Eduvest – Journal of Universal Studies
Volume 5 Number 2, February, 2025
p- ISSN 2775-3735- e-ISSN 2775-3727

THE FUTURE OF ELECTRIC CARS IN INDONESIA: EXPLORING FACTORS INFLUENCING THE PURCHASE INTENTION THROUGH THE MODIFIED THEORY OF PLANNED BEHAVIOR

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ABSTRACT

This study explores the factors influencing the purchase intention of electric cars in Indonesia using a modified approach to the Theory of Planned Behavior (TPB). With increasing air pollution caused by fossil-fuel vehicles, Electric Cars (ECs) have emerged as an environmentally friendly solution. However, challenges such as limited charging infrastructure and relatively high prices hinder their adoption in Indonesia. The study employs a survey-based questionnaire with respondents who have knowledge about electric cars. The analysis incorporates factors such as brand knowledge, environmental concern, perceived risk, and price sensitivity. The results indicate that brand knowledge and environmental concern positively influence attitudes, which in turn affect purchase intention. Subjective norms and perceived behavioral control also play significant roles in shaping purchase intentions. On the other hand, perceived risk negatively impacts purchase intention, while price sensitivity does not significantly moderate the relationship between attitude and purchase intention. This research provides practical implications for automotive companies and policymakers to promote the adoption of electric cars in Indonesia by improving infrastructure and educating the public on the environmental benefits and long-term cost efficiency of electric vehicles.

KEYWORDS *electric cars, purchase intention, theory of planned behavior, price sensitivity.*

INTRODUCTION

Air pollution has become one of the most talked about issues in Indonesia. This is due to the increasing number of fossil fuel vehicles (Haryanto, 2018). Air pollution in Indonesia has reached levels that do not meet the daily average air

How to cite: Kurniawan I et all. (2025). The Future of Electric Cars in Indonesia: Exploring Factors Influencing The Purchase Intention Through The Modified Theory of Planned Behavior. Journal Eduvest. *Vol 5*(2): 3089-3101
E-ISSN: 2775-3727

quality guidelines set by the World Health Organization (WHO) of 25 micrograms per cubic meter (µg/m³) by 2023 (Cottrell et al., 2019). According to the IQAir World Ranking Report, Indonesia is ranked 14th in the world with pollution of 37.1 micrograms per cubic meter (µg/m³) which puts Indonesia in the number 1 position in Southeast Asia. with several environmental problems increasing such as unfavorable climate change, ozone depletion, energy crisis, global warming, air pollution that can affect human health and the environment (Bhutto et al., 2022).

Electric Cars (ECs) are environmentally friendly alternatives that help reduce air pollution by producing no exhaust emissions. They utilize rechargeable batteries, making them more efficient than conventional fossil fuel vehicles. Growing consumer awareness of the benefits of electric cars has increased global demand. Greater knowledge about a brand enhances purchase intentions. In Indonesia, ECs are viewed as solutions to air pollution and innovations over traditional fossil-fueled vehicles. A positive environmental attitude encourages consumers to focus on ecological issues, motivating them to consider purchasing electric cars (Li, Long, Chen, & Geng, 2017).

There are several problems that hinder the effectiveness of ECs. One of them is the infrastructure of Public Electric Vehicle Charging Stations (SPKLU) which is still very limited, especially outside big cities (Gunawan et al., 2022). This causes hesitation in adopting electric cars with limited range and limited charging. Concern over battery life is another problem, especially when traveling long distances and in the presence of additional elements like congested traffic and poor road conditions that can shorten battery life more quickly. This may add to electric vehicle adoption worries regarding trip range

When customers perceive risks associated with using a product or service, they often exhibit a variety of behaviors, one of which is delaying purchasing activities to avoid losses. There are also economic factors where the price of electric cars is considered relatively high compared to other conventional vehicles, which is a barrier for many consumers in Indonesia due to low income (Gunawan et al., 2022). According to the Central Statistics Agency (BPS), the highest average wage or net salary per month for laborers/employees for all education levels will be IDR 3,144,676 in 2023. Meanwhile, the price of the cheapest electric car vehicle ranges from IDR 200,000,000 to more than IDR 3,000,000,000. This causes the effect of price sensitivity on the intention to buy an electric car seen from the average wage owned by the Indonesian people.

However, the Indonesian government continues to support the reduction of greenhouse gas emissions through electric vehicles, including Presidential Regulation Number 55 of 2019 on the Battery Electric Vehicle Program for road transportation. The government also provides subsidies to promote environmentally friendly vehicles. These subsidies are expected to boost people's purchasing intention for electric cars, as evidenced by a significant increase in electric car sales in Indonesia in 2023. Although challenges remain, the high demand for fossil fuel vehicles and the government's growing support for electric cars indicate strong potential for future sales.

One theory that explains the factors that drive customer purchase intentions is known as the Theory of Planned Behavior (TPB). The Theory of Planned Behavior

(TPB) explains factors that drive customer purchase intentions, including attitudes, subjective norms, and perceived behavioral control (PBC). These elements shape an individual's decision to purchase environmentally friendly products, such as electric cars. Factors like brand positioning, environmental concern, and price sensitivity also influence consumer decisions. However, limited research exists on what drives electric car purchase intentions, especially in Indonesia. This study highlights the importance of brand knowledge, environmental concerns, perceived risk, and price sensitivity in influencing electric car purchase intentions based on the TPB framework. Therefore, this study aims to understand the factors that can increase consumer purchase intention for electric car products so that companies and governments can use the results of this study in developing electric car innovations, determining policies, increasing consumer purchase intention, and encouraging electric car sales. So, this research question was developed to support the research objectives, namely:

1. First, does Brand Knowledge significantly affect Purchase intention?
2. Second, does Environmental Concern affect Purchase Intention?
3. Third, how does Attitude affect Purchase Intention?
4. Fourth, does Subjective Norm affect Purchase Intention?
5. Fifth, how does Perceived Behavioural Control affect Purchase Intention?
6. Sixth, how does Perceived Risk affect Purchase Intention?
7. Seventh, does Price sensitivity moderate the effect of Attitude on Purchase Intention?

RESEARCH METHOD

Questionnaire and Data Collection

This research methodology uses a survey approach by utilizing primary and secondary data. Primary data was obtained through a survey in the form of a questionnaire distributed via Google Form online through social media to reach respondents who met the criteria set by the researcher. Meanwhile, secondary data is information obtained from literature, such as relevant readings, books, journals, and previous research articles.

The object of this research is an electric car, which is a vehicle driven by one or more electric motors, using electrical energy stored in batteries or other energy storage devices. The research location is Indonesia, with the respondent population being the Indonesian people. They are individuals who have knowledge about electric car products. Population determination is a crucial stage in research, considering that the population has the potential to provide information or data that has significant relevance and usefulness in the context of conducting research (Kuantitatif, 2016).

The study's participants are citizens of Indonesia (WNI) who are at least 20 years old and have knowledge of electric vehicles. 189,986,800 persons are estimated to be Indonesian nationals aged 20 and above in 2023 based on statistics from the Central Statistics Agency. Since the Slovin technique is being used in this

investigation, a minimum sample size of 400 respondents is necessary. The calculation of the formulation using the Slovin method is as follows:

$$n = \frac{N}{1 + N\,(e)^2}$$

$$n = \frac{189{,}986{,}800}{1 + 189{,}986{,}800\,(0.05)^2}$$

$$n = 399.999$$

$$n = 400$$

Description:

n : Number of samples
N : Total population
e : Error tolerance limit (0.05)

Researchers use non-probability sampling. Non-probability sampling is a sampling method that does not provide equal opportunities or opportunities for each element or member of the population to become part of the sample. The procedure applied in this study is to use incidental sampling, which is sampling based on chance. With this method, anyone who happens to meet the researcher can be used as a sample, if deemed suitable as a data source (Kuantitatif, 2016). Therefore, based on these considerations, the researcher selected a sample of 400 Indonesian citizens residing in Indonesia using non-probability sampling techniques. The age limit of respondents was above 20 years old and were required to be aware of electric car products.

Data collection involved distributing surveys via Google Forms through social media platforms like WhatsApp, Instagram, and Line, using a 5-point Likert scale to measure the variables. Researchers utilized questionnaires to gather data directly from sampled participants. The collected data will be analyzed using software, and results will be interpreted to test the study's hypotheses.

Measurement

This study uses 8 variables, namely brand knowledge, attitude, Environmental Concern, Subjective Norm, Perceived Behavioural Control, and Perceived Risk as independent variables, Price Sensitivity as a moderating variable, and Purchase Intention as the dependent variable. The questionnaire in this study uses a 5-point Likert scale measurement.

The data collected from the questionnaires that have been distributed must first be tested for validity and reliability for each variable used as a measuring tool. This validity test uses Smart PLS 3 software for descriptive factor analysis. Reliability testing is also carried out using Smart PLS 3 software on Reliability Analysis with Cronbach's Alpha.

Construct Validity Test

To assess the validity and reliability of the measurement model, several tests were conducted. Convergent validity was established when the loading factor value for each indicator exceeded 0.7 or, in cases where it fell between 0.6 and 0.7, if the

average variance extracted (AVE) value was greater than 0.5. Discriminant validity was confirmed when the cross loading of each variable was above 0.7 or when the square root of the AVE for each construct exceeded the correlation between constructs. Reliability was assessed using Cronbach's alpha and composite reliability, with acceptable values being above 0.6 and 0.7, respectively. While Cronbach's alpha may underestimate reliability, composite reliability is generally considered a more accurate measure.

RESULT AND DISCUSSION

For each of these main points, the researcher includes a discussion of the research findings. The data analysis method used by the researcher in this study is Smart PLS (Partial Least Squares). To know the difference in several respondent criteria such as gender, age, last educational level, and average monthly income. The questionnaire link was shared with respondents who met the research requirements, namely Indonesian citizens, aware of electric vehicles, and over 20 years old as a requirement for having a driver's license in Indonesia. When distributing questionnaires and processing data analysis, several indicators from each variable were eliminated because they did not meet the validity test requirements, some of which were perceived behavior control (PBC) 3 and perceived risk (PR) 5.

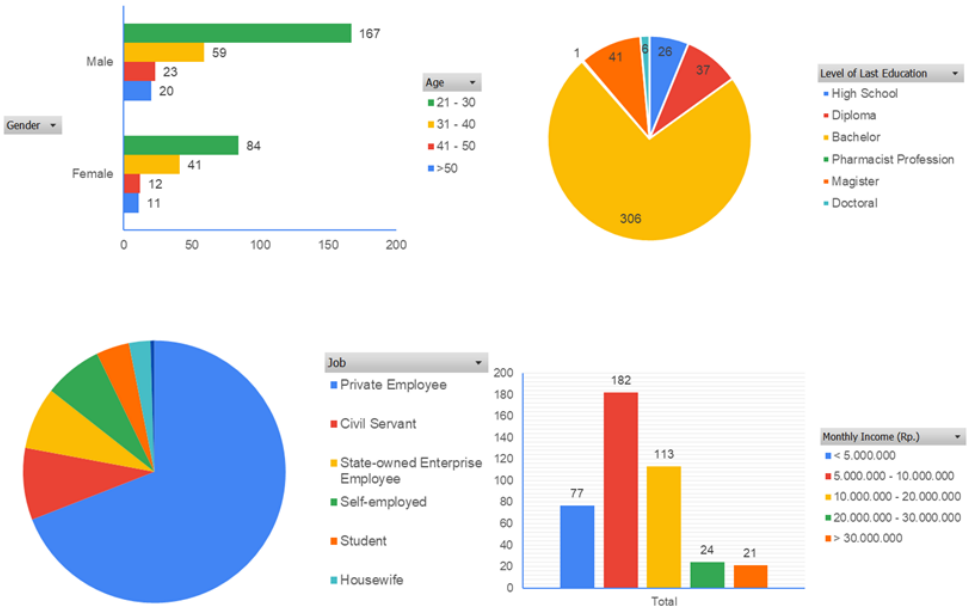

Figure 1. Respondent Data

Validity Test: Convergent

Convergent validity test results for the various constructs involved in the study. Each construct is measured using a number of indicators, each with a load factor value that indicates how well the indicator measures the construct. For example, the Attitude construct was measured using five indicators (AT1 to AT5)

with factor loadings of 0.705 to 0.857. For Attitude, good internal consistency values and adequate convergent validity are indicated by a Composite Reliability (CR) value of 0.907 and an Average Variance Extracted (AVE) of 0.661, respectively. In addition, having a Cronbach's Alpha value of 0.907 indicates that it is highly reliable. The brand knowledge structure is measured by three indicators (BK1 to BK3) and the shelving factor is between 0.805 and 0.886, and the CR and Cronbach's Alpha values are 0.879. In addition, structures such as Perceived Risk, Perceived Behavioral Control, Price Sensitivity, Subjective Norm, Purchase Intention, and Environmental Concern show different values of suppression factor, CR, AVE, and Cronbach's Alpha. This gives an idea of the measurement quality of the different theories used in the study, and shows that most of the theories have adequate validity and reliability.

The results of the discriminant validity analysis based on cross loading show that> 0.70 for each construct which means that the cross loading value for each construct of each variable compared to other latent factors is higher which means that it has met the requirements and is of good value.

The Attitude variable (AT1-AT5) has a loading value range of 0.705 to 0.857; the brand knowledge variable (BK1-BK3) has a loading value range of 0.805 to 0.886; the Environmental Concern variable (EC1-EC3) has a loading value range of 0.758 to 0.876; the Perceived Behavioral Control variable (PBC1, PBC 2, PBC 4, PBC 5) has a loading value range of 0.710 to 0. 876; the Purchase Intention variable (PI1-PI5) has a loading value range of 0.714-0.865; the Perceived Risk variable (PR1-PR4) has a loading value range of 0.783-0.863; the Price Sensitivity variable (PS1-PS3) has a loading value range of 0.790 to 0.902; the Subjective Norm variable (SN1-SN4) has a loading value range of 0.704 to 0.808; and the moderation variable has a loading value of 1,000.

Based on the results of the Fornell-Lacker table, all the roots of the AVE (Fornell-Larcker Criterion) of each construct are greater than the correlation with other variables. For example Attitude: for the AVE value is 0.661, the AVE root is 0.813. The value of 0.813 is greater than the correlation with other constructs, namely with 0.458, 0.67, 0.516, -0.198, 0.659, -0.078, 0.671 and 0.504. Likewise with other latent variables, where the AVE Root value> Correlation with other constructs. Because all latent variables AVE Root value> Correlation with other constructs, the discriminant validity requirements in this model have been met.

Table 1. R Square

	R Square	**R Square Adjusted**
Attitude	0.485	0.483
Purchase Intention	0.609	0.603

In table 1, it can be seen that the R-Square result of the Purchase Intention variable has an R value of 0.609. So it can be interpreted that in this study the influence of perceived risk, perceived behavioral control, attitude, and subjective norm on the purchase intention of electric cars is 60.9%, while the rest is 39.1%. In

addition, the R-Square value of the Attitude Variable is 0.485. So it can be interpreted that in this study the influence of environmental concern and brand knowledge on attitude is 48.5% while the rest is 51.5%.

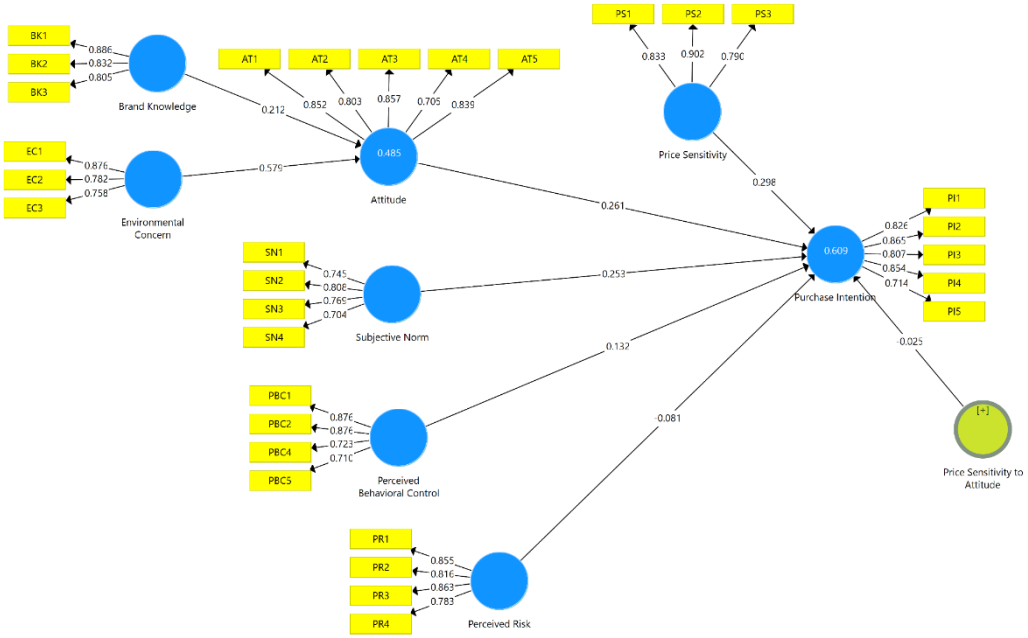

Figure 2. Analysis Results of SMART PLS

Table 2. Results of The Structural Equation Model and Hypothesis Testing

	Original Sample (O)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
Brand Knowledge_ -> Attitude	0.212	0.212	0.042	5.059	0.000
Environmental Concern_ -> Attitude	0.579	0.581	0.038	15.296	0.000
Attitude -> Purchase Intention	0.261	0.258	0.056	4.642	0.000
Subjective Norm -> Purchase Intention	0.253	0.255	0.047	5.405	0.000
Perceived Behavioral Control -> Purchase Intention	0.132	0.133	0.040	3.294	0.001
Perceived Risk -> Purchase Intention	-0.081	-0.084	0.029	2.789	0.005
Price Sensitivity to Attitude -> Purchase Intention	-0.025	-0.024	0.034	0.739	0.460

H1: Brand Knowledge (BK) positively influences Attitude towards electric cars in Indonesia.

Based on the results of the study, it shows that there is a strong and significant relationship between Brand Knowledge and Attitude. The value of O = 0.212 and p = 0.000 indicates the strength of the relationship between the two variables. This value also indicates that the higher a person's brand knowledge, the more positive

the person's attitude towards electric cars. Therefore, brand knowledge has a very important and crucial role in shaping consumer perceptions. With a stronger brand, it will be easier to build prospective customers' trust to have a purchase intention. This finding is also in line with previous research, namely Ha et al. (2023), (Hong Wang, Ma, & Bai, 2019), and (Morton, Anable, & Nelson, 2016), which show that brand knowledge is a very important factor to influence consumer attitudes towards a new product. With adequate knowledge, it can help consumers to reduce their uncertainty and doubts about electric cars.

H2: Environmental Concern (EC) positively influences Attitude towards electric cars in Indonesia.

The analysis results that have been obtained show that there is a strong and significant relationship between Environmental Concern and Attitude. The O value of 0.579 and p = 0.000 certainly indicates that the higher the level of concern of individuals on environmental issues, the more likely they are to have a positive attitude towards electric cars. This finding is also consistent with previous studies Ha et al., (2023), Ali & Nausad, (2022), (Maichum, Parichatnon, & Peng, 2017) which show that the role of environmental concern in driving electric vehicle adoption. This also shows that several problems related to climate change, pollution, scarce resources have been able to successfully motivate people and their attitudes to consider electric cars as a solution that is certainly sustainable. This relationship is the relationship with the highest influence in this study so that increasing environmental concern is important to pay attention to because it has a positive effect on one's attitude towards electric cars.

H3: Attitude (AT) positively influences Purchase Intention (PI) of electric cars in Indonesia.

The results of the analysis show that there is a positive attitude towards electric cars which has a significant influence on purchase intention from the value of O = 0.261 and p = 0.000. This finding is in line with previous research, namely (Mehraj & Qureshi, 2022), (Jan, Ji, & Yeo, 2019), (Kumar & Kapoor, 2017), which shows that Attitude is a variable that is also important in encouraging consumers to take purchasing actions. The emergence of this attitude certainly comes from many factors, it can be due to awareness of the positive impact of electric cars on the environment, the perception of long-term cost savings, and the influence of personal references.

H4: Subjective Norm (SN) can positively influence Purchase Intention (PI) of electric cars in Indonesia.

The analysis results show a value of O = 0.253 and p = 0.000, which means that SN has a significant positive effect on the purchase intention of electric cars in Indonesia. This shows that social influences in the form of motivation, approval, and surrounding beliefs play an important role in consumer purchase intentions for electric cars in Indonesia. This research is in line with the research of (Adnan, Nordin, Rahman, & Rasli, 2017) (Shalender & Sharma, 2021), and Gunawan et al. (2022) which proves that there is a positive influence of subjective norm on the intention to buy, adopt, or use an electric car. The higher the normative beliefs or social influence, the more one’s purchase intention for an electric car increases.

This result is also the second highest factor that affects the purchase intention of an electric car in this study.

H5: Perceived Behavioral Control (PBC) positively influences Purchase Intention (PI) of electric cars in Indonesia.

The analysis results show a value of O = 0.132 and p = 0.001, which means that PBC has a significant positive effect on the intention to buy an electric car in Indonesia. This study supports previous research, namely in the research of (Adnan et al., 2017) (Shalender & Sharma, 2021), and Gunawan et al., (2022) which proves that there is a positive influence on the intention to buy, adopt, or use an electric car. The higher the confidence in financial capability and the ability to buy, use, and drive an electric car, it can encourage the intention to buy an electric car in Indonesia. In addition, the more confident and optimistic consumers are able to buy and adopt electric cars, the higher the purchase intention for electric cars in Indonesia. This effect shows that through affordable prices and better financial capabilities, it can positively encourage the purchase intention of electric cars in Indonesia.

H6: Perceived Risk (PR) negatively affects Purchase Intention (PI) of electric cars in Indonesia.

The analysis results show the value of O = -0.081 and p = 0.005, which means that PR has a significant negative effect on the purchase intention of electric cars in Indonesia. The results of this study have the same impact between perceived risk which has a negative influence on adopting electric vehicles as (Shanyong Wang, Wang, Li, Wang, & Liang, 2018). The perception of risk acceptance that will be felt when buying an electric car can reduce and even prevent consumer intention to adopt electric cars in Indonesia. Several actions can be taken to overcome doubts about this perceived risk such as motivating, explaining, and convincing consumers of the feared risks. Assurance of the financial benefits, safety, efficiency of using electric cars, quality, and performance of electric car products should also be considered and improved in order to reduce the perception of perceived risk. In addition, consumers in Indonesia must also be further convinced and proven that there is a provision of insurance for electric cars, insurance on batteries, faster and more durable battery charging, and the provision of adequate infrastructure with an even distribution in each region so that the purchase intention of consumers in Indonesia on electric cars can increase significantly in the future.

H7: Price Sensitivity (PS) negatively moderates the relationship between Attitude and Purchase Intention (PI) of electric cars in Indonesia.

The analysis shows the value of O = -0.025 and p = 0.460, which means that Price Sensitivity negatively moderates the relationship between attitude and intention to buy an electric car in Indonesia but is not significant. This proves that the level of individual sensitivity to price can indeed weaken the relationship between attitude and intention to buy an electric car in Indonesia but the relationship is not significant. Consumers' buying ability on electric cars and consumers' willingness to pay more do not significantly affect their attitude towards their intention to buy an electric car. The results of this study are not in line with the research of (Bhutto et al., 2022) which shows that there is a significant negative moderating effect on the relationship between attitudes and purchase intentions for

hybrid vehicles, which means that the more sensitive consumers are to price, it can reduce the positive relationship between attitudes and purchase intentions. In this study, the moderating effect of the level of sensitivity to price on consumer attitudes to buy electric cars is the only factor that does not prove significant. Consumers are aware that electric cars do have higher prices and are willing to pay more, but this price sensitivity is not strong enough to influence the attitudinal factors that drive purchase intention for electric cars in Indonesia.

Implications

Theoretical Implications

This research can pave the way for further research on what can make someone have an interest in buying an electric car. This study uses the Theory of Planned Behavior in developing the initial concept in determining the research framework to analyze the factors that influence the purchase intention of an electric car. This concept is also complemented by risk perception which also affects the purchase intention of an electric car. In addition, we already know that knowledge about products and concern for the environment are very important because they affect one's attitude. Although in this study the moderating effect of price sensitivity did not significantly affect the relationship between attitude and purchase intention, this moderating effect can still be utilized and tried in other studies with different environmentally friendly products or demographic areas that are not the same.

In addition, we already know that the role of a person's attitude towards electric cars, risk perception, product knowledge, and environmental awareness is very important. However, this study also proves that price sensitivity is not necessarily a major barrier in influencing attitudes towards purchase intention on electric cars.

The finding that the moderating effect of price sensitivity is not significant opens up opportunities for further research. Other researchers can certainly try to re-examine this moderating effect on environmentally friendly products and different consumer segments in the future. In addition, this study also suggests that other factors can be added to strengthen the relationship to the purchase intention of an electric car.

Practical or Managerial Implications

This study on electric vehicles in Indonesia provides managers and practitioners in the automotive sector with insightful information. The enormous market potential in Indonesia offers a chance to promote ecologically friendly and emission-free automobiles. Partnering with green groups can be a smart way to spread the word about the advantages of electric vehicles for the environment. Companies may show the public how committed they are to protecting the environment by implementing focused CSR programs. This could raise awareness of environmental issues and encourage people to buy eco-friendly products like electric cars. Marketing departments can take advantage of this momentum to create campaigns that emphasize the environmentally friendly features of electric vehicles. By collaborating with different stakeholders, they can increase public interest in the adoption of electric vehicles.

The goal of marketing and sales teams should be to create a powerful and recognizable brand that highlights the benefits and characteristics of electric cars

over traditional vehicles in order to influence consumer purchase intentions. Consumer attitudes are the most important element influencing purchase intentions, according to this study, and they can be greatly influenced by effective education regarding electric automobiles. Given that environmental factors have an indirect impact on Indonesian opinions toward the purchase of electric cars, social initiatives such as community engagement can also be successful.Product development should place a high priority on developing a range of offers at different price points in order to target different market segments, with an emphasis on usability and benefits. Furthermore, transparent information regarding performance, operating costs, and safety as well as cooperation with the public and private sectors to create a wide and easily accessible charging infrastructure can all contribute to increasing customer trust in electric vehicles.

CONCLUSION

This study only focuses on purchase intentions and not on the final purchase decision because most people have a monthly income that is still not enough to consider purchasing an electric car. Future research needs to explore up to the final purchase decision stage, this is of course supported by samples that have higher incomes. In addition, there are several other factors that can influence the purchase intention of electric cars in Indonesia that can also be investigated in future research. Although Indonesia's low average wage makes the affordability of buying an electric car difficult, the country still has significant market potential driven by awareness of the superior quality and benefits of electric cars compared to conventional cars. So the results of this study are expected to be utilized for marketing strategies and the government can also use it to make policies that support the use of electric cars in Indonesia.

While electric vehicles are gaining popularity in Indonesia, their sales still significantly lag behind conventional fossil-fueled vehicles. This research reveals that environmental concerns are the primary reason why people consider purchasing electric cars. Other factors influencing purchase intention include positive attitudes towards electric vehicles, brand knowledge, perceived behavioral control, and perceived risk associated with electric vehicles. Additionally, subjective norms play a significant role in purchase intention. However, price sensitivity appears to have an insignificant influence on the intention to purchase electric cars. The findings of this study can serve as a reference for various stakeholders to promote the adoption of electric vehicles in Indonesia.

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