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Analysis of Factors Influencing Electric Vehicle Adoption with Age, Gender, and Experience as Moderating Variables Across Metropolitan, Mountainous, and Small City Regions in Indonesia

Dewi Zulfana
Institut Teknologi PLN, Indonesia
Email: d.zulfana@gmail.com

ABSTRACT

Electric vehicles (EVs) are a key strategy for achieving Indonesia's Net Zero Emissions (NZE) target by 2060. This study analyzes the factors influencing EV adoption across three regional classifications—metropolitan areas (Jakarta and Tangerang), mountainous areas (Bandung and Bogor), and small urban areas (Cirebon)—using the UTAUT2 theory (Venkatesh et al., 2012) and the partial least squares structural equation modeling (PLS-SEM) method. Data were collected from 286 respondents via an online questionnaire. The results indicate that UTAUT2 factors generally exert a significant influence, though outcomes vary across regions. In Bandung, the significant influencers of EV adoption are Facilitating Conditions (FC), Price Value (PV), and Hedonic Motivation (HM). In Tangerang, FC is the dominant factor, while in Jakarta, PV has the most significant effect. In contrast, in Bogor and Cirebon, UTAUT2 constructs do not significantly affect Use Behavior or Behavioral Intention, with an R^2 *of only 12%, suggesting other dominant external factors. Furthermore, the moderation effect of experience shows that 52% of Bandung respondents have never used an EV, indicating a strong tendency among residents to accept and try new technologies, including EVs. Age moderation reveals that respondents aged 36–45 are more open to adopting new technologies. These findings underscore the need for region-specific strategies emphasizing infrastructure development, pricing, user motivation (related to design, features, and pleasurable experiences), public outreach, regulations, and performance enhancements.*

Keywords: *Net Zero Emission (NZE); Electric Vehicle; UTAUT2; Use Behavior; Behavioral Intention*

INTRODUCTION

Global climate change has become a crucial issue that urges real action from all countries in the world. The increase in greenhouse gas (GHG) emissions, especially carbon dioxide (CO2), due to human activities is the main cause of global warming and its impact is increasingly felt. The transportation sector, with its reliance on fossil fuels, is one of the largest contributors to GHG emissions (Azhar et al., 2024; Oladunni et al., 2022; Tchanche, 2020). Globally, transport accounts for about 24% of total CO2 emissions (International Energy Agency, 2023). In Indonesia, data from the Ministry of Environment and Forestry (MoEF) and the Ministry of Transportation (Kemenhub) show that the transportation sector contributed 159 million tons of CO2 or equivalent to 21.85% of national GHG emissions in 2022, placing it as the second-largest sector after the energy sector (Kementerian Perhubungan Republik Indonesia, 2024).

Indonesia as a committed country to the Paris Agreement (Paris Agreement), has an ambitious target of reducing GHG emissions by 29% on its own and 41% with international support by 2030. To achieve this target, the government has issued various policies, including Presidential Regulation No. 55 of 2019 concerning the Acceleration of the Battery-Based Electric Motor Vehicle (KBLBB) Program. The regulation aims to encourage the transition from conventional oil-fueled vehicles to electric vehicles, which are considered a key solution to reduce emissions in the transport sector (NDC Partnership, 2021).

The government's program is in order to realize Net Zero Emission (NZE) by 2060, a commitment born from awareness of the urgency of climate change and the importance of the transition to clean and sustainable energy (Sari et al., 2020; Hidayat & Rahman, 2021). The government realizes that achieving this target requires a comprehensive transformation in various sectors, including the energy and transportation sectors (Pratama & Setiawan, 2022; Yulia & Kusuma, 2023). Therefore, various programs and policies have been launched to realize NZE 2060 (Lestari & Wibowo, 2021; Rinaldi & Santosa, 2020; Yusuf & Widodo, 2022).

The transportation sector plays an important role in efforts to achieve NZE 2060. The government is actively promoting the use of electric vehicles as an alternative to conventional fossil fuel vehicles. Various fiscal and non-fiscal incentives are provided to encourage people to switch to electric vehicles, such as exemption from Sales Tax on Luxury Goods (PPnBM), purchase subsidies, priority of special routes, and ease of licensing. Development of supporting infrastructure, such as Public Electric Vehicle Charging Stations (SPKLU) to make it easier for electric vehicle users. Not only that, the government also encourages the conversion of conventional vehicles to electric vehicles and the development of the electric vehicle battery industry in the country.

Indonesia is intensively encouraging the growth of electric vehicle sales and various innovations continue to be developed to create a supportive ecosystem. One of the most prominent innovations is the development of Public Electric Vehicle Charging Stations (SPKLU) with fast charging technology. This type of SPKLU allows charging electric vehicle batteries in a much shorter time, overcoming one of the main obstacles, namely the length of charging time. PT PLN (Persero) has innovated by utilizing electric poles as SPKLU, so that it is more accessible to the public. With these various innovations, Indonesia strives to create an electric vehicle ecosystem that is reliable, efficient, and accessible to the public, so that it can accelerate the transition to sustainable transportation and achieve the NZE 2060 target.

Electric vehicles offer significant potential in reducing GHG emissions, especially in densely populated metropolitan areas and even in mountainous areas with different topography, or small cities that are equipped with SPKLU infrastructure. Electric vehicles do not produce direct emissions from the exhaust, which contributes to improved air quality. In addition, electric vehicles have the potential to be integrated with renewable energy sources, such as solar power plants, further strengthening their environmental benefits. Economically, the use of electric vehicles can reduce dependence on fuel oil imports, as well as open up opportunities for the development of the battery industry and electric vehicle components in the country.

Despite having great potential, the growth of electric vehicle sales in Indonesia still faces various challenges. Data from the Indonesian Motor Vehicle Industry Association (GAIKINDO) shows that sales of electric vehicles (including hybrids) in Indonesia in 2022 reached around 20,681 units or around 2%, then in 2024 it will increase by 4%, and in April 2025 it will be 9.3% of total motor vehicle sales. This figure shows that the penetration of electric vehicles is still very low, due to the government's target of 5% in 2024 and 11% in 2025 (GAIKINDO, 2025).

The basis for choosing the research location is the development of the region with the number of transaction times, the number of KWH, and the amount of rupiah income in the region then classified based on different characteristics. This study focuses on the analysis of

factors that affect the use of electric vehicles in three classifications of regions with different characteristics, namely metropolitan areas, mountainous areas, and small cities. The selection of these three regional classifications is based on regional developments and the number of Public Electric Vehicle Charging Stations (SPKLU) available, which reflects the level of infrastructure readiness and potential acceptance of electric vehicle technology in each regional classification.

Jakarta has the largest data, namely the accumulated number of transactions 40,135 times, 1,320,669 kWh, and the amount of revenue of IDR 3,257,799,423,-. Then followed by Tangerang with an accumulated number of transactions of 28,431 times, 845,777 kWh, and total revenue of IDR 2,095,868,788,-. Followed by Bogor with an accumulated number of transactions of 12,323 times, 395,366 kWh, and total revenue of IDR 975,280,875,-. Furthermore, Bandung with an accumulated number of transactions of 11,496 times, 375,637 kWh, and total revenue of IDR 926,615,006,-. Finally, Cirebon with a total of 5,438 transactions and 8,503 times, 207,614 kWh and 192,459 kWh, and total revenues of IDR 512,136,881 and IDR 464,753,321

The difference in the number of KWH and the amount of rupiah income shows variations in the level of electric vehicle use in the three regional classifications. By selecting the research location in the three regional classifications based on the quantitative data, this study aims to understand the factors that affect the use of electric vehicles in various regional classifications in Indonesia, so that it can provide policy recommendations that are more targeted and effective in encouraging the growth of electric vehicle use in Indonesia. Therefore, the author chose the title "Analysis of Factors Affecting the Use of Electric Vehicles with Age, Gender, and Experience Moderation Variables in the Classification of Metropolitan Areas, Mountainous Areas, and Small Cities in Indonesia".

This study aims to explore the factors influencing the use of electric vehicles (EVs) in Indonesia, focusing on metropolitan areas, mountainous areas, and small towns, based on the UTAUT2 framework (Venkatesh et al., 2012). It seeks to identify the key factors affecting EV adoption and assess which regional classification has the most significant influence of these factors. The purpose of the research includes raising awareness about the benefits of EVs, understanding the current landscape of EVs in Indonesia, and addressing the challenges and strategies for increasing EV adoption.

The research offers several benefits for various stakeholders. For the government, it provides recommendations for policy formulation and resource allocation to promote EV use. For PT PLN (Persero) and other stakeholders, it helps identify business opportunities and strategies to expand the EV market. For the community, it aims to increase awareness of the economic, environmental, and social benefits of EVs. Academically, it contributes to sustainable transportation research and provides references for further studies. Environmentally, the research supports the clean energy transition, reduces carbon emissions, and improves air quality, making a positive impact on various sectors and accelerating the adoption of EVs in Indonesia.

METHOD

This study explored the use of electric vehicles (EVs) across three regional classifications in Indonesia—metropolitan areas, mountainous areas, and small cities—by analyzing the

driving and inhibiting factors for EV adoption using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) (Venkatesh et al., 2012). The research identified key aspects such as performance expectancy, facilitating conditions, social influence, and hedonic motivation that influenced EV adoption.

Data collected from an online survey between January 30 and March 1, 2025, provided a comprehensive understanding of how these factors varied across regions. Metropolitan areas like Jakarta and Tangerang demonstrated higher EV adoption rates due to better infrastructure, higher purchasing power, and progressive government policies. Conversely, mountainous areas (Bogor and Bandung) and small cities (Cirebon) showed lower adoption rates, potentially attributable to inadequate infrastructure, logistical barriers, and negative public perceptions of EVs. The study emphasized the need for region-specific policies to address these disparities and accelerate EV adoption across Indonesia.

The study's research design followed a systematic approach that began with a literature review laying the foundation for understanding EV adoption within the UTAUT2 framework. Data collection through online surveys gathered insights from various regions, which were then analyzed using structural equation modeling (SEM) to examine relationships between UTAUT2 variables and EV use. The findings indicated that UTAUT2 factors—such as performance expectancy, effort expectancy, and social influence—significantly impacted EV adoption, with metropolitan areas showing the strongest effects. Additionally, the research suggested that age, gender, and experience acted as moderating variables, influencing how UTAUT2 factors affected EV usage. The results informed future policies and strategies aimed at boosting EV adoption and ensuring a sustainable transportation system in Indonesia.

RESULTS AND DISCUSSION

The results of the study Analysis of Factors Affecting the Use of Electric Vehicles with Age, Gender, and Experience Moderation Variables in the Classification of Metropolitan Areas, Mountainous Areas, and Small Cities in Indonesia illustrate the characteristics of respondents and factors that affect the use of electric vehicles in Jakarta and Tangerang as representations of metropolitan areas, Bandung and Bogor as representations of mountainous areas, and Cirebon as representations of cities Small.

1. Classification of regions

The distribution of respondents by region shows that Jakarta and Tangerang dominate the number of participants, each by 37%. Bandung accounted for 10% of respondents, followed by Cirebon 12% and Bogor 4%. This shows that most of the respondents come from urban and metropolitan areas that have a higher potential for the adoption of electric vehicle technology. With these results, it can be said that the questionnaire has been spread across all classifications of the research area, although the results are uneven.

2. The level of knowledge of the respondents towards electric vehicles.

This is intended to find out the respondents' knowledge or understanding of the context to be surveyed. As many as 99% of respondents stated that they already knew about electric vehicles, while only 1% did not know about it. This high level of knowledge is a positive indicator for the dissemination of information and public education about environmentally friendly vehicle technology.

3. Respondents as decision-makers in purchasing

As many as 92% of respondents admitted to being decision-makers in the vehicle purchase process, while 8% did not. This is important in the analysis of consumer behavior, as purchasing decisions directly affect the adoption of new technologies such as electric vehicles. If there are insignificant results while the average respondent is not a decision maker then the analysis can lead to this.

4. Respondent Income

The income distribution shows that the majority of respondents (64%) have an income above IDR 20 million per month. Meanwhile, 25% are in the range of Rp 10-20 million, 9% are between Rp 5-10 million, and only 2% earn below Rp 5 million. This data indicates that most respondents come from the middle to upper economic group, which has greater purchasing power towards high-tech products such as electric vehicles.

5. Resources about electric vehicles

The internet (48%) and social media (45%) are the two main sources of information about electric vehicles. Other sources such as television (1%), newspapers/magazines (1%), and friends/family (5%) contribute only small amounts. This emphasizes the importance of digital marketing strategies and online-based education in disseminating information about electric vehicles.

6. Technology acceptance decision

In terms of acceptance of electric vehicle technology, 45% of respondents stated that they accepted, 26% rejected (*no*), and 29% doubted or did not provide an answer. Although the acceptance rate is quite high, there are still about one-third of respondents who are not sure or rejected, which needs to be a concern in the strategy to increase the adoption of electric vehicles and will be discussed in more detail in the sub-chapter of the discussion.

The discussion of the results of the research on Analysis of Factors Affecting the Use of Electric Vehicles with Moderation Variables of Age, Gender, and Experience in the Classification of Metropolitan Areas, Mountainous Areas, and Small Cities in Indonesia is a discussion of the results of SEM modeling analysis using the SMART PLS tool based on factors that affect the use of electric vehicles in Jakarta and Tangerang as a representation of metropolitan areas, Bandung and Bogor as representations of mountainous areas, and Cirebon as representations of Small Cities will be explained in more detail as follows.

1. Evaluation of Measurement Models (Outer Model)

a. Loading factor

Based on the test results, all indicators in the model have a loading factor value above 0.600, which indicates good convergent validity. According to Hair et al. (2014), loading values above 0.70 are considered very good, while values between 0.60–0.70 are still acceptable.

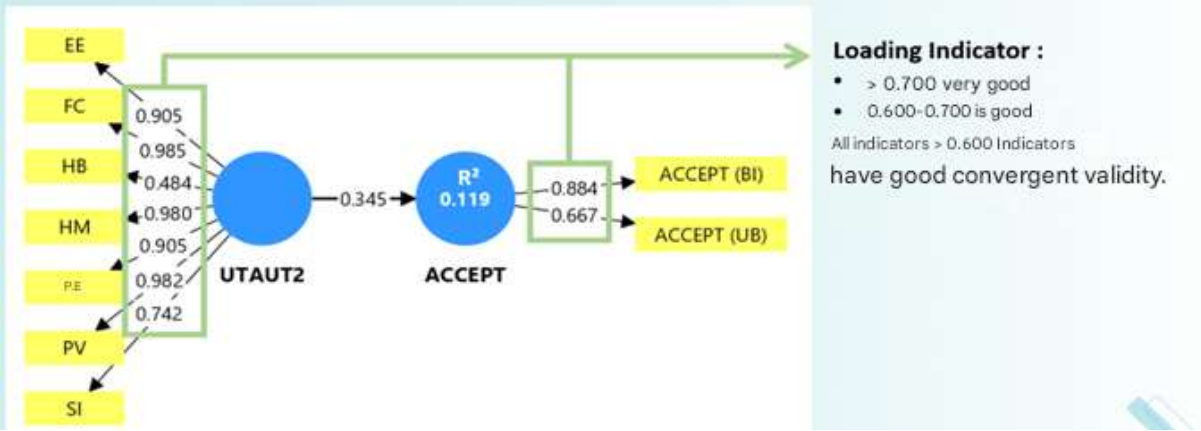

Fig 1. Diagram Loading Factor

Since the Habit (HB) indicator has a loading value below 0.6 (0.484), which means its contribution to the weak model will be removed and recalculated as follows.

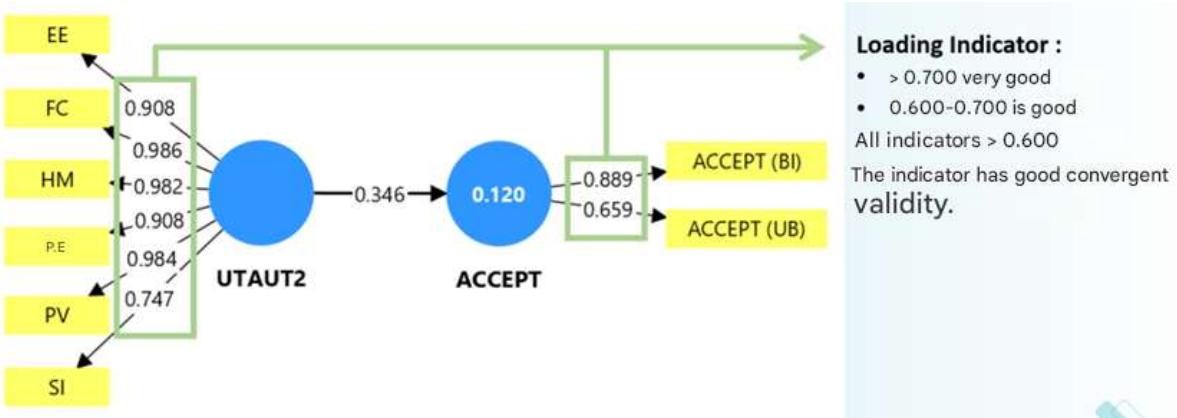

Figure 2. Loading Factor Diagram Without HB Indicator

The details of the loading value of the UTAUT2 construct after recalculation are as follows: EE (Effort Expectancy) 0.908, FC (Facilitating Conditions) 0.986, HM (Hedonic Motivation) 0.982, PE (Performance Expectancy) 0.908, PV (Price Value) 0.984, and SI (Social Influence) 0.747.

b. Average Variance Extracted (AVE)

AVE is used to measure the validity of the convergence, the variable value of the indicator describes the variance of the construct. If the AVE ≥ 0.500 then the validity converges well (Fornell & Larcker, 1981). The results obtained from the construct ACCEPT 0.612 and UTAUT2 0.852. This means that each construct is able to explain more than 50% of the variance of its indicators, so it is considered to be valid in a convergent manner.

c. Composite Reliability (CR)

In PLS-based SEM, Composite Reliability (CR) or rho_c is considered more representative because it takes into account the contribution of each indicator to the construct. The test results of the ACCEPT construct rho_c = 0.755 and the UTAUT2 construct rho_c =

0.972. The value exceeds the threshold or criterion value ≥ 0.700, which means that both constructs are considered to have good composite reliability (Hair et al., 2019).

Cronbach's Alpha It is used to measure the internal consistency of indicators in a single construct. Based on the results of data processing, the ACCEPT construct has a value Cronbach's Alpha of 0.388 and the UTAUT2 construct has a value of 0.963. Based on Hair et al. (2019), Cronbach's Alpha value ≥ 0.700 indicates high reliability. However, in the PLS-SEM approach, Cronbach's Alpha is not the only reference for reliability, as it is highly dependent on the number of indicators and the distribution of data.

2. Evaluation of Structural Models (Inner Model)

a. Path coefficient

The path coefficient from the UTAUT2 to ACCEPT construct is 0.346, which means that the indicators in UTAUT2 explain 34.6% of the variation in technology acceptance.

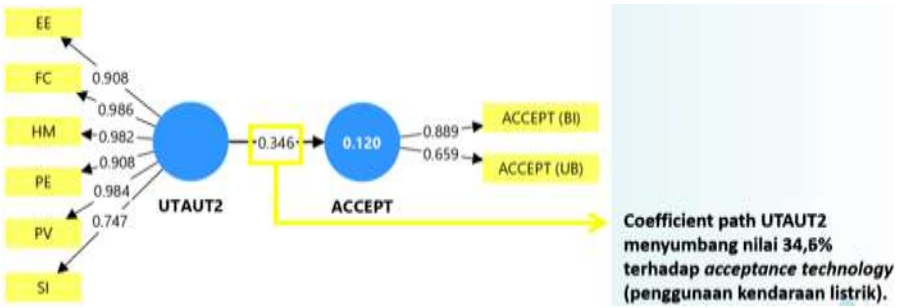

Fig 3. Diagram Path Coefficient

b. R Square (R^2) or determination value

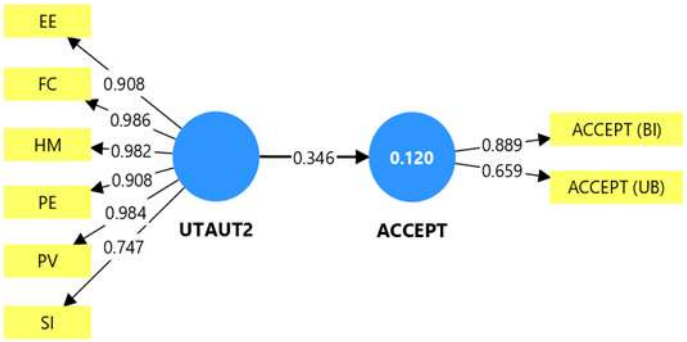

Figure 4. Diagram R^2

An R^2 value of 0.120 indicates that the ACCEPT construct is only 12% explained by the UTAUT2 construct, while 88% is influenced by other variables that are not included in this model. This shows that the model's predictive ability on electric vehicle acceptance is still very limited.

In line with Hair et al. (2014), a very low R^2 value indicates that the model does not yet cover all of the influencing factors, so it is recommended to consider additional variables beyond UTAUT2 in follow-up studies. These findings imply that although UTAUT2 has contributed to the formation of intentions and behaviors of using electric vehicles, its contribution is still limited. Therefore, the extension of the model with additional variables will

be very helpful in improving the predictive accuracy of the [25]behavioral intention (BI) and use behavior (UB) in the context of electric vehicles.

Although the test results show that the R-square (R^2) value for the endogenous construct is in the low or weak category (0.120 < 0.25), this does not necessarily diminish the overall validity of the developed model. Hair et al. (2017) stated that in the SEM-PLS approach, R^2 is a predictive indicator that is relative and depends on the research context and the complexity of the model. Therefore, a model with a low R^2 value can still be considered theoretically and practically meaningful if other indicators, such as construct reliability ([20]Composite Reliability and Cronbach's Alpha), convergent validity (AVE), and discriminant validity have met the established criteria.

Furthermore, the test of the path coefficient showed that most of the relationships between constructs in the model had a statistically significant influence, as shown by the t-statistical value > 1.96 and the p-value < 0.05. This indicates that although the overall predictive capabilities of the model are still limited, structurally the relationships between the constructs have been in accordance with theoretical expectations and support the internal validity of the research model.

Although the model's predictive ability is relatively weak based on the R^2 value, the model still shows a valid and significant relationship structure, and makes a relevant contribution in explaining the factors that influence the intentions and behaviors of electric vehicle use in Indonesia.

c. Fit Models with SRMR

The SRMR value shows the difference between the estimated model covariance matrix and the observed covariance matrix. The smaller the SRMR value, the better the model's fit for the data. The results of this study showed that the SRMR value = 0.069. According to Henseler et al. (2014) and Hair et al. (2019), the model is declared fit if the SRMR value is below the threshold of ≤ 0.080, and ideally ≤ 0.050. Therefore, with an SRMR value of 0.069, the model in this study has met the model fit criteria, meaning that the proposed model structure has sufficient compatibility with the empirical data obtained from the respondents.[26][20]

In addition to SRMR, there are also other indicators such as d_ULS, d_G, Chi-square, and NFI, but the PLS-SEM approach focuses more on the SRMR value as the main indicator of model fit. Chi-square values are not used in the PLS approach because they are non-parametric and do not demand data normality. The d_G (geodesic distance) value is not available in this result (n/a) because the model is so simple that it is sufficient to use SRMR. SmartPLS does not calculate NFI (Normed Fit Index) by default, Hair et al. (2019) suggest relying on SRMR and bootstrapping quantile alone as the primary fit model measures in the context of PLS. The value d_ULS = 0.173, is used to detect errors between the observed and estimated matrices (this is rarely the main criterion). The value of this d_ULS (Unweighted Least Squares Discrepancy) is analyzed using bootstrapping quantile as follows:

FC (Facilitating Conditions): stable and positive coefficients in almost all quantiles (+1). This means that the condition of the facility that supports it always improves usage behavior.

PV (Price Value): a sharp negative coefficient (-) across all quantities. This suggests that the higher the cost perception (PV), the lower the usage behavior tendencies.

HM (Hedonic Motivation): the coefficient increases progressively in the upper quantile (in this study the quantile range is 0.75 – 0.95). This suggests that for users with a high tendency to use the system, the motive of pleasure plays an increasingly important role. The quantile regression coefficient for Use Behavior (UB) shows how the influence of variables such as FC, HM, and PV changes significantly across different quantiles. HM (Hedonic Motivation) increased sharply in the upper quantile, while PV (Price Value) became increasingly negative.

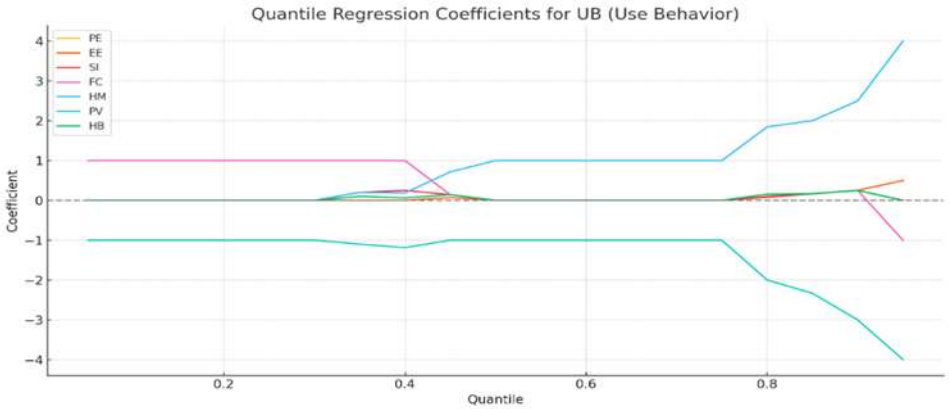

Figure 6. Quantile Regression Graph from UB

HM and PV: there is a strong balancing effect. In the lower quantile (0.05 – 0.20), HM is very negative and PV is very positive, but reverses direction in the upper quantile (0.75 – 0.95). This indicates that there are two types of users, namely: Using electric vehicles based on pleasure (HM). Using electric vehicles based on cost/benefit (PV) value

PE, EE, SI: variables such as PE (Performance Expectancy), EE (Effort Expectancy), and SI (Social Influence) start to have an impact in the middle quantile (0.50), which means they are more important for users who are in the medium intention stage.

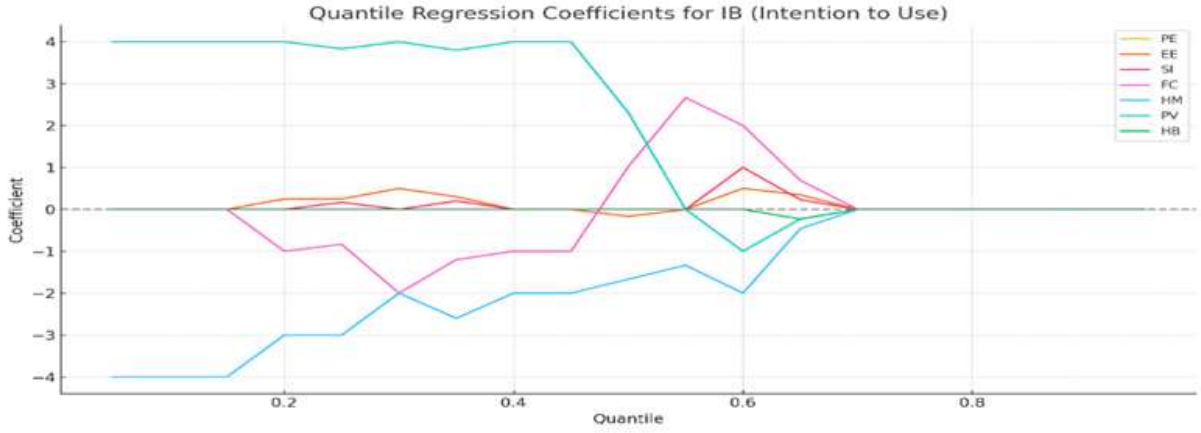

Figure 7. Quantile Regression Graph of IB

The quantile regression coefficient for Behavioral Intention (BI) shows that HM and PV have large and opposite coefficients in the lower and upper quantiles. Meanwhile, EE and SI (Effort Expectancy & Social Influence) only have a strong effect in the middle quantile (around the median value).

d. Significance Testing

In this model, the UTAUT2 construct is a latent construct formed by several main indicators, namely: EE (Effort Expectancy), FC (Facilitating Condition), HM (Hedonic Motivation), PE (Performance Expectancy), PV (Price Value), SI (Social Influence). The ACCEPT construct reflects the acceptance of electric vehicle use technology, which in this model consists of two important aspects, namely: BI (Behavioral Intention), intention to use electric vehicles and UB (Use Behavior), actual behavior in using electric vehicles.

Based on the results of the analysis using the PLS SEM approach, it was found that the UTAUT2 construct has a significant effect on the ACCEPT construct (UTAUT2 factors affect the use of electric vehicles in all classifications of metropolitan areas, mountainous areas, and small cities in Indonesia). This is proven through the following analysis results:

1) Statistical T-Test

The result t-value is 6.118 above the threshold value of t> 1.960, which indicates that the relationship between the constructs is statistically significant at a significance level of 5% (α = 0.05) (Hair et al., 2019).

2) P Values

This p value is 0.000 or less than 0.050, reinforcing that the relationship between the constructs is really significant and not coincidental (random error) (Hair et al., 2021) .

The following is the result of the significance test diagram through SEM modeling, with a t-value of 6,118 in the UTAUT2 construct as a whole, 17,486 and 6,838 in the ACCEPT (BI) and (UB) constructs, then the constructs of other indicators are above 1,960 with R^2 0.120 or 12%.

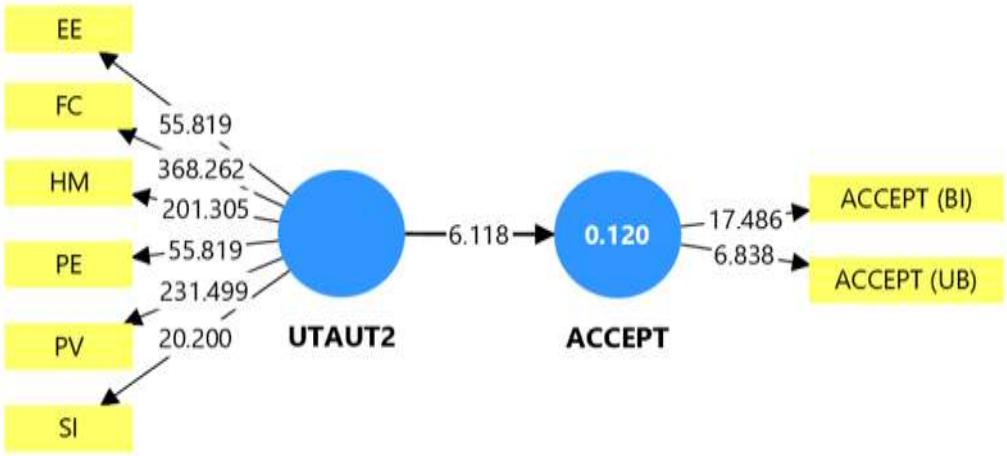

Figure 8. SEM Modeling Significance Test Diagram

e. Effect Size Testing using F Square (F^2)

Based on the results of SEM modeling analysis that has been carried out previously, a number of independent variables such as Facilitating Conditions (FC), Price Value (PV), and Social Influence (SI) show significant p-values, which means that there is a statistical influence on dependent variables, namely Use Behavior (UB) and Behavioral Intention (IB). Statistically there is a detectable relationship between exogenous constructs and endogenous constructs, as confirmed by P-values that are below the conventional significance threshold (>0.05).

According to Hair et al. (2019), significance tests aim to identify the observed effects that are most likely not to occur by chance.

However, when measuring the effect of size (effect size) using F-square (F^2), it was found that the entire variable had a value of $F^2 < 0.02$, which was categorized as a minor effect. The highest F^2 value against Use Behavior (UB) is PV (0.0072), while against Behavioral Intention (IB) is SI (0.0064), both of which are well below the threshold or insignificant (0.02) as stated by Cohen (1988).

These results suggest that although some constructs are statistically significant, their actual contribution to the prediction of dependent variables is very small. This phenomenon is common in studies with large sample sizes or with dependent variables whose distribution is uneven, Sullivan and Feinn (2012).

The constructs of Performance Expectancy (PE) and Effort Expectancy (EE) show a significant p-value, but the value of F^2 is close to zero. This suggests that although the relationship is statistically present, the practical impact on technology use behavior is very weak or very small in terms of its actual contribution to life or practical context (PE and EE do have an effect, but they have very little influence on respondents' decision to use electric vehicles).

f. Analysis Based on Regional Classification Representation

The factors in the UTAUT2 theory have a significant influence on the acceptance of the use of electric vehicles (ACCEPT) in all classifications of research areas, both metropolitan areas, mountainous areas, and small cities. However, after being analyzed separately from each regional classification, the results are as follows:

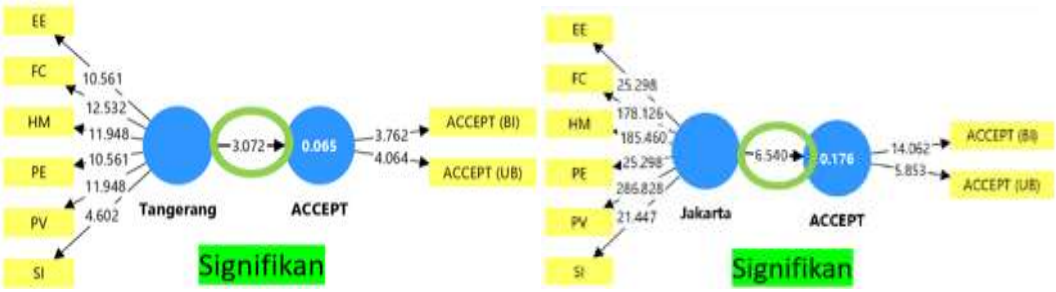

Figure 9. Metropolitan Area Classification Significance Test Diagram

In Tangerang and Jakarta, the entire UTAUT2 construct significantly affects the acceptance of electric vehicles. This shows that people in metropolitan areas tend to be more responsive to new technologies including electric vehicles. The main factors that influence are the availability of facilities (FC) and price (PV).

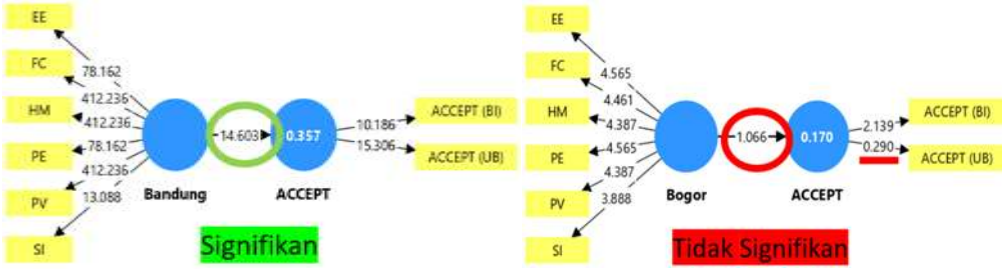

Figure 10. Significance Test Diagram of Mountainous Area Classification

Although both are mountainous areas, the results are different between Bandung and Bogor. In Bandung, the factors of UTAUT2 are very significant. This can be due to a higher level of awareness and access to electric vehicle infrastructure. Meanwhile, in Bogor there is no significant influence. The results of the analysis showed that behavioral intention (BI) was significant, while use behavior (UB) was not significant.

So that the calculation of these two analyses shows that the UTAUT2 factors do not significantly affect the use of electric vehicles in Bogor. Based on statistical analysis, where t results > 1,960 shows that all factors in UTAUT2 significantly affect the use of electric vehicles in Bogor. However, after all these factors were combined, it turned out that the results were not significant or not strong enough to affect the use of electric vehicles in Bogor because the calculation of t results was indeed smaller compared to other areas that had a significant effect.

It is also possible that there are other factors that are stronger (indicated by the R^2 value of 17% representing all UTAUT2 factors). The UTAUT2 factor in Bogor with the highest significance value is EE (ease of use of electric vehicles is the main consideration factor) and the lowest is SI (people around you cannot influence the decision to use electric vehicles). Based on the analysis of the theory of Acceptance Technology, BI>UB illustrates that respondents have an interest in adoption (BI) but are not accompanied by real actions of making purchases (UB). Based on the analysis of the questionnaire results, it shows that UB is not significant in Bogor due to infrastructure factors 64%, socialization 14%, expensive 7%, battery waste 7%, after-sales 4%, and regulations 4%.

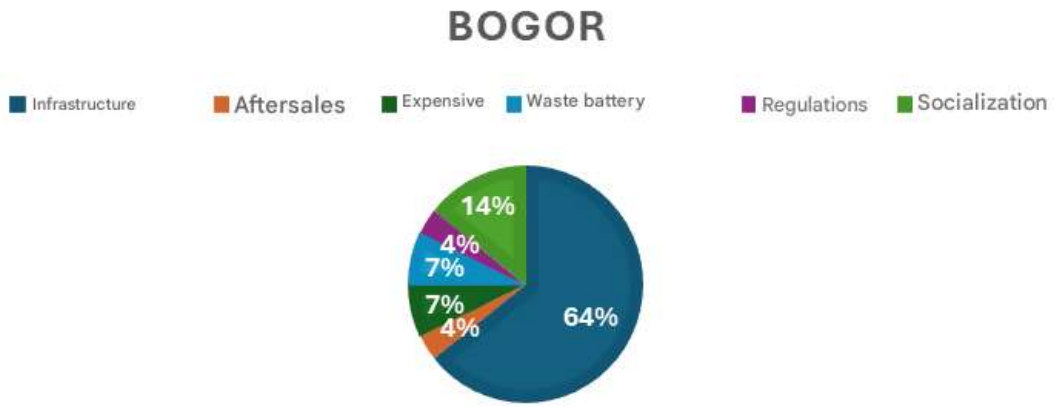

Figure 11. Graph of Questionnaire Results of Significant Areas of Not Effect (Bogor)

In a small town in this case Cirebon, the factors in the model are not significant in encouraging the acceptance of the use of electric vehicles. The results of the analysis showed that behavioral intention (BI) was significant, while use behavior (UB) was not significant. So that the calculation of these two analyses shows that the UTAUT2 factors do not significantly affect the use of electric vehicles in Cirebon.

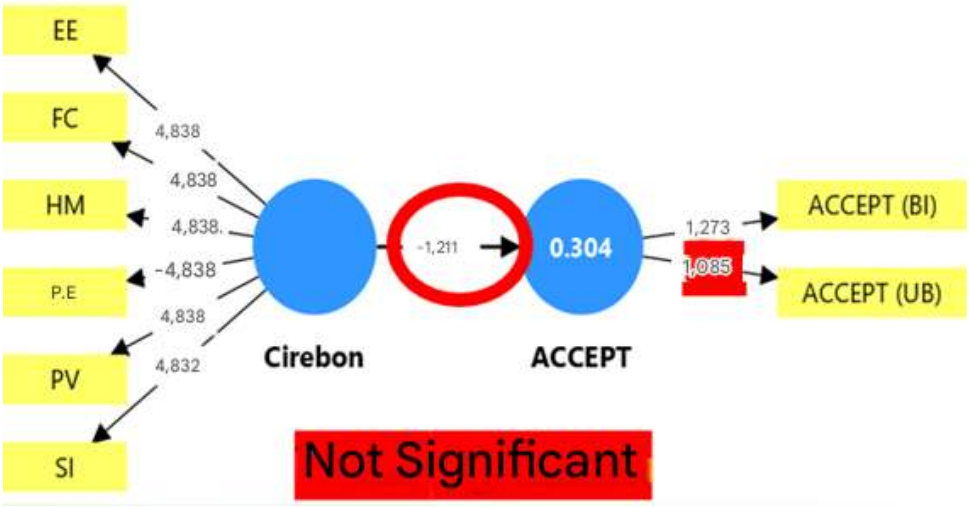

Figure 12. Small Town Classification Significance Test Diagram

Based on statistical analysis, where t results < 1,960 shows that the UTAUT2 factor does not significantly affect the use of electric vehicles in Cirebon. The UTAUT2 factor in the Cirebon area has equal or equal significance values. This means that convenience (EE), support (FC), motivation (HM), performance (PE), price (PV), and social (SI) have an equal influence in Cirebon. Although BI and UB are both insignificant, BI>UB. Based on the analysis of Acceptance Technology theory, this illustrates that respondents have an interest in adoption (BI) but are not accompanied by real actions of making purchases (UB).

Figure 13. Graph of Questionnaire Results of Significant Areas of Not Effect (Cirebon)

Based on the analysis of the results of the questionnaire, it shows that UB is insignificant in Cirebon due to infrastructure factors 37%, regulations 18%, expensive 18%, after-sales 9%, socialization 9% and battery waste 9%. There is a significant influence on the use of electric vehicles in Jakarta, Tangerang, and Bandung based on the diagram above explained by the analysis:

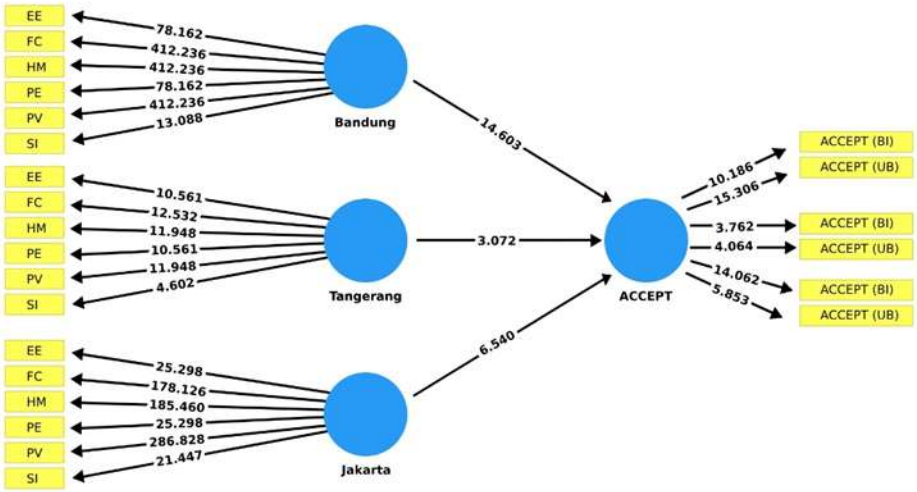

Figure 14. Significance Test Diagram of Influential Significance Regions

According to the Acceptance Technology theory, in the Jakarta area, BI's value is higher than UB's, which means that interest in adoption (BI) is higher than the actual act of making a purchase (UB). According to the analysis of the questionnaire results, BI>UB is due to infrastructure factors 52%, regulation 13%, expensive 11%, after-sales 9%, battery waste 6%, socialization 5%, and reliability 4%.

Meanwhile, the Bandung and Tangerang areas have lower BI values than UB, which means that the real act of making a purchase (UB) is higher than the interest for adoption (BI). According to the analysis of the questionnaire results, BI<UB is influenced by the savings factor of 48%, green 34%, technology 17%, and infrastructure 1%. Furthermore, a comparative analysis of the moderation results between the most significant and least significant regions was carried out to deepen the analysis and determine the influence of other variables that may affect the results.

In this study, a comparative analysis was conducted on the influence of moderation variables (gender, age, and experience) in the two regions that showed the most contrasting results based on the classification of UTAUT2 significance on electric vehicle acceptance, namely Bandung as the region that showed the most significant influence, and Bogor as the region that showed the least significant influence.

This analysis refers to the UTAUT2 theory (Venkatesh et al., 2012), which states that [14]gender, age, experience is a moderation variable that can strengthen or weaken the relationship between the main constructs (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions) against Behavioral Intention (BI) and Use Behavior (UB).

- Gender (gender)

The gender distribution between the two regions is relatively similar, with the dominance of male respondents in Bandung (90%) and Bogor (86%). This suggests that gender is not the main differentiating factor in the difference in significance between regions, as the trends are similar.

- Age (age)

The difference is quite striking in terms of the age distribution of respondents. In Bandung, the 36–45 age group dominates with a proportion of 41%, which is theoretically

more financially mature and may have a higher awareness of green technology. Meanwhile, Bogor is dominated by respondents aged 25-35 years (31%), who tend to be in the early phase of their careers, so they may be more affected by price and infrastructure factors, and have limited access to electric vehicles.

- Experience

Bandung shows that 52% of respondents have never used an electric vehicle, while in Bogor only 49%. Although the difference is small, it shows that in Bandung, although the experience is still low, other factors from UTAUT2 can still significantly influence the intention and behavior of using electric vehicles. So it can be said that the Bandung area has a strong tendency to accept and try new technologies, including electric vehicles.

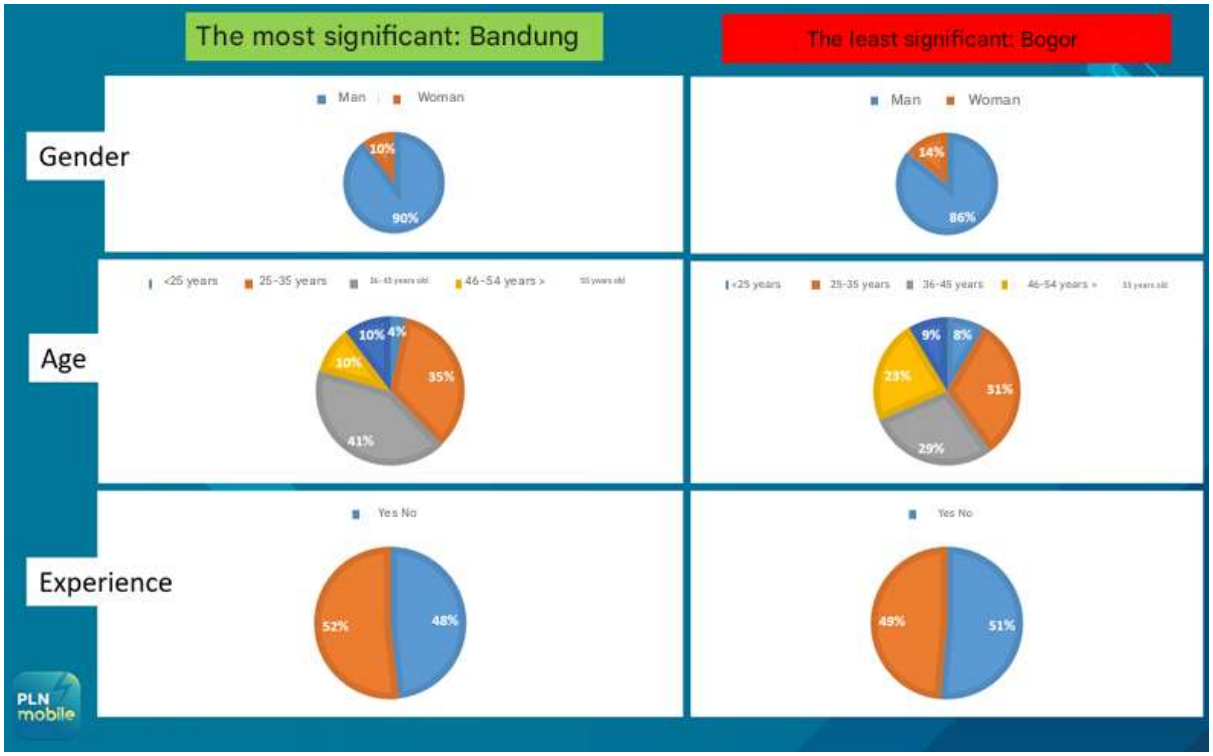

Figure 15. Comparative Analysis Diagram of Moderation Variables

CONCLUSION

Analysis of UTAUT2 factors influencing electric vehicle (EV) adoption across Indonesian regions—metropolitan (Jakarta, Tangerang), mountainous (Bandung, Bogor), and small cities (Cirebon)—revealed significant effects in Jakarta, Tangerang, and Bandung (with facilitating conditions [FC], hedonic motivation [HM], and price value [PV] most influential in Bandung, especially among ages 36–45), but minimal impact per F-square tests and no significance in Bogor or Cirebon, where Cirebon showed a gap between behavioral intention (BI) and use behavior (UB). Bandung exhibited the highest potential despite low usage, yet the model explained only 12% of variance, underscoring external factors beyond UTAUT2. For future research, integrate additional variables like infrastructure quality, policy incentives, and cultural attitudes into an extended UTAUT2 framework, tested via multi-group PLS-SEM across more diverse Indonesian regions.

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