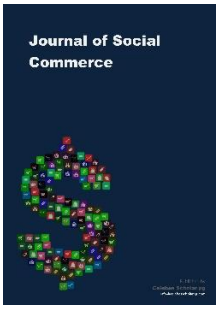

ISSN 2809-929X (Print)
ISSN 2809-9303 (Online)

Journal of Social Commerce

Vol. 2 No. 2, 2022 (Page: 82-99)
DOI: https://doi.org/10.56209/jommerce.v2i2.30

Factors Influencing Purchasing Intention Toward Electric Vehicle in Vietnam

Pham Van Tuan[1,2], Nguyen Thi Phuong Thao[2], Le Thi Thuy Linh[2], Tran Thi Le[2], Nguyen Thuy Linh[2], Hoang Minh Tuan[2]

[1]Associate Professor, Faculty of Marketing National Economics University, Hanoi, Vietnam
[2]Faculty of Marketing National Economics University, Hanoi, Vietnam

Article History

Submitted: 17 April 2022,
revised: 28 May 2022,
Accepted: 26 June 2022

Keywords

Purchasing Intention, Electric Vehicle, Influencing Factors, Vietnam.

Abstract

With the growth of the global electric vehicle industry, Viet Nam is proud to be one of the countries with an electric vehicle manufacturing company. This study will focus on government support, environmental perception, pricing perception, infrastructure attributes, and performance factors impacting the purchase intention of electric cars based on the theory of planned behavior (TPB) with variables mediators are attitude and subjective norms. A nationwide questionnaire survey of all ages with 406 valid samples was conducted from December 2021 to January 2022. The result showed that government support, environmental perception, pricing perception, infrastructure attributes, and performance factors positively influence both attitude and subjective norms, according to the SEM results, and attitude and subjective norms have a positive impact on Vietnamese people's intention to buy electric cars. The report has since provided guidance to the government and businesses on stimulating the growth of the electric car sector.

Introduction

Electric vehicles (EVs), which are gaining popularity as an environmentally beneficial innovation, are anticipated to be a long-term solution to the global concerns of energy constraint and pollution. Global sales of EVs more than doubled in 2021, while deliveries of internal combustion engine cars remained flat Governments worldwide have proposed a range of approaches and invested billions of dollars to foster development (Du & Ouyang,

Corresponding Author: Pham Van Tuan, Email: phamvantuan@neu.edu.vn, Address: 207 Giải Phóng, Đồng Tâm, Hai Bà Trưng, Hà Nội, Vietnam
Nguyen Thi Phuong Thao, Email: 11184592@st.neu.edu.vn
Le Thi Thuy Linh, Email: 11182699@st.neu.edu.vn
Tran Thi Le, Email: 11192716@st.neu.edu.vn
Nguyen Thuy Linh, Email: 11192983@st.neu.edu.vn, hoangtuan.ylvp@gmail.com
Hoang Minh Tuan, Email: hoangtuan.ylvp@gmail.com

2017). This includes legal framework establishments, incentives for research and development, tax credits and exemptions, and many other non-monetary supports. For instance, The EU, The US, China, Canada, and many countries have announced plans to phase out ICE cars on the road and encourage their citizens to use EVs. (NT, 2021).

The Vietnamese government has taken many measures to support the EV adoption in the nation such as tax reduction for EV to the lowest level of equivalent to 1%; registration fee exemption for electric cars; registration fee exemption for buses using clean energy; domestically produced EV are taxed from 5 - 15%, while the tax applied to ICE cars is from 10 - 150%. The tax reduction will directly affect the selling price, making EVs more competitive than petrol cars in the same segment.

However, Vietnam is a young market in the EV segment with a market adoption history of around 3 - 5 years. In 2020, Vietnam had 900 EVs on the road, which was still a relatively low number (Vietnam Register, 2021). Although VinFast, Vietnam's only domestic EV firm, said that it had received more than 50,000 orders for its electric vehicle models between 2021 and 2022, in general, this number of orders does not reflect real sales to date.

In addition, Vietnam is considered one of the world's fastest-growing automotive markets, with significant growth rates. In the EV segment, Vietnam has an advantage over its neighbours Thailand, Malaysia, and Indonesia. It has a domestic pure electric car company and a strategic location close to China - the world's largest EV market on Earth. Although the Vietnamese government has implemented many measures to support the EV industry, many major automakers, including Hyundai, Mercedes, Hongqi, Audi, and others, are bringing their EVs to the Vietnamese market, consumers in Vietnam remain sceptical. The article will investigate consumer EV adoption behaviour factors to solve this problem.

Number of studies on the purchase intention of customers for EV products have been carried out (See for example: Ye et.al, 2021; Moataz Mohamed & Christopher, 2018). Most of them have been carried out and developed with the help of the theory of planned behaviour (TPB). Scholars have examined several determinants identifying the drivers and obstacles to consumer adoption of electric vehicles. They may be classified into three groups that are (1) technological concerns such as vehicle ownership costs, driving range, and charging time; (2) biological influences such as customers' demographics and personality traits. (3) contextual factors including government support, gasoline prices, and infrastructure attributes such as charging stations (Bjerkan et.al, 2016; Sierzchula et al., 2014).

Factors, which are government supports, environmental concerns, performance, charging infrastructure (VQ, 2021), are shown to positively affects the customers' purchase intentions of EV, while the price is regarded as the negative factor to EV adoption. The demographic variables, including gender, age, education level, and occupation, act as the individual factors (Bennett & Vijaygopal, 2018; He & Zhan, 2018). In these studies, the customer profile of a well-educated middle-aged married man has a strong propensity for buying EVs.

Although there is a large diversified number of studies into this topic, we recognize that there haven't been any studies that utilize the theory of planned behaviour (TPB) and take into account the geographical location in Vietnam as a demographic factor, simultaneously. In addition, it is concluded that previous studies virtually neglected the correlation between the subjective norm in the TPB model with other consumers' buying intentions, such as government support and environmental concerns.

Specifically, this study addresses three research questions: (1) How do EVs affect car consumers in the Vietnamese market? (2) What factors affect consumers' intention to purchase electric cars? What is the correlation between the factors? (3) What are the suggested strategies and solutions for government, businesses, and consumers?

The content is arranged as follows. The TPB framework and an overview of EV and customer purchasing intention are presented in Section 2. In Section 3, we explain the study's research model and hypotheses. In section 4, we describe the study approach, and then in section 5, we go through the data analysis. The analysis of the results, as well as a discussion of the theoretical and practical implications and limitations, are all covered in Section 6. Finally, in Section 7, the study's conclusion is delivered.

Model theory

The Multi-Attribute Attitude Model

Ajzen & Fishbein (1975), The Multi-attribute Attitude Model is a useful tool for investigating and predicting attitudes, which is shown by the following equation:

$$A_0 = \sum_{i=1}^{n} b_i e_i$$

Where:

A_0 = attitude toward the object

b_i = strength of the believe that the object has attribute i

e_i = evaluation of attribute i

n = number of salient beliefs about the object

This model breaks down a consumer's overall attitude into smaller components. Specifically, customer attitudes are defined as a measure of their perceptions (also known as beliefs) and their evaluations of a product or brand and its attributes (including characteristics, functions, cognitive abilities and benefits).

When a customer decides to purchase a product, they first need to identify the product and then evaluate its attributes. This model describes the product's strengths and flaws by analysing its features, resulting in liking or disliking the product (attitude). This model breaks down a consumer's overall attitude into smaller components. Specifically, customer attitudes are defined as a measure of their perceptions (also known as beliefs) and their evaluations of a product or brand and its attributes (including characteristics, functions, cognitive abilities and benefits).

When a customer decides to purchase a product, they first need to identify the product and then evaluate its attributes. This model describes the product's strengths and flaws by analysing its features, resulting in liking or disliking the product (attitude). A favourable attitude toward many different traits can impact overall attitudes and behavioural trends, but a negative attitude toward a specific attribute can also influence general attitudes and behavioural trends. variable attitude toward many different traits can impact overall attitudes and behavioural trends, but a negative attitude toward a specific attribute can also influence general attitudes and behavioural trends.

Theory of Reasoned Action (TRA)

The TRA model explains in more detail than the multi-attribute model (Ajzen & Fishbein, 1975). The model assumes that a customer's attitude toward an item isn't necessarily correlated with their actions. It explains the activities that precede the buying behavior and at the same time shows that, “Behavioral intention” is the decisive factor to predict the consumption behaviour. “Behavioural intention” is influenced by two factors: a person's attitude about the behaviour and the subjective norm related to the behaviour.

The element "Attitude" refers to how an individual feel about a particular behaviour. Attitudes are measured by “Belief Strength” (belief in product attributes) and “Belief Evaluation” (evaluation of belief in product attributes), similar to that measured in the Multi-

Attribute Attitude Model. Consumers will notice attributes that provide necessary benefits and have varying degrees of importance.

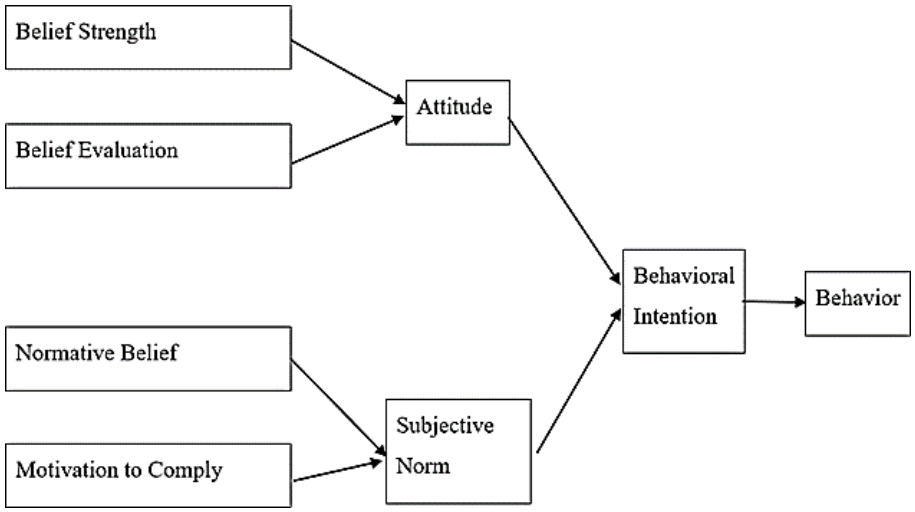

Figure 1. Model of rational action theory

"Subjective norm" is the second essential component influencing "Behavioural intention". According to Ajzen's definition, “Subjective norm is perceived social pressure to perform or not to perform behaviour". This factor is measured by “Normative Belief” (belief about the influencers will think I should or should not buy the product) and “Motivation to Comply” (the impulse to do the will of the influencers). The purchase intention of consumers is strongly influenced by the support or opposition of their relatives and friends.

The theory of planned behaviour

TPB is an extension of TRA model (Fishbein & Ajzen, 1975). The TPB model modified TRA by adding the Perceived Behavioural Control (PBC) factor leading to the formation of a "behavioural intention". Ajzen's Theory of Planned Behaviour (TPB) (1991) is an enhanced version of the TPB model (Ajzen a& Fishbein, 1975)

According to the idea of planned behaviour, behavioural intention is the most important component in explaining customer behaviour, as it predicts and explains their actual behaviour when making a purchase.

Behavioural intention is influenced by three factors, in which two factors: "attitude" and "subjective norm" inherit the theory of rational action (TRA). The “Attitude” factor relates to how positive or negative a person is when evaluating the behaviour in question. The second factor is a social component known as the “subjective norm”, which refers to social pressure to perform or not to perform an activity. When the subjective norm is affected more strongly, the behavioural intention of consumers will also increase significantly. The third factor that Ajzen considers to influence people's intentions is "Perceived behavioural control", which relates to how easy or difficult it is to perform a particular behaviour or perform the behaviour. Is it limited or not? Ajzen demonstrated that the perceived behavioural control factor not only directly affects behavioural intentions but also indirectly affects actual behaviour. When this component is added, behavioural intent interpretation will provide better and more accurate results. As a general rule, the more positive an individual's attitudes and subjective norms toward behaviour and their perceived ability to control behaviour.

Overview of research on electric cars

Domestic research

Factors affecting the intention to buy Vinfast electric motorcycles of people in Ho Chi Minh city. Tran (2021) conducted a study to determine the factors affecting the intention to buy Vinfast electric motorbikes for people in Ho Chi Minh City. The study was carried out by a non-probability sampling method with 153 survey participants all studying and working there. The writers have combined material from theoretical foundations such as TRA, TPB, TAM, and related research publications to consider quantifiable aspects. Thereby, 6 factors were identified that influence people's intention to buy Vinfast electric motorbikes, including environmental awareness, attitude, perceived behavioral control, Attraction other means, Subjective standards and finally promotion policy with 27 observed variables. After gathering data, the authors processed it using SPSS software, which included descriptive statistics, Cronbach's Alpha test, EFA, linear regression, and Anova. The results show that these 6 factors all have an impact on the intention to buy Vinfast electric motorbikes for people in Ho Chi Minh City. In which the Attitude variable has the strongest impact. From the research results, the author gives some managerial implications to increase the intention to buy Vinfast electric motorbikes for people in Ho Chi Minh City.

Foreign researches

Electric vehicle development in Beijing: An analysis of consumer purchase intention. Ustaoğlu & Yıldız (2012) analyzed electric vehicle purchase intentions. After surveying people in Beijing, the two authors collected 502 valid samples. Based on the theory of planned behavior TPB, the study introduced the model of purchase intention with electric vehicle products through three variables of the model: attitude, subjective norm, perceived behavioral control. In addition, the study also evaluates the impact of policy measures (non-monetary policy measures and monetary policy measures) of the Chinese government on the intention to buy electric vehicles. of consumers. The results show that attitude, cognitive-behavioral control, cognitive status, product awareness and monetary incentive policy measures have significant positive effects on the intention to buy electric cars of people. consumption in Beijing. However, subjective indicators and non-monetary policy incentives do not have a significant impact on purchase intention. In addition, the two authors also show that there are significant differences in the demographic variables (gender, age, education, income and car ownership) in the purchase intention of consumers.

Does Value Co-Creation Really Matter? An Investigation of Italian Millennials Intention to Buy Electric Cars

Author Costanza Nosi and colleagues developed a study focusing on exploring the factors that determine the intention to buy electric cars of Italians aged 18-35 years 2017. The study focuses on the role that co-innovation plays in consumer decision-making. In the field of electric vehicles, the report has used TPB model theory with familiar variables: Attitude, Subjective norm, Perceived behavioural control. In particular, the authors emphasize the perceived importance of electric vehicle attributes. Through a survey of 523 Italians aged 18-35, the results show the positive impact of factors on the intention to buy an electric car.

Why do consumers choose to buy electric vehicles? A paired data analysis of purchase intention configurations?

Also based on TPB theory with three psychological attributes: attitude, subjective norm and perceived behavioural control along with four policy factors (subsidies, purchases, license plate control, preferential use of and driving incentives), Ye et al. (2021) built a model with these attributes leading to electric vehicle purchase intention. The results collected from 1087

valid samples from the Chinese population that the authors measured confirmed that the profile of attributes leading to high electric vehicle purchase intention always includes at least one psychological attribute. On the contrary, even if the government has implemented a purchase subsidy, without the presence of attitudinal factors, subjective norms and cognitive-behavioural control, the intention to buy an electric vehicle will be low. In addition, the authors also provide different demographic characteristics to measure different Chinese people's electric vehicle purchase intentions.

Moataz Mohamed & Christopher (2018) study measured the impact of five latent constructs: environmental concerns, attitudes, subjective norms, personal ethical standards, and perceived behavioural control on the intention to adopt electric vehicles together with socio-demographic variables. The study uses a sample of 15392 households and is based on the psychological orientation of those who accept electric vehicles as a potential vehicle based on the basic theory of the TPB model. The results show that attitudes and perceived behavioural control are the factors that have the greatest influence on consumers' intention to adopt electric vehicles.

Key Factors Influencing Consumers' Purchase of Electric Vehicles

Authors Jui Che Tu and Chun Yang established a theoretical framework based on TPB theory and TAM technology acceptance model and IDT innovation spill over theory, and also discovered the main factors affecting intention to buy an electric vehicle. With the results from the SEM analysis of 114 responses, the two authors show that attitude towards behaviour, subjective norm, and self-control have a significant positive effect on behavioural intention. Specifically, self-control has the greatest influence, followed by norms and subjective attitudes toward behaviour, which indicates the consumer's ability to control the resources needed to purchase. Electric vehicles have the highest impact on behavioural intention.

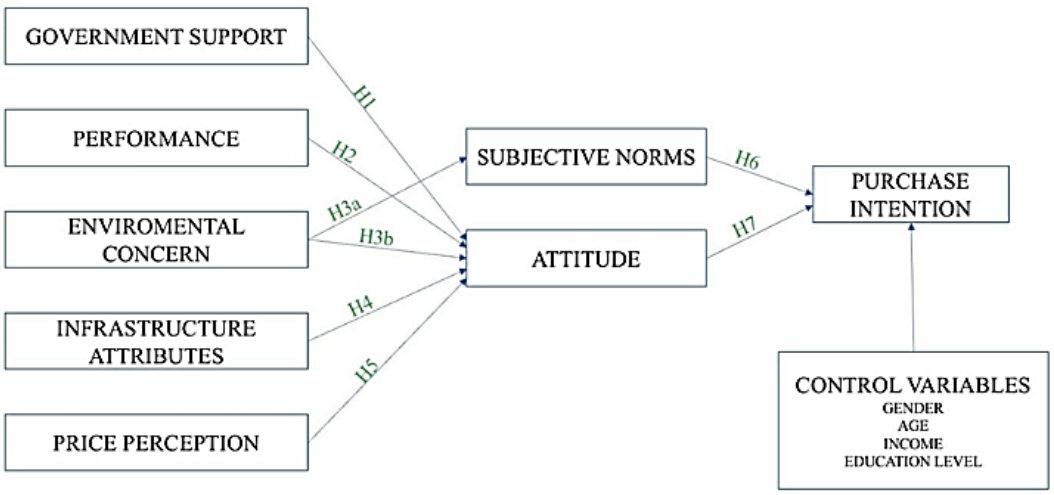

Figure 2. Framework of consumer intent

We developed a framework to explore the determinants of consumer intent to buy EVs based on the literature review and the theory of planned behaviour (TPB). The research model is represented in Figure 1. This figure includes variables such as attitude, subjective norm, government support, performance, perceived environmental concern, infrastructure attributes, and price perception. We propose that government support, performance, perceived environmental concern, infrastructure attributes, attitude, and subjective norms are positive factors that may positively influence Vietnamese consumer EV purchase intention, whereas price is the negative factor that may negatively impact purchase intention. Gender, age,

income, geographic location, and educational level are all considered control variables in this study.

H1: Government support positively affects attitude

Government support includes financial and non-financial policies. Shalender & Sharma (2021), Financial policies related to the government's money support (preferential tax, exemption from toll and parking fee, reduction of acquisition tax and value-added tax, electricity subsidy, road tax exemption, and taxes on fossil fuel) to encourage people to use electric vehicles. Non-financial policies include driver privileges, tax exemptions, charging infrastructure incentives, bus lane driving privileges, EV license plates, electric vehicle priority during heavy traffic.

Currently, many governments encourage the use of electric vehicles in their countries in a variety of ways. In the United States, the government has approved a $15 billion support package for electric car infrastructure (charging stations) and zero-emission electric vehicle manufacture. In China, the government has subsidized electric automobiles by deducting up to 30 percent from the selling price by 2020. Subsidies for electric car purchases play an essential role in boosting demand (Hao et al., 2014). Statistical research methodologies have also confirmed the link between financial incentives and the intention to use electric automobiles in 30 nations around the world (Sierzchula et al., 2014). As a result, Li & Shang. (2020) proved the existence of a positive relationship between government subsidies and purchasing intent. Huang & Ge (2019), on the other hand, believe that non-financial policy instruments have little impact on Beijing inhabitants' purchase intentions. However, the number of studies examining the impact of government support on attitudes toward electric vehicles is still lacking.

H2: Performance positively affects attitude

Vehicle performance was proven to have a significant impact on the buying decision-making process in previous studies (Adamson, 2005; Rietmann & Lieven, 2019). The driving range of an electric vehicle is one of its most important characteristics (She et al., 2017). According to numerous surveys, buyers are most concerned about the maximum range that electric vehicles can travel on a single charge (Degirmenci & Breitner, 2017; Egbue & Long, 2012; Lieven et al., 2011; Lim et al., 2014). Based on the research of hybrid vehicle owners, Ozaki and Sevastyanova (2011) concluded that the factors related to the vehicle performance such as high ride quality, low noise, automatic transmission and easy operation will affect consumers' acceptance of EVs. Meanwhile, performance factors such as riding comfort, safety, ease of use, charging time and operability were found to have an influence on the acceptability of a new energy vehicle in a study of Chinese customers (Dat & Huy, 2021).

H3a: Environmental concern positively affects subjective norm H3b: Environmental concern positively affects attitude

Ozaki & Sevastyanova (2021) defined environmental awareness as understanding and concern for environmental issues. The increasing number of people owning personal cars is one of the key factors causing the problem of environmental pollution environmental perception on behaviour and concluded that people who care about the environment will behave differently from others. Then, inherited the above research and showed that consumers' environmental concerns affect the buying behaviour of green products. In another perspective, Krupa et al (2014) show that people interested in climate change have a positive attitude towards the use of electric vehicles. Many researchers have delved into the relationship between environmental awareness and electric car buying behaviour and concluded that environmental awareness is a factor that positively affects customers' buying behaviour of electric cars (NT, 2021; Mohamed, 2016), Malaysia has a positive impact on

attitude towards environmental perception. However, there have not been many studies analysing the impact of environmental perception on subjective norms.

H4: Infrastructure attributes positively affect attitude

For electric cars, infrastructure includes charging stations (the location of the charging station, the density of charging stations within a certain radius, the time it takes to fully charge a vehicle in a certain period of time or the time it takes to charge). fast charging time at super-speed charging poles) and the road system to serve the needs of the people. Up to now, there have been many studies, both at home and abroad, studying the infrastructure factor in the relationship with purchase intention and attitude. The results show that infrastructure positively affects purchase intention Kester et al., 2018; Habich-Sobiegalla et al., 2019; Rietmann & Lieven, 2019). In particular, Han et al. (2017) conducted a study based on 609 observational samples in Anhui province, China, which demonstrated a positive relationship between infrastructure and attitudes. In the world, the number of electric car charging stations is still quite small compared to conventional gasoline cars (Krupa et al., 2014) but is being improved and expanded. The competitive advantage of electric vehicles is the driving range and charging time (Ustaoglu & Yıldız, 2012) to promote the strengths of this vehicle, car manufacturers are in the process of building more typical new charging stations.

H5: Price perception has a positive effect on attitude

The price factor is the first factor used to build customer perceived value and is always considered a key factor. Price perception is a financial cost that consumers have to pay to buy or utilize a product. Price is usually related to the consumer's satisfaction with a purchase based on the costs incurred by the consumer such as monetary costs, time and effort invested to obtaining the product (Egbue, & Long, 2012). Price perception in electric cars includes the cost of car ownership, vehicle operating costs (including home charging stations, taxes to be paid, registration costs, vehicle insurance, etc.). Purchase price is the most important factor affecting customers' intention to buy electric vehicles. Price perception has a positive effect on purchase intention (Liu, 2017). Besides, Price perception has a positive impact on attitude. This result is consistent with the study of Han et al (2017). On the other hand, price perception has a negative impact on consumers' intention to buy electric cars because survey respondents think they will have to spend a lot of money on each charge.

H6: Subjective norm positively affects intention to buy electric cars

H7: Attitude has a positive influence on the intention to buy electric cars

The TPB model proposed by Ajzen (1991) shows that behavioural intention is influenced by three factors, in which two factors "Attitude" and "Subjective norm" inherit the theory of rational action. (TRA). In TPB, attitudes, subjective norms, and perceived behavioural control can directly influence behavioural intentions. Therefore, many researchers have applied the TPB model to study the intention to buy electric cars. Typically, 300 sent questionnaires, collected 274 questionnaires in Beijing city, China, showing that attitude has a positive impact strongly on buying an electric car. However, the relationship between the subjective norm and the intention to buy is not supported or in other words, there is no influence between the subjective norm and the intention to buy an electric car.

In Belgium shows that subjective norms greatly affect the intention to buy electric cars. Similarly, surveyed the intention to buy electric cars from 18-35 years old in the central region of Italy and concluded that attitude and subjective norm both have a positive impact on intention to buy electric vehicles.

Methods

Research Design

Understanding the theoretical foundation and overview of research documents, developing models and scales, constructing a system of independent and dependent variables, determining the relationship between factors, conducting preliminary quantitative studies to test the scale's reliability (Cronbach's Alpha), conducting formal quantitative research to test the scale by exploratory factor analysis (EFA), confirmatory factor analysis (CFA), constructing a system of independent and dependent variables, constructing a system of independent and dependent variables, constructing a system of independent and dependent variables (SEM). This study uses quantitative research methods. The quantitative method focuses on data and mostly uses numbers to do research. The elements in the study model were gathered from prior research articles, the majority of which were conducted outside of the United States. As a result, the author's team tweaked it to fit the realities of the Vietnamese setting.

Questionnaire Design

The questions were completed online using Google Forms and shared on social media. The questionnaire's layout is separated into two sections: The first section collects the respondents' basic personal information, while the second section asks questions concerning the elements in the proposed research model. To avoid confusion among survey respondents, the questionnaire is offered in Vietnamese. The authors conducted a pilot poll on 20 people of all ages residing in various regions around the country before sending the questionnaire out on a large scale, with the goal of revealing any unclear or missing questions. a clear understanding Because this can lead to misinterpretation of data and waste of resources.

Sample and Data Collection

The survey used the quantitative method with categorical and five-point Likert scale items. The target audience for this study was potential consumers of electric vehicles from three different parts of Vietnam. Participants were recruited by distributing surveys to different Facebook groups for conventional and electric vehicles. A total of approximately 30 groups were reached, ranging from 10,000 to 200,000 people in size. In this research, we did not specifically target a demographic group; all respondents were welcomed regardless of gender, age (the majority of them were between the ages of 2002 and 1975), region, education, occupation, or income.

For collecting enough data, we sent approximately 750 questionnaires through Facebook Group. Only 468 respondents returned for this survey and the valid sample number is 406 (n=406), giving a response rate of 62.4%. If the limited sample size is greater than 150, the sample size for the research can be acceptable (Pallant, 2016). Data were analysed in SPSS and all variables were developed through descriptive statistics. The proposed hypotheses are null hypotheses. We use the frequencies to analyse and describe the data, and the components in buying intention were tested by using the SEM.

Variables and Measurements

The questionnaire in this study includes 4 types of variables which are dependent variables, independent variables, mediating factors, and control variables. Respondents were asked to score how agreeable the answers were on a 5-point Likert scale ranging from "strongly disagree" (1 point) to "strongly agree" (5 points).

Table 1. Questionnaire for Respondents

Independent variables	**Purchase Intention**	PI1	I intend to learn more about EV
		PI2	I intend to purchase an EV in the future
		PI3	I intend to switch to an EV
Dependent variables	**Government Support**	GS1	I study about the government policy of EV in Vietnam
		GS2	I think the financial incentives of the Vietnamese government has a positive influence on developing EV
		GS3	I think the government subsidies for EVs is very beneficial to me
		GS4	The support of the Vietnamese government in building more charging stations across the country makes me think that I am benefiting from it.
	Performance	PM1	I think driving EVs is very smooth because there is no engine noise.
		PM2	I am interested in the technology of EVs
		PM3	I think EVs have good performance
		PM4	I think it very safe to drive an EV
	Environmental Concern	EC1	People who are close to me think that it is important to consider the environment when I purchase a vehicle
		EC2	I think the environmental pollution today is very serious
		EC3	I think we need to protect the environment
		EC4	I think EVs should be used as a means of protecting the environment
	Infrastructure Attributes	IA1	I think the charge-point is convenient for my everyday needs
		IA2	Certain privileges for EVs as non-monetary benefits is quite a special advantage for EV owners
		IA3	I think it doesn't take long to fully charge an EV
	Price perception	PP1	I think the price of EV in Vietnam is reasonable now
		PP2	I think the price of EV leasing service in Vietnam is reasonable now
		PP3	I think the price of charging an EV at charge points is much more inexpensive than the cost of refueling petrol/gas cars.
		PP4	The lifetime cost of an EV is cheaper than conventional cars.
Mediating variables	**Attitude**	A1	I am interested in EV
		A2	I think it is the right decision to adopt EV
		A3	I think electric cars meet my needs well
		A4	Generally, it is convenient to use EV
	Subject Norm	SN1	I buy EV as there are many subsidies for EVs implemented by the Vietnamese government
		SN2	People around me usually consider how much incentives they can get when planning to buy an EV
		SN3	People around me think that it is the right choice and reasonable to purchase an EV
Control variables	**Demographic Variables**	DV1	Gender
		DV2	Age
		DV3	Education level
		DV4	Income
		DV5	Geographic area in Vietnam

Table 2. Analysis of variables

Variables		**Quantity (N)**	**Ratio (%)**
Year of birth	Gen Z (1997 - 2012)	285	70.2
	Gen Y (1980 - 1996)	87	21.4
	Gen X (1965 - 1979)	32	7.9
	Baby Boomers (1946 - 1964)	2	0.5
Gender	Male	222	54.7
	Female	181	44.6
	Others	3	0.7
	Under 15 million VND	301	74.1
	From 15 million VND - Under 30 million	92	22.7

Income	VND		
	From 70 million VND or more	13	3.2
Place of study/work	North	300	73.9
	Central	30	7.4
	South	76	18.7
Highest level of education	Upper secondary education	34	8.4
	Bachelor's or equivalent level	342	84.2
	Master's or equivalent level	29	7.1
	Others	1	0.2

Results and Discussion

Respondent profiles

Sample structure by year of birth

Of the 406 responses that the authors have compiled and processed, 285 are gen Z, accounting for 70.2% and 87 are gen Y, accounting for 21.4%; The rest are the X generation and the Baby Boomers generation (34 respondents accounting for a total of 2.5%). The large difference in the year of birth (age) among the respondents is attributed to the fact that the survey was collected online on the social networking platform Facebook - where the majority of users belong to Gen Z, so the survey mainly reaches this target group.

Sample structure by gender

The two gender groups, men and women, have roughly the same number of respondents. Specifically, there are 222 male respondents, accounting for 54.7% and 181 female respondents, accounting for 44.6%. This figure is reasonable because men are often more interested in vehicles, especially cars, than women.

Sample structure by income

Due to their young age, the income level of the Z generation is still quite low. The majority of respondents with income below 15 million VND accounted for the majority (301 respondents, equivalent to 74.1%). Besides, the survey can also reach some people of older age, so 22.7% of respondents have an income from 15 million VND to less than 30 million VND.

Sample structure by place of study/work

The majority of respondents are living or studying/working in the North (300 people, equivalent to 73.9%). Since the author is currently living and studying in the North, personal relationships may have a subjective influence leading to this result.

Sample structure by the highest level of education

The highest level of education of the respondents is mainly bachelor's or equivalent level. It can be concluded that people who are fond of new technology in the car manufacturing industry are usually quite educated. Because of their high level of education, their incomes are mostly at the high average level. This helps them easily accumulate assets to own a car.

Reliability and validity test

Convergent validity test

The standardized load value of each latent variable was determined using AMOS 22.0 to assess the scale's convergence validity. Table below shows the combined reliability value (CR value) as well as the average variance extracted (AVE value). The following three

criteria should be included in a convergent validity test. The average variance extracted (AVE) was greater than 0.5; the standardized loading value was greater than 0.5; the combination of reliability (CR) was greater than 0.7, and the standardized loading value was greater than 0.5. Each latent variable's standardized factor loading value was larger than 0.5, as indicated in Table 2, and the CR values above the minimum threshold of 0.7 were specified by Martnez and Garca (2000). Table 2 shows that all of the AVE values were over the 0.5 thresholds, suggesting that the questionnaire had strong convergent validity.

Table 3. Combined reliability value (CR value) and average variance extracted

Variable	Measurement Project	Factor Loading	CR Value	AVE Value	Cronbach Alpha Value
Government Support (GS)	GS1	0.744	0.828	0.547	0.828
	GS2	0.754			
	GS3	0.695			
	GS4	0.719			
Performance (PM)	PM1	0.715	0.806	0.512	0.806
	PM2	0.751			
	PM3	0.759			
	PM4	0.638			
Environmental Concern (EC)	EC1	0.729	0.825	0.541	0.824
	EC2	0.812			
	EC3	0.692			
	EC4	0.687			
Infrastructure Attributes (IA)	IA1	0.757	0.796	0.565	0.795
	IA2	0.785			
	IA3	0.701			
Price Perception (PP)	PP1	0.767	0.82	0.532	0.82
	PP2	0.653			
	PP3	0.702			
	PP4	0.781			
Subjective Norm (SN)	SN1	0.866	0.817	0.598	0.815
	SN2	0.778			
	SN3	0.68			
Attitude (AT)	AT1	0.876	0.879	0.645	0.877
	AT2	0.604			
	AT3	0.793			
	AT4	0.705			
Purchase Intention (PI)	PI1	0.749	0.776	0.536	0.776
	PI2	0.688			
	PI3	0.764			

The results of the discriminant validity test revealed that the arithmetic square root of each variable's AVE was larger than the correlation coefficient with other variables, showing strong discriminant validity.

Table 4. Result of discriminant validity test (N = 406)

	GS	PM	EC	IA	PP	SN	AT	PI
GS	0.74							
PM	0.284	0.715						
EC	0.276	0.069	0.735					
IA	0.183	0.329	0.164	0.751				
PP	0.276	0.166	0.297	0.317	0.729			
SN	0.213	0.36	0.132	0.497	0.394	0.773		
AT	0.528	0.408	0.448	0.556	0.541	0.552	0.803	
PI	0.172	0.137	0.166	0.233	0.308	0.375	0.437	0.732

The goodness of model fit test

The model's goodness of fit was examined in this study, and the findings are reported in Table 4. The degree of freedom to the fitting index chi-square ratio was 1.701, the CFI value was 0.951, the GFI value was 0.910, the TLI value was 0.943, the RMSEA value was 0.042, and the PCLOSE value was 0.993 which meant the model had a good fitting effect (Hu & Bentler (1999), Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, Structural Equation Modeling)

Table 4. Result of model goodness fit (N = 406)

	CMIN/df	CFI	GFI	TLI	RMSEA	PCLOSE
Criteria	< 3	> 0.9	> 0.9	> 0.9	< 0.06	> 0.05
Fitting effect	1.701	0.951	0.91	0.943	0.042	0.993

SEM test

The SEM model was established and the association between the variables was verified using the software analytic tools AMOS 22.0 and SPSS 23.0. Table 5 summarizes the findings.

Table 5. Result of SEM model test (N = 406)

Hypothesis	Proposed effect	Standardized Estimate	S.E	C.R	P	Pass the test
H1	+	0.278	0.06	4.659	***	Yes
H2	+	0.181	0.054	3.336	***	Yes
H3a	+	0.178	0.061	2.937	0.003	Yes
H3b	+	0.19	0.056	3.425	***	Yes
H4	+	0.343	0.054	6.313	***	Yes
H5	+	0.322	0.057	5.669	***	Yes
H6	+	0.193	0.056	3.447	***	Yes
H7	+	0.304	0.053	5.723	***	Yes

Note: *p<0.05 **p<0.01 ***p<0.001

According to Table 5, hypothesis H1, H2, H3a, H3b, H4, H5, H6, H7 were verified. Government support, performance factor, perceived environment concern, infrastructure attributes, price perception had a positive effect on attitude and perceived environment concern also had a positive effect on subjective norms. At the same time, with standardized estimates of 0.193 and 0.304, subjective norms and attitudes had a favorable effect on buying intention. Purchase intention is found to be more influenced by attitude than by subjective norm. With coefficients of 0.342 and 0.322, the infrastructure attributes. and pricing perception has the greatest impact on attitude, while the performance index of 0.181 has the least impact on attitude.

Theoretical contributions

Based on the results of this study, recommendations are made for state management agencies, promoting good support policies such as tax reduction, registration fee reduction, and uniform infrastructure construction to push consumers to seek more electric car products. The goal of businesses is to maximize profits. Therefore, businesses manufacturing and trading electric cars need to have an in-depth understanding to find strategies and plans to increase the market share of electric vehicle products by enhancing advanced technologies and popular vehicle designs or the location and number of charging stations. Finally, consumers have more understanding of the electric car industry and its characteristics. Thereby providing a more comprehensive view contributing to the decision to buy electric car products in the future.

Practical and managerial implications

The study discovered that among the variables, infrastructure attributes had the strongest impact on consumers' attitudes toward buying electric vehicles, with a standardized estimate of 0.343. These people believe that the quantity of charging stations and their location will influence their decision to acquire an electric vehicle. It is recommended that electric vehicle companies support accelerating the process of installing charging stations across the country. Additionally, the Vietnamese government should lend its support by piloting a charging pile arrangement in strategic areas to act as a model, then drawing additional investors through subsidies, which will help alleviate the difficulties of charging electric vehicles.

Vietnamese consumers are price sensitive towards electric vehicles (Singh et al., 2020). They believe that the price of an EV, as well as the monetary value it will cost them for the rest of its lifespan, will influence their purchase intention (the price factor was the second most powerful influence on customers' buying decisions, with the standardized estimate of 0.322). The price of an EV is mostly affected by two factors including (1) battery, which accounted for 43% of the cost of the vehicle and (2) tax charges. As a result, it is advised that electric car makers should better implement battery servicing strategies such as battery leasing, while also bolstering the research and development of new battery technologies. At the same time, the government should lower the EV registration fee as well as the road tax, and introduce more subsidies for stakeholders, especially for households using electric vehicles such as electricity price reductions, and selling price incentives.

Although Vietnamese customers feel that electric vehicles have a significant impact on the environment, the factor environmental concerns had a minor impact on these individuals' purchase intentions. It is advised that many stakeholders including the mass media, the manufacturers, and the government should bring the topic of environmental conservation and green living closer to Vietnamese people to boost their awareness and preference for EVs as a means of green products. In addition, EV businesses should advertise the products by combining the environment-friendly benefits of EV with other factors such as the charging station coverage and reasonable pricing, so they can effectively attract more customers who are likely to adopt EVs.

Performance has a beneficial impact on Vietnamese buyers' EV purchase intentions. EV is a green technological product with a modern driving system and new features such as an artificial intelligence voice assistant, automatic parking, hand-free driving. As a result, it is proposed that EV manufacturers should implement more marketing campaigns to enhance consumers' opportunities to interact with electric vehicles directly.

Future studies should analyse electric vehicles using different approaches from this study and compare the differences in order to encourage EV adoption. The survey was conducted in the setting of Vietnam's EV background, which is still emerging and developing. Many of the measurable factors have a lower value impact on the buying intention, which is not because of the ignorance but the little awareness of the Vietnamese consumers to the issue. Further studies can be implemented more comprehensively when the Vietnam EV market is fully mature and the potential local buyers are better educated about the topic.

The focus of the study is on electric vehicles with battery-equipped in the Vietnamese market. Future research should compare whether different EV models with different philosophies are correlated to the diversity of consumers' intention to adopt EV. The TPB model applied in this study ignored the perceived behavioural control. It is recommended that future researchers should take this limitation into account and study more.

The study used only demographic factors as control variables. Further researchers could consider many other types of variables, and as for the demographic factors, it is suggested to

consider sub-variables such as marital status car ownership status. The price perception factor discussed in this study only considers the monetary value. Further study can consider the other factors at the higher level of consumers' cost such as time, information research, installation cost. This study exclusively collected surveys in the Vietnam region due to the time and budget restrictions. Future scholars can explore more by comparing the difference in the EV adoption among consumers in neighbouring Southeast Asia countries or other regions to seek the resolution of promoting the popularization of EVs.

Conclusion

Electric cars are considered an advanced solution that brings various benefits to society. Researchers at home and abroad (China, USA, Canada, India) have conducted research on this topic to contribute to clarifying the potential of electric cars. Research works have focused on exploiting common factors affecting customers' intention to buy electric vehicles based on: price perception, infrastructure, environmental awareness, social influence, or key support of the government. Previous studies have looked at how support from the government will bring about positive results for the intention to use electric cars. The infrastructure factor greatly influences the decision to buy an electric car because if the infrastructure is developed, it will be convenient for customers to use electric cars.

Therefore, in developed countries, consumers tend to give preference to electric vehicles over conventional vehicles. In addition, individual consumers through the above studies show that in developed countries, their awareness of the issue of electric vehicles is more complete and clearer than in developing countries where there are not many favourable conditions for the development of the electric automobile industry. However, in different countries, the relationship between the factors has changed. In particular, Vietnam is a developing country that needs to deeply analyse the factors affecting the intention to buy electric cars to make full use of this potential industry.

ORCID

Pham Van Tuan https://orcid.org/0000-0003-0001-7331
Nguyen Thi Phuong Thao https://orcid.org/0000-0001-8831-0043

References

Adamson, K.A., 2005. Calculating the price trajectory of adoption of fuel cell vehicles. *International Journal of Hydrogen Energy*, 30, 341-350. https://doi.org/10.1016/j.ijhydene.2004.07.004

Ajzen, I. (1991). The Theory of Planned Behavior. *Organization Behaviour and Human Decision Processes,* 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Bennett, R., & Vijaygopal, R. (2018). Consumer attitudes towards electric vehicles: Effects of product user stereotypes and self-image congruence. *European Journal of Marketing,* 52(3/4), 499-527. https://doi.org/10.1108/EJM-09-2016-0538

Bjerkan, K. Y., Nørbech, T. E., & Nordtømme, M. E. (2016). Incentives for promoting battery electric vehicle (BEV) adoption in Norway. *Transportation Research Part D: Transport and Environment,* 43, 169-180. https://doi.org/10.1016/j.trd.2015.12.002

Dat, P. M., Huy, D. T. N. (2021). Opportunities and challenges for doing business in vietnam via a multi factor model impacts, *Journal of Contemporary Issues in Business and Government| Vol 27* (2), https://doi.org/10.47750/cibg.2021.27.02.019

Degirmenci, K., & Breitner, M. H. (2017). Consumer purchase intentions for electric vehicles: *Is green more important than price and range?. Transportation Research Part D: Transport and Environment,* 51, 250-260. https://doi.org/10.1016/j.trd.2017.01.001

DT Tinh, NT Thuy, DT Ngoc Huy. (2021). Doing Business Research and Teaching Methodology for Undergraduate, Postgraduate and Doctoral Students-Case in Various Markets Including Vietnam, Elementary education Online 20 (1) https://doi.org/10.17051/ilkonline.2021.01.148

Du, J., & Ouyang, D. (2017). Progress of Chinese electric vehicles industrialization in 2015: *A review. Applied Energy, 188*, 529-546. https://doi.org/10.1016/j.apenergy.2016.11.129

Egbue, O. & Long, S. 2012. Barriers to Widespread Adoption of Electric Vehicles: *An Analysis of Consumer Attitudes and Perceptions. Energy Policy,* 48: 717–729. https://doi.org/10.1016/j.enpol.2012.06.009

Habich-Sobiegalla, S., Kostka, G., & Anzinger, N. (2019). Citizens' electric vehicle purchase intentions in China: *An analysis of micro-level and macro-level factors. Transport Policy*, 79, 223-233. https://doi.org/10.1016/j.tranpol.2019.05.008

Han, L., Wang, S., Zhao, D., & Li, J. (2017). The intention to adopt electric vehicles: *Driven by functional and non-functional values. Transportation Research Part A: Policy and Practice*, 103, 185-197. https://doi.org/10.1016/j.tra.2017.05.033

Hao, H., Ou, X., Du, J., Wang, H., & Ouyang, M. (2014). China's electric vehicle subsidy scheme: *Rationale and impacts. Energy Policy*, 73, 722-732. https://doi.org/10.1016/j.enpol.2014.05.022

He, X., & Zhan, W. (2018). How to activate moral norm to adopt electric vehicles in China? An empirical study based on extended norm activation theory. *Journal of Cleaner Production*, 172, 3546-3556. https://doi.org/10.1016/j.jclepro.2017.05.088

He, X., Zhan, W., & Hu, Y. (2018). Consumer purchase intention of electric vehicles in China: *The roles of perception and personality. Journal of Cleaner Production*, 204, 1060-1069. https://doi.org/10.1016/j.jclepro.2018.08.260

Huang, X., & Ge, J. (2019). Electric vehicle development in Beijing: An analysis of consumer purchase intention. *Journal of cleaner production, 216*, 361-372. https://doi.org/10.1016/j.jclepro.2019.01.231

Jui Che Tu & Chun Yang (2019), 'Key Factors Influencing Consumers' Purchase of Electric Vehicles', Sustainability, 11 (14), 3863. https://doi.org/10.3390/su11143863

Kester, J., Noel, L., de Rubens, G. Z., & Sovacool, B. K. (2018). Policy mechanisms to accelerate electric vehicle adoption: *a qualitative review from the Nordic region. Renewable and Sustainable Energy Reviews*, 94, 719-731. https://doi.org/10.1016/j.rser.2018.05.067

Krupa, J. S., Rizzo, D. M., Eppstein, M. J., Lanute, D. B., Gaalema, D. E., Lakkaraju, K., & Warrender, C. E. (2014). Analysis of a consumer survey on plug-in hybrid electric vehicles. Transportation Research Part A: *Policy and Practice*, 64, 14-31. https://doi.org/10.1016/j.tra.2014.02.019

Li, Y., & Shang, H. (2020). Service quality, perceived value, and citizens' continuous-use intention regarding e-government: *Empirical evidence from China. Information & Management*, 57(3), 103197. https://doi.org/10.1016/j.im.2019.103197

Lieven, T., Mühlmeier, S., Henkel, S. & Waller, J.F. 2011. Who Will Buy Electric Cars? An Empirical Study in Germany. Transportation Research Part D: *Transport and Environment*, 16(3): 236–243. https://doi.org/10.1016/j.trd.2010.12.001

Lim, M.K., Mak, H.-Y. & Rong, Y. 2014. Toward Mass Adoption of Electric Vehicles: *Impact of the Range and Resale Anxieties. Manufacturing & Service Operations Management*, 17(1): 101–119. https://doi.org/10.1287/msom.2014.0504

Lin, B., & Wu, W. (2018). Why people want to buy electric vehicle: *An empirical study in first-tier cities of China. Energy Policy*, 112, 233-241. https://doi.org/10.1016/j.enpol.2017.10.026

Moataz Mohamed & Christopher D. H. (2018), 'The influence of vehicle body type in shaping behavioural intention to acquire electric vehicles: *A multi-group structural equation approach', Transportation Research, Part A 116*, 54–72. https://doi.org/10.1016/j.tra.2018.05.011

Mohamed, M., Higgins, C., Ferguson, M., & Kanaroglou, P. (2016). Identifying and characterizing potential electric vehicle adopters in Canada: *A two-stage modelling approach. Transport Policy*, 52, 100-112. https://doi.org/10.1016/j.tranpol.2016.07.006

N Thi Hang, D Thi Tinh, DT Ngoc Huy, PT Hong Nhung. (2021). Educating and training labor force Under Covid 19; *Impacts to Meet Market Demand in Vietnam during Globalization and Integration Era, Journal for educators, teachers and trainers*, 12(1) https://doi.org/10.1080/0267257X.2012.659007

NT Hang, DTN Huy, TH Le, S Gwoździewicz, NTP Thanh, NT Dung, (2022). Further Analysis on Internet of Things (IOT) Applications in Emerging Markets and Vietnam, Ambient Communications and Computer Systems, 407-416 https://doi.org/10.1007/978-981-16-7952-0_38

NT Hoang, DTN Huy. (2021). Determining factors for educating students for choosing to work for foreign units: *Absence of self-efficacy, JETT 12 (2)*, 11-19 https://doi.org/10.47750/jett.2021.12.01.023

Ozaki, R., Sevastyanova, K., (2011). Going hybrid: An analysis of consumer purchase motivations. *Energy policy*, *39*(5), 2217-2227. https://doi.org/10.1016/j.enpol.2010.04.024

Rietmann, N., & Lieven, T. (2019). How policy measures succeeded to promote electric mobility–Worldwide review and outlook. *Journal of cleaner production*, 206, 66-75. https://doi.org/10.1016/j.jclepro.2018.09.121

Shalender, K., & Sharma, N. (2021). Using extended theory of planned behaviour (TPB) to predict adoption intention of electric vehicles in India. *Environment, Development and Sustainability*, 23(1), 665-681. https://doi.org/10.14704/WEB/V18SI04/WEB18143

She, Z. Y., Sun, Q., Ma, J. J., & Xie, B. C. (2017). What are the barriers to widespread adoption of battery electric vehicles? A survey of public perception in Tianjin, China. *Transport Policy*, 56, 29-40. https://doi.org/10.1007/s10668-020-00602-7

Sierzchula, W., Bakker, S., Maat, K., & Van Wee, B. (2014). The influence of financial incentives and other socio-economic factors on electric vehicle adoption. *Energy policy*, 68, 183-194. https://doi.org/10.1016/j.enpol.2014.01.043

Singh, V., Singh, V., & Vaibhav, S. (2020). A review and simple meta-analysis of factors influencing adoption of electric vehicles. Transportation Research Part D: *Transport and Environment*, 86, 102436. https://doi.org/10.1016/j.trd.2020.102436

Tran Thu Thao & Tran Khanh Linh (2021), 'Các yếu tố ảnh hưởng đến ý định mua xe máy điện Vinfast của người dân trên địa bàn Tp. HCM', *Tạp chí Khoa học và Công nghệ, 50*. https://doi.org/10.46242/jst-iuh.v50i08.951

Ustaoğlu, M., & Yıldız, B. (2012). Innovative green TechnologyinTurkey: *electric vehicles' future and forecasting market share. Procedia-Social and Behavioral Sciences*, 41, 139-146. https://doi.org/10.1016/j.sbspro.2012.04.018

VQ Nam, DTN Huy. (2021). Solutions to Promote Startup for the Youth in Minoritty and Moutainous Region of Thai Nguyen Province-Vietnam, *Journal of Contemporary Issues in Business and Government*| Vol 27 (3), https://doi.org/10.47750/cibg.2021.27.03.260

Ye, F., Kang, W., Li, L., & Wang, Z. (2021). Why do consumers choose to buy electric vehicles? A paired data analysis of purchase intention configurations. *Transportation Research Part A: Policy and Practice*, *147*, 14-27. https://doi.org/10.1016/j.tra.2021.02.014