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Analysis of Electric Vehicles Purchase Intentions as Sustainable Transportation in Indonesia: Implications for Government Policies

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Abstract: Accelerating electric vehicle adoption to reduce greenhouse gas emissions has become a global priority. Indonesia initiated its electric vehicle program in 2019, yet by 2022, the market share of electric vehicles was only 1.47 percent. Given this, it is crucial to understand consumer intentions to purchase electric vehicles, which can help manufacturers develop strategies and guide government policies. This study applies the Theory of Planned Behavior (TPB) and Structural Equation Modeling (SEM) using the Partial Least Square (PLS) method. The research variables are based on an extended TPB model, where attitudes are linked to economic gain, economic loss, and environmental awareness. Subjective norms are represented by government policy variables, and perceived behavioral control is reflected in infrastructure, vehicle features, and availability. Additionally, demographic variables such as age, gender, education level, and income were included as control variables. Analysis of data from 100 respondents revealed that the most influential factors affecting consumers' intentions to purchase electric vehicles are vehicle availability, government policy, and economic advantages, with T-statistic values of 4.498, 3.967, and 2.419, respectively. These findings suggest that implementing purchasing incentive programs and expanding electric vehicle models and capacities are key to increasing consumer interest in electric vehicles.

Keywords: electric vehicle; intention to purchase; TPB; PLS-SEM; Indonesia

1. Introduction

Promoting electric vehicles (EVs) in land transportation is one program to lower carbon emissions. EVs have much lower emissions than vehicles using internal combustion engines (ICEV)[1)]. The transportation sector accounted for 28% of Indonesia's energy sector emissions in 2018, and this percentage is rising quickly. It is anticipated that emissions from the transportation sector will increase by 53% from 2015 levels by 2030 and almost double between 2030 and 2060. Without addressing the burning of fossil fuels in the transportation sector, achieving net-zero emissions will not be feasible[2)]. According to Indonesia's Nationally Determined Contribution (NDC), the number of 2-electric wheelers must reach 1.8 million by 2025 and 13 million by 2030, while the number of 4-electric wheelers must reach 0.4 million by 2025 and 2 million by 2030 in order to satisfy the emission reduction objective[2)]. The 1.5°C warming target set forth in the Paris Agreement is still far off from being met by this goal[2)].

Electric vehicles are projected to represent more than 60% of cars sold globally by 2030[2)]. Indonesia, in 2019, started to expedite the road transportation scheme for battery-powered electric vehicles[3)]. The program objectives are to develop an electric vehicle ecosystem consisting of incentives for EVs local production, build and deploy electric vehicle charging stations (EVCS) by

stated-own enterprises in the initial phase, promote user awareness of the benefits of EVs, and provide some fiscal and non-fiscal incentives.

In 2022, Indonesia sold 15,437 of all types of electric vehicles[4]. This number increased sharply by 383.46% compared to 2021, when electric cars sold 3,193 units[4]. The battery electric vehicles (BEVs) sold in 2022 was 10,327, an increase of 59% compared to the 2021 sales of 685 units[4]. The hybrid electric vehicles (HEVs) were 5,100 units, a rise of 106.23% compared to 2021, which was 2,473 units[4]. Battery conditions play a role in optimizing fuel efficiency within hybrid vehicles, ultimately contributing to the ongoing advancements in sustainable transportation[5]. Even though the popularity of electric vehicles is rising, the market share is still meager, only 1.47%. Meanwhile, in numerous industrialized nations in 2016, more than 100,000 Electric and hybrid vehicles were sold, including more than 500.000 in China, 222.200 in Europe, and 157.130 in the United States[2]. Manufacturers have also begun selling more than 100,000 electric vehicles in other underdeveloped nations.

When consumers make purchasing decisions, they face more alternatives due to information exchange and value variation during purchasing[6]. Many consumers still buy ICEVs as new vehicles, which is very significant. Indonesia is still in the early stages of its electric car adoption, and the realization still needs to be well short of the government-set goals. The low adoption of electric vehicles in Indonesia results from the need for more supporting infrastructure and more comprehensive legislation[7]. The high cost of batteries is the primary factor behind the high price of electric cars. However, in the future, there will undoubtedly be a decrease in the cost of making these batteries, and as a result, BEVs can reach competitive prices with ICEVs and even be below the price of PHEVs in 2030[1].

Analyzing consumer intentions to buy electric cars is essential in determining variables that attract consumer interest. Many studies have been discussing the plan to buy an electric car. There is research on intentions to purchase electric vehicles in Hong Kong using the Theory of Planned Behavior (TPB) and Partial Least Squares - Structural Equation Modeling (SEM-PLS)[8]. The same study in China uses the TPB, PLS-SEM, the Technology Acceptance Model (TAM), and the Innovation Diffusion Theory (IDT) methods[6]. Analysis based on time series data related to factors that impact the proportion of electric automobiles on the market was conducted in South Korea[9]. The usage correlation statistical analysis analyzes the factors that foster motivation for adopting electric vehicles in the Netherlands[10]. The research compared the scenario of adopting electric vehicles using the game theory method in India[11]. In Hong Kong, there is an analysis of attitudes and reasons for the slow adoption of electric cars using descriptive statistics[12]. The TPB approach is used in Malaysia to analyze the intention to buy a hybrid vehicle[13]. Turkey has also provided a breakdown of the choices for purchasing electric vehicles using the SEM and TPB methods[14]. Then, there is an analysis of intentions to buy electric cars using India's SEM and TPB methods[15]. Research related to the study of intentions to purchase electric vehicles using the SEM and TPB methods was also conducted in Germany[16]. There is also an analysis of electric vehicle purchasing behavior models using China's SEM and TPB methods[17]. Previously, the research analyzed the intention to acquire electric vehicle models using the SEM and TPB methods in China[18]. In that research, the conceptual model created adds to the TPB concept[18].

In Indonesia, studies on the purchase intentions of electric cars are limited to descriptive statistical techniques[7]. Using the Analytic Network Process (ANP), the other researcher investigated the prediction of intentions to purchase electric vehicles[19]. In the meantime, there is research that employed the Market Development Index (MDI) and Share Development Index (SDI) analysis-based sampling[20]. There is currently no research on consumer intentions to purchase electric vehicles in Indonesia that employs the TPB framework in conjunction with the SEM method to examine the factors that affect consumer interest. To capture consumer intentions to purchase EVs in Indonesia, this research adapts the TPB and SEM-PLS model approaches by incorporating several variables[18].

EV demand won't change just by concentrating on the upstream. EVs compete with automobiles powered by internal combustion engines since they are a more recent technology. The government needs to increase the attraction of EVs, especially from an economic one, in order to shift consumer attitudes[2]. With every decision they make, consumers weigh the advantages, disadvantages, potential financial rewards, and ease. The reasoning will vary based on the kind of car[2]. Apart from the framework and rules pertaining to electric vehicles, the government must to refrain from enacting laws that promote internal combustion engine usage. Regrettably, policy inconsistency happens, as demonstrated by the tax break offered to customers who bought ICE cars during the pandemic and the ongoing fuel subsidies. Instead of pursuing two opposing objectives, the government must make the tough choice to take one course. A no-regrets policy is necessary if we are to successfully decarbonize the transportation sector.

To meet the target of net zero emissions by 2050 and environmental sustainability in a pollution-free Indonesia, the government must identify the barriers to EV sales and development, regarding the low number of EVs purchased in Indonesia. Therefore, this study aims to identify the factors influencing consumer interest in buying EVs using a statistical method and the Theory of Planned Behavior (TPB). Additionally, the research will explore the relationship between predictor variables and consumer intentions. The findings of this data processing and analysis are required to provide an in-depth analysis of

consumer behavior, which can be applied to determine the most effective steps and strategies for solving the issue.

2. Literature Review

2.1 Electric Vehicles as Eco-green Cars

A battery-based electric motorized vehicle is powered by an electric motor that gets its electricity directly from the battery within or outside the vehicle[3]. Electric vehicles (EVs) have emerged as a critical component in global strategies aimed at mitigating climate change and reducing greenhouse gas (GHG) emissions. The transportation sector is a significant contributor to global carbon emissions, and the shift from internal combustion engine vehicles (ICEVs) to EVs is seen as a pivotal step in achieving the 1.5°C temperature rise limit set forth by the Paris Agreement. EVs, powered by electricity and often utilizing renewable energy sources, offer a cleaner alternative to traditional vehicles by substantially reducing carbon emissions during their lifecycle. Electric vehicles (EVs) can be divided into two categories: battery-only models (BEVs), which require a plug-in outlet to recharge, and hybrid models (HEVs). Plug-in Hybrid Electric Vehicles (PHEV) may be filled with liquid gasoline and include a battery for storing energy[21].

In recent years, the global adoption of EVs has accelerated, with several countries leading the charge. For instance. The transition toward EVs is driven by a combination of technological advances, government incentives, and growing consumer awareness of environmental sustainability. However, despite the increasing popularity of EVs globally, challenges remain in emerging economies like Indonesia, where adoption rates are still significantly lower compared to industrialized nations.

Indonesia, the fourth most populous country in the world, plays a critical role in the global effort to reduce carbon emissions, particularly through its transportation sector. The government of Indonesia initiated its push for EV adoption in 2019 with the issuance of Presidential Regulation No. 55/2019, which outlined a national strategy to accelerate the use of battery-powered electric vehicles for road transportation[3]. This regulation introduced a range of fiscal and non-fiscal incentives to encourage both EV production and consumption, as well as the development of supporting infrastructure such as electric vehicle charging stations (EVCS). Apart from PEVCS, there is also a Public Electric Vehicle Battery Exchange Station (battery swab), which is a means of exchanging batteries that will be recharged with batteries that have been recharged for BEV for the public[22]. The charging technology in Indonesia consists of 4 types[22]: slow charging technology with an output power of up to 7 kilowatts; intermediate (medium) charging technology with an output power of more than 7 kilowatts up to 22 kilowatts; fast charging technology with an output power of over 22 kilowatts up to 50 kilowatts; and ultra-fast charging technology with an output power of over 50 kilowatts.

EVs in all types are eco-green vehicles and low-carbon emission vehicles. Based on the life cycle assessment result, BEVs have the lowest emission in EV types compared to hybrid cars. EVs have lower emissions than internal combustion engine vehicles (ICEVs). Using a cleaner electricity power generation for charging stations will create more environmentally friendly EVs[23,24].

EVs are sustainable products that must be introduced to consumers as attractive products by other subsystems in an EV ecosystem, namely EV manufacturers, EV charging station providers, and the government with effective policies[25,26].

Infrastructure deficiencies, high initial prices, and poor performance all hinder the adoption of EVs in Indonesia[2]. The adoption of EVs has increased recently. But even with such a significant increase, the rate of EV adoption is still far behind Indonesia's NDC target. The biggest obstacles to EV adoption are limited driving/riding range, high upfront costs, and inadequate charging infrastructure[2]. Moreover, EVs' poor performance, long charging times, and short travel range are all seen as obstacles[2]. The perception and ignorance of consumers regarding EVs also hinder the adoption of EVs[2].

2.2 Theory of Planned Behavior (TPB)

The analysis of consumer intentions to purchase electric vehicles is a crucial step in identifying the factors that draw in customers. The theory of planned behavior (TPB) is one of many theories that can explain or forecast how people will act or intend to act. According to TPB, human behavior can be predicted and explained in particular situations[27]. This theory presents one of the most used social psychology theories for analyzing and forecasting behavior in people[27]. The concept of planned behavior is predicated on the notion that people generally act responsibly[28]. People take into account the information that is accessible and think about the effects of their choices either obliquely or directly[24]. This idea places an individual's plan to participate in a specific conduct (or not) at its core[27].

Because intention is a factor that directly influences behavior, it can be used to predict one's behavior[29]. Previous studies have found that using attitudes, subjective standards, perceived behavioral control, and individual moral obligations, the TPB model can significantly enhance the forecast of intents[30]. The TPB model is generally intended to increase the ability of standard models to explain and forecast actual intents regarding behavior[29]. The TPB behavior model is depicted in Fig. 1.

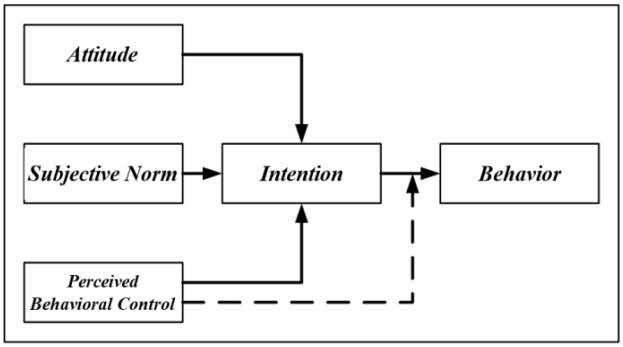

Fig. 1: Theory of Planned Behavior Behavior Model[27].

The innovation resistance theory (IRT) and theory of consumer value (TCV) are the other two theories that are thought to be employed in this study in addition to TPB. Resistance-oriented user behavior can be better understood by utilizing the theoretical framework for consumer resistance provided by IRT[31]. When it comes to adopting and using innovation, rational decision-making and reasoning about the potential for changes brought about by alterations to the status quo and departures from preexisting belief systems can be used to characterize innovation resistance[31]. Finding out why Indonesian consumers are still reluctant to accept new technologies—EVs in particular—is made possible by this approach. There are two categories of barriers that are used as resistance in IRT: psychological and functional barriers[31]. Usefulness, value, and risk barriers are the construct variables that make up functional barriers[31]. Meanwhile, psychological barriers consist of tradition barriers and image barriers[31].

The other theory is theory of consumption values (TCV). TCV is one concept that helps to explain why consumers make the decisions they do. It is predicated on the notion that five values—functional, emotional, social, epistemic, and conditional—have an impact on an individual's ultimate decision when making a purchase[32]. Same as TPB, customer behavior may be predicted, described, and explained using the TCV. It can be used in a variety of situations with a single product. Three basic assumptions form the basis of the TCV: consumption values are independent, contribution of consumption values varies depending on the purchasing scenario, and consumer behavior is a function of varied consumption values[32].

TPB was chosen because of its relevance and flexibility in integrating factors such as government policy, environmental attitudes, behavioral control, and demographics, all of which are critical in understanding EV purchase intention in Indonesia. While IRT and TCV also have their advantages, TPB is more suitable for this study because of its broader focus and ability to explain both drivers and barriers to consumer intention.

2.3 Structural Equation Modelling (SEM)

SEM is utilized to determine the factors influencing the intention to buy an electric vehicle[29]. SEM can be used to present a mechanism model for electric vehicle purchase plans based on the theory of planned behavior[30]. Structural Equation model (SEM) enabled the integration of qualitative and quantitative criteria into the decision-making process to be or not active in joint action[33]. It's applied to comprehend the connection between varied observations using different kinds[34]. One way is to use a lot of other variables and SEM to find a correlation[29].

A significant problem with partial least squares structural equation modeling (SEM-PLS) is its sensitivity to sample size. PLS analysis results can vary significantly with different sample sizes. This indicates that a large sample is needed for results to be consistent and credible[35]. SEM-PLS, suitable for analysis processes with limited sample numbers, facilitates the simultaneous evaluation of measurement and structural models[36]. SEM effectively evaluates the connections between the many independent and dependent variables while working with latent variables[36]. PLS-SEM is used to test the validity and reliability of the hypotheses[37].

2.4 The Research Variables

This study utilizes the conceptual framework of the Theory of Planned Behavior, which asserts that the desire to partake in a specific behavior is developed due to various causes or elements, including attitudes, personal standards, and the perception of behavioral control[27]. Studies on energy and the environment still use this theory[18]. So, variable settings get closer to real life. Interpretations of attitudes, personal standards, and behavioral control perception are also developing[18].

Beliefs concerning the effects of an action, also known as behavioral beliefs, impact one's attitude toward this behavior[27]. A person's subjective assessment of the universe, his perception of himself, and his environment are all influenced by his beliefs. They are carried out by associating specific acts with potential gains or losses that could be experienced if he does or does not do them. This belief may become more robust if the evidence supports the behavior's potential benefits for the individual considering their appraisal. The more individuals think an action will have positive results, the more positive attitudes people have toward that conduct; conversely, the more people believe a behavior will produce negative repercussions, generally speaking[27].

This attitude can be determined by assessing the degree to which an individual considers the advantages or disadvantages of a specific behavior[18]. Researchers previously included an awareness of environmental effects as part of their views in the TPB model. This affects consumers' decision-making on green purchases[38].

Subjective norms are people's beliefs of what significant folks in their lives expect of them in terms of engaging in or refraining from specific activities[27]. Every day, each individual's relationships can be categorized vertically and horizontally. Teacher-student, professor-student, or parent-child ties are examples of vertical

relationships. Interactions between persons and their friends or other equals are called horizontal relationships. The construction of subjective norms will be influenced by the motivation to abide by requests to perform or refrain from doing a behavior if expectations are viewed as demands (injunctive) in vertical interactions[27]. On the other hand, in horizontal interactions, expectations are established descriptively, resulting in a desire to mimic or follow (identify) the conduct of others around them[27].

According to some earlier research on the environment and energy, legislative support and retail incentives are crucial for raising public awareness and interest in renewable energy technology and promoting social acceptance of the technology[39]. Previously, research also used this opinion, including government policy variables, as a manifestation of subjective norms[18].

An individual's perception of how simple or complex a given behavior is known as perceived behavioral control or behavioral control[27]. The greater one's perception of control over behavior is, the more one believes that resources and opportunities associated with that conduct are available and play a significant role in one's life. Consumers may assess a product or technology's worth based on travel time and charging requirements[40]. Consumers also factor in a technology's characteristics and marketability when determining a product's or technology's value[9].

The research variables in this study are grounded in the extended Theory of Planned Behavior (TPB), which examines consumer behavior across three primary constructs—attitude, subjective norms, and perceived behavioral control—each adapted to the context of electric vehicle (EV) adoption in Indonesia. The detailed breakdown of variables is as follows:

Attitudes: This construct is divided into three dimensions, reflecting consumers' perceptions of: Economic gain (e.g., long-term savings on fuel and maintenance), Economic loss (e.g., high upfront costs and potential depreciation), and Environmental awareness (e.g., knowledge of EVs' reduced carbon footprint). These sub-variables capture consumers' evaluative beliefs about the positive and negative consequences of purchasing EV.

Subjective Norms: Translated into the government policy variable, subjective norms reflect the influence of policy measures on consumer intentions. This includes:

Financial incentives such as subsidies and tax reductions, Non-financial incentives like exclusive driving privileges or reduced tolls. These aspects highlight how governmental actions and societal expectations shape consumers' perceived social pressure to adopt EVs.

Perceived Behavioral Control: This construct includes three variables: Infrastructure (e.g., the availability and accessibility of public EV charging stations), Vehicle features (e.g., battery range, safety features, and performance), and Availability (e.g., the variety of EV models and the ease of purchase). These variables assess the degree to which consumers feel that external conditions facilitate or hinder their ability to purchase EV.

Demographics: Control variables like age, gender, education level, and income are incorporated to account for variations in consumer behavior across different population groups.

This structured approach to variables provides a comprehensive framework for understanding the factors influencing EV purchase intentions, allowing for a more nuanced analysis of consumer behavior in Indonesia's emerging EV market. This research uses the conceptual model of research with the addition of several variables[18]. Based on the literature review that has been conducted, 24 indicators of intention to purchase electric cars were obtained, which were divided into 8 hypothesis-forming variables as shown in Table 1[18].

2.4.1 Demographics

The perception that participation in an environmentally friendly consumption lifestyle by purchasing environmentally friendly products such as electric vehicles projects a social image of a good citizen is one of the considerations a person makes when buying an electric car[41]. Demographic growth is one factor that has brought the conditions of daily human life into a dangerous state and led to global climate change[42]. The analysis results demonstrate that various demographic factors, including sex, age, formal education, earnings, and the number of cars in a family, affect consumers' intentions to make purchases[8,30].

2.4.2 Environmental Awareness

Researchers stated that the variables influencing electric vehicle use are linked to beneficial environmental effects, including lowering air pollution. Still, there are also negative environmental impacts from battery waste and emissions from electricity production using fossil fuels[12]. Both personal and environmental benefits[6] and the environmentally friendly characteristics of electric vehicles[17,30] influence the plan to purchase electric cars. Public awareness, understanding[30], and their contribution to protecting the environment affect the decision to buy electric vehicles[29].

2.4.3 Government policy

Government subsidies[6] and tax reduction policies[17] will influence interest in buying an electric car for consumers with low annual household incomes. Besides, non-financial incentive policy instruments, such as providing permission to drive in particular lanes, are practical choices that significantly and positively affect purchase intentions[43].

Some researchers explain that consumers choose electric vehicles mainly because of tax refunds and government incentives[44]. One of the most important aspects influencing consumers' inclination to buy is

incentive scheme measurement[29,30]. Governments can create an incentive mechanism[45].

Government policy can also support low carbon society[46]. However, consumer intentions to buy electric vehicles are greatly influenced by financial incentive programs, purchase subsidies, tax exemptions, decreased parking fees, and increased purchase loan amounts[30].

2.4.4 Availability

Previous research also suggests a strong positive correlation between a country's EV market share and the range of variations available in the retail[9]. Additionally, availability significantly corresponds with each independent and dependent variable[9]. More than 60 types of electric vehicles were available in 2015 throughout the country. The sole EV sold globally is the BMW i3, and in 2015, no Chinese-made electric vehicle was sold outside of China. EV producers are experimenting with the marketability of EV models in many different nations. Production cap before departing is based on each nation's incentive scheme[47].

2.4.5 Infrastructure

Utilizing electric vehicles requires infrastructure adaptation, which includes building some public electric vehicle charging stations, electricity supply, service center vehicles, and road infrastructure, influencing the shift from internal combustion engine vehicles to electric cars[48]. The unavailability of charging stations/charging stations with larger capacity and fast charging along travel routes is a core problem for electric vehicle users[30,48]. The major hurdles to developing EVs in Indonesia are the initial costs and the lack of charging station infrastructure and standards[49]. A study also estimates plug's power usage pattern for public electric vehicle charging stations within multi-uncertainty parameters in Indonesia's urban area[46].

2.4.6 Financial Benefits

As stated in several previous studies, vehicle price is the primary factor consumers use when buying electric vehicles. Price can change purchasing intentions[50]. Electric cars are generally considered environmentally friendly products, influencing purchase intentions related to price and other costs[51]. Prices of ecologically friendly goods are typically more expensive than those of non-green goods[29]. Few people are willing to pay extra for eco-friendly goods, yet some still aren't[52]. Usage-based policy incentives are an effective way to increase sales of electric vehicles[43].

Table 1. Research Variables.

Variable	Indicator	Source
Demographics	Age influences intentions to buy an EV	29,30)
	Gender influences intentions to buy an EV	29,30)
	The level of education affects EV purchase intention	8,29,30)
	Income/expenses influence the tendency to buy an EV	29,30)
Environmental Awareness (Attitudes)	EVs produce lower carbon gas emissions than car fuel oil	8,30,54)
	Driving an EV makes less noise.	8,54)
	EV energy consumption is lower compared to material cars, which burn oil	8,30,47,53)
Government Policy (Subjective Norms)	Providing incentives for EV purchases drives EV usage intentions	29,30,43)
	Tax reduction policy (granted 0% luxury goods tax) on EV purchases by the government increases the propensity to buy EVs	29,30,43)
	Having an EV is more flexible in driving because there is relaxation in the regulations (e.g., odd even vehicles plat rules)	29,30)
Availabilities (Perceived Behavioral Control)	EV is easy to order and ready stock at the market	9)
	Several types of EVs are already available in the Indonesian market (Sedan, SUV, MPV, City Car, etc.)	9)
	Ease of getting spare parts for electric vehicles	30)
Infrastructures (Perceived Behavioral Control)	Public Electric Vehicle Charging Station, which is used for vehicle battery charging electricity, is easy to find	30)
	The Public Electric Vehicle Charging Station accommodates all EV plug socket shapes.	30)
Financial Benefits (Attitudes)	Using EVs reduces fuel consumption	51)
	EV maintenance is cheaper and more economical because it does not have a system exhaust like in a car with fuel oil.	52)
	Tax deduction	43)
Financial Disadvantages (Attitudes)	The purchase price of an electric vehicle is still high	8,29)
	EV resale prices fall further if compared to conventional cars	29)
	Battery prices are expensive. Barriers to buying an EV	8,30)

Vehicle Features (Perceived Behavioral Control)	By using an EV, I can go long distances with one-time charging	9)
	Charging an EV battery doesn't take long	30)
	The performance of electric cars in terms of speed, acceleration, and comfort is the same as that of a vehicle's conventional car.	30)
	Electric vehicle safety standards are the same as conventional engine vehicles.	30)

2.4.7 Financial Loss

Compared to internal combustion engine cars, electric vehicles are still expensive, an obstacle to purchasing electric vehicles[8,48]. Therefore, the researcher stated that it is crucial to examine the problems that result in high prices of electric cars and provide alternative price reductions[48].

2.4.8 Vehicle Features

Electric vehicles are more economical in terms of fuel costs because of their excellent energy efficiency[47,53]. Because electric cars have fewer components, maintenance and repair costs are also lower[53]. In addition, electric vehicles are environmentally friendly and provide greater comfort, producing less vibration and noise[54]. Improving the performance of electric vehicles, such as increasing mileage, shortening charging time, extending battery life, and enhancing security and safety features, increases electric vehicle purchase intentions[30].

2.5 Research Hypothesis

Figure 2 shows the conceptual model of intention to purchase an electric vehicle, which offers a hypothetical structural equation model for electric vehicle purchase intention adopted from the previous paper[18].

The hypotheses regarding the customer's intention to buy an electric vehicle are below.

H1. Demographics have a positive influence on behavioral intentions to purchase electric vehicles. This hypothesis aims to confirm that a person's age, gender, income, and occupation favorably impact their intention to purchase an electric vehicle.

H2. Environmental awareness positively influences behavioral intentions to purchase electric vehicles. This hypothesis is used to verify whether environmental factors positively impact the intention to buy an electric vehicle.

H3. Government policy has a positive influence on behavioral intentions to purchase electric vehicles. The purpose of this hypothesis is to verify whether government measures have a favorable impact on the intention to purchase an electric vehicle.

H4. Availability has a positive influence on electric vehicle purchasing intention. This hypothesis is used to validate whether there is a positive direct influence of product and spare parts availability on electric vehicle purchasing intention.

H5. Infrastructure has a positive influence on behavioral intentions to purchase electric vehicles. This hypothesis is to validate the influence of existing infrastructure, which positively influences the intention to buy an electric vehicle.

H6. Financial benefits positively influence the behavioral intention to purchase electric vehicles. This hypothesis was carried out to test whether taking into account the financial benefits obtained positively affected the behavioral intention to purchase an electric vehicle.

H7. Financial losses positively influence the behavioral intention to purchase an electric vehicle. This hypothesis tested whether there is a positive influence in calculating financial losses on the intention to buy an electric vehicle.

H8. Vehicle features positively influence behavioral intention to purchase an electric vehicle. This hypothesis tested whether vehicle feature factors positively influence the intention to purchase an electric vehicle.

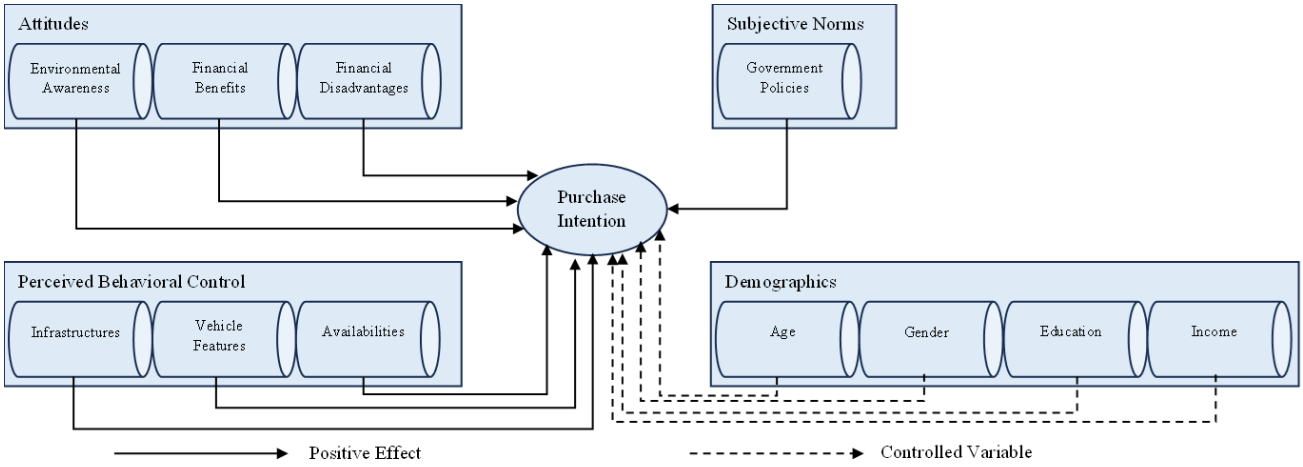

Fig. 2: Conceptual Model of Intention to Purchase an Electric Vehicle[18].

3. Research Methodology

3.1 Research Stages Using the SEM Method

To conduct the research, electronic surveys were distributed, and 100 respondents participated. Two different approaches to data analysis were used: descriptive analysis for demographic data and PLS-based inferential statistical analysis. After defining the research topic and conducting a literature review, the next steps involved data collection and processing. Figure 3 shows the steps taken by the author in collecting and processing data.

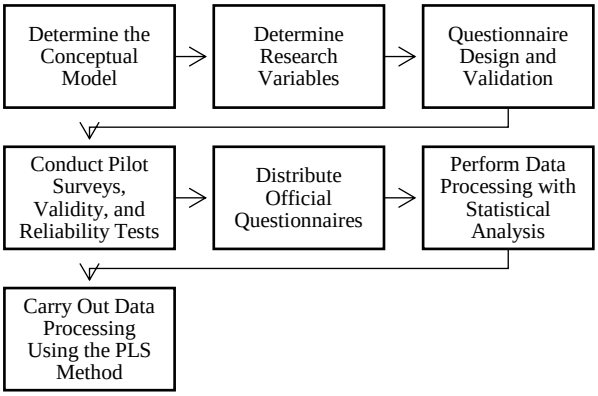

Fig. 3: Research Steps.

3.1.1 Determine the Conceptual Model

Model development was carried out using a literature review. The model created is based on the TPB and obtained eight latent variables: Demographics, Environmental Awareness, Government Policy, Availability, Infrastructure, Financial Benefits, Financial Losses, and Vehicle Features.

3.1.2 Determine Research Variables

The author next determines indicator variables for people's motivation to buy electric vehicles based on the conceptual model built. Based on the literature review that has been carried out, 24 indicator variables were obtained for the intention to buy an electric car as shown in Table 1.

3.1.3 Questionnaire Design and Validation

The design of the questionnaire in this research was based on a literature review. The questionnaire design was divided into three sessions. The questionnaire questions in session 1 contained the demographics of the respondents (such as gender, age, education, occupation, etc.).

Questions were developed for the second session based on the indicators and conceptual model that had been identified previously. The questions have five response options (strongly disagree, disagree, unsure, agree, and strongly agree).

Meanwhile, the questions in session 3 aimed to find people's reasons for being interested or not in buying an electric vehicle.

3.1.4 Calculating the Number of Questionnaire Needs

A survey is needed to validate the conceptual model that has been created. The survey was carried out using a questionnaire tool. The questionnaire used was an online questionnaire. The expected number of respondents is 100 respondents. Data processing with statistical analysis is used to interpret descriptive data from the questionnaire. After that, to get the value of the degree of relationship between factors in the conceptual model, PLS-SEM software was used.

3.1.5 Conduct Pilot Surveys, Validity, and Reliability Tests

A pilot survey was conducted on the population of potential respondents to verify and validate the questionnaire and whether the respondents' answers were valid and followed the data required for the research. The pilot survey results can be used to determine whether the questionnaire is ready and suitable for distribution.

3.1.6 Distribute Official Questionnaires

The distribution of questionnaires was carried out online. Distribution of questionnaires online is carried out using social media such as WhatsApp.

3.1.7 Perform Data Processing with Statistical Analysis

After obtaining the sample size as expected, the next step is to process the survey data using statistical analysis.

3.1.8 Carry Out Data Processing Using the PLS Method

A complete SEM approach can be implemented using PLS-SEM, a statistical framework for analyzing factor models, which includes both substantive and theoretical models and performs goodness-of-fit tests for the model[55]. Further data processing is conducted using the PLS method, with structural model testing performed using SmartPLS software version 4.0. The steps in Partial Least Squares (PLS) include designing the structural model, conducting the outer model test, performing the inner model test, and testing the hypotheses.

3.2 Data Retrieval

The questionnaire consists of three sections, each with closed-response options based on a 5-point Likert scale. The first section includes questions about demographic factors such as gender, age, education, employment status, and income. The second section covers hypothetical questions related to infrastructure, availability, government policy, demographics, awareness, the environment, and vehicle features. The third section focuses on public declarations of interest or plans to purchase an electric vehicle.

The questionnaire will be validated by consulting the Chairman of the Indonesian Electric Vehicle Community

(KOLEKSI). After expert validation and adjustments to the question order, the questionnaire will be ready for use in a pilot study.

In June 2023, a pilot survey was conducted, with 36 participants completing the online questionnaire. Following the pilot survey, validity and reliability tests were performed on the collected data. The validity test compared the correlation table values with the correlation results for each question, while the reliability test used Cronbach's Alpha. A Cronbach's Alpha value greater than 0.6 indicates that the questionnaire is reliable. Based on the results, the questions were deemed both valid and reliable.

The online questionnaire distribution was carried out using social media platforms, primarily WhatsApp. Researchers directly contacted potential respondents via personal messages and shared the questionnaire link through statuses and posts in relevant groups. The online questionnaire distribution took place in July 2023.

3.3 Structural Model

The first step is to create a structural and measurement model using PLS software. This model is based on a conceptual framework, including the variables and indicators previously defined. The conceptual model is adapted from prior research models, with the addition of several new variables. Figure 4 illustrates the structural and measurement model developed from the problem formulation for the intention to purchase an electric vehicle. For comparison, an alternative structural model was also developed, where the variables are grouped into the main constructs of the Theory of Planned Behavior (TPB): Attitude, Subjective Norm, and Perceived Behavioral Control, with the addition of Demographics as a control variable. This model is shown in Fig. 5.

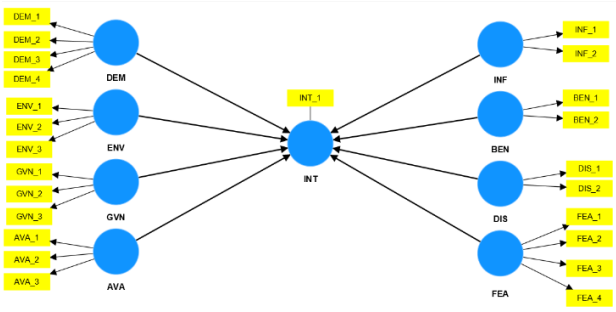

Fig. 4: Structural Model of Electric Vehicle Purchase Intention.

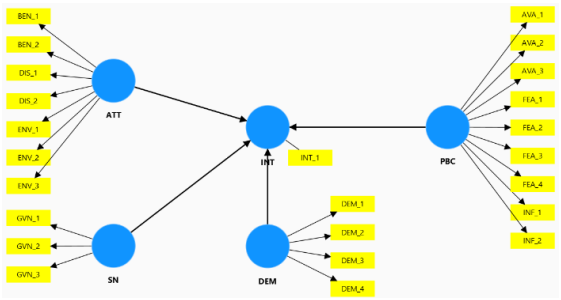

Fig. 5: Alternative Structural Model of Electric Vehicle Purchase Intention.

Description:

ATT	: Attitudes
SN	: Subjective Norms
PBC	: Perceived Behavioral Control
DEM	: Demographics
ENV	: Environmental Awareness
GVN	: Government Policy
AVA	: Availabilities
INF	: Infrastructures
BEN	: Financial Benefits
DIS	: Financial Disadvantages
FEA	: Vehicle Features
INT	: Intention to Purchase an Electric Vehicle

3.4 Data Collection

Based on the results of the online questionnaire distribution, 100 respondents completed the survey. The initial target was members of the Indonesian electric car community (KOLEKSI), but due to the small number of members, additional general respondents were included.

4. Results

4.1 Respondent Characteristics

One hundred respondents completed the questionnaire, according to the survey results. The respondents' demographic information is shown in the Table 2.

Table 2. Respondent Profiles.

Characteristics	Amount	Percentage
Sex		
Man	85	85%
Woman	15	15%
Age		
26 - 36 Years	39	39%
> 36 Years	61	61%
Formal Education		
Junior High	1	1%
High/Vocational	5	5%
Diploma	5	5%
Bachelor	48	48%
Postgraduate	39	39%
Doctor	2	2%

Work		
Civil servants/BUMN employees	55	55%
Private employees	31	31%
Self-employed	9	9%
Etc.	5	5%
Income		
< Rp. 10 million	40	40%
Rp. 10 million to less than Rp. 20 million	29	29%
Rp. 20 million to less than Rp. 30 million	9	9%
> Rp. 30 million	22	22%

The results in Table 2 show that, on average, 15% of the respondents who completed the questionnaire were women, while 85% were men. This aligns with expectations, as men tend to have a greater interest in the automotive sector. The majority of respondents, 39%, were in the age range of 26 to 36 years, while 61% were over 36 years old. This indicates that the average respondent was over 36 years old.

In terms of education, the majority of respondents were undergraduate (S1) degree holders, accounting for 48%, followed by postgraduate (S2) degree holders at 39%. Respondents with a high school/vocational school background and those with a diploma made up 5% each, doctorate (S3) degree holders 2%, and junior high school graduates 1%.

Table 2 also shows that most respondents were civil servants or employees of state-owned enterprises (BUMN), representing 55%, followed by private sector employees at 31%, self-employed individuals at 9%, and 5% falling into the "other" category. In terms of monthly income, 40% of respondents earned less than Rp. 10 million, 29% earned between Rp. 10 million and less than Rp. 20 million, 22% earned more than Rp. 30 million, and 9% earned between Rp. 20 million and less than Rp. 30 million.

4.2 Validity and Reliability Calculations

Validity and reliability tests were conducted on the collected data. For the validity test, the correlation values in the table were compared with the correlation results for each question. Meanwhile, reliability was assessed using Cronbach's Alpha, with a value above 0.6 indicating that the questionnaire is reliable. Based on the results of the pilot survey, the researcher concluded that the questionnaire was an adequate data collection tool for this study, as the questions were both valid and reliable.

4.3 PLS-SEM Results Model

Due to cross-loading values, several variables or indicators related to interest in or intention to purchase an electric vehicle were found to be invalid. The AVA_1, DEM_1, DEM_2, DIS_2, and FEA_2 indicators must be removed if their values are less than 0.5. After removing these invalid indicators from the measurement model, the model calculation was repeated using PLS (Partial Least Squares) software version 4.0. The resulting values for interest in and intention to purchase an electric vehicle are shown in Fig. 6. In the alternative structural model, some variables were also removed if their values were less than 0.5. The results are shown in Fig. 7.

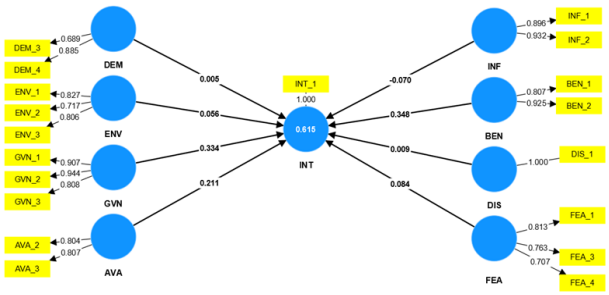

Fig. 6: Complete Processing Outcomes for the Intention to Purchase an Electric Car Model.

The validity test was conducted again, and the measurements (outer loadings) produced the results shown in Fig. 6 and Fig. 7. These results indicated that all variables and indicators in the interest/intention model to purchase electric vehicles met the requirements to be considered valid, with critical values greater than 0.5.

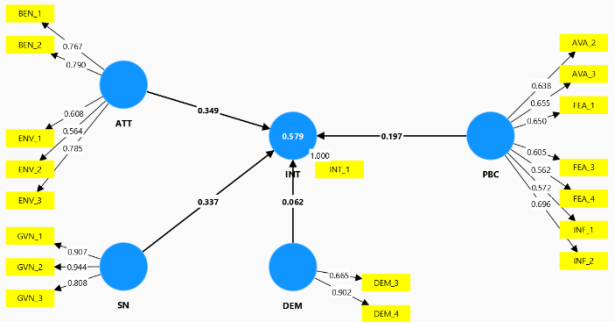

Fig. 7: Complete Processing Outcomes for the Intention to Purchase an Electric Car Alternative Model.

4.4 Inner Model Testing

To ensure the accuracy and robustness of the structural model, an inner model test was conducted. The evaluation of the inner model is reflected in the determination coefficient (R^2) of the endogenous variable. For the INT indicator, the R^2 value is 0.615. R^2 values are generally categorized as 0.19 (weak), 0.33 (moderate), and 0.67 (strong)[56]. Based on the research findings, the intent construct variable (INT) in the path model for electric vehicle purchase intent has an R^2 value of 0.615. This indicates that the DEM, FEA, INF, GVN, DIS, BEN, ENV, and AVA variables account for 61.5% of the variation in intent, with the remaining 38.5% attributed to factors outside the model. In the alternative model, the R^2 value is 0.579, meaning that the ATT, PBC, SN, and DEM

variables explain 57.9% of the variation in interest, while 42.1% is influenced by factors outside the model.

4.5 Hypothesis test

Next, the t-statistic values and probabilities are compared with the critical values to determine whether to accept or reject the hypothesis. The following data were obtained to test the research hypothesis.

Table 3. Evaluation of T-Statistic Values of EV Purchase Intention Model.

Relation	T-Statistics	Critical Value	Evaluation
Demographics -> Intention	0.065	> 1.984	Not significant
Vehicle Features -> Intention	1,206		Not significant
Infrastructure -> Intention	0.773		Not significant
Government Policy -> Intention	3.967		Significant
Economic loss -> Intention	0.116		Not significant
Environmental Awareness -> Intention	0.664		Not significant
Availability -> Intent	2.419		Significant
Economic Profit -> Intention	4.498		Significant

Table 4. Evaluation of Probability Value of EV Purchase Intention Model.

Relation	P Values	Critical Value	Evaluation
Demographics -> Intention	0.948	<0.05	Not significant
Vehicle Features -> Intention	0.228		Not significant
Infrastructure -> Intention	0.440		Not significant
Government Policy -> Intention	0,000		Significant
Economic loss -> Intention	0.908		Not significant
Environmental Awareness -> Intention	0.507		Not significant
Availability -> Intent	0.016		Significant
Economic Profit -> Intention	0,000		Significant

Table 5. Evaluation of T-Statistic Values of EV Purchase Intention Alternative Model.

Relation	T-Statistics	Critical Value	Evaluation
Demographics -> Intention	0.877	> 1.984	Not significant
Attitudes -> Intention	4.460		Significant
Subjective Norms -> Intention	4.054		Significant
Perceived Behavioral Control -> Intention	2.043		Significant

Table 6. Evaluation of Probability Value of EV Purchase Intention Alternative Model.

Relation	P Values	Critical Value	Evaluation
Demographics -> Intention	0.381	< 0.05	Not significant
Attitudes -> Intention	0,000		Significant
Subjective Norms -> Intention	0,000		Significant
Perceived Behavioral Control -> Intention	0,041		Significant

The tables summarize the evaluation of factors influencing electric vehicle (EV) purchase intention. Table 3 and Table 5 present the t-statistic values for model of intention to purchase an electric vehicle and alternative structural model. While Table 4 and Table 6 focus on the probability values (p-values) for model of intention to purchase an electric vehicle and alternative structural model. These tables analyze the significance of relationships between various predictors and EV purchase intention.

4.6 Additional Result

In addition to questions related to SEM, the questionnaire also included two multiple-choice questions: one about the factors that made respondents interested in purchasing electric vehicles, and another about the factors that made them not interested. The results of these questions are presented in Fig. 8 and Fig. 9.

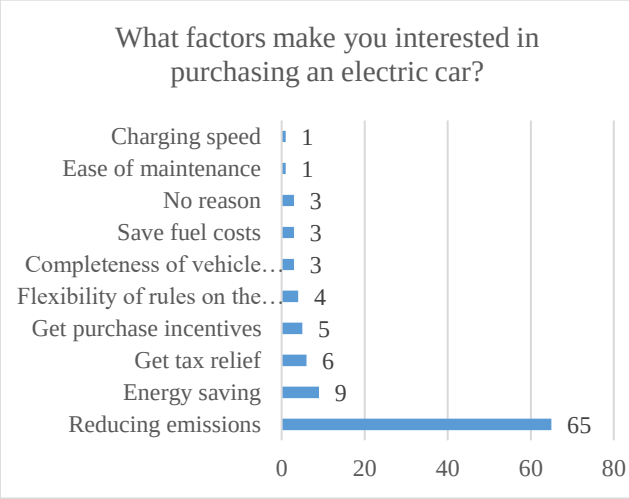

Fig. 8: What Factors Made Respondents Interested in Purchasing Electric Vehicles.

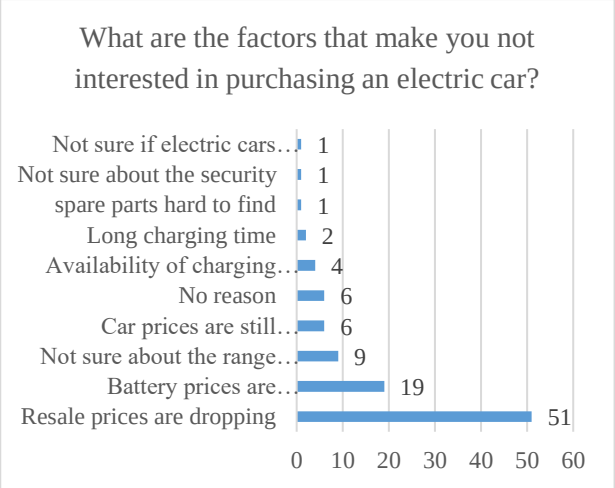

Fig. 9: What Factors Made Respondents Not Interested in Purchasing Electric Vehicles.

Figure 8 shows the proportion of respondents who selected these factors, providing insight into the strongest drivers of interest in EVs. Fig. 8 provides insight into what makes consumers interested in EVs, which can help companies and governments in designing more effective marketing strategies or policies. Figure 9 shows the various factors that cause resistance or barriers to EV adoption. This information is important to understand what needs to be addressed to increase EV adoption rates. Figure 9 provides insight into the challenges and barriers that need to be overcome to increase consumer interest in EVs.

5. Discussion

The results of this study provide important insights into the factors that influence consumers' intention to purchase electric vehicles (EVs) in Indonesia. Applying the Theory of Planned Behavior (TPB), this study identifies three key variables—economic benefits, government policies, and vehicle type availability—that significantly influence consumer behavior. Each of these factors offers a deeper understanding of the challenges and opportunities in driving EV adoption, especially in emerging markets such as Indonesia. This section discusses the implications of these findings, compares them with international trends, and explores how these factors can be leveraged to accelerate EV adoption in Indonesia.

5.1 Economic Benefits: The Key Driver of EV Adoption

This study shows that economic benefits (EVs) are the most significant factor in shaping consumers' intention to purchase electric vehicles, with a T-statistic value of 4.498. This finding is in line with global research that highlights financial considerations as a key motivator for EV adoption. Consumers are particularly sensitive to total cost of ownership, including high initial costs, long-term fuel savings, and lower maintenance costs. This is consistent with studies in China and the United States, where financial incentives such as subsidies, tax credits, and discounts have been shown to be highly effective in encouraging EV purchases[18,27)].

However, in Indonesia, despite the government's subsidies and tax breaks, these findings suggest that these incentives are not enough to make EVs affordable for the majority of the middle class. Therefore, policies that expand these incentives, such as the introduction of low-interest loans, long-term installment plans, or further reducing the cost of purchasing an EV through targeted subsidies, need to be considered. For example, working with financial institutions to create accessible green financing options could reduce barriers for middle-class consumers, making EVs a more attractive option.

Furthermore, the economic appeal of EVs is not limited to individual consumers. With businesses increasingly looking for cost-effective and sustainable transportation solutions, the commercial electric vehicle market also has great potential. Governments and manufacturers can capitalize on this opportunity by offering tailored incentives for commercial vehicle fleets, thereby encouraging adoption on a larger scale and increasing overall EV sales.

5.2 Government Policy: Building Trust and Momentum

Government policy (GVN) was also identified as a significant factor influencing consumer intention, with a T-statistic value of 3.967. In many countries, government intervention is a key driver of EV market growth. Policy tools such as subsidies, tax breaks, and incentives for charging infrastructure have been widely used to reduce barriers to entry and build consumer confidence[13)]. For example, countries such as Norway and the Netherlands have seen rapid EV adoption thanks to strong government support, not only in the form of financial incentives but also through favorable policies, such as reduced toll fees and exclusive access to low-emission zones[10)].

In Indonesia, although the government has introduced several policies to encourage EVs, their effectiveness has been limited by a lack of consistent communication and public awareness. This finding suggests that many consumers are either unaware of the incentives available or do not consider them sufficient to offset the higher cost of EVs. This suggests the need for more aggressive and consistent public information campaigns that clearly articulate the benefits of EV ownership and the incentives offered by the government. A targeted approach, using social media, public service announcements, and partnerships with EV manufacturers, can help bridge this gap and raise awareness among potential buyers.

Furthermore, EV adoption in Indonesia is closely tied to broader energy and environmental policies. As the government works to meet its climate goals under the Paris Agreement, EVs offer an opportunity to significantly reduce carbon emissions from the transportation sector. By integrating EV promotion with broader energy and environmental policies—such as transitioning to renewable energy sources for charging stations—the government can improve the sustainability of its overall EV initiatives. Additionally, creating policies that gradually reduce the use of internal combustion engine vehicles (ICEVs), such as increasing taxes or restricting access to certain urban areas, can accelerate the shift to EVs.

5.3 Vehicle Availability: Matching Consumer Preferences

Vehicle availability (AVA), with a T-statistic value of 2.419, is the third most significant factor influencing purchase intention. This finding underscores the importance of offering a variety of EV models that match the needs and preferences of Indonesian consumers. Currently, the EV market in Indonesia is still limited, with a focus on smaller passenger vehicles that do not fully meet the demand for larger vehicles, such as 7-seater family cars[57].

In global markets, the availability of a variety of EV models has been associated with higher adoption rates. For example, in the United States and Europe, consumers can choose from a wide range of EVs, from compact city cars to luxury SUVs and trucks, allowing manufacturers to reach different market segments. In contrast, the limited choice of EV models in Indonesia may limit consumer choice and slow down adoption rates. This is especially evident in the lack of larger vehicles, which are very popular among families and businesses in Indonesia[57].

Manufacturers, therefore, have a key role to play in expanding the range of EV models available in the Indonesian market. Introducing larger and more versatile EVs that cater to local preferences can significantly boost consumer interest. Additionally, offering vehicles with improved features such as longer range, faster charging times, and more powerful battery technology can further reduce negative perceptions of EVs and make them a more attractive option for Indonesian consumers.

5.4 Improving Infrastructure as a Key Enabler

While the study did not find infrastructure to be a statistically significant factor, the role of charging infrastructure cannot be ignored. The lack of adequate charging stations, especially fast-charging options, remains a major barrier to EV adoption in Indonesia[26]. Without a large and reliable charging network, even consumers who are interested in purchasing an EV may be hesitant due to concerns about convenience and practicality. Therefore, while infrastructure did not emerge as a key enabler in the study, fixing this issue is critical to the long-term growth of the market.

To improve consumer perceptions of the practicality of EV ownership, stakeholders should prioritize expanding charging infrastructure, especially in urban areas and along major transportation routes. Public-private partnerships can play a key role in building this infrastructure, with government incentives encouraging private investment in charging stations. Additionally, integrating renewable energy sources into the charging network can increase the appeal of EVs as a green alternative, further driving adoption.

5.5 Implications and Strategic Recommendations

The findings of this study provide a roadmap for accelerating EV adoption in Indonesia. To create a more conducive environment for EV growth, policymakers and industry stakeholders should focus on the following areas:

Increase Financial Incentives: Expanding financial incentives, such as subsidies, low-interest loans, and targeted discounts, will make EVs more affordable for a wider range of consumers. Manufacturers and financial institutions should collaborate to offer green financing options.

Improve Policy Communication: A more consistent and effective communication strategy is needed to raise public awareness of government incentives and the long-term benefits of EV ownership.

Expand Vehicle Availability: Manufacturers should introduce a broader range of EV models, particularly larger vehicles that cater to local consumer preferences. Additionally, improving the performance and features of EVs, such as battery life and charging speed, will further enhance consumer appeal.

Develop Charging Infrastructure: A widespread and accessible network of charging stations is essential for supporting mass EV adoption. Government policies should incentivize private investment in charging infrastructure, with an emphasis on integrating renewable energy sources to make the charging process more sustainable.

For manufacturers, a key takeaway is the importance of offering a diverse range of EV models that meet local preferences. For policymakers, the focus should be on

refining policies that offer meaningful financial and practical incentives to consumers. Future research should focus on evaluating the effectiveness of these strategies and exploring additional factors, such as consumer education and long-term infrastructure development, that may further influence the future of EV adoption in Indonesia.

By addressing these factors, Indonesia has the potential to become a significant player in the global shift toward sustainable transportation, contributing not only to its domestic climate goals but also to the broader global efforts to combat climate change.

6. Conclusions

This study's data analysis from 100 respondents revealed that the variables with T-Statistic values of 4.498, 3.967, and 2.419, respectively, that most affect consumer intention to buy electric vehicles are the availability of vehicle types (AVA), government policy (GVN), and economic benefits (BEN). These three variables are strongly associated with the three primary components of the Theory of Planned Behavior, which are government policy as a subjective norm factor, availability as a component of the behavioral control factor, and economic advantages as an attitude factor. This implies that stakeholders need to take these three aspects into account in order to enhance customer intention to buy electric vehicles. For the alternative model, the results are also the same, where attitudes (ATT), subjective norms (SN), and perceived behavioral control (PBC) influence consumer intention to purchase electric vehicles with statistical values of 4.460, 4.054, and 2.043.

The findings provide valuable insights for policymakers, manufacturers, and other stakeholders looking to accelerate the adoption of electric vehicles in Indonesia. The three most significant factors—economic benefits, government policy, and vehicle availability—should guide future strategies aimed at boosting consumer adoption of EVs. Based on these results, the following strategic recommendations are proposed.

6.1 Enhance Financial Incentives

To address the high upfront cost of EVs, the government and manufacturers should collaborate to offer more accessible and substantial financial incentives. This could include low-interest loans, extended tax relief, or additional subsidies for mid-range EVs aimed at middle-class consumers. Such measures can lower the financial barrier and broaden access to EVs for a wider demographic, making EVs more affordable and appealing.

6.2 Improve Policy Communication

Effective communication of government policies is crucial for building consumer trust and understanding of the benefits of EVs. Clear, transparent, and consistent messaging about available incentives and government support will be essential in shifting consumer perceptions and attitudes. Public engagement campaigns and the dissemination of easily accessible information through various channels can help raise awareness and encourage positive attitudes toward EV adoption.

6.3 Expand Vehicle Availability

Manufacturers should prioritize expanding the range of EV models available, particularly those that cater to local consumer preferences. This could include introducing larger family vehicles or more affordable options suitable for both urban and rural markets. A broader variety of models will help address consumer concerns about limited options and better align the EV market with Indonesian consumer needs. A competitive and diverse EV market will stimulate consumer interest and drive higher adoption rates.

6.4 Develop Charging Infrastructure

In addition to vehicles and policy, it is essential to improve EV charging infrastructure. Expanding the availability and accessibility of charging stations will ease consumer concerns about range anxiety and convenience. Partnerships between the government, private sector, and energy companies can play a key role in building a robust and widespread charging network, which is crucial for supporting mass EV adoption.

Other businesses are also impacted by Indonesia's electric vehicle market expansion. The energy and infrastructure sectors will grow as EV usage rises, especially in the development of renewable energy sources and EV charging infrastructure. The automotive sector will have to transition to electric vehicles, which will open up new avenues for businesses to diversify and innovate. While the technology and electronics industries will profit from the growing demand for EV batteries and cutting-edge charging systems, financial institutions will be essential in providing customized financing alternatives for EVs. Additionally, a move toward electric fleets has the potential to revolutionize the transportation and logistics sectors, increasing demand for environmentally friendly logistics solutions. Finally, the growing demand could lead to growth in the mining sector for raw materials like lithium, cobalt, and nickel for EV batteries.

Future studies should consider larger sample sizes and more geographically diverse regions to validate these findings further. Research could also explore additional factors, such as the role of infrastructure development (e.g., charging stations) and long-term cost benefits (e.g., lower maintenance and fuel costs) in enhancing consumer confidence in EVs. Understanding the interplay between these factors and consumer behavior will be essential for shaping effective policies and strategies to accelerate EV adoption.

By addressing the identified barriers and implementing the recommended strategies, stakeholders can play a

pivotal role in advancing the electric vehicle market in Indonesia. These actions will not only support the transition to more sustainable transportation but also contribute to Indonesia's broader environmental goals, such as reducing carbon emissions and promoting long-term environmental sustainability. Through increased collaboration between government bodies, manufacturers, and the private sector, the EV market can develop more rapidly, benefiting all parties involved and contributing to a greener future.

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