4. Knowledge (X5) was also positively and significantly associated with EV adoption intentions ($r = 0.558$; $p < 0.001$), thus supporting H5. The Perceived Usefulness variable (X6) had a significant positive correlation ($r = 0.457$; $p < 0.001$), in line with H6.

Similarly, Perceived Ease of Use (X7) was positively and quite strongly correlated with EV adoption intentions ($r = 0.636$; $p < 0.001$), in favor of H7. In contrast, Perceived Risk (X8) actually had a significant negative correlation with EV adoption intention ($r = –0.411$; $p < 0.001$), meaning that the higher the risk perception, the lower the EV adoption intention, which is not in line with H8. Overall, correlation results showed that almost all independent variables had a positive and significant relationship with EV adoption intentions, except for insignificant Environmental Concern (X3) and negatively related Perceived Risk (X8). These findings provide an initial picture that social, psychological, and cognitive factors such as subjective norms, behavioral control, moral norms, knowledge, perception of benefits, and ease of use have more influence on EV adoption intentions than environmental and risk factors.

### *Loading Factor*

**Table 6. Loading *Factor Results***

| **Rotated Component Matrix[a]** | | | |
|---|---|---|---|
| | Component | | |
| | 1 | 2 | 3 |
| X1 | .709 | .103 | |
| X2 | | .871 | |
| X3 | .125 | | .919 |
| X4 | .793 | .144 | .332 |
| X5 | .464 | .750 | .136 |
| X6 | .368 | .737 | |
| X7 | .721 | .304 | .269 |
| X8 | -.638 | -.157 | .380 |
| Y | .789 | .291 | |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Based on Table 6, the results of factor analysis using the Principal Component Analysis (PCA) method with Varimax rotation show that the research indicators contain three main

components. This can be seen from the loading factor value that is above 0.50 in most variables, so it can be said that the measured construct has a fairly good convergent validity.

In Component 1, the variables that have high loading are X1 (Subjective Norm = 0.709), X4 (Moral Norm = 0.793), X5 (Knowledge = 0.464), X6 (Perceived Usefulness = 0.368), X7 (Perceived Ease of Use = 0.721), and Y (EV Adoption Intention = 0.789). This shows that factors of social norms, morals, knowledge, benefits, and ease of use have a strong relationship with EV adoption intentions and can be grouped as dominant factors. In Component 2, the variables that contain strength are X2 (Perceived Behavior Control = 0.871), X5 (Knowledge = 0.750), and X6 (Perceived Usefulness = 0.737). This indicates that the dimensions of behavioral control, knowledge, and benefit perception tend to form a separate group of factors that represent the cognitive aspects and ability of individuals to adopt EVs.

Meanwhile, in Component 3, the most dominant variable was X3 (Environmental Concern = 0.919), with additional contributions from X4 (Moral Norm = 0.332) and X8 (Perceived Risk = 0.380). This shows that environmental concern is a stand-alone factor, but it still has a relationship with moral norms and risks. Interestingly, X8 (Perceived Risk) has a negative loading on Component 1 (–0.638), which emphasizes that the higher the perceived risk, the opposite direction to the dominant factor that drives EV adoption intentions.

Overall, these results show that the research construct is divided into three main dimensions, namely: (1) social-psychological factors and adoption intentions, (2) cognitive factors and individual abilities, and (3) environmental factors and risks. These findings reinforce previous correlation results, where risk and environmental factors behave differently than social and cognitive factors in influencing EV adoption intentions.

## Hypothesis Test

**Table 7. Hypothesis Test Results**

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| | | Unstandardized Coefficients | | Standardized Coefficients | | |
| | Model | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 1.131 | .785 | | 1.441 | .151 |
| | X1 | .049 | .040 | .055 | 1.239 | .216 |
| | X2 | .007 | .038 | .008 | .179 | .858 |
| | X3 | -.213 | .039 | -.220 | -5.392 | <.001 |
| | X4 | .308 | .043 | .378 | 7.176 | <.001 |
| | X5 | .104 | .034 | .187 | 3.087 | .002 |
| | X6 | .014 | .062 | .012 | .219 | .827 |
| | X7 | .266 | .045 | .308 | 5.953 | <.001 |
| | X8 | -.053 | .033 | -.068 | -1.614 | .108 |

a. Dependent Variable: Y

The results of the coefficient analysis show that:

1) H1: Subjective Norm (X1) → Positively but not significantly affected EV adoption intention (B = 0.049; Sig. = 0.216). Rejected.
2) H2: Perceived Behaviour Control (X2) → Had no significant effect on EV adoption intention (B = 0.007; Sig. = 0.858). Rejected.
3) H3: Environmental Concern (X3) → Negatively and significantly affects EV adoption intention (B = –0.213; Sig. < 0.001). Rejected (the opposite direction of the relationship of the hypothesis).
4) H4: Moral Norm (X4) → Positively and significantly affects EV adoption intention (B = 0.308; Sig. < 0.001). Accepted.

5) H5: Knowledge (X5) → Positively and significantly affects EV adoption intention (B = 0.104; Sig. = 0.002). Accepted.
6) H6: Perceived Usefulness (X6) → Had no significant effect on EV adoption intention (B = 0.014; Sig. = 0.827). Rejected.
7) H7: Perceived Ease of Use (X7) → Positively and significantly affects EV adoption intention (B = 0.266; Sig. < 0.001). Accepted.
8) H8: Perceived Risk (X8) → Negatively but not significantly affected EV adoption intention (B = –0.053; Sig. = 0.108). Rejected.

**Determination Coefficient Test**

The determination coefficient ($R^2$) test is used to measure how much an independent variable is able to explain the variation of dependent variables in a regression model. The value of $R^2$ is between 0 and 1, where the closer to 1 means the better the model is at explaining the relationship, while a value closer to 0 indicates low explanatory ability. This test is important to assess the feasibility of the model, but it cannot be used alone because it does not show a cause-and-effect relationship and needs to be supported by other statistical tests such as the F test and the t test (Widodo, 2021).

**Table 8. Determination Coefficient Test Results**

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 107.309 | 5 | 21.462 | 94.24 | 0.000 |
| Residual | 60.122 | 264 | 0.228 | | |
| Total | 167.43 | 269 | | | |

**Table 9. Regression Analysis and Hypothesis Testing Results**

| Hypothesis | Path | β | SE | t-value | p-value | Tolerance | VIF | Decision |
|---|---|---|---|---|---|---|---|---|
| H1 | PE → BI | 0.276 | 0.065 | 4.833 | < 0.001* | 0.416 | 2.405 | Supported |
| H2 | EE → BI | 0.096 | 0.062 | 1.77 | 0.078*** | 0.465 | 2.153 | Supported |
| H3 | SI → BI | 0.275 | 0.056 | 5.131 | < 0.001* | 0.472 | 2.118 | Supported |
| H4 | FC → BI | 0.217 | 0.069 | 3.606 | < 0.001* | 0.375 | 2.664 | Supported |
| H5 | EC → BI | 0.111 | 0.057 | 2.457 | 0.015** | 0.672 | 1.489 | Supported |

**Model Statistics:**
$R^2 = 0.641$, Adjusted $R^2 = 0.634$
$F(5,264) = 94.240$, $p < 0.001$
Standard Error = 0.477
*p < 0.001, **p < 0.05, ***p < 0.10

Based on Table 8, the results of the ANOVA test in the table above show that the regression model used in this study is statistically significant. The *F-test* value of 94.24 with a significance level of 0.000 ($p < 0.001$) indicates that independent variables simultaneously affect dependent variables. This is reinforced by the *Sum of Squares* comparison, where the regression value of 107,309 is much greater than the residual value of 60,122, thus suggesting that most of the variation in the dependent variables can be explained by the regression model.

**The Influence of Subjective Norms on EV Adoption Intentions**

The results showed that subjective norms had a positive but insignificant influence on the intention to adopt electric vehicles (EV) with a regression coefficient value of 0.049 and a significance of 0.216. This means that while subjective norms or social pressures from the surrounding environment tend to increase a person's intention to adopt an EV, the influence is not statistically strong enough. This indicates that the decision to adopt an EV is not so much influenced by the views or encouragements of others, but rather determined by individual internal factors.

This is in line with the Theory of Planned Behavior (TPB), which emphasizes that subjective norms are one of the main determinants of the formation of adoption intentions (La Pade & Muin, 2022). This understanding can be applied to people's intentions in adopting electric vehicles (EVs). Social pressures from the surrounding environment, whether in the form of support from family, friends, community, or government policies, can affect the way individuals view the importance of switching from fossil fuel vehicles to electric vehicles (Gaol & Tjenreng, 2025). Campaigns that emphasize environmental benefits, cost efficiency, and government support for the use of electric vehicles will further strengthen social norms that encourage people to have positive intentions towards the adoption of this technology (Rahimah, 2025).

In addition, this concept is also relevant when associated with the theory of the decision to buy micro business products in Indonesia. Social encouragement, such as "buy local products" campaigns or trends in supporting MSMEs, create strong social norms in society. This positive social pressure makes individuals feel that buying local products is not only an economic decision, but also part of a social responsibility to help national economic growth (Ridha et al., 2025). In other words, subjective norms are an important factor that fosters the intention to adopt certain behaviors, including supporting small business actors.

This finding is different from the research of Kumar & Naman (2020) which states that subjective norms have a positive effect on EV adoption intentions. These differences in results can be influenced by the social, cultural, and public acceptance of electric vehicle technology in each country. Therefore, understanding the role of subjective norms remains important for policy makers, business actors, and marketers to design more effective strategies by harnessing the power of social influence in shaping the adoption intentions of Indonesian consumers.

However, the results of this study show that subjective norms have a positive but insignificant influence on EV adoption intentions, with a regression coefficient value of 0.049 and significance of 0.216. This means that while subjective norms or social pressures from the surrounding environment tend to increase a person's intention to adopt an EV, the influence is not statistically strong enough. This indicates that the decision to adopt an EV is not so much influenced by the views or encouragements of others, but rather determined by individual internal factors.

**The Effect of Perceived Behavioral Control on EV Adoption Intentions**

The results showed that perceived behavior control had no significant effect on the intention of adopting electric vehicles with a regression coefficient of 0.007 and a significance of 0.858. These findings indicate that individual perceptions of ease or control in using EVs, such as the availability of infrastructure or financial capabilities, are not the main factors influencing adoption intentions. Thus, even if a person feels capable or incapable, it does not determine their decision in intending to use an EV.

This result is in line with the research of Marco & Arifin (2024) which shows that perceived behavioral control (PBC) has no effect on the adoption intention of electric vehicles, several studies related to fintech adoption intention have actually found the opposite result. In the context of fintech, PBC has a positive effect because individuals' perceptions of ease of access, ability to use applications, and availability of resources directly increase their confidence to adopt digital financial services. Factors such as a stable internet connection, simple feature support, and adequate digital literacy make individuals feel in complete control, thus driving their intention to use fintech as a practical and efficient transaction solution.

In contrast to the research of Marco & Arifin (2024), with the findings of Kumar & Naman (2020) showing that perceived behavioral control actually has a positive effect on EV

adoption intentions. These differences in results show a variation in context, where in some studies, perceived control is able to encourage adoption intentions, while in the context of this study these factors do not play a significant role.

Thus, the study showed that perceived behavioral control (PBC) had no significant effect on the intention to adopt electric vehicles, with a regression coefficient of 0.007 and a significance of 0.858. These findings indicate that individual perceptions of ease or control in using EVs, such as the availability of charging infrastructure or financial capability, are not the main factors influencing adoption intentions. Even if a person feels capable or incapable, it does not determine their decision in intending to use an EV. In contrast, the intention to switch to electric vehicles is more influenced by other factors such as perception of benefits, ease of use, positive attitudes, and social influence.

**The Effect of Environmental Concern on EV Adoption Intentions**

The results showed that environmental concern had a negative and significant effect on the intention to adopt electric vehicles (EVs), with a regression coefficient of -0.213 and a significance value of < 0.001. These findings are contrary to the hypothesis proposed, as theoretically concern for the environment should encourage individuals to be more intentional in adopting environmentally friendly technologies such as EVs. This result indicates a paradox, namely that individuals who have a high concern for the environment are actually more skeptical of EVs. One possible reason is that they consider that battery production, recycling processes, and energy sources for EV charging still have a significant environmental impact, so the ecological benefits of electric vehicles are not seen as completely "green".

This finding is different from the results of Wang's (2017) research which shows that environmental concerns have a positive effect on EV adoption intentions. In the context of the study, consumers with high environmental concerns were more motivated to adopt EVs because of the belief that these vehicles are an effective solution to reduce carbon emissions, coupled with the support of government policies that reinforce the positive image of EVs. These differences in results show that the influence of environmental concern on EV adoption intentions is greatly influenced by the social context, energy literacy level, and public trust in the environmental advantages of electric vehicle technology.

Thus, it can be concluded that although concern for the environment is generally considered as a driving factor for the adoption of environmentally friendly technology, in this study the opposite effect was found. This emphasizes the importance of transparency of information regarding the EV life cycle, from production to battery disposal, as well as the provision of renewable energy as the main source of charging. These efforts are needed so that consumers who have high environmental concerns are no longer skeptical, but see EVs as a real solution in reducing negative impacts on the environment.

**The Moral Influence of Norm Behavior on EV Adoption Intentions**

The results showed that moral norms had a positive and significant influence on EV adoption intentions, with a regression coefficient of 0.308 and a significance of < 0.001. This indicates that moral norms, namely individual beliefs about the moral obligation to act environmentally friendly, are an important factor that drives the intention to adopt electric vehicles. In other words, the higher a person's sense of moral responsibility towards the environment, the greater their intention to use EVs.

In line with the Theory of Planned Behavior (TPB), attitude toward behavior (ATB) is seen as one of the main factors that determine a person's intentions. This finding is in line with Kumar and Naman (2020) who affirm that moral norms have a positive effect on EV adoption intentions. Therefore, the formation of moral norms and positive attitudes of the community through education, benefit promotion, and increased environmental awareness are very

important to accelerate the adoption of electric vehicles in Indonesia. The results of Raditya's research (2025) support this, stating that ATB has a significant effect on the adoption intention in the use of e-wallets by Gen Z in Pekanbaru, because individuals' positive attitudes towards the use of e-wallets encourage the emergence of strong intentions to use them.

However, this is different from the findings of Adni et al. (2024) which show that ATB does not have a significant effect on adoption intention in the use of CWLS in West Java. The rejection of the hypothesis indicates that even if a person has a positive attitude toward CWLS, it does not directly encourage the intention to adopt it. Other factors, such as subjective norms, perceptions of behavioral control, or financial literacy levels, are thought to be more dominant in influencing an individual's decision to use CWLS in the region. In the context of electric vehicle adoption, the results show that moral norms have a positive and significant influence on EV adoption intentions, with a regression coefficient of 0.308 and a significance of < 0.001. This indicates that moral norms, namely individual beliefs about the moral obligation to act environmentally friendly, are an important factor that drives the intention to adopt electric vehicles. In other words, the higher a person's sense of moral responsibility towards the environment, the greater their intention to use EVs.

**The Influence of Knowledge on EV Adoption Intentions**

The results showed that knowledge had a positive and significant influence on the intention of adopting electric vehicles (EV), with a regression coefficient of 0.104 and a significance of 0.002. This means that the higher the level of individual knowledge about EVs, both in terms of environmental benefits, technology, energy efficiency, and how to use them, the greater their intention to adopt it. Adequate knowledge can increase consumer confidence in the advantages of EVs while reducing doubts and risk perceptions in using them.

These findings are in line with research by Wang et al. (2018) who stated that consumer knowledge plays an important role in increasing EV adoption intentions. Consumers who have adequate literacy about electric vehicle technology are more likely to accept innovation because they understand the long-term benefits and potential operational cost savings. Knowledge also helps to suppress the perception of risks, for example related to battery life or limited infrastructure, so that consumers are more confident in making decisions.

Thus, it can be concluded that increasing public knowledge is a crucial factor in driving EV adoption. Public education efforts through socialization, environmental awareness campaigns, and the provision of clear and transparent information about electric vehicle technology need to be strengthened. This strategy not only increases consumer understanding, but also has the potential to accelerate the acceptance of EVs in Indonesia as an environmentally friendly transportation solution.

**The Effect of Perceived Usefulness on EV Adoption Intentions**

The results showed that perceived usefulness did not have a significant effect on EV adoption intentions, with a regression coefficient of 0.014 and a significance of 0.827. This indicates that while EVs have certain uses such as energy efficiency or cost savings, those perceptions are not strong enough to influence a person's intention to adopt them. This finding could be due to the fact that the benefits of EVs have not been felt in real terms by most consumers.

This result is different from the findings of Faizani & Indriyanti (2021) which stated that perceived usefulness has a positive and significant effect on adoption intention in using QRIS through e-wallet applications. In the context of QRIS, the convenience and direct benefits of users can be felt in daily transaction activities, thus encouraging an increase in interest in

using it. Meanwhile, in the context of EVs in Indonesia, despite the potential benefits, real experience related to cost efficiency and convenience of use has not been fully felt by the wider community. According to the Technology Acceptance Model (TAM), perceived usefulness is indeed one of the main factors that can theoretically affect adoption intentions. However, in the case of EVs in Indonesia, this factor does not seem to have a significant influence. This is in line with the explanation that technology adoption is not only determined by perceived benefits, but also by other factors such as high initial costs, limited supporting infrastructure, and risk perception. However, the study by Wang et al. (2018), shows that perceived usefulness has a positive effect on EV adoption intentions, especially when consumers have sufficient knowledge, risks can be minimized, and there is policy support in the form of financial incentives. In other words, the influence of PU can increase if the benefits of EVs can really be felt directly by consumers, and supported by conducive government policies. Thus, it can be concluded that in the current Indonesian context, the perception of usability is not strong enough to influence the intention of EV adoption. However, the potential for PU remains open to become a key factor in the future if accompanied by infrastructure improvements, incentive policies, and consumer education about the real benefits of electric vehicles.

**The Effect of Perceived Ease of Use on EV Adoption Intention**

The results showed that perceived ease of use had a positive and significant effect on EV adoption intentions, with a regression coefficient of 0.266 and a significance of < 0.001. This means that the easier an EV is to use, both operationally and maintenance-wise, the greater the individual's intention to adopt it. These findings are in line with technology adoption theory, where ease of use is an important factor in increasing consumer acceptance of new innovations.

These results are in line with the research of Wiprayoga et al. (2023) which states that perceived ease of use has a positive and significant influence on adoption intention, which means that the easier a technology is to use, the higher the individual's interest in utilizing it. This convenience is able to reduce psychological and technical barriers, so that users feel more comfortable and confident in adopting the technology.

In contrast to these findings, Permana et al. (2023) explained that perceived ease of use does not have a significant effect on the purchase intention of electric vehicles in Indonesia. This shows that although people understand the benefits of electric vehicles, the factor is not strong enough to drive purchase intent. Other factors such as price, availability of charging infrastructure, and risk perception are considered to be more dominant in influencing purchasing decisions.

Thus, it can be concluded that the ease of use of EVs, such as user-friendly features, clear information availability, and a practical charging process, is able to foster confidence and reduce psychological barriers in switching from conventional vehicles. The results of this study are also strengthened by a study conducted in China, which shows that perceived ease of use has a positive effect on EV adoption intentions. Therefore, simplification of technology and education about ease of use are important strategies in increasing the adoption of electric vehicles in Indonesia.

**The Effect of Perceived Risk on Adaption Intention**

The results showed that perceived risk had a negative but insignificant effect on the intention to adopt electric vehicles (EVs), with a regression coefficient of -0.053 and a significance value of 0.108. This means that while perceived risks such as battery safety, relatively high prices, or infrastructure limitations tend to lower adoption intentions, these influences are not statistically strong enough. As such, risk factors have not yet been a major consideration in an individual's decision to intend to adopt an EV.

This finding is different from the results of a study by Wang et al. (2018) which found that perceived risk actually has a positive effect on EV adoption intentions. In the context of the study, consumers who are aware of the risks are still encouraged to adopt EVs due to financial incentive policies and increased consumer knowledge that can reduce concerns. These differences in results show that the influence of perceived risk on EV adoption intentions is greatly influenced by external environmental conditions, such as regulatory support, infrastructure availability, and consumer literacy towards new technologies.

Thus, it can be concluded that although risk perception is often considered an obstacle to adopting technology, in this study these factors are not significant enough in influencing EV adoption intentions. This indicates that consumers are more likely to consider other factors such as ease of use, environmental benefits, and operational costs in making decisions. Therefore, the strategy to increase EV adoption in Indonesia should be more focused on education, information transparency, and infrastructure support, so that risk perception can be suppressed and EV adoption increases.

## CONCLUSION

The hypothesis testing revealed that moral norms, knowledge, and perceived ease of use positively and significantly influenced the intention to adopt electric vehicles, while subjective norms, perceived behavioral control, perceived usefulness, and perceived risk showed no significant effect. Although environmental concern was significant, its negative influence contradicted the initial hypothesis. These results highlight that personal factors like moral norms, knowledge, and ease of use are more critical in driving adoption intention than social influences, risk perception, or environmental concerns. Future research should explore the underlying reasons for the negative impact of environmental concern and investigate other contextual factors affecting electric vehicle adoption.

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