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# Identify the Factors Affecting Electric Car Consumption Behavior in Vietnam

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## ABSTRACT

Main objective: Research on electric car consumption behavior and then identify factors affecting this behavior in order to propose recommendations to promote green consumer behavior to protect the environment through the use of cars run on electricity. The first goal of the study is to synthesize theories and build a research model with hypotheses and measurement scales for the research. The second goal is to analyze the current status of electric car consumption behavior in Vietnam to identify and evaluate the influence of factors on electric car usage behavior. Finally, the research team proposed recommendations and solutions to improve factors related to electric cars that affect consumer behavior. From there, it promotes increased use of electric cars.

**Keywords:** Identified; Influencing factors; Consumer behavior; Electric cars

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## 1. Introduction

In today's increasingly developing social context, the green technology revolution is like a breath of new wind blowing in, shaking many areas of life. More than ever, people are living in an increasingly seriously polluted environment, with the number of vehicles participating in traffic increasing. That also means traffic jams and emissions from vehicles causing air pollution are increasing. The explosion in vehicle traffic has increased traffic congestion and air pollution in provinces, not just cities with high population density. IQAir's 2022 measurement of environmental pollution said that by 2022 in Vietnam, the concentration of PM2.5 fine dust will be 5.4 times higher than the WHO's guaranteed air level, ranking 30th in the world. about air pollution. This poses an urgent task of minimizing environmental pollution, especially emissions from vehicles while the number of vehicles is constantly increasing.

Main objective: Research on electric car consumption behavior and then identify factors affecting this behavior in order to propose recommendations to promote green consumer behavior to protect the environment through the use of cars run on electricity. The first goal of the study is to synthesize theories and build a research model with hypotheses and measurement scales for the research. The second goal is to analyze the current status of electric car consumption behavior in Vietnam to identify and evaluate the influence of factors on electric car usage behavior. Finally, the research team proposed recommendations and solutions to improve factors related to electric cars that affect consumer behavior. From there, it promotes increased use of electric cars.

Not only is it a problem of environmental pollution, but traditional means of transport also have problems with fuel consumption, because the fuel supply is limited and the number of means of transport is constantly increasing. This helps protect natural resources, while reducing the impact of fossil fuel exploitation and transportation. The top task today is how to reduce emissions from vehicles that pollute the environment and find materials to replace current petroleum materials. And electric cars are a suitable means to solve these two urgent problems.

With the problems of environmental pollution and limited petroleum energy sources in the context of the potential development of the electric car market in Vietnam, research on car consumption behavior is important. Electricity is extremely urgent to promote electric car consumption behavior as well as reduce environmental pollution emissions and solve the problem of gasoline. Therefore, the research team decided to choose the topic "Identifying factors affecting electric car consumption behavior in Vietnam" to analyze in depth the positive and negative impacts of electric cars. Research factors on the behavior of using electric cars of Vietnamese consumers.

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## 2. Content

### 2.1 Research overview

#### *Main research directions on consumer behavior*

Ahmad Hosaini and Rojhe (2020) through the research article "Review Paper on Factors Influencing Consumer Behavior" have pointed out the factors that affect consumer behavior. Typically, factors affecting consumer buying behavior include mental factors, civic factors, cultural factors and personal

factors. Consumer behavior is not the same or consistent in all conditions but it changes over time. There are different factors and components that impact consumer behavior. When these factors or components change, consumer behavior also changes such as demographic factors, social factors and cultural factors.

Having similar results to Ahmad Hosaini and Rojhe, Gajjar (2013) pointed out in the article "Factors Affecting Consumer Behavior" that research on consumer behavior is quite difficult and complex. Because there are many variables involved and they tend to interact and influence each other. These variables are identified as the most important general influences on consumer behavior which are "external environmental variables influencing behavior", "culture and subculture", "social class", "society and social groups", "family and interpersonal influences" and "other influences".

#### ***Research on environmental protection behavior***

The three variables "positive attitude towards the environment", "relationship between people and the environment" and "willingness to pay to protect the environment" were created in the study by Quentin M. Duroy (2005). researched in the article "The Determinants of Environmental Awareness and Behavior". The variables are regressed against a set of economic, demographic, political, psychological, and educational variables. Quentin M. Duroy shows that economic affluence has, at best, a marginal direct effect on environmental awareness and no direct effect on environmental behavior. In addition, the study also demonstrates that the level of urbanization, the level of subjective happiness and the level of income equality have a direct influence on cognition, while education, population pressure and happiness have a direct influence on cognition. significant correlation with environmental behavior.

#### ***Research articles on electric car usage behavior***

Regarding consumer behavior, there have been countless studies conducted and most of those studies often use some main models such as TPB, TAM,.... Using the theory of planned behavior plan (TPB) to study the factors that significantly impact individuals' intention to purchase electric vehicles in Ghana, Williams Ackaah and colleagues (2021) in the study "Factors invest consumers' intentions to purchase electric vehicles in Ghana".

Next, Bhutto and colleagues (2021) collected data from 358 electric vehicle users who knew about battery and plug-in hybrid EVs to learn about "Factors Affecting the Consumers' Purchase Intention and Willingness -to-Pay More for Electric-Vehicle Technology". Based on the "Theory of Planned Behavior (TPB)", the study shows that attitude, subjective norms, behavioral control, and environmental factors affect purchase intention and readiness. consumers pay more for electric vehicle technology. And consumer attitudes toward electric vehicles are the strongest predictor of electric vehicle purchase intention.

Along with TPB theory, but with other factors, Usamah Shakeel (2022) conducted research in the article "Electric vehicle development in Pakistan: Predicting consumer purchase intention" with attitude factors, subjective norms, cognitive state, product perception, perceived behavioral control, non-monetary incentives, and monetary policy. The result of the study is that most factors have significant beneficial results on consumers' intention to buy electric vehicles.

In addition to the TPB or TAM theories, the TRA theory of reasoned action is also used by researchers to analyze factors affecting electric car consumption behavior. In the study "A market modeling review study on predicting Malaysian consumer behavior towards widespread adoption of PHEV/EV" by Nadia Adnan and colleagues (2017) combined the TPB model and the TRA model. However, the joint outcomes of vehicle ownership costs, driving range, and charging times have acted as moderating factors that directly influence consumer intention and PHEV/EV adoption. in fact.

#### ***Domestic studies***

Research on factors affecting the intention of vehicles using electric motors in Vietnam has also attracted the attention of domestic and foreign researchers. Based on the review results of previous studies, the research team found that: the study on the author's proposed theoretical framework (Truong, 2022) has not concluded on the research results on this issue. . The author's research Truong in 2022 used the unified technology acceptance model (UTAUT) and the personal norms model (NAM), with proposed influencing factors such as: Expected performance, Effort Expectations, Social Influence, Favorable Conditions, Reception

## **2.2. Research Methods**

The research team used mixed research methods, including qualitative and quantitative research methods.

- Qualitative method: conducted by synthesizing and analyzing previous research topics, articles and documents, many of which have been published in prestigious journals in Vietnam and around the world. .

- Quantitative method: In addition to conducting research, the team also took another important step: distributing survey questionnaires to evaluate the appropriateness of the scale and research model. Conducted by surveying via online questionnaire sent to consumers aged 18 and over. Questionnaires were completed online using Google Forms and shared and posted on social media sites. mainly Facebook. After being collected, the data was processed using SPSS 25, SMARTPLS 3 software. In this step, the team designed and distributed the survey to a representative sample group.

### **2.3 Theoretical basis and research model**

#### **2.3.1. Some perspectives on consumer behavior**

The term "Consumer Behavior" is the set of activities, decisions and actions that consumers take when purchasing and using products or services. It represents the way consumers interact with the market and influence businesses, products and services.

The theory of consumer behavior is a branch of microeconomics that connects preferences with consumer demand and consumer supply. It analyzes how consumers balance their consumption needs measured by their preferences with the constraints on their spending and by increasing their spending according to the actual needs of the consumer.

Some popular views of researchers on the concept of consumer behavior include: Georgi (2013) stated that: "Consumer behavior is a phrase that refers to human actions in shopping and Using products involves psychological and social processes in all contexts before, during, and after purchase. There are four groups of factors that influence and impact consumer behavior, including cultural, social, personal and psychological. According to Philip Kotler (2001), "Consumer behavior is the study of how individuals, groups and organizations select, purchase, use and dispose of goods, services, ideas and experiences to satisfy satisfy their needs and desires". According to David L. Loudon & Albert J. Della Bitta (1993), "Consumer behavior is defined as the decision-making process and actual actions of individuals when evaluating, purchasing, using or disposing of products. abandon goods and services". Similarly, according to the views of Leon G. Schiffman & Leslie Lazar Kanuk (1997), "Consumer behavior is all actions that consumers exhibit in the process of exchanging products, including: investigation , purchase, use, evaluate and dispose of products and services that satisfy their needs".

Logically, consumption is separated from production because of the combination of two different economic factors. First, consumption is personal because personal tastes or preferences determine the level of satisfaction people gain from the goods and services they consume; on the other hand, a producer may make something that he himself would not consume. Therefore, different motives and capabilities are involved. The models that make up buyer theory are built to represent the measurable needs patterns of a buyer based on the assumption that it has value. These variables are used to calculate the rate at which a good is purchased (demand) be it the price per unit of a particular good or the price of an equivalent good and the assets of the equivalent good.

#### **2.3.2. Factors affecting consumer behavior**

##### ● Cultural factors

The cultural factors that are confirmed to have the most profound influence on consumer behavior are: Culture, subculture and social classes.

- Culture: Cultural factors have great significance in consumers' buying habits.
- Subculture: Within a cultural group, there can be subcultures called subcultures.
- Social class: Everywhere in the world there is some form of social class. Social class is determined not only by income, but also by a number of other factors such as education, economic background, educational level and place of residence.

##### ● Social factors

Consumer behavior also stems from social factors such as reference groups, family and local societal roles. (Georgi, 2013).

- Family: This is an important factor in forming an individual's purchasing behavior.
- Reference group: A relationship group is a person or group of people that influences an individual's opinions, beliefs, attitudes and behavior. Marketers think reference groups are important.
- Social role and status: A person's social role and position in a group or community affects that individual's spending behavior.

##### ● Personal factors

Buyer decisions are also rooted in personal characteristics, most notably the buyer's age and stage in the life cycle, occupation, economic circumstances, lifestyle issues, that person's personality and thoughts about themselves.

- Age: Age is a major factor associated with purchasing. Teenagers' purchasing choices will be different from middle-aged and older adults.
- Occupation: A person tends to buy items that match his or her profession.
- Income: Higher income leads to higher consumer purchasing power.
- Lifestyle: Lifestyle is the attitude and way of functioning of an individual in society.

- Psychological factors

A person's shopping choice also stems from four psychological factors: Motivation, perception, knowledge, beliefs and attitudes. (Georgi, 2013)

- Awareness: Consumer awareness is an important factor affecting consumer behavior.
- Motivation: When a person's needs are strong enough, meeting those needs and getting people to behave in ways that can be considered motivating creates pressure.
- Attitudes and beliefs: Consumers have certain attitudes and beliefs that influence their purchasing decisions.

### 2.2.3 Some models of consumer behavior

#### Howard-Sheth model

The Howard-Sheth model is a model of the relationship between the customer and the purchasing decision process. Proposed by Gerald Zaltman, John Howard and Jagdish Sheth (1969), this model explains how customers approach purchasing decisions and the factors that influence their purchasing behavior.

This is a useful tool in understanding the customer's purchasing decision process. With its comprehensiveness and high applicability, this model provides a comprehensive view of the purchasing decision, from pre-decision to post-decision consequences. It helps shape marketing strategies based on customer awareness, information search, and evaluation of choices. At the same time, this model emphasizes the role of post-decision consequences, creating a basis for improving products and services, increasing customer satisfaction and loyalty.

#### Kotler model

According to Philip Kotler, consumer behavior is a model that explains how customers begin to search, then choose, use and evaluate a product or service.

The Kotler model includes 5 main stages as follows:

- Perception of needs: Consumers have perceptions of their needs, including physical needs, spiritual needs, social needs and self-expression.
- Search for information: To meet and solve needs, customers will search for information about goods and services.
- Evaluate options: Consumers evaluate goods and service options to determine which goods and services best meet their requirements.
- Purchasing decision: After considering various options, buyers choose the item or service that best meets their requirements.
- Action: The consumer makes a decision to purchase the item or service after passing through the purchase decision stage.

Behavioral research models

#### Theory of planned behavior (TPB)

The Theory of Planned Behavior (TPB) is a theory built and developed based on the assumptions about human behavior in the Theory of Reasoned Action (TRA). According to this theory, human behavior is influenced by intentions, determined by three main factors including: attitude toward the behavior, subjective norms, and perceived behavioral control (PBC).

TPB is a prediction model of human behavior that has been designed to overcome the limitations of the Theory of Reasoned Action by adding the element of cognitive behavioral control to the model. However, TPB still has some limitations in predicting behavior (Werner, 2004), such as not explaining all the factors that determine behavioral intentions and not fully reflecting a person's behavior. In summary, TPB has helped improve behavioral prediction models, but still needs to be improved to become a more accurate behavioral prediction tool.

### 2.2.2 Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) is a theory developed in the late 1960s by Martin Fishbein and Icek Ajzen, two psychologists. The theory of reasoned action includes behavior, behavioral intentions, attitudes, and subjective norms. According to this theory, a person's behavior depends on his or her intention in performing the action. This intention is created from attitudes and subjective norms towards that behavior.

Yet, this theory lacks flexibility and does not take into account unexpected or unexpected situations, and does not offer specific solutions to enhance participants' intentions and behavior. Additionally, the theory may focus too much on important factors and ignore other factors that also influence participants' behavior.

However, TRA theory has been successfully applied in many different fields such as education, health, management, marketing and other fields. It provides a theoretical framework for understanding human behavior and helps experts come up with optimal solutions for each specific situation. It should be noted that this theory also has some limitations that should be considered when used.

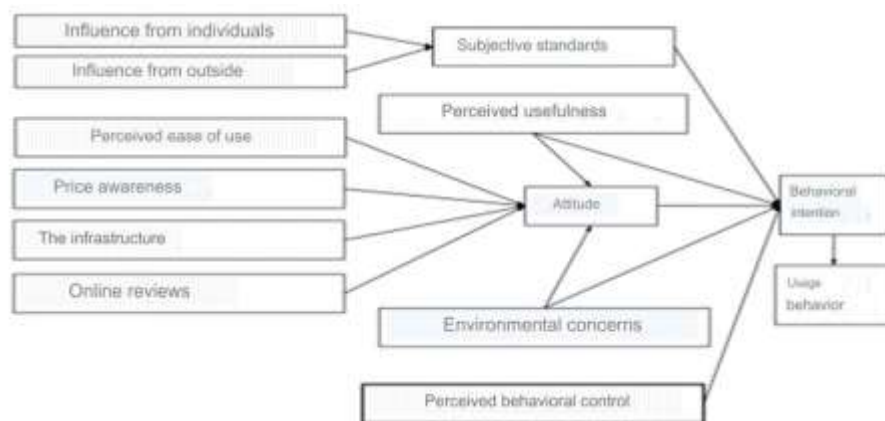
Technology acceptance model (TAM)

The Technology Acceptance Model (TAM) was developed by Fred Davis in 1989 to model the process of users accepting and using new technology. Two key factors influencing user decisions include perceived usefulness and ease of use of the technology. Perceived usefulness refers to the extent to which users believe a new technology can enhance their job performance, whereas perceived ease of use refers to the extent to which users believe that using new technology won't take much effort.

TAM has been applied to explain many types of systems such as E-learning systems, learning management systems, etc. However, it is not suitable to explain the application of pure systems or advanced systems, entertainment systems such as music, online games or learning and playing systems.

In the context that the electric car market in Vietnam has a lot of development potential, understanding the influencing factors is extremely necessary to promote electric car consumption behavior in Vietnam.

From the research model of Jui and Chun (2019), the team believes that applying and promoting the research model of Jui-Che Tu and Chun (2019) is suitable for the research context in Vietnam. Because the research of Jui and Chun (2019) was conducted in China - this is a large electric car market, so consumers will have different thoughts, consumption behaviors, and attitudes. Furthermore, electric cars appeared earlier in China and are more commonly used than in Vietnam, so consumers here are somewhat more familiar with electric cars



Source: Author team

Figure 3.2. Proposed research model

## 2.3 Research results and discussion

### 2.3.1 Test the scale using Cronbach's Alpha reliability

The Correlation coefficient between the variable and the sum of all variables is  $> 0.5$ , thus satisfying the criterion  $> 0.3$  given by Nunnally, J. (1978).

According to Cortina (1993), to represent a very good measurement scale, the Cronbach's Alpha indexes of all groups will range from 0.8 to 1. The group has obtained extremely satisfactory research results, specifically the system Cronbach's Alpha number of "Influence from individuals" is 0.879, of "Influence from outside" is 0.870, "Perceived usefulness" is 0.911, "Perceived ease of use" is 0.921. The factor groups "Perceived behavioral control", "Charging infrastructure" and "Price awareness" also have relatively good Cronbach's Alpha coefficients of 0.893, 0.802 and 0.897, respectively. And the factors with the highest Cronbach's Alpha coefficient are "Environmental concern" with 0.949, "Online reviews" with 0.935, "Attitude" with an index of 0.955, and "Intention to use" with 0.927.

### 2.3.2 Current status of electric car usage behavior of consumers in Vietnam

#### ● Influence from individuals

Individuals who influence a customer's purchase and use of a product are divided into many different groups. Through survey results on the influence of individuals on the decision to buy and use electric cars from people in the Facebook group about electric cars, it has been shown that individuals have a large influence on the purchase and use of electric cars. Use electric cars with the following data:

According to the survey results, survey members are not much influenced by important people. Only a few of their significant others think they should buy an electric car, which is shown by only obtaining 29.58% of opinions agreeing and strongly agreeing. Besides, a better result is when 41.78% of respondents agree and strongly agree that buying an electric car will make others think they are rich. That's right, because electric cars are not very popular in Vietnam and according to the general thinking of Vietnamese people, you have to be rich to buy a car. So this may be a familiar thing when people think that owning an electric car means being rich.

#### ● Influence from the external environment

According to survey data, influences from the external environment contribute significantly to customers' buying behavior. As society develops, people's awareness also increases, which means people are aware of the problem of environmental pollution caused by cars using traditional fuels. Survey data shows that 76.53% of respondents agree and strongly agree that cars using traditional fuel cause environmental pollution. Next, receiving subsidies when purchasing electric vehicles also affects the behavior of purchasing electric vehicles. These subsidies aim to promote the use of electrified vehicles in the country, indirectly attracting manufacturers. Automobile and motorbike production switched to producing zero-emission vehicles. In Vietnam, domestically produced electric vehicles are entitled to a special consumption tax reduction of 12% of the selling price (reduced from 15% to 3%, applicable until February 28, 2027) and exemption from registration fees, equivalent to a reduction in registration fees. The parking fee is from 10% to 12% of the vehicle's listed value (New legal policy, 2022). If converted into money, the value of tax and fee incentives for electric vehicles in Vietnam is currently the most attractive in Southeast Asia, up to 8,000 USD (equivalent to 200 million VND) for a car with a listed price of 42,000 VND. USD. Thus, among the four largest electric car and motorbike markets in ASEAN, the support method of Indonesia and Thailand is the same, which is to finance the final buyer with government money. Meanwhile, Malaysia and Vietnam use tax and fee incentives to stimulate electric vehicle consumption, through tax reductions for manufacturers and reduced rolling costs for final buyers. That is also reflected in the data of 43.66% of respondents agreeing and strongly agreeing, which is the percentage of individuals who would buy an electric vehicle if given the above subsidy.

- Perceived usefulness

Through the survey, it can be seen that perceived usefulness received very few "strongly disagree" and "disagree" opinions on the evaluation criteria. That means, the majority of surveyors think that electric cars are really useful for their lives as well as themselves.

Electric vehicles produce no emissions on the road and are helping to reduce air pollution in heavily congested cities. Many countries are now promoting the use of electric vehicles as a solution to reduce carbon emissions directly. next. This is also widely agreed and strongly agreed (74.18%), this rate is not too high because electric vehicles do not create carbon emissions directly but indirectly still have an impact. Because to obtain raw materials to produce an electric car, it requires mining tens of tons of raw metal. Furthermore, the lithium-ion batteries used to power vehicles are highly chemically reactive and can leach toxins during the extraction process. However, the recent common situation in Vietnam in recent months is that gasoline prices have increased for a long time (peaking up to 33 thousand VND/liter of gasoline (Petrol price management information on June 21, 2019). 2022 – Ministry of Industry and Trade), this has caused the spending of individuals using fuel cars to increase. Therefore, in the current context, there were 55.04% of opinions "agree" and "strongly agree" with the criterion that electric cars will help save costs.

- Perceived ease of use

Even though they have only been on the market for a decade, electric cars have gradually become a global vehicle with many superior equipment. Almost anyone can easily use and drive. Electric car driving is considered more flexible than gasoline cars with many driving ways such as driving with one brake pedal, operating in combination with using phone applications and self-driving by installing self-driving car mode, the survey showed that 54.46% of survey participants "agree" and "strongly agree" with the ease of use and 53%.05% of survey participants "agree" and "strongly agree" regarding ease of driving. And when it is easy to use and easy to drive, interacting with the car is not difficult, in addition, there will be less need for reference to find out how to use it.

Electric car engines operate quite smoothly, are easy to interact with, and do not make noise like gasoline cars. This is an improvement in electric vehicles, but in some ways it causes inconvenience for those who have the habit of driving based on the feel of the roar and vibration of the engine. This is also reflected in the survey data: 40.85% of respondents agree and strongly agree about comfortably using the vehicle's functions. To create conditions for customers to access and experience the difference

Since the end of 2021, especially when the armed conflict between Russia and Ukraine occurred, the world petroleum market has complicated developments, supply is scarce, and gasoline prices continuously increase. A common situation in Vietnam in recent months is a prolonged increase in gasoline prices, the highest being up to 33 thousand VND/liter of gasoline (Petrol price management information on June 21, 2022 - Ministry of Industry and Trade ), consumers have to wait in long lines to buy gasoline. Maybe that's why the cost of charging an electric car is considered cheaper than the price of gasoline. Up to 52.11% of surveyors agreed with this criterion.

In addition, the proportion of survey participants who rated the price of electric cars as expensive was also up to 47.89%, which shows that the cost of electric cars is not just the cost of buying a car and is accompanied by additional costs. maintenance fees, battery replacement and other costs. Maybe because of that, the fact that the current price of electric cars is affordable and reasonable is only agreed by a few reviewers, specifically 33.33%.

- Environmental concerns

Environmental issues are currently considered hot issues and are most aware and concerned by people in the world in general and Vietnam in particular. This is shown by the very high rate of "Agree" and "Strongly Agree" opinions of survey participants.

According to survey results. The highest rated criterion is up to 75.12% of Italians "agree" and "strongly agree" with the criterion "Environmental problems are becoming more and more serious in recent years". In an environmental report from the Ministry of Natural Resources and Environment (National Environmental Status Report, 2021), data that makes everyone look back are given: 10,000 tons of pesticide chemicals are consumed. consumed annually, 2.3 tons of household waste, 7 million tons of industrial solid waste, etc. Every day, there are 283 industrial parks discharging 550,000 m3 of wastewater into the environment, there are 615 industrial clusters but only 5 % use wastewater treatment systems, more than 500 production facilities are outdated. Besides, there are 5,000 businesses, 4,500 craft villages, and 13,500 medical facilities generating tens of tons of waste into the environment. In

addition, with the current number of vehicles, they accidentally release a large amount of toxic gases into the environment. In addition, factories and enterprises are pushing into the air a large amount of deadly poisons every day. atmosphere. This makes the already polluted atmosphere even more serious. Based on these figures, it can be seen that the current environmental situation is at an alarming level. If there is no change to thoroughly resolve it, environmental pollution will become more and more serious. than.

Aware of this serious situation, 73.71% of respondents "Agree" and "Strongly agree" with the view that people should change their behavior to reduce climate change and protect the environment. school.

- Online reviews

Currently, with industry 4.0, network information has developed rapidly, online reviews play a quite important role in shopping. A good review can increase sales and customer loyalty by influencing consumer behavior. Without positive reviews, it is likely that the business will perform poorly.

Before buying any product, consumers often tend to gather information and refer to online reviews to be able to make the right choice. There were 59.15% and 55.40% of "Agree" and "Strongly Agree" opinions for two opinions: "Collect information from online consumer product reviews before buying a product." electric car" and "Often refer to online reviews from other consumers to help choose the right electric car". Collecting and consulting online reviews is like a step to help consumers know whether this electric car product is really as good as the manufacturer advertises or not. For consumers, these reviews are all experiences and comments of electric car users, so they feel that online reviews are a very reliable source of information. This is shown by 60.56% of the opinions "Agree" and "Strongly agree" with the view "I believe that online reviews are a reliable source of information about electronic cars".

With confidence in online reviews of electric cars, the opinion "Online reviews help me buy an electric car with value for money" was rated "Agree" by 56.81% of people. " and "Strongly agree".

#### Results of testing the measurement model

Testing the quality of observed variables - Outer Loadings coefficient The team tested the quality of observed variables through SmartPLS. The outer loading value in SmartPLS is the correlation coefficient between an observed variable and a latent variable in the PLS-SEM model. The outer loading coefficient can be used to evaluate the quality of observed variables of an outcome scale factor. If an observed variable has a low outer loading, it may indicate that that variable does not contribute much to the corresponding factor and can be eliminated from the model.

The outer loading value can be

The value of P runs from 0 to 1 and has the following meaning:

- A small P value ( $\leq 0.05$ ) indicates that the null hypothesis is invalid  $\rightarrow$  Reject the null hypothesis.
- A large P value ( $> 0.05$ ) indicates that the alternative hypothesis is weak  $\rightarrow$  The null hypothesis cannot be rejected

The results table reflects that there are 3 relationships with unusually large P-values: PU  $\rightarrow$  ATT = 0.654, PU  $\rightarrow$  BI = 0.983 and PP  $\rightarrow$  ATT = 0.205. Therefore, "Perceived usefulness" has no impact on "Attitude" and "Intention to use", and the factor "Perceived price" has no impact on "Attitude".

From the analysis results of the research team, it can be concluded that the relationships in the remaining models are all significant, due to P-value  $< 0.05$ . Among them, the relationship between "Attitude" and "Intention to use" is the strongest relationship in the model, with an impact value of 0.746. This shows that users' "Attitude" has a strong impact on their "Intention to Use".

In addition, "Influence from individuals" and "Influence from outside" both have a high impact on "Subjective norm" in the model, 0.539 and 0.524 respectively. This suggests that these factors have a significant influence on how users evaluate electric vehicles, and should be considered in the development of electric vehicle-related products and services. These results can be used to guide product and service development strategies related to electric vehicles.

#### Explanation degree of the independent variable for the dependent

The fluctuation of the adjusted R-squared value ranges from 0 to 1. There is often no exact standard of what level the adjusted R-squared must be for the model to meet the requirements. The more meaningful the model is the closer this index is to 1, the weaker the model significance is the closer it is to 0 (Hair et al., 2013). More specifically, if it is between greater than 0.5 and 1, it is a good model, less than 0.5 means the model is not good. Through the table below, we can see the level of explanation of the independent variables for the dependent variable in the regression model.

From the analysis results of the research team, it can be seen that the variables "Subjective Norm", "Attitude", "Intention to use electric vehicles" all have an adjusted R-squared greater than 0.5, respectively. is 1; 0.875; 0.870. This shows that the group's research model is strongly significant (Hair et al., 2013).

#### The level of influence of the independent variable effect size f<sup>2</sup>

Effect size f<sup>2</sup> (f squared) is the coefficient that evaluates the effectiveness of the impact of each independent variable on the dependent variable. The f Square index table was proposed by Cohen (1988) to evaluate the importance of independent variables. Specifically as follows: From the test analysis results, we can see that the impact from the variable "Perceived usefulness" to "Attitude" and "Intention to use" has an f Square index of 0.001 and 0,

respectively. These two index values are both less than 0.02, from which it can be concluded that the variable "Perceived usefulness" has an extremely small impact on the variable "Attitude" and has no impact on the variable "Intention to use". In addition, the variable "Price awareness" has an extremely small or no impact on "Attitude" with an  $f^2$  index value of 0.015. This can be explained by the fact that price is not an important factor for users in the process of evaluating a product or service, and they may accept a higher price if the product or service is meet their needs.

Test the average difference in intention to use between groups of people with different incomes

The research team used the One way Anova method to analyze the average difference with the quantitative variable "Intention to use" to calculate the average value along with the qualitative variable "Income" with 5 value groups. different for comparison.

According to the theory of Welch Test, when the Sig-Levene Statistic result in this test is  $> 0.05$ , it means the variance of the values is homogeneous. Realizing that the Sig-Levene Statistic result in this test is  $0.044 < 0.05$ , so the variance between the choices of the qualitative variable "Income" is different, we will use the Welch test results in the Robust table. Tests of Equality of Means.

Welch's Sig test is equal to  $0.030 < 0.05$ , meaning there is an average difference in intention between different average income groups. Thus, there are differences in usage intention between consumers with different average incomes. Source: Compiled results of the research team

The chart shows that people with income "from 15 to under 30 million VND" will have increasing intention to use and those with income "from 50 to under 70 million VND" will have increasing intention to use. the more it decreases.

Test the average difference in intention to use between groups of people living and working in different areas

The research team used the One way Anova method to analyze the average difference with the quantitative variable "Intention to use" to calculate the average value along with the qualitative variable "Twin location" with 3 price groups. different values for comparison.

According to the theory of Welch Test, when the Sig-Levene Statistic result in this test is  $> 0.05$ , it means the variance of the values is homogeneous. Noticed Sig- Levene Statistic results in testing

Assumption	Content	Impact coefficient	P Value	Inspection results
H1	Influence from individuals has a positive impact on subjective norms.	0.539	0.000	Accept
H2	External influences have a positive impact on subjective standards.	0.524	0.000	Accept
H3	Subjective norms have a positive impact on consumers' intention to use electric cars.	0.125	0.017	Accept
H4	Perceived usefulness has a positive impact on consumer attitudes.	0.029	0.654	Remove
H5	Perception of usefulness has a positive impact on consumers' intention to use electric cars.	0.001	0.983	Remove
H6	Perceived ease of use has a positive impact on consumer attitudes.	0.146	0.011	Accept
H7	Price awareness has a positive impact on consumer attitudes.	0.104	0.205	Accept
H8	Infrastructure has a positive impact on consumer attitudes.	0.156	0.019	Remove
H9	Online reviews have a positive impact on consumer attitudes.	0.338	0.000	Accept
H10	Environmental concern has a positive impact on consumer attitudes.	0.255	0.000	Accept



H11	Environmental concern has a positive impact on consumers' intention to use electric cars.	-0.147	0.014	Accept
H12	Attitude has a positive impact on consumers' intention to use electric cars.	0.746	0.000	Accept
H13	Perceived behavioral control has a positive impact on consumers' intention to use electric cars.	0.248	0.000	Accept
H14	Intention has a positive impact on consumers' behavior of using electric cars.		0.003	Accept

Source: Compiled results of the research team

#### Table 4. Results of testing hypotheses

In conclusion, from the results of the test analysis, the authors concluded that the variables "Influence from individuals", "Influence from outside", "Perceived ease of use", "Infrastructure", "Price Perception", "Environmental Concern", "Online Review", "Perceived Behavioral Control", "Subjective Norm", "Attitude" all have an impact on customer satisfaction, consumer decisions and behavior of customers in Vietnam. In which the variable "Attitude" has the greatest impact with an impact index of 0.746, followed by "Interpersonal influence" and "External influence" with P value of 0.539 and 0.524, respectively. This result answered the second question that the research team posed at the beginning: "What factors influence the intention and behavior of using electric cars of Vietnamese people?".

The authors' hypotheses set out above are all accepted, excluding three hypotheses: "Perception of usefulness has a positive impact on consumer attitudes"; "Perception of usefulness has a positive impact on consumers' intention to use electric cars" and "Perception of price has a positive impact on consumer attitudes". Discuss research results.

The team's research model includes 12 factors (including the dependent variable) with 14 hypotheses. After the research, positive results were obtained, consistent with reality based on factor analysis using Cronbach's Alpha index, Outer Loadings index and Convergence convergence. The analysis shows that the tested factors are consistent with reality.

Scales of "Interpersonal influence", "External influence", "Perceived usefulness", "Perceived ease of use", "Perceived price", "Infrastructure Floors", "Environmental concern", "Perceived behavioral control", "Attitude" were researched and all showed good results of analysis of Cronbach Alpha, Outer Loadings, and Convergence coefficients, showing good results. suitable scale. The factors "Perceived ease of use" (0.146), "Perceived price" (0.104), "Infrastructure" (0.156) have a positive impact on "Attitude", and at the same time "Subjective Norms" (0.125), "Attitude" (0.746), "Perceived behavioral control" (0.248) also positively affect customers' "Intention to use". These results will contribute to helping businesses manufacturing and trading electric cars in Vietnam to measure customers' "intention to use" and "consumption behavior".

Research shows that there are two factors that do not have an impact on consumers' consumption behavior: "perceived usefulness" and "perceived price". Different from this research result, Jui and Chun (2019) showed that "perceived usefulness" has a positive impact on consumer intention and also showed the opposite result to the results of the article. This study is that "interpersonal influence" has no impact on electric vehicle consumption intention.

#### 2.3.3. Recommendations for electric car businesses in the Vietnamese market

Solutions to improve and promote the positive impact of subjective standards

The first is to increase customer awareness about the advantages of electric cars. According to the evaluation results, advertising about electric vehicles in various media can motivate consumers to buy and use electric cars. Therefore, electric vehicle manufacturing, sales and marketing companies should increase and promote promotional activities about electric cars on traditional media channels such as TV or social networking sites such as Facebook, Youtube, ...

Second, businesses can stimulate the intention to buy and use electric cars by creating special programs for customers who have their own cars or customers who have previously purchased cars from the business, including Including new customer referrals. Because according to the survey, up to 56.34% of opinions think that individuals will buy electric cars that family and friends used to buy.

Third, the Government can apply policies on tax reduction or tax exemption for electric cars and at the same time impose fines on vehicles running on fossil fuels. Because according to the results of the group's analysis of the current consumption situation, up to 43.66% of survey participants agreed and strongly agreed with the opinion "I buy an electric car because there are many subsidies for electric cars." implemented by the Vietnamese government. Therefore, these tax policies will make using electric cars more attractive than other traditional vehicles.

The solution enhances and leverages the positive impact of ease of use

Firstly, it is necessary to increase improvements in technology and support equipment for drivers. Electric cars today are often equipped with diverse features to meet user needs, but there is still much room to improve features. Businesses can create user-friendly and easy-to-understand user interfaces, as well as add smart features.

Second, improve the ability to transmit information between users and electric car manufacturers. Interaction between users and manufacturers through channels such as online support, mobile applications, email or calls will help users easily exchange and provide information.

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