*Nanotechnology Perceptions*
*ISSN 1660-6795*
*www.nano-ntp.com*

# Looking for Key Factors that Can Increase Electric Vehicle Adoption Intentions in Indonesia

**Muhammad Ifaldhi Hafiz[1], Harry Setiawan[2], Bintoro Bagus Purmono[3], Nur Afifah[4], Juniwati[5]**

[1,2,3,4,5] *Faculty of Economics and Business, Universitas Tanjungpura, Indonesia*
*Corresponding Author: b1021211223@student.untan.ac.id*

This study investigates the factors that impact electric vehicle (EV) adoption intentions in Indonesia, focusing on perceived ease of use, environmental concern, and perceived usefulness as significant drivers. Attitude serves as a mediating variable, while financial incentive policy serves as a moderating variable. The study approach is quantitative, with 220 respondents from Indonesia's metropolitan regions surveyed using the purposive sample method. A 5-point Likert scale online questionnaire was used to collect data, which was then analyzed using Structural Equation Modeling (SEM) in AMOS 26 software. The findings indicate that environmental concerns and attitudes have a major impact on adoption intentions, while perceived ease of use and perceived usefulness influence indirectly through attitude. In addition, financial incentive policies strengthen the connection between attitude and desire to adopt electric vehicle, emphasizing the importance of government support in promoting EV adoption. This study concludes that building positive attitudes towards EVs and providing financial incentives can increase the adoption of electric vehicles in Indonesia. The findings are likely to give insights for manufacturers, marketers, policymakers and stakeholders in designing strategies to encourage EV adoption, ultimately contributing to environmental sustainability in Indonesia.

**Keywords:** Adoption Intention; Electric Vehicles; Environmental Concern; Financial Incentives Policy; Perceived Ease of Use; Perceived Usefulness.

## 1. Introduction

Over the past few years, the automotive industry's rapid transition has been driven by new forces in the vehicle manufacturing business towards more environmentally friendly and low-carbon emission technologies (D. Wu & Li, 2024). It is likely that electric cars (EVs) will become popular. Several countries have put a lot of effort into introducing different types of electric cars (Febransyah, 2021). One of the main causes of global warming is atmospheric emissions of greenhouse gasses from vehicles and global warming. One way to mitigate this problem is to switch from driving a vehicle that runs on electricity rather than gasoline or diesel. Electric vehicles have many potential benefits, but not everyone is opting for them. This is especially true in developing countries (Hidayat & Cowie, 2023). The challenge in understanding Indonesians' intentions is to know their preferences and expectations for electric vehicles, especially since electric vehicles are still new in Indonesia.

About 31.5% of Indonesia's total carbon dioxide emissions come from the transportation sector. Energy consumption and carbon dioxide emissions will only increase sharply as Indonesia becomes an industrialized country (Murtiningrum et al., 2022). The large number of motorized vehicle users has resulted in various issues with the environment, including global warming, limited availability of oil resources in Indonesia, and pollution that adversely affects health. This condition makes the use of electric vehicles very important in Indonesia (Ray & Harito, 2023). The government has set a target to have 2 million electric cars and 13 million electric motorcycle riders on the road by 2030. Another goal of the electric motorcycle conversion program is to double production from 50,000 units in 2023 to 150,000 units in 2024. There are currently less than 100,000 electric vehicles on Indonesian roads, with an estimated 74,000 electric motorcycles and 20,000 electric cars (Anshori, 2023).

## 2. Literature Review

Although the government has set ambitious targets to raise the total of electric vehicle users in Indonesia, the realization is still far from expectations. Achieving this objective requires thoroughly investigating aspects influence people's tendency to adopt electric vehicles. In this regard, various studies have revealed that factors such as Perceived Ease of Use have a significant influence in shaping users' attitudes and perceptions towards the benefits of new technologies, including electric vehicles. This factor is often considered a key element influencing technology adoption factors, across a variety of contexts (Huang et al., 2022). This concept describes how easy a product is to learn and use effectively with little or no effort, which has an effect on user preference. Products that are easier to use are often preferred, this perception represents a person's own evaluation of the simplicity of the technology and relates to the physical and psychological burden of using the technology or a product (Boubker et al., 2024; Hitten, 2019; Jaiswal et al., 2021; Nabila et al., 2023; Song & Jo, 2023; J. Wu et al., 2019) in the context of this research is the electric vehicle.

Another significant and strong aspect is Environmental Concern, This is the amount to which people care about harm to the environment and pay attention to environmental topics or issues (Cui et al., 2021; Park & Lin, 2020). This concept involves understanding, finding solutions, and an individual's willingness to contribute to solving environmental problems (Samarasinghe et al., 2024). The term is increasingly used to predict a change in behaviour from environmentally destructive actions to more environmentally friendly actions (Ha et al., 2023). People who care deeply about environmental concerns often to be more proactive in implementing appropriate measures to preserve nature (Akroush et al., 2019; Pebrianti & Aulia, 2021).

Perceived usefulness is another factor influencing electric vehicle adoption intention. It is defined as an individual's beliefs about how useful a new technology is in supporting the performance of a product or service and that the technology offers significant benefits, high relevance, and an effective solution to the problem at hand. (Adu-Gyamfi et al., 2022; Jaiswal et al., 2022). In addition, perceived usefulness refers to a person's perception of the ability of a new system to increase the productivity and effectiveness of the tasks performed (Tu & Yang, 2019). In the context of electric vehicles, Perceived Usefulness explores the degree to which a person is able to considers the efficiency of an electric vehicle's functions (Boubker et al., 2024).

In addition, attitude is an important factor in shaping adoption intention directly or acting as a mediator because it reflects how a person views a behavior, either with a positive or negative assessment (Alam et al., 2024; He & Hu, 2024). Attitudes reflect positive or negative evaluations of adoption behaviour, rooted in users' internal beliefs about innovative technologies or new products. Individuals who have a good view of technology are more inclined to adopt it. Conversely, Negative impressions can be a hindrance to the adoption of that technology. (Jaiswal et al., 2021).

Regarding the high price of electric vehicles (EVs), few consumers actively choose to buy them. Electric vehicles, especially when compared to internal combustion engine ICE vehicles, are still too new, too expensive, and too immature for most people to buy. To solve this problem, financial incentives can help close the price gap between electric cars and ICEs, which are cheaper. In order to get more people to use electric cars, the government offers such policies as (ownership tax benefits, valued added tax benefits, purchase subsidies, and registration tax benefits) (Xue et al., 2021). Financial incentive policy measures can be a stimulus in promoting the deployment of electric vehicles (EVs), furthermore, as a result of the moderating effect of this external stimulus, it can influence the direction or level in terms of the connection between people's attitudes regarding electric vehicles and their willingness to adopt them (Jaiswal et al., 2021).

The word adoption intention relates to how an individual engages in a specific action (Dubey & Sahu, 2021). Within the framework of electric vehicles, This pertains to the degree of public interest in buying or using these vehicles in the future (Boubker et al., 2024). It can be said that individuals who Make use of and embrace new products, services, and technology faster than others in the same social structure, which suggests that when a consumer adopts a new product, they have already tried and accepted the product (Li et al., 2023).

This study seeks to uncover important variables impacting the desire to adopt electric vehicles (EVs) in Indonesia by building on results from earlier research in other countries. This

study's variables are based on those of earlier research by (Boubker et al., 2024; Buhmann et al., 2024; Ha et al., 2023; Jaiswal et al., 2021; Murtiningrum et al., 2022; Wang et al., 2021). Finding out what factors impact EV adoption in Indonesia the most is the driving force for this research. In order to promote the adoption of environmentally friendly vehicle that uses electrical energy to operate, this research will be valuable for manufacturers, marketers, and policy officials.

## 3. Research Method

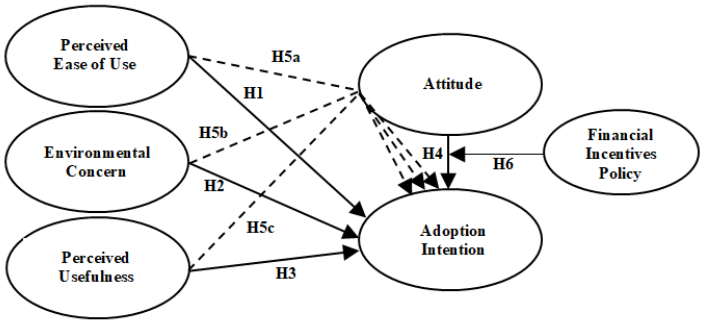


**Figure 1.** Research framework

3.1 Direct Effect

This research examines the direct relationship between several variables on the adoption intention of electric vehicles, starting from perceived ease of use, based on previous studies, this relationship shown to significantly increase the desire to adopt electric vehicles across a number of nations. Jaiswal et al., (2021, 2022) found that these perceptions contribute to increasing electric vehicle adoption intentions in India. Similar results were also found by Ha et al, (2023) in a study in Vietnam, This variable acts as a pull factor, encourage more people to adopt these eco-friendly vehicles.

In addition, Environmental Concerns also substantial effect in shaping the desire to embrace electric vehicles. A cross-cultural research between India and Spain conducted by Higueras-Castillo et al, (2023) demonstrates that this component is significantly influential in both nations. Research in China also corroborates these findings, where J. Wu et al, (2019) found that this variable increases individuals' intention to use and purchase electric vehicles. A subsequent investigation conducted by Cui et al, (2021) shows that the level of environmental concern also influences household motivation to buy electric vehicles.

Perceived Usefulness also plays a role in shaping adoption intention as evidenced by the findings of Ha et al. (2023) in Vietnam identified that the real usefulness of EVs (which is included in the pull factor) compared to conventional vehicles strengthens this perception to adopt electric motors. Similar results were also found by Boubker et al. (2024) that people in Morocco are more likely in order to accelerate the widespread use of EVs if they have a good impression of its environmental benefits. Findings from Jaiswal et al. (2021, 2022) in India and J. Wu et al. (2019) in China also show that intention to adopt is positively and significantly affected by this variable.

Next is the attitude variable, in previous findings in various countries such as Spain, Indonesia, India, and China by (Buhmann et al., 2024; Fu, 2024; Jaiswal et al., 2021; Murtiningrum et al., 2022) that this variable has a relationship that makes the adoption rate of this environmentally friendly vehicle increase.

**H1.** Perceived ease of use affects the adoption intention of electric vehicles directly.
**H2.** Environmental concern affects the adoption intention of electric vehicles directly.
**H3.** Perceived Usefulness directly affects Adoption Intention of electric vehicles.
**H4.** Attitude directly affects Adoption Intention of electric vehicles.

3.2 Mediation Effect

From several previous empirical findings on the indirect relationship between perceived ease of use, environmental concern, and perceived usefulness on adoption intention through attitude variables, the result is that attitude can act as a good mediator in increasing adoption intention and purchase intention for electric vehicles (Buhmann et al., 2024; Jaiswal et al., 2021; Murtiningrum et al., 2022).

**H5a.** Attitude mediates the connection between perceived ease of use and the intention to adopt electric vehicles.

**H5b.** Attitude mediates the connection between environmental concern and the intention to adopt electric vehicles.

**H5c.** Attitude mediates the connection between perceived usefulness and the intention to adopt electric vehicles.

3.3 Moderation Effect

Previous research has investigated the interaction between attitudes and intentions for electric vehicle adoption, with financial incentive policies acting as moderating factors in this dynamic (Jaiswal et al., 2021) in its findings, the Financial Incentives Policy has a favorable and highly supportive influence on the relationship between attitudes towards electric vehicles (EVs) and adoption intentions.

**H6**. Financial incentive policy significant moderates attitude on electric vehicle adoption intention

The researchers employed a quantitative methodology and utilized a non-probability sampling methodology called purposive sampling. In this method, the researcher decides what characteristics to include in the sample and there is a fair and equal opportunity for every individual in the population to be chosen. An online survey with a 5-point Likert scale, where "Strongly agree" is rated 5, and "Strongly disagree" is rated 1, was used to collect primary data. Using AMOS 26 as a statistical tool, this study will assess and examine the analytical models of the study constructs' measurements using Structural Equation Modeling (SEM). A number of fit index parameters will be used to assess the model fit test.

The population of this study included vehicle drivers across Indonesia with a sample that met the following criteria: 1) Own a gasoline-engine vehicle (Car, Motorcycle, or similar); 2) Can and often use conventional vehicles; 3) Are aware of, care about environmental issues, or follow pro-environment communities; 4) Have a monthly income of at least Rp. 5 million; 5) Are aware of incentive policies related to electric vehicles; 6) Live in urban areas. Pontianak, Jakarta, Bandung, Makassar, Semarang, Palembang, Surabaya, Yogyakarta, Bali, Medan, and Batam are some of the cities in Indonesia where 220 respondents participated.

For the purpose of evaluating construct reliability, we will be using the CR and AVE values, while validity will be assessed using a valid standardized loading factor (SLF) value of ≥0.50 (Hair et al., 2022). To test the research hypotheses and the structural model, SEM analysis is performed by comparing the t-statistic with the important t-table value, which is usually 1.97 at $\alpha = 0.05$. To find out how the mediating factor has an indirect impact, we will apply the Sobel test.

## 4. Result and Discussions

The study involved 220 respondents with various demographics. Following the distribution of respondent data based on demographic variables outlined in Table 1 in this part, we give a thorough analysis of the study's findings and explain them in detail.

Table 1. Respondent Characteristics

| **Category** | **Items** | **f** | **%** |
|---|---|---|---|
| Gender | Male | 116 | 52.7 |
| | Female | 104 | 47.3 |
| | **Total** | **220** | **100** |
| Age | 18-25 Years | 58 | 26.4 |
| | 26-35 Years | 79 | 35.9 |
| | 36-45 Years | 40 | 18.2 |
| | 46-55 Years | 32 | 14.5 |
| | 56-65 Years | 11 | 5.0 |
| | >65 Years | 0 | 0 |
| | **Total** | **220** | **100** |
| Domicile | Pontianak | 117 | 53.2 |

| | | | |
|---|---|---|---|
| | Makassar | 26 | 11.8 |
| | Jakarta | 22 | 10.0 |
| | Bandung | 13 | 5.9 |
| | Surabaya | 14 | 6.4 |
| | Yogyakarta | 10 | 4.5 |
| | Denpasar | 6 | 2.7 |
| | Samarinda | 5 | 2.3 |
| | Palembang | 3 | 1.4 |
| | Sukabumi | 3 | 1.4 |
| | Bogor | 1 | 0.5 |
| | **Total** | **220** | **100** |
| Education level | High School | 61 | 27.7 |
| | Diploma | 22 | 10.0 |
| | Bachelor's Degree | 116 | 52.7 |
| | Master's Degree | 21 | 9.5 |
| | Doctorate | 0 | 0 |
| | **Total** | **220** | **100** |
| Monthly income (Rp.) | 5 Million - 10 Million | 184 | 83.6 |
| | Above 10 Million - 20 Million | 25 | 11.4 |
| | Above 20 Million - 30 Million | 9 | 4.1 |
| | Above 30 Million - 40 Million | 2 | 0.9 |
| | Above 40 - 50 Million | 0 | 0 |
| | Above 50 Million | 0 | 0 |
| | **Total** | **220** | **100** |
| Type of vehicle owned | Motorcycle | 119 | 54.1 |
| | Car | 16 | 7.3 |
| | Motorcycle and Car | 85 | 38.6 |
| | other | 0 | 0 |
| | **Total** | **220** | **100** |
| Joined in pro-environment communities | Yes | 14 | 6.4 |
| | No | 206 | 93.6 |
| | **Total** | **220** | **100** |

Source: Processing by Author

4.1 Measurements Model

**Table 2**. Standardized Loading Factor, Construct Reliability (CR), and Average Variance Extracted (AVE)

| **Items** | | **SLF** | **CR** | **AVE** |
|---|---|---|---|---|
| Perceived Ease of Use | Driving an electric vehicle seems like it would be easy for me. | 0.859 | 0.906 | 0.709 |
| | I find it simple to learn how to operate an electric vehicle. | 0.843 | | |
| | To me, operating an electric vehicle is indistinguishable like operating a regular vehicle. | 0.722 | | |
| | I find charging electric vehicles to be easy. | 0.640 | | |
| Environmental Concern | Individuals bear a responsibility for protecting the environment | 0.703 | 0.906 | 0.763 |
| | I think environmental issues have escalated in severity in recent years. | 0.792 | | |

| | | | | |
|---|---|---|---|---|
| | I think we ought to coexist harmoniously with the environment by attaining sustainable development. | 0.764 | | |
| | I take into account the environmental implications when selecting a vehicle. | 0.590 | | |
| Perceived Usefulness | I contend that the utilization of electric vehicles can enhance the effectiveness of my trips. | 0.834 | 0.923 | 0.751 |
| | I contend that the utilization of electric vehicles can enhance traffic quality. | 0.854 | | |
| | I contend that utilizing electric vehicles can enhance my health. | 0.819 | | |
| | I contend that the utilization of electric vehicles can enhance environmental quality. | 0.805 | | |
| Attitude | I believe that driving a vehicle powered by electricity is beneficial. | 0.842 | 0.930 | 0.772 |
| | I believe that driving an electric car is the proper thing to do. | 0.903 | | |
| | I am in favor of the nation enacting further laws to motivate people. | 0.709 | | |
| | In the long run, I believe switching to electric vehicles is a wise choice. | 0.845 | 0.928 | 0.764 |
| Financial Incentives Policy | I think subsidy strategy is likely to promote the use of electric vehicles. | 0.840 | | |
| | I think The easing of tax policies will facilitate the uptake of electric vehicles. | 0.892 | | |
| | Subsidy and tax regulations are crucial for my acquisition of electric vehicles. | 0.838 | | |
| | The government ought to offer further incentives for the utilization of electric vehicles. | 0.778 | | |
| Adoption Intention | I inclined to use electric vehicles while selecting a vehicle in the near future. | 0.888 | 0.950 | 0.828 |
| | I plan to adopt an electric vehicle when choosing a vehicle in the near future. | 0.937 | | |
| | I intend to adopt electric vehicles when making a vehicle choice soon. | 0.929 | | |
| | Urge that others consider adopting electric vehicles while selecting a vehicle. | 0.707 | | |

Source: Processing by Author

Based on the data in Table 2, the indicators used to build the model are considered reliable and valid. The current indications confirm the correctness and validity of each item while evaluating the overall model structure. The value of the standardized load factor (SLF) is always higher than 0.50. The results of the Construct Reliability (CR) test show that the model built can measure the structure reliably and consistently, and they also prove that all measuring instruments are reliable, above the threshold of 0.70.

Table 3. Goodness of Fit Index

| Goodness of Fit Index | Cut Off Value | Result |
|---|---|---|
| CMIN/DF | ≤ 3.00 | 2.290 |
| RMSEA | ≤0.08 | 0.077 |
| RMR | ≤0.05 | 0.246 |
| GFI | ≥0.90 | 0.818 |
| TLI | ≥0.90 | 0.898 |
| IFI | ≥0.90 | 0.910 |
| CFI | ≥0.90 | 0.909 |
| NFI | ≥0.90 | 0.850 |

Source: Processing by Author

Based on the book "Multivariate Data Analysis" by (Hair et al., 2019). a model is said to have a good fit if it uses at least three to four different goodness-of-fit (GOF) indices, including one absolute index and one incremental index. This means there is no need to report all indices, as they often provide redundant information. However, reporting CMIN/DF, CFI (Comparative Fit Index), and RMSEA (Root Mean Square Error of Approximation) values is often considered sufficient to evaluate the fit of a model.

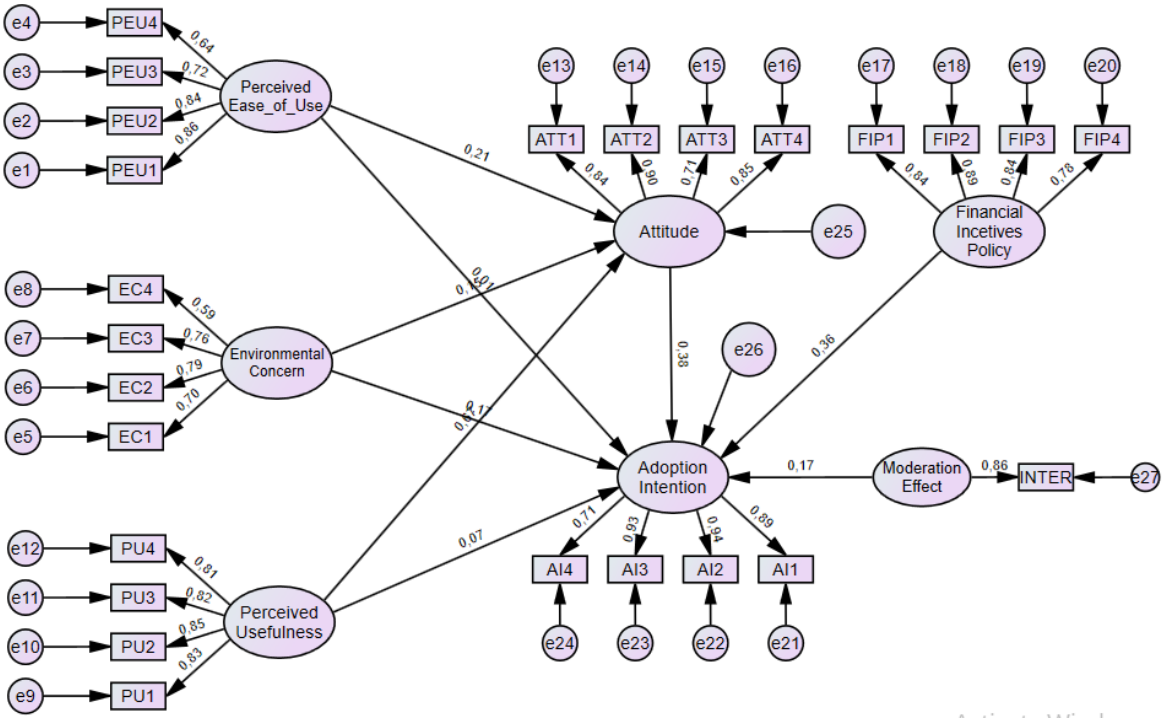


**Figure 2**. Full Model Testing

4.2 Hypothesis Test

The reason for conducting this investigation is to find out how interdependent components affect the study constructs used for this analysis. Below are the results.

Table 4. Hypothesis Test

| | | | Estimate | S.E. | C.R. | P | Label |
|---|---|---|---|---|---|---|---|
| Perceived Ease of Use | → | Adoption_Intention | 0.009 | 0.070 | 0.134 | 0.893 | Insignificant |
| Environmental Concern | → | Adoption_Intention | 0.286 | 0.108 | 2.652 | 0.008 | Significant |
| Perceived Usefulness | → | Adoption_Intention | 0.068 | 0.093 | 0.735 | 0.462 | Insignificant |
| Attitude | → | Adoption_Intention | 0.395 | 0.100 | 3.930 | *** | Significant |
| Moderation Effect | → | Adoption_Intention | 0.036 | 0.014 | 2.564 | 0.010 | Significant |

Source: Processing by Author

The main findings addressing what variables impact the desire to adopt EVs in Indonesia are shown in Table 4, this displays the outcomes of examining the correlations between variables. If the t value is higher than 1.97 and the p value is lower than $\alpha = 0.05$, then the relationship between the variables is considered significant, and the t value and p value are used to determine this significance. The results show that the two sets of variables, independent and dependent, are significantly affected when both conditions are met.

Based on the analysis results, hypotheses 2, 4, and 6 show t-values that exceed 1.97 and p-values that are less than $\alpha = 0.05$, thus fulfilling both conditions for declaring a significant effect. In contrast, hypotheses 1 and 3 do not reach the required t-value limit, and the p-value is greater than α, so it can be stated that the relationship between these variables is not significant.

To verify the indirect effects through the constructed mediating variables, the results are shown in Table 5 based on the Sobel test results.

Table 5. Sobel Test – Significance of Mediation

| | | | | | Sobel test statistics | Two-tailed probability | Label |
|---|---|---|---|---|---|---|---|
| Perceived Ease of Use | → | Attitude | → | Adoption_Intention | 2.68300188 | 0.00729646 | Significant |
| Environmental Concern | → | Attitude | → | Adoption_Intention | 2.05763730 | 0.03962496 | Significant |
| Perceived Usefulness | → | Attitude | → | Adoption_Intention | 3.65941025 | 0.00025280 | Significant |

Source: Processing by Author

Three separate factors affect the likelihood that a person will adopt an electric vehicle: perceived ease of use, perceived usefulness, and environmental concern. The Sobel test was used to investigate the mediating function of attitude variables in this relationship. (Plan to Adopt). H5a, H5b, and H5c indicate that attitude significantly strengthens the relationship between Perceived Ease of Use, Environmental Concern, and Perceived Usefulness with Adoption Intention, according to the statistical findings of the Sobel test $\geq 1.97$ and p values $< 0.05$.

## 5. Discussion

The findings of this study reveal many significant insights that align with and enhance previous research on electric vehicle (EV) adoption in Indonesia. Hypothesis testing shows that attitudes towards electric vehicles significantly influence adoption intentions. Favorable attitudes are fostered by perceived ease of use, environmental concern, and perceived usefulness of electric vehicles. These

results support other research showing that favorable opinions about accessibility and technological advantages foster attitudes conducive to the adoption of new technologies (Buhmann et al., 2024; Murtiningrum et al., 2022; Wang et al., 2021). A novel finding of this study is that individuals' intention to adopt electric vehicles is still low in Indonesia due to insufficient infrastructure for charging and the fact that people still do not perceive the ease and benefits of electric vehicles. Perceived usefulness and perceived ease of use have no bearing on the decision to adopt, but both shape attitudes towards the adoption of these environmentally friendly vehicles. Concern for the environment also emerged as a key component stimulating the desire to switch to EVs. This aligns with the findings of earlier studies which found that Sustainable products or technologies are more likely to be purchased by eco-conscious consumers (Ha et al., 2023; Higueras-Castillo et al., 2023; J. Wu et al., 2019). The relationship between attitude and intention to adopt electric vehicles is moderated by financial incentive policies, which is the last finding. Previous research in the international environment has shown that with desire to use implementation incentives such as subsidies and tax savings, the number of electric vehicles can be raised. (Jaiswal et al., 2021).

## 6. Conclusion

This study aims to find the main key variables that can increase the intention to adopt electric vehicles in Indonesia, with Attitude as a mediating variable and Financial Incentive Policy as a moderating variable. The findings in the study are that not all of the proposed hypotheses are in line with the initial expectations outlined in the chapter "Introduction." According to this study. Environmental concerns and attitudes towards electric vehicles directly affect adoption intentions, although perceived ease of use and usefulness do not. Financial incentive policies also strengthen the relationship between attitudes and adoption intentions, indicating that government incentives can increase electric vehicle adoption. This study shows that attitudes mediate the relationship between perceptions of electric vehicles and adoption intentions in Indonesia. The study also emphasizes incentive programs as a driver of adoption, which may be followed by other developing countries. The findings imply that authorities should use better financial incentives to encourage the adoption of electric cars. By educating the public about the simplicity and benefits of electric vehicles and providing supporting infrastructure such as charging stations, public opinion will improve. However, this study has its shortcomings. The study only covers urban Indonesians and does not include cultural elements that may influence adoption aspirations. To overcome this obstacle, future studies should expand the geographical coverage and include socio-cultural elements. A more thorough study of financial incentive programs is also needed to create a better electric car adoption plan.

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