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Determinant Factors of Purchasing Intention Toward Electric Vehicles in Indonesia

Fahmi Setiadi[1], Nur Chayati[2]
[1]Taxation Diploma Program, Vocational School, Universitas Sebelas Maret
[2]Accounting Study Program, Faculty of Economics and Business, Universitas Sebelas Maret
*fahmisetiadi@staff.uns.ac.id

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ABSTRACT
This study aims to examine factors that affect the intention to buy an electric vehicle from the perspectives of the theory of planned behaviour, norm activation model, and frugality. The study's results reveal that attitudes, subjective norms, perceived behavioural control, personal norms, and frugality directly influence the intention to purchase an electric vehicle. Additionally, the perception of incentives, ascription of responsibility, and awareness of consequences also indirectly influence the intention to buy an electric vehicle. The study's findings suggest that both the government and entrepreneurs must play a significant role in hastening the transition from fossil fuel vehicles to electric vehicles. The government can implement both fiscal and non-fiscal policies. Specifically, it can provide fiscal incentives to encourage the purchase of electric vehicles and expedite the development of public electric vehicle charging station infrastructure, making it easier for consumers to charge their cars. Automotive entrepreneurs can contribute by promoting safe, comfortable, and affordable electric vehicles, thereby increasing consumer confidence in purchasing them. Products of electric vehicles are crucial in convincing consumers that they provide superior environmental solutions, as they prioritize advancing sustainability goals in the environmental sector rather than generating new environmental issues.

Introduction

Nations around the globe are now exhibiting indications of a warming climate that might potentially have disastrous long-term consequences [1], [2]. Governments worldwide have been actively considering the challenge of redefining public policies to address climate change and reduce resource exploitation, including energy, raw materials, and water [3]. Undoubtedly, air pollution has lately become one of Indonesia's most urgent social and environmental issues. Indonesia's emissions growth in 2022 will be the most significant among Southeast Asian countries. According to Worldmeter, fossil CO2 emissions in Indonesia were 692,236,110 tons in 2022. Furthermore, the transportation sector is a major contributor to CO2 emissions. The transportation sector involves the combustion of fossil fuels for vehicles such as cars, trucks, ships, trains, and planes.

In order to decrease global warming and alleviate the consequences of climate change, it is imperative to shift from conventional gasoline-powered automobiles to electric vehicles [4], [5], [6]. Western governments are actively promoting the use of electric vehicles as a means of more ecologically sustainable transportation and to decrease reliance on oil. Previous studies have shown that both monetary and non-monetary incentives significantly influence the intentions to adopt electric vehicles [7], [8].

Although there is empirical evidence indicating that legislative incentives can have a beneficial impact on the acceptance of electric vehicles [9], there is a dearth of research on the specific motives that can successfully stimulate the purchase of electric vehicles. Previous research examine consumers' inclination to purchase an electric vehicles with a primary emphasis on the technical aspects of electric technology [10]. Previous study developed a model to explain the primary motivations for the acquisition of "greener" vehicles [11]. While prior and subsequent studies have focused on factors of that framework, such as financial incentives [12], the effect of technology [13] and fuel efficiency and environmental awareness [14]. Amongst other factors, more recent study provided further elucidation on the characteristics and attitudes towards electric vehicles [15].

The current level of awareness of the advantages of electric vehicles has not yet achieved its maximum extent [15]. The absence of knowledge and the perceived danger associated with electric vehicles create a psychological obstacle in their acceptance [16], [17]. To enhance the correlation between psychological aspects and the adoption of electric vehicles, policymakers should offer more support, such as strategic marketing and advocacy on social media platforms, to emphasize the environmental advantages of electric vehicles and raise awareness about individuals' ethical obligations [18].

Previous research suggests that psychological factors such as personal norm, subjective norm, and attitudes towards electric vehicles influence the intention to adopt them [18], [19] Government support, incentives, and environmental consciousness have contributed significantly to the substantial growth in electric vehicles literature over the last ten years [2], [20]. The existing literature mostly concentrated on environmental, psychological, and policy factors, with little investigation on consumer behavior in relation to electric cars [15]. However, the stated desire and willingness to pay more for electric vehicles can vary [21]. Notwithstanding the increasing popularity of electric vehicles, there is a dearth of research investigating customers' intentions and their willingness to pay for them, particularly in the context of emission-free mobility in Indonesia.

The Indonesian government has issued several policies in relation to the transition from fossil fuel use to electric energy. One of the policies established by the Indonesian government is the Minister of Finance Regulation Number 8 and Number 9 of 2024 regarding the Provision of Incentives for Value-Added Tax and Luxury Goods Tax borne by the Government on the Sale of Electric Vehicles. The government hopes that with the issuance of this regulation, electric vehicle sales will increase, accelerating the transition from fossil energy to electric energy.

The Theory Planned of Behavior posits that intention shapes behavior, including attitudes, subjective norms, and perceived behavioral control [22]. Previous research reveals that various factors, including a person's social psyche, experience, image, government support, perception of strengths, benefits, weaknesses, and perception of risks and incentives, can effect on attitudes, subjective norms, and perceived behavioral control [15].

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Government support is one of the things that influences the intention. Based on previous research, the influence of government support on a person's behavioral intentions showed inconsistent results. [23] argue that government support will affect someone's intention to do something, while [24] show that government support does not affect a person's intentions. Previous studies specifically discussed the effect of government support in the form of incentives on a person's intentions, showing that incentives from the government can have a direct and indirect effect on intentions [25]. The VAT and Sales Tax on Luxury Goods incentives borne by the government on the sale of electric vehicles are a form of government support to increase electric vehicle sales to accelerate the program to switch the use of fossil energy to electrical energy as renewable and more environmentally friendly energy. Previous research suggests that the Value Added Tax (VAT) and Sales Tax on Luxury Goods (SToLG) incentives for the sale of electric vehicles may influence people's intentions to purchase these vehicles. Given the inconsistent results of previous research and the recent implementation of the VAT and SToLG incentive rules on electric vehicle sales, a separate study is necessary to confirm the impact of these policies.

Other studies show that factors other than attitudes, subjective norms, and perceived behavioral control can also influence intentions. Previous research shows that a person's perception of moral obligations, past experiences, moral standards, selfishness, knowledge, habits, caring, sense of responsibility, and personal norms directly affects a person's intention to do something [15], [25], [26]. One of the highlights of previous research findings is that the altruistic psyche can influence a person's intentions. The creation of electric vehicles aimed to reduce the use of fossil energy, which can cause pollution, and replace it with renewable energy in the form of electricity. An altruistic person will try to create a beneficial environment based on a sense of care and responsibility for the sustainability of life on earth. Therefore, researchers argue that altruism will influence someone's intention to purchase an electric vehicle. To prove this hypothesis, researchers use the norm activation model to discuss a person's altruism.

Frugality can also influence a person's intention to buy or pay for something. [27] stated that frugality is based on a person's motivation to save money. Previous research shows that a person's frugal lifestyle has an effect on a person's intention to buy a new energy vehicle, which is due to the cost efficiency of using new energy vehicles, tax incentives, and subsidies from the government for the purchase of new energy vehicles [28]. [29] stated that frugality will affect CSR by creating responsible consumption in accordance with SDG 12 (Haustein & Jensen, 2018; Zhang et al., 2022) to create environmentally friendly business processes and cost efficiency. According to [30], frugal consumers consider price factors when deciding whether to buy. Based on the previous research, there is a possibility that frugality affects a person's decision to buy an electric vehicle. Cost efficiency from using electric vehicles or government incentives can trigger frugal behavior. Electric vehicles are a new thing in Indonesia and have been a hot issue in recent years. As a result, researchers must conduct empirical evidence related to the influence of frugality on the intention to buy an electric vehicle in Indonesia.

This study aims to investigate the factors that influence an individual's intention to purchase an electric vehicle, considering perspectives from TPB, NAM, and personal frugality. The results of this study have implications for the government as a regulator and for electric vehicle entrepreneurs as business actors.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Recent years have seen a substantial expansion in the electric vehicle literature. Consumer adoption of an innovation is defined by researchers as a behavioral reaction in which consumers express their intentions to purchase and use the invention [31], [32]. Deliberate factors such as buyer readiness, intention, and desire to embrace new technologies or innovative products are primary indicators of adoption behavior [21]. Numerous studies employ these characteristics as a means of illustrating adoption behavior [32]. Therefore, our objective is to evaluate a comprehensive model of consumers' intents to embrace electric vehicles. The theory of planned behavior (TPB) suggests that behavioral intention is the most reliable indicator of actual behavior. Three factors influence it: attitude, subjective norm, and perceived behavioral control [22], [33].

Research on low carbon travel reveals that attitudes, subjective norms, and perceived behavioral control have a significant impact on a person's intention to do low carbon travel [34], [35], [36]. Other research on the issue of low carbon footprints also showed that attitudes, subjective norms, and perceived behavioral controls had a significant effect on a person's intention to order a menu with a higher low carbon footprint [37]. [38] discussed the intention to use renewable energy, showing that attitudes, subjective norms, and perceived behavioral control affect a person's desire to use renewable energy. Energy-saving efforts also correlate with low carbon. The use of electric vehicles is a way to reduce carbon emissions and save energy. [39] demonstrated that a person's social interaction can influence their energy-saving behavior as a subjective norm. Based on the existing empirical evidence, the hypothesis that we formulated is as follows:

H1a : Attitude has a positive effect on behavioral intention.
H1b : Subjective norms has a positive effect on behavioral intention.
H1c : Perceived behavioral control has a positive effect on behavioral intention.

The issuance of MoFR Number 8 and Number 9 Year 2024 coincided with the provision of VAT and SToLG incentives on the sale of electric vehicles. We issued this regulation to accelerate the transition from fossil energy to electric energy by boosting the sales of electric vehicles. Previous research on the impact of incentives on an individual's behavior has revealed varying results. [20] found that incentives in the form of price reductions and tax reductions increase consumers' intention to purchase electric vehicles, thereby increasing electric vehicle sales in America. [40] showed that providing incentives cannot affect a person's behavior. [41] contend that the government must provide both fiscal and non-fiscal incentives for the electric vehicle adoption program to succeed. Empirical evidence suggests that the outcomes of incentive programs can differ. Incentive programs can successfully achieve their goals or vice versa. The failure of an incentive program to achieve its goals is natural. Newly issued policies include VAT and SToLG incentives for electric vehicle sales. This study will further examine the influence of the incentive program in increasing the intention of Indonesian consumers to buy electric vehicles. Having reviewed the existing literature, we can formulate the following hypotheses:

H1d : View of incentives has a positive effect on attitude
H1e : View of incentives has a positive effect on subjective norm
H1f : View of incentives has a positive effect on perceived behavioral control

The norm activation model has 3 main variables, namely personal norms, a sense of care, and a sense of responsibility (Schwartz, 1977). A sense of care and a sense of responsibility influence personal norms, which in turn influence intentions. Personal norms are a mediating variable between a sense of concern for intentions and a sense of responsibility for intentions [25], [42], [43].

The NAM theory elucidates the factors that motivate individuals to engage in pro-environmental actions. The intention to carry out pro-environmental actions that have been discussed by previous research using the perspective of NAM are the intention to reduce air pollution [44], the intention to adopt electric vehicles in order to reduce carbon dioxideon [25], [45], the intention to carry out food waste management [46], and the intention to use public transportation [45].

[25] discuss a person's intention to adopt an electric vehicle from the perspective of NAM. The study explains that personal norms are a mediating variable between awareness of consequences to the intention to adopt electric vehicles and ascription of responsibility to the intention to adopt electric vehicles. This research will examine the intention to adopt electric vehicles within the context of Indonesia. Indonesia is accelerating the transition from fossil energy to electrical energy. The researcher formulated the following hypothesis based on a review of the existing literature:

H2a : Ascription of responsibility has a positive effect on personal norm
H2b : Awareness of consequences has a positive effect on personal norm
H2c : Personal norm has a positive effect on behavioral intention.

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Frugality is a consumer lifestyle that emphasizes being aware when spending money. People with frugal souls will think of long-term benefits when spending money [47]. People with a frugal soul will also refrain from spending and always try to maximize the utility of their staff.

The previous research has shown that frugality affects consumer behavior [27], [48], [49]. Influenced consumer behavior includes consumer behavior in buying new energy vehicles [28]. The study shows that frugality encourages a person's intention to buy a new energy vehicle because of the savings resulting from the purchase. The other study shows different results. [50] showed that frugality has a negative effect on a person's intention to buy environmentally friendly goods based on the idea that the cost incurred to buy environmentally friendly goods is higher than the benefits obtained. This study examines the impact of consumer frugality on the purchase of electric vehicles in specific cases in Indonesia. Thus, the following hypothesis based on a review of the existing literature:

H3 : Frugality has a positive effect on behavioral intention.

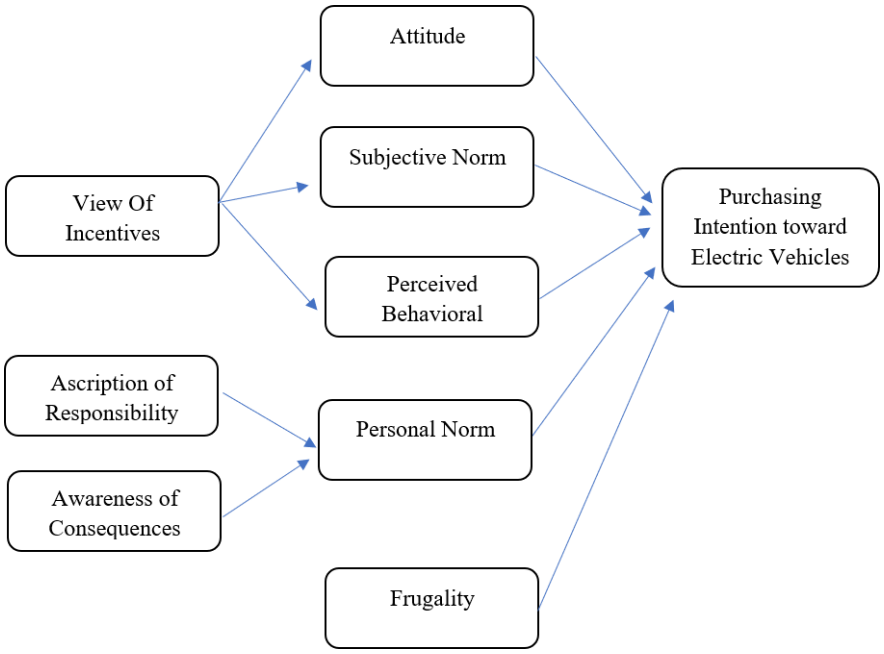

Figure 1. Conceptual Framework

RESEARCH METHODS

This research aims to examine the factors that influence the intention to buy an electric vehicle from the perspectives of TPB, NAM, and an individual's frugality. The study utilizes primary data, directly collected from research subjects through questionnaire instruments. This study uses a random sampling method in selecting research subjects. We randomly sent a questionnaire to the respondents.

The distributed questionnaire consisted of 2 parts. The first part of the questionnaire asks questions about the research sample's information, including gender, age, city/region of residence, average monthly income, and marital status. The second section asks questions about the object under investigation, which includes attitudes, subjective norms, perceived behavioral control, incentive views, responsibility attribution, consequence awareness, personal norms, behavioral intention, and frugality (Table 1). The measurement of the research object uses a 1–5 Likert scale.

This study employs a partial least squares (PLS)-based SEM test as its analysis technique. SMARTPLS version 3.0 serves as the PLS software for this study

Table 1. Construct

Construct	Source
Attitude	[51]
Subjective Norm	[51]
Perceived Behavioral Control	[51]
View of Incentive	[51]
Ascription of Responsibility	[51]
	[45]
Awareness of Consequence	[51]
	[45]
Personal Norm	[52]
	[53]
	[45]
Behavioral Intention	[51]
Frugality	[28]

RESULTS AND DISCUSSION

Sample Profile

Table 2. Sample Profile

Sample Characteristics	Description	Total	Percentage
Gender	Male	80	47%
	Female	89	53%
Age	18	1	1%
	19-59	163	96%
	60 +	5	3%
Average income per month	0-5.000.000	93	55%
	5.000.001 - 10.000.000	46	27%
	10.000.001 - 15.000.000	15	9%
	15.000.001 - 20.000.000	7	4%
	>=20.000.001	8	5%
Marital Status	Single	61	36%
	Married	108	64%

Table 1 displays the sample profile. Based on gender, more respondents who filled out the questionnaire were women than men, with a difference of 5%. Most respondents were people of productive age, 19 to 59 years old. Respondents also came from various regions in Indonesia. The data shows that respondents come from Java, Sumatra, Kalimantan, Sulawesi, Papua, Bali, and Nusa Tenggara Timur. 55% of respondents earn less than 5 million rupias, and the rest earn more than 5 million rupiah. 64% of respondents are married, and the rest are single.

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Table 3. Direct Hypothesis Result

Hypothesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/ STDEV|)	P Values	Information
AC -> PN	0.418	0.422	0.051	8.211	0.000	Significant Positive
AR -> PN	0.412	0.410	0.063	6.531	0.000	Significant Positive
AT -> BI	0.156	0.153	0.059	2.649	0.008	Significant Positive
FG -> BI	0.340	0.343	0.084	4.058	0.000	Significant Positive
PBC -> BI	0.146	0.147	0.060	2.434	0.015	Significant Positive
PN -> BI	0.190	0.194	0.070	2.737	0.006	Significant Positive
SN -> BI	0.246	0.242	0.065	3.756	0.000	Significant Positive
VI -> AT	0.562	0.562	0.064	8.814	0.000	Significant Positive
VI -> PBC	0.461	0.458	0.067	6.840	0.000	Significant Positive
VI -> SN	0.571	0.573	0.050	11.385	0.000	Significant Positive

Direct Hypothesis Testing

In Table 3, the results of the direct hypothesis testing indicate that the p value is less than 0.05 and the statistical t value is greater than 1.96. This indicates a positive and significant of all hypotheses.

Table 4. Indirect Hypothesis Result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/ STDEV|)	P Values	Information
VI -> AT -> BI	0.088	0.087	0.037	2.366	0.018	Significant Positive
VI -> PBC -> BI	0.067	0.068	0.032	2.079	0.038	Significant Positive
AC -> PN -> BI	0.080	0.082	0.031	2.592	0.010	Significant Positive
AR -> PN -> BI	0.079	0.079	0.030	2.583	0.010	Significant Positive
VI -> SN -> BI	0.140	0.139	0.040	3.503	0.001	Significant Positive

Indirect Hypothesis Testing (Mediation)

The results of the variable hypothesis test in Table 4 indicate that the p value is less than 0.05 and the statistical t value is greater than 1.96. The View of Incentives variable affects the intention to buy an electric vehicle, which is mediated by attitude variables, subjective norms, and perceived behavioral controls. The variables Ascription of responsibility and Awareness of Consequence affect the intention to buy electric vehicles, mediated by the personal norm variable.

Discussion and Implications

This study aims to investigate the factors that influence the intention to purchase an electric vehicle, considering the perspectives of TPB, NAM, and an individual's frugality. Based on TPB's

perspective, the results of this study show that a person's attitude, subjective norms, and perceived behavioral control positively and significantly affect the intention to buy an electric vehicle. This is in line with previous research that discusses the influence of attitude, subjective norms, and perceived behavioral control on intention [34], [35], [37], [54].

The view of incentives also showed a significant positive influence on attitude, subjective norms, and perceived behavioral control. The view of incentives also has a significant positive influence on the intention to buy electric vehicles indirectly through the mediating variables of attitude, subjective norms, and perceived behavioral control. [41] assert that the government must provide both fiscal and non-fiscal incentives to successfully transition from fossil energy vehicles to electric energy vehicles. The study's results suggest that achieving the shift from fossil energy vehicles to electric energy vehicles requires collaboration between automotive entrepreneurs and the government. The government can play a role by providing incentives, such as fiscal policy instruments that offer tax breaks on electric vehicle products. Automotive entrepreneurs have

the potential to enhance government incentive policies by implementing extensive promotional campaigns aimed at persuading people about the safety, comfort, and affordability of electric vehicles. The massive promotional move will create new users who will be the subjective norm for whoever is closest to them to buy electric vehicles.

The NAM perspective describes the influence of a person's altruistic nature on the intention to buy an electric vehicle. The results of this study show that a person's personal norm has a significant positive effect on the intention to buy an electric vehicle. A person's ascription of responsibility and awareness of consequence significantly and positively influence their personal norms. The personal norm variable mediates the significant positive effect of a person's ascription of responsibility and awareness of consequence on the intention to buy an electric vehicle. This study's results align with previous research, demonstrating that an individual's altruistic nature can also impact their intention [25]. These findings imply that the environmental impact of electric vehicles influences a person's intention to buy one. The negative impact of electric vehicles on the environment can influence a person's decision to buy an electric vehicle. Regulators, or the government, play an important role in controlling and minimizing the negative impact of electric vehicles on the environment. Automotive entrepreneurs must also consider the product recycling cycle to ensure that electric vehicles do not cause new problems in the form of electronic waste. The government and automotive entrepreneurs should focus their efforts on establishing sustainable development goals in the environmental sector.

According to the study's findings, frugality has a significant positive effect on the intention to buy an electric vehicle. These results support previous research that states that frugality will affect consumer behavior, including the intention to buy an electric vehicle [27], [48], [49]. Automotive entrepreneurs and the government should acknowledge that the value of benefits outweighs the costs consumers incur for these electric vehicles, thereby accelerating the shift from fossil fuel vehicles to electric energy vehicles. The government must accelerate the development of Public Electric Vehicle Charging Station (PEVCS) infrastructure to make it easier for owners of electric vehicles to charge their vehicles. Insufficient infrastructure can lead to the perception of electric vehicles as low-value vehicles, as they may not be practical for daily activities. Automotive entrepreneurs can also contribute by offering product warranties, low product prices, affordable spare parts prices, workshop availability, and the ease of obtaining electric vehicle spare parts. We must convince ourselves that electric vehicles offer high efficiency values.

CONCLUSION

This research provides practical and theoretical implications. This study shows that the intention to buy an electric vehicle can be influenced by the view of incentives, the three main determinants of intention according to TBP: personal norm, ascription of responsibility, awareness of consequence, and frugality. For practitioners, these things can be the basis for consideration by government practitioners and automotive entrepreneurs in an effort to succeed in the transition of fossil energy vehicles to electric energy vehicles. From the perspective of TBP, NAM, and frugality, this study contributes to the existing literature on factors influencing the intention to purchase electric vehicles for academics.

This study has several weaknesses. First, this study has not concentrated on electric vehicles of a specific type. Future research could concentrate on specific types of electric vehicles. Secondly, there has not been any qualitative discussion in this study. Further research can include qualitative discussions based on data obtained through observations and in-depth interviews.

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