

# The Effect of Environmental Care, Environmental Knowledge, and Perceived Consumer Effectiveness on Attitudes and Buying Intentions of Electric Vehicles

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## ABSTRACT

Increasing knowledge and concern for the environment spur companies in product development with the aim of providing solutions to environmental problems in order to foster attitudes and purchase intentions. This study aims to explain the effect of environmental awareness, environmental knowledge, and perceived consumer effectiveness on attitudes and purchase intentions of electric vehicles, as well as to explain the influence of attitudes on purchase intentions on electric vehicles at the 2022 Periklindo Electric Vehicle Show (PEVS) Exhibition. A total of 160 respondents used by using purposive sampling technique. Structural Equation Modeling (SEM) is a data analysis technique used. The results of this study indicate that knowledge and concern for the environment have a positive and significant effect on attitudes and purchase intentions, and attitudes have a positive and significant effect on purchasing intentions for green products.

**Keywords:** Environmental Concern, EV

**JEL Classifications:** F64, L94, Q50

## 1. INTRODUCTION

The sustainable use of fossil fuels has led to a steady increase from the concentration of CO<sub>2</sub> in the atmosphere to 400.26 ppm in 2015 (Abas et al., 2015). The transportation sector is a major contributor to the world's fossil fuel consumption and greenhouse gas emissions. In 2013, energy spent in the 22 transport sectors comprised 27.6% of the world's total energy consumption and 92.6% of this was based on consumption of oil products. In addition, CO<sub>2</sub> emissions produced by the transportation sector are 22.9% of the total CO<sub>2</sub> emissions in the world (Woo et al., 2017). To slow climate change and develop sustainable energy resources, the world community must support a major energy transition from fossil fuels to renewable energy and the use of alternative energy sources. The depletion of fossil fuels in the future motivates researchers, designers, car manufacturers, and transportation agencies to look for alternative sources of power, such as electric power, for vehicles (Mehtar et al., 2015).

The first wave of revival in electric vehicle (EV) sales began in the early 1970s, sparked by the first oil crisis in California. In the

1980s, EV batteries experienced a renaissance due to concerns about fossil fuel supplies and transportation-related air pollution (Ajanovic, 2015). During this period, a number of existing EV battery productions were devoted to experimental needs. There was a resurgence in the early 1990s due to growing concerns about climate issues. EV is a transportation alternative that can reduce greenhouse gas (GHG) emissions and improve energy security (Kang et al., 2016). The environmental and social benefits of EVs can only be realized through maximum public adoption. Thus, automotive companies are encouraged to increase environmental awareness by developing various electric vehicle products, both two and four wheels that provide solutions to environmental problems.

Before the decision-making process in purchasing a product, consumers will have an awareness or intention to buy the product. Purchase intention is a step that leads to the tendency and purpose of a person to buy the product he likes the most (Kotler & Armstrong, 2008). Shah et al. (2012) stated that purchase intention is a process that studies and analyzes the reasons why consumers buy products in certain places. This means that what

marketers learn is the causes or reasons that consumers have in their intention to buy a product. According to Simamora (2001), states that the purchase intention felt by consumers arises because of the emergence of a basic trust in a product accompanied by the ability to buy the product, there is influence from people around who can be trusted by potential consumers, and have feelings that are very interested. to all product information obtained through trusted sources. Aman et al. (2012) stated that environmental factors that can influence the purchase intention of electric vehicles are environmental knowledge, environmental awareness, perceived consumer effectiveness, and attitudes.

Based on a theoretical and empirical literature review, this study was conducted with the aim of analyzing the influence of attitudes on the intention to buy electric vehicles for visitors to the 2022 Perikliindo Electric Vehicle Show (PEVS) with the antecedents of environmental knowledge, environmental care, and perceived consumer effectiveness.

## 2. LITERATURE REVIEW

### 2.1. Environmental Concern

Angelovska et al. (2012), stated that environmental awareness is a possible predictor of purchasing behavior for environmentally friendly products. Concern for the environment can be considered as a level of commitment and emotional from consumers to various issues in the surrounding environment (Aman et al., 2012). According to Weigel in Joshi (2012), environmental care can be considered as attention to the facts and behavior of oneself with certain consequences for the surrounding environment. According to Weigel in Joshi (2012), environmental concern can be considered as a concern for the facts and behavior of oneself with certain consequences for the environment. Some consumers translate their concern for the environment by choosing green products to improve the quality of the environment and their quality of life (Martin and Simintiras in Novandari, 2011). Diamantopoulos et al. in Aman et al. (2012), said that environmental concern can be a major factor in the consumer decision-making process.

According to Aman et al. (2012), that there is an effect of concern about the environment on the attitudes of consumers of green products in Sabahan, Malaysia. The existence of environmental concern can be a factor or variable that affects attitudes (Baron and Kenny in Aman et al., 2012). Julina (2013) revealed that attention or concern for environmental issues can affect attitudes. In addition, there is a positive and significant effect of environmental concern on purchase intention of green products in Sabahan, Malaysia (Aman et al., 2012). This research is supported by other studies which state that environmental awareness has a positive effect on purchase intention of consumers of green products in Pakistan (Ali & Israr, 2012). It is positive and significant that environmental concern has an effect on green purchase intention in the case of the clothing industry in Pakistan. This research means that the increasing environmental awareness owned by consumers, the green purchase intention owned by consumers will increase

(Saeed et al., 2013).

*H1: Environmental awareness has a significant positive effect on attitudes*

*H2: Environmental concern has a significant positive effect on purchase intention*

### 2.2. Environmental Knowledge

Chen (2013) states that environmental knowledge is a series of ecological knowledge possessed by individuals about the environment. The better the environmental knowledge possessed by consumers, the consumers will know more about the quality of environmentally friendly products and will increase their motivation to buy environmentally friendly products (Banyte et al., 2010). Knowledge of the environment is a basic knowledge possessed by a person about everything that can be done and attempted to assist in environmental protection by facilitating their behavioral commitment to purchase green products (Lee, 2010). Green products and environmental products is a business term used to describe products that protect or enhance the natural environment by saving energy and/or resources and reducing or eliminating the use of toxic materials, pollution, and waste (Pavan in May et al., 2012). According to Shamdasmi et al. in Noor et al. (2012), that green products are also considered as products that will not pollute the earth or damage natural resources (SDA) and can be recycled or conserved.

Barber et al. (2009) stated that objectively environmental knowledge possessed by consumers can have a positive and significant effect on attitudes held by consumers in purchasing wine. Noor et al. (2012) stated that consumers of green products in ten major hypermarkets in Malaysia have environmental knowledge that has a positive effect on attitudes. Furthermore, the knowledge that consumers have about the environment can have a positive and significant effect on the purchase intention of green products in Malaysia (Mei et al., 2012). This is also supported by other studies which state that knowledge about the environment has a positive and significant effect on purchase intentions of consumers of green products in Pakistan (Ali & Israr, 2012). There is a positive and significant effect of knowledge about the environment on the purchase intention of green products on consumers of green products in Sabahan, Malaysia (Aman et al., 2012).

*H3: Environmental knowledge has a significant positive effect on attitudes*

*H4: Environmental Knowledge has a significant positive effect on purchase intention*

### 2.3. Perceived Consumer Effectiveness

Perceived Consumer Effectiveness (PCE) refers to the extent to which people believe that their actions make a difference in solving problems (Ellen et al., 1991). PCE, defined as "self-evaluation in the context of a problem" (Berger & Corbin, 1992), differs from attitudes that reflect an evaluation of a problem (Bohner & Dickel, 2011). Ellen et al., (1991) show that PCE for environmental issues also differs from concern or attitude towards the environment and makes a unique contribution to predicting environmentally conscious behaviors such as green purchases. Consumer concerns about environmental issues may

not easily translate into pro-environmental behavior, however, individuals who have a strong belief that their environmentally conscious behavior will produce positive results. So they will be more likely to engage in these behaviors in support of their concerns for the environment. Thus, self-efficacy beliefs might influence the likelihood of carrying out green buying behavior.

PCE is determined by knowledge by both direct and indirect experience and varies with individuals as their personal knowledge and experience differ (Brown, 1979; Thompson, 1981). Some people believe that their actions lead to certain outcomes that can bring about change, while others have little belief they have the ability to make a difference. PCE is a specific situation or issue and these personal beliefs may be formed under the influence of a more general and abstract value orientation.

*H5: Perceived consumer effectiveness has a significant positive effect on attitudes*

*H6: Perceived consumer effectiveness has a significant positive effect on purchase intention*

#### 2.4. Attitude

Attitude is an expression of liking or disliking a person which can be reflected on a particular object. Attitude is the result of a person's psychological process, so this cannot be seen or observed directly but must be inferred from everything he does or says (Suprapti, 2006). Attitude is a tendency that can be learned in every behavior with actions that mean pleasant or unpleasant towards the object (Schiffman & Leslie, 2008). According to Giyatno (2012), environmental attitudes are general tendencies that occur in a person and are formed or learned when responding consistently/fixedly to environmental conditions in the form of liking (positive) or disliking (negative). According to Lee in Noor et al., (2012) environmental attitude refers to the consideration of individual values towards environmental protection. Mowen & Minor (2002) stated that the formation of consumer attitudes related to attitudes, beliefs, and behavior. Attitudes, beliefs, and behavior are also related to the concept of product attributes. Product attributes are characteristics of a product, where consumers have confidence in the attributes of a product (Suprapti, 2006).

#### 2.5. Green Purchase Intention

Purchase intention refers to the tendency of consumers to buy a product that they really like (Kotler & Armstrong, 2008). Shah et al. (2012) stated that purchase intention is a process that studies and analyzes the reasons why consumers buy products in certain places. Purchase intention is a consumer's process of deciding whether or not to use a product that he feels is useful for him. Simamora (2001) said that purchase intention for a product arises because of the basis of trust in the product which is accompanied by the ability to buy the product. In addition, purchase intentions can also arise if a consumer feels very interested in various information about products obtained through advertisements, experiences of people who have used them, and the urgent need for a product. According to Schiffman and Leslie in Lee et al. (2013), that purchase intention is considered as a measurement of the possibility of consumers

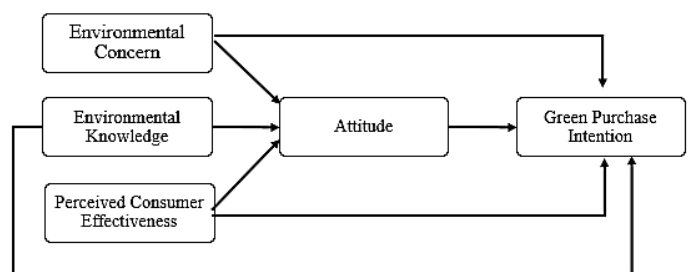
buying certain products, where if the purchase intention is higher, the probability of purchase will be greater. Purchase intention is a consumer's process of deciding whether or not to use a product that is considered useful for him (Murwatiningsih & Apriliani, 2013).

There is a strong and significant effect of attitudes on the desire to buy green or environmentally friendly products, this means that consumers with strong environmental attitudes will consider environmentally friendly products and are willing to pay more for products that are beneficial to the environment (Barber et al., 2009). According to Cheah & Ian (2011), that there is an effect of attitude on environmentally friendly products on the willingness to buy environmentally friendly products for students of a large university in Australia. Consumer attitudes have a significant effect on green product purchase intentions on green product consumers in Sabahan, Malaysia (Aman et al., 2012). Attitude variables can have a positive effect on the purchase intention of green products in Malaysia (May et al., 2012). Mukhtar & Butt (2012), agree with previous research that consumer attitudes can positively affect the intention to choose and buy halal products for consumers in Pakistan.

*H7: Attitude has a significant positive effect on purchase intention*

Based on the description of the literature review and previous research, the framework developed in this study is described in a chart as follows:

Figure 1: Model



### 3. METHOD

The research method used in this research is quantitative. The type of research used is causal descriptive, where according to Zikmund et al (2013) descriptive research is research that describes the characteristics of objects, humans, groups, organizations or the environment. According to Sekaran & Bougie (2013) a causal study is a research conducted to detect cause and effect between two or more variables. The variables used are environmental awareness, environmental knowledge, and PCE as endogenous variables, while attitudes and purchase intentions are exogenous variables. Data was collected by distributing questionnaires to visitors to the 2022 Perikliindo Electric Vehicle Show (PEVS) with a sample of 160 people using the non-probability sampling method. The analytical technique used is Structural Equation Modeling, commonly abbreviated as SEM.

According to Ghozali (2011), Partial Least Squares (PLS) is a powerful analytical method because it does not assume that the data must be measured at a certain scale and the number of samples required is small. Besides being able to be used to confirm theory, PLS can also be used to explain whether or not there is a relationship between latent variables. In PLS, two model evaluations are carried out, namely the outer model (measurement model) and the inner model (structural model). The outer model defines how each indicator block relates to its latent variable. The outer model is evaluated with reflexive indicators evaluated with convergent validity, discriminant validity or with Average Variance Extracted (AVE), and composite reliability. While the inner model describes the relationship between latent variables based on substantive theory. The inner model is evaluated by looking at the R-squares for each dependent latent variable. Changes in the value of R-squares can be used to assess the effect of certain independent latent variables on the dependent latent variable.

### 4. RESEARCH RESULTS AND DISCUSSION

#### 4.1. Measurement Model Test Results (Outer Model)

##### a. Validity

Figure 2: Outer Model Path Diagram with SmartPLS 3.0

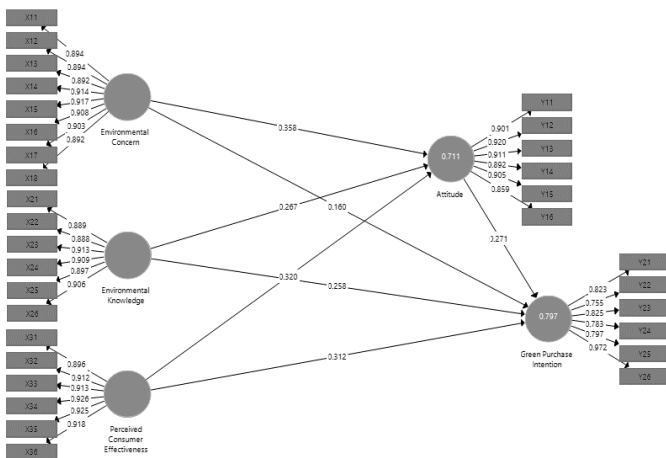


Table 1: Loading and Average Variance Extracted (AVE)

Variable	Indicator	Loading	(AVE)
Environmental Concern	X11	0.894	0.813
	X12	0.894	
	X13	0.892	
	X14	0.914	
	X15	0.917	
	X16	0.908	
	X17	0.903	
	X18	0.892	
Environmental Knowledge	X21	0.889	0.811
	X22	0.888	
	X23	0.913	
	X24	0.909	
	X25	0.897	
	X26	0.906	
	X27	0.906	
PCE	X31	0.896	0.837
	X32	0.912	
	X33	0.913	
	X34	0.926	
	X35	0.925	
	X36	0.919	
	X37	0.915	
	X38	0.920	

Attitude	X36	0.918	0.807
	Y11	0.901	
	Y12	0.920	
	Y13	0.911	
	Y14	0.892	
	Y15	0.905	
Purchase Intention	Y16	0.859	0.687
	Y21	0.823	
	Y22	0.755	
	Y23	0.825	
	Y24	0.783	
	Y25	0.797	
	Y26	0.972	

Convergent validity will be fulfilled if the factor loading value of each indicator is > 0.6. The results of the convergent validity test through the loading factor in the table above show that the 32 items are declared valid. Average Variance Extracted AVE value greater than 0.5 indicates that the items in a variable have sufficient convergent validity. Average Variance Extracted (AVE) Environmental Concern 0.813, Environmental Knowledge 0.811, PEC 0.837, Attitude 0.807, Purchase Intention 0.687. In the table above, it can be seen that all variables have an AVE value greater than 0.5, which means it can be said to have convergent validity.

Table 2: Discriminant Validity

	Environmental Concern	Environmental Knowledge	PCE	Attitude	Purchase Intention
Environmental Concern	0.902				
Environmental Knowledge	0.689	0.900			
PCE	0.691	0.696	0.915		
Attitude	0.763	0.736	0.753	0.898	
Purchase Intention	0.760	0.785	0.806	0.818	0.829

Discriminant Validity A construct or variable is declared to have discriminant validity if the construct or variable is completely different from other constructs or variables. The simplest test to test discriminant validity is to compare the root of the AVE value of the two constructs with the correlation value between the two constructs, the root of the AVE value must be greater than the root of the correlation value. In the table above, it can be seen that the AVE root value in each variable is greater than the correlation value root, which means the measuring instrument has discriminant validity.

##### b. Reliability

In addition to the validity test, the researcher also conducted a reliability test. To determine the reliability of each construct of this study, a test was conducted by looking at the Composite Reliability and Cronbachs Alpha values of each construct. According to Jogiyanto & Willy (2014) the Cornbach's Alpha coefficient of at least 0.6 indicates that the questionnaire has a fairly good level of reliability.

Table 3: Composite Reliability dan Cronbach's Alpha

	Cronbach's Alpha	Composite Reliability
Environmental Concern	0.967	0.972
Environmental Knowledge	0.953	0.963
PCE	0.961	0.969
Attitude	0.952	0.962
Purchase Intention	0.907	0.929



The results of the reliability test in the table above show that the research variables can be said to be reliable (Cronbach's alpha value is greater than 0.6) and thus can be used as an instrument in measuring the variables specified in this study.

#### 4.2. Structural Model Test Result (Inner Model)

In PLS, the accuracy of the proposed model can be measured using R-Square (R<sup>2</sup>) and Path Coefficient (PC). The structural model test (inner model) was carried out by observing the value of R<sup>2</sup> on the endogenous latent construct and the t-value of each exogenous latent variable on the endogenous latent construct from the bootstrapping results. R-Square with a value of 0.67 is considered strong, 0.333 means moderate, and 0.19 is weak (Chin; Hock & Ringle; Urbach & Achleemann in Indrawati, 2015). The path diagram of the inner model in this study is shown in the following figure.

Figure 3: Path Diagram of the Inner Model with SmartPLS 3.0

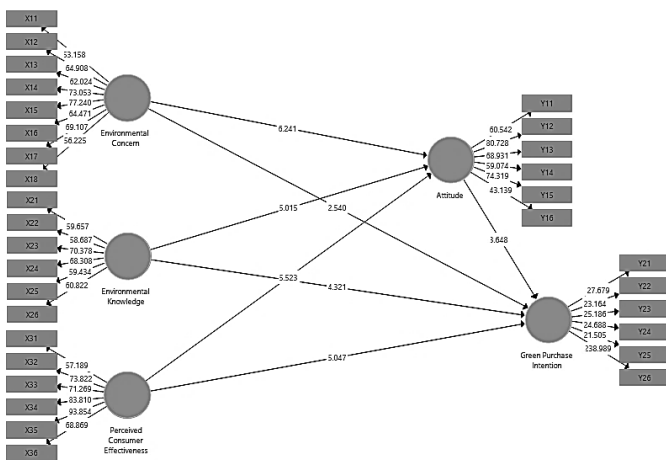


Table 4: R Square

	R Square
Attitude	0.711
Purchase Intention	0.797

Based on the table above, it can be seen that the r-square value of attitude is 0.711 or 71.1% which means that the attitude variable can be explained by environmental awareness, environmental knowledge, and PCE variables of 71.1% and the remaining 28.9% is explained by factors Other values not examined in this study, this value is considered strong because it is above 0.67. Then the r-square value of purchase intention is 0.797 or 79.7% which means that the purchase intention variable can be explained by variables of environmental concern, environmental knowledge, PCE and attitude of 79.7% and the remaining 20.3% is explained by other factors that are not examined in this study, this value is considered strong because it is above 0.67.

According to Chin; Hock & Ringle; Urbach & Achleemann in Indrawati (2015) to see whether the independent variable has an effect or not and how the direction of the relationship can be seen from the Tcount value and the path coefficients owned. Path coefficients must have a Tcount value greater than 1.96 (this value is obtained from Ttable with a confidence level of 0.05).

Based on the table above, an explanation of the following

hypotheses can be obtained:

#### 4.3. The Effect of Environmental Concern on Attitudes and Purchase Intentions

The effect of environmental concern on attitudes obtained a significance value of research with a Tcount of 6.260 > 1.96 and a P-value of 0.000 < 0.50. Furthermore, the effect of environmental concern on purchase intention is obtained by the significance value of the study with a Tcount of 2.669 > 1.96 and a P-value of 0.008 < 0.50. Thus, H1 which states that environmental awareness affects attitudes and H2 which states that environmental care affects purchase intentions are accepted. This finding is also supported by Angelovska et al. (2012) which states that environmental awareness is a possible predictor of purchasing behavior for environmentally friendly products and can be a major factor in the consumer decision-making process. Environmental care is considered as a level of commitment and emotional to various issues regarding the environment (Aman et al., 2012). Furthermore, Julina (2013) also found that concern or concern for environmental issues can affect attitudes.

Table 5: Direct, Indirect, and Total Effect

	Direct Tvalue	Pvalue	Indirect Tvalue	Pvalue	Total Tvalue	Pvalue
Environmental Concern -> Attitude	6.260	0.000			6.260	0.000
Environmental Concern -> Purchase Intention	2.669	0.008	3.154	0.002	4.843	0.000
Environmental Knowledge -> Attitude	4.647	0.000			4.647	0.000
Environmental Knowledge -> Purchase Intention	4.101	0.000	2.990	0.003	5.677	0.000
PCE -> Attitude	5.013	0.000			5.013	0.000
PCE -> Purchase Intention	5.482	0.000	3.380	0.001	7.279	0.000
Attitude -> Purchase Intention	3.862	0.000			3.862	0.000

#### 4.4. The Effect of Environmental Concern on Attitudes and Purchase Intention

The effect of environmental knowledge on attitudes obtained a research significance value with a Tcount of 4.647 > 1.96 and a P-value of 0.000 < 0.50. Furthermore, the effect of environmental knowledge on purchase intention is obtained by the significance value of the study with a Tcount of 4.101 > 1.96 and a P-value of 0.000 < 0.50. Thus, H3 which states that environmental knowledge affects attitudes and H4 which states that environmental knowledge affects purchase intention is accepted. These findings are also supported by research by Julina (2013); Haryanto et al. (2014) that understanding/knowledge of environmental issues can affect attitudes towards green products in Indonesia. Furthermore, it was found that there was a positive and significant effect of environmental knowledge on the purchase intention of electric vehicles. This finding is also supported by the research of Saeed et al. (2013); Akbar et al. (2014) which states that the increasing knowledge of the environment that exists in consumers, the green purchase intention possessed by consumers will increase.

#### 4.5. Effect of PCE on Attitude and Purchase Intention

The effect of PCE on attitudes obtained a research significance value with a Tcount of 5.013 > 1.96 and a P-value of 0.000 < 0.50. Furthermore, the effect of PCE on purchase intention is obtained by the significance value of the study with a Tcount of 5.482 > 1.96 and a P-value of 0.000 < 0.50. Thus, H5 which states that PCE affects attitudes and H6 which states that PCE affects purchase intention are accepted. This study corroborates the findings of Ellen et al., (1991) showing that PCE for environmental issues also differs from concern or attitude towards the environment and makes a unique contribution to predicting environmentally conscious behaviors such as green purchases.

#### 4.6. Influence of Attitude on Purchase Intention

The effect of attitude on purchase intention is obtained by the significance value of the study with a Tcount of 3.862 > 1.96 and a P-value of 0.00 < 0.50. Thus, H7 in this study which states that attitude influences purchase intention is accepted. The findings of this study are also supported by research by Zhu (2012); Ling (2013) which states that consumer attitudes towards advertising can significantly influence the purchase intention of consumers of green products in Shanghai, China. Furthermore, Uthamaputharan & Amin (2013) revealed that consumer attitudes have a positive and significant effect on consumer purchase intentions in Malaysia. Furthermore, it was found that environmental attitudes become a factor that drives consumers' purchase intentions on the purchase of green products (personal care) in Penang, Malaysia. Furthermore, based on the results of testing the indirect effect. Environmental attitudes mediate the indirect effect of environmental awareness, environmental knowledge and PCE variables on the purchase intention of electric vehicles. This indicates that the better the information and the high perception of security and privacy affect the perceived quality of e-commerce services, which in turn has implications for customer satisfaction. This finding is also supported by Akbar et al. (2014) who found that there was a positive and significant effect of attitudes on green consumers' purchase intentions.

### 5. CONCLUSION

This research has succeeded in revealing previous assumptions about the positive impact of environmental awareness, environmental knowledge, PCE on attitudes and its implications for the intention to buy electric vehicles. Although it has involved survey research with various visitors to the 2022 Perikliindo Electric Vehicle Show (PEVS), this research is still considered to have weaknesses. First, in terms of research subjects, which only used a population of visitors to the 2022 Perikliindo Electric Vehicle Show (PEVS) exhibition and only used a relatively small sample. In the future, it is possible to develop a research that uses research subjects with more diverse professions and with a larger number of samples. The various possible additions are intended so that the research model can be more tested. Furthermore, this study uses antecedent factors in the form of environmental awareness, environmental knowledge, and PCE. Even though it is very possible that there are several other important variables that can affect the improvement of service quality and online consumer satisfaction. Therefore, in future research, it is necessary to consider involving other variables in the research model such as perception, innovation, and subjective norms.

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