

Original Article

Factors Affecting the Electric Motorbikes Demand of Gen Z in Vietnam

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Abstract: Conventional gasoline vehicles are the main cause of global climate change. Recognizing the serious and urgent problem, consumers have recently tended to switch to energy-powered vehicles, of which the most popular are electric motorbikes. The article studies the factors affecting the demand for electric motorbikes of the young generation Z in Vietnam. In order to assess the factors affecting the demand for electric motorbikes, the article uses qualitative research methods combined with quantitative research, the research team collects data through surveys and investigations. Collected data are aggregated and analyzed using Excel and Eviews 8 software. The research results show that the factors affecting the demand for electric motorbikes of young generation Z in Vietnam include: (1) The price of electric motorbikes; (2) Prices of substitute goods; (3) Prices of complementary goods; (4) Consumer's income; (5) Consumer tastes. In which the price of electric motorbikes and the price of complementary goods have the opposite effect, the price of complementary goods, income and consumer tastes have a positive impact with the demand for electric motorbikes of the gen Z in Vietnam. In addition, the research team also considers the impact of factors on the demand for electric motorbikes through an econometric model. The results show that when the price of electric motorbikes increases by 1%, the demand decreases by 3.5%; when the price of substitute goods increases by 1%, demand increases by 1.7%; when the price of complementary goods increases by 1%, the demand decreases by 0.18%; When income increases by 1 million VND, respondents are willing to spend 540 thousand VND to buy electric motorbikes. Thereby, the research team proposes some policy implications to promote the demand for electric motorbikes of the young generation Z in Vietnam.

Keywords: Factors Affecting, Demand, Electric Motorbike, Electric Motorbikes Demand, Young Generation, Gen Z, Vietnam.

I. RAISE THE ISSUES

Global warming is an urgent issue that was discussed at the Rio Summits in 1992 and Kyoto in 1997. The increasing number of vehicles running on fossil fuels causes environmental pollution and serious traffic congestion. The Vietnam Association of Motorbike Manufacturers (VAMM) said that more than 3 million motorcycles were sold on the market overall, or an average of more than 8,000 units each day. On average, more than 3 million new motorbikes are registered each year, equivalent to 9000 newly registered motorbikes every day (Nam Phong, 2023).

Although the Covid-19 epidemic has seriously damaged the overall business, the electric motorbike market has not stopped heating up with many spectacular breakthroughs. According to a report by Motorbike Data, in 2022, Vietnam's electric motorbikes market has risen to the second position in the world, the largest and fastest growing in the ASEAN region. The electric motorbike field shows great potential as the market share grows significantly, from 5.4% in 2019 to 10% in 2021 and continues to grow strongly in 2022. Also in 2022, the vehicle market electric machines witnessed the presence of a series of new brands such as Selex, EVGo ... (Chi, 2023).

In 2022, with the sharp fluctuation of gasoline prices, the price of some internal combustion engine cars also increased rapidly due to supply constraints. This is one of the factors that motivates users to gradually switch to electric motorbikes. However, the market share of electric motorbikes is still quite small compared to fossil fuel-powered motorbikes and is mainly concentrated on imported cars or foreign brands. In particular, the Vietnam Association of Motorbike Manufacturers (VAMM) estimates that there are roughly 4 million electric bikes and motorbikes in use throughout the nation. Numerous manufacturers of electric motorcycles have also started to compete in this prospective market (Vinfast, 2023).

Due to its convenience, affordability, and environmental friendliness, electric motorbike use has progressively become more prevalent in major cities, particularly Hanoi and Ho Chi Minh City in recent years. In particular, people's demand for electric motorbikes has increased thanks to the appearance of domestic manufacturers with methodical investment strategies,



focusing on improving product quality and diversifying models (Vu, 2023).

There are, however, few scholarly studies on the Vietnamese market for electric motorbikes. These articles are thorough and examine the elements influencing consumer demand, particularly among young people, for electric motorbikes. In order to be able to consider the factors affecting the demand for electric motorbikes to provide discussions, implications for policies to support enterprises producing and trading electric motorbikes, and encouraging consumers to use electric motorbikes requires serious and up-to-date research on this vehicle.

With the rise in popularity of electric motorbikes, Vietnam will produce a new generation of environmentally friendly 'two-nos' cars with no exhaust pipes and no greenhouse gas emissions. This has even more significance given that Vietnam is researching ways to come to a consensus on reducing net emissions to "zero" by 2050 at the "26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26)".

Realizing the urgency of the problem, the research team conducted the article: "Study on the factors affecting the demand for electric motorbikes of the young generation Z in Vietnam". The research objective is to synthesize information about electric motorbikes, market trends, factors affecting the demand for electric motorbikes, and at the same time find the right direction for businesses, thereby attracting the attention of the authorities, step by step create a legal corridor to prepare for the popularity of this type of vehicle.

II. THEORETICAL BASIS AND RESEARCH OVERVIEW

A) Demand and Factors Affecting Demand

In the textbooks and courses on the subject of microeconomics, the theory of consumer demand for commodities is frequently discussed. This article examines the theory of consumer demand for commodities using materials from Anh, N.T.V., & Duong, L.X. (2021).

Demand (D): "Demand is the quantity of consumers who are willing and able to buy products at various prices during a given period of time, other things being constant." The substitution effect and the income effect both explain why consumers tend to buy more of a good when its price drops and vice versa. Most goods in an economy have an inverse relationship between price and quantity requested; economists refer to this relationship as:

Quality Determinants (Q^D): "The quantity demanded of a certain good or service tends to increase when the price of that good or service decreases and vice versa (with all other factors are constant)".

Managers must comprehend the aspects driving demand in order to identify the causes influencing the consumption of firms' products. Managers can develop a strategy to boost demand and encourage product use by using the understanding of the elements impacting demand to guide their decisions. The factors influencing demand will vary depending on the commodity. Table 1 provides a summary of the common factors influencing demand and quantity for goods.

Table 1: Factors Affecting Demand and Quantity Demanded

Factors	Relationships	Correlation
Px: Price of the commodity	$P_x \uparrow \Rightarrow Q_x^D \downarrow$ $P_x \downarrow \Rightarrow Q_x^D \uparrow$	Inverse
I: Income	Normal goods: $I \uparrow \Rightarrow D_x \uparrow$ Inferior goods: $I \uparrow \Rightarrow D_x \downarrow$	Positive Inverse
N: Population	$N \uparrow \Rightarrow D_x \uparrow$ $N \downarrow \Rightarrow D_x \downarrow$	Positive
Py: Price of related goods	Substitute goods: $P_y \uparrow \Rightarrow D_x \uparrow$ Complementary goods: $P_y \uparrow \Rightarrow D_x \downarrow$	Positive Inverse
T: Taste	$T \uparrow \Rightarrow D_x \uparrow$	Positive

D_x : Demand for good X

Q_x^D : Quantity demand for good X.

Source: Duong, L.X. (2012)

B) Electric Motorbike, Advantages And Limitations

a. Electric motorbike

A motorcycle powered by an electric motor with a maximum output of no more than 4 kW and a maximum design speed of no more than 50 km/h is referred to as an electric motorcycle (According to Decree 171/2013/ND-CP).

Advantages and limitations of electric motorbike?

b. Advantages:

According to autobikes.vn (2019) , Compared with traditional motorbikes, electric motorbikes have the following advantages: (i) Lower cost + fuel price; (ii) No driver's license required; (iii) Do not pollute the environment, release harmful gases to people; (iv) Battery can be charged at home or station; (v) The vehicle runs without noise and vibration; (vi) Less repair and maintenance.

According to Vinfast (2022), electric motorbikes have advantages, such as: Powerful operation, outstanding safety technology and especially the “unlimited” smart feature are the advantages of electric motorbikes that are highly appreciated by consumers. With those advantages, electric motorbikes are the optimal choice to help customers save operating costs during the time of rising gasoline prices.

c. Limitations:

According to Autobike.vn (2019), Vietnamnet.vn (2019), Electric motorbikes have some limitations such as: (i) The charging time is quite long; Can't move continuously far; (iii) The problem of the maximum travel speed of about 50km/h; (iv) Difficulty in repair; (v) Easily damaged by flooding.

Vinfast (2021) points out 14 disadvantages of electric scooters: (i) May increase the number of accidents (ii) Electric scooters can be left everywhere, because in many cities there is a lack of regulations on motorbike parking electricity properly; (iii) Overcharging and other battery problems; (iv) Insurance issues; (v) Only suitable for short distances; (vi) High discount of E-Scooters, the depreciation rate of electric motorbike is usually quite high; (vii) May not be suitable for the obese; (viii) E-scooters can be stolen; (ix) Small or no storage space; (x) Can be dangerous if there are not enough scooter lanes; (xi) Relatively slow compared to cars or motorbikes; (xii) Technical problems with the scooter sharing app; (xiii) The high purchase price of electric motorbikes is also a major drawback of electric motorbikes; (xiv) People can become lazy.

In 2022, the number of electric motorbikes in Vietnam is nearly 2 million, accounting for about 2.7% of the total number of motorbikes in Vietnam (McD, 2023). According to a research paper on automotive consumption in Southeast Asia, about 19% of respondents in Vietnam answered that they would like their next car's engine to be powered by an electric battery (Deloitte, 2023). In fact, this number will be higher for motorbikes due to many other factors (price, gas price, city traffic environment, population density...). Therefore, it is predicted that there will be a large shift of consumption to electric vehicles in Vietnam in the coming years.

C) Research Overview

Many experimental studies on electric motorbikes have been carried out in many countries around the world. The study by Yi-Chang Chiu and Gwo-Hshiung Tzeng (1999) demonstrates that the consumer's taste is a key element influencing electric motorbikes. The rapid growth of electric motorbikes (Electric Motorbike - EM) in Taiwan in recent years has been facilitated by an understanding of consumer preferences, tastes, and environmental and energy concerns when driving motorbikes in metropolitan areas. Examine briefly the most recent advancements in EM at the same time. The study specifically examines the prospective demand for electric motorbikes among customers based on interview survey data and preference modelling techniques. Survey results show that gender is a factor affecting consumer demand for electric motorbikes, specifically women will be potential customers for electric motorbikes in this country.

In their study from 2022, Angela Dianita Murtiningrum, Agus Darmawan, and Hartanto Wong explore how Indonesians perceive the use of electric motorbikes (EMs). The Theory of Planned Behaviour (TPB) model is extended in this paper in order to identify the elements influencing electric scooter consumption behaviour. The data is then analysed using the partial least squares structure model (PLS-SEM). The results support the findings of the earlier studies by demonstrating that full awareness of EM, environmental advantages, economic benefits, and legislative incentives favourably influence attitudes towards EM adoption. Perceived cost and danger, however, did not seem to have a big impact in the study. Additionally, it was discovered that elements associated with strong behavioural control and support from close family and friends had a substantial impact on EM adoption. Additionally, this paper offers reasonable pricing ranges for EMs and optimal price points (OPPs) for groups that can be distinguished based on monthly income. All of these findings offer useful information to various parties hoping to increase the uptake of EM in Indonesia.

In addition, a number of empirical studies have also pointed out the factors affecting consumers' behavior of consuming electric motorbikes. Research by Thao, T.T and Linh, T.K (2021) on factors affecting the intention to buy Vinfast electric motorbikes of people in Ho Chi Minh City. The study mentions and analyzes the impact of 7 factors: (1) Purchase intention, (2) Environmental awareness, (3) Attitude, (4) Perceived behavioral control, (5) The attractiveness of other means, (6) Subjective norms, (7) Promotion policy. According to the study's findings, purchasing intention, environmental awareness, attitude, perceived behavioural control, subjective norms, and advertising policy are all elements that influence consumers'

decision to acquire Vinfast electric motorbikes. Additionally, in Ho Chi Minh City, buyers' intentions to purchase electric motorbikes are negatively impacted by the appeal of other cars.

Research on the consumption behavior of electric motorbikes in the green consumption trend of people in Ho Chi Minh City, Cuong, P.H and Huong, N.T.Q (2021) put into the research model 6 factors including: (1) Environmental awareness; (2) Effectively reduce pollution; (3) Perceived quality; (4) The level of attention to costs; (5) Media influence; (6) Degree of behavioral control. According to research findings, all six of the aforementioned variables have a favourable influence on customers' purchase behaviour for electric motorcycles in Ho Chi Minh City.

In addition, studying the factors affecting the acceptance of electric motorbikes in the Republic of Ghana, Lukuman Wahab & Haobin Jiang (2018) has included 14 factors into a quantitative research model to assess the impact of factors on the acceptance of using electric motorbikes, including: Gender; Age; Academic level; Monthly income; Household size; Battery charging time; Battery life; The joy of driving; Operating costs; Price perception; Environmental concerns; Government subsidies; Public charging; The infrastructure and performance of electric motorbikes; High usage is 200km and the maximum distance is less than 100km. Research results indicate factors such as: Price perception; Government subsidies; Performance of electric motorbikes; High usage to cover 200km and maximum mileage less than 100km were found to be statistically significant in the use of electric motorbikes. Besides, other factors such as: Gender; Age; Maximum education level; Monthly income; Household size; Battery charging time; Battery life; The joy of driving; Operating costs; Environmental conditions and public charging infrastructure are not statistically significant, means that have no impact on consumer demand or adoption of electric scooters in the country.

An analysis of Anh, N.T.V, Tung, H.T, Tien, C.T.T., (2022) examines the variables influencing Hanoi students' demand for hand sanitizer products. The research team created a survey form based on the theory of commodity demand and gathered responses from 876 university students in Hanoi regarding the variables influencing the demand for hand sanitizer products. The findings of the synthesis and analysis of survey data demonstrate that a variety of factors, including the prevalence of the disease and its cost, have an impact on the demand for hand sanitizer products among students. A more significant role. From the research results, the authors have proposed a number of solutions to stimulate the demand for hand sanitizer as one of the prevention measures against the Covid-19 epidemic, and also discussed the development direction for the next research.

Researchers Anh, N.T.V., Linh, N.C.K., Tran, N.N.B., and Thao, N.M. (2022) examined the variables influencing Vietnamese youth's demand for "Made in Vietnam" facial cleansers. The synthesis and analysis of survey data demonstrates that the price of the product, income, tastes, prices of related items, and market expectations are just a few of the variables that have an impact on Vietnamese youth demand for facial cleanser products. Additionally, the research team takes into account young customers' expectations for the product as well as their beliefs and support for "Made in Vietnam" facial cleanser goods in the future. Vietnamese face wash also has benefits over imported products in these areas.

III. RESEARCH METHODOLOGY

A) Theoretical Research Methods

Analytical and synthetic methods are used to clarify the theoretical basis of Demand; Factors affecting the demand for electric motorbike "Made in Vietnam".

The article reviews studies on demand for goods and services and studies on electric motorbikes. From there, determine and analyze the influence of factors on the demand for electric motorbike "Made in Vietnam".

B) Practical Research Methods

a. Methods of investigation and survey:

On the basis of factors affecting the "Made in Vietnam" electric motorbike demand, the research team conducted a survey. Votes were distributed to individuals through the Google Form platform (https://docs.google.com/forms/d/e/1FAIpQLSdeqvoWbp5ROurEWbKp0jDOg3XKXTAKXp7lW_o4DvRa9pA7OA/viewform), the number of votes collected was 328 votes.,

b. Analysis of electric motorbike demand through econometric model:

Based on the influencing factors, combined with the demand analysis method according to the econometric model, the topic estimates the demand for electric motorbikes. Specifically: With two factors of price (P), the price of related goods including substitute goods (PTT) and the price of complementary goods (PBS), the research team will build a regression equation to build the relationship The relationship between these factors and the quantity demanded of electric motorbikes.

c. General model:

$$Q = a \cdot P + b \quad (1)$$

In which: P is the price of electric motorbike; Q is the quantity demanded of electric motorbikes (showing the willingness and ability to pay of the survey subjects). a, b are the coefficients.

$$QSS_{TT} = c \cdot P_{TT} + d \quad (2)$$

In which: PTT is the price of substitute goods for electric motorbikes (prices of Wave, Xmen, Vision... with prices ranging from 15 to 20 million VND); QSSTT is the quantity demanded of electric motorbikes (showing the willingness and ability to pay of the respondents when there is a change in the price of substitute goods). c, d are the coefficients.

$$QSS_{BS} = e \cdot P_{BS} + f \quad (3)$$

In which: PBS is the price of complementary goods of electric motorbikes (prices of batteries/batteries, these spare parts are considered complementary goods, the average price ranges from 1,500,000 to 3,000,000 VND); QSSBS is the quantity demanded of electric motorbikes (representing the willingness and ability to pay of the survey subjects when there is a change in additional goods prices). e, f are the coefficients.

d. The procedure is taken as follows:

Step 1: To execute the model using the gathered secondary data, use EViews 8 software.

Step 2: Check the statistical significance of the regression coefficients with the explanatory variables and the statistical significance of the regression model with a significance level $\alpha=0.05$.

Statistical significance for a regression coefficient is met by:

- i. Prob < $\alpha=0.05$
- ii. Prob(F-statistic) < $\alpha=0.05$

Step 3: Examine the model's ability to explain data using its R-squared and Adjusted R-squared coefficients.

A model is explanatory (fit) if:

- i. R-squared > 0.6
- ii. Adjusted R-squared > 0.6

Step 4: Check the model's defects with $\alpha=0.05$.

When the regression coefficients in the model are statistically significant, the R-squared, Adjusted R-squared should not exhibit autocorrelation, and the model is good (may be utilised for analysis). The model's residuals ought to follow the conventional normal distribution at the same time.

The study's authors checked for these flaws using EViews 8 capabilities. Specifically:

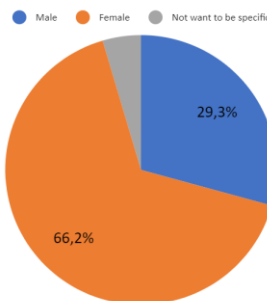
- Breusch-Godfrey test to check autocorrelation. The model does not have an autocorrelation defect at some level p if Prob (F-statistic) and Prob (Obs *R-squared) > $\alpha=0.05$.
- Breusch-Pagan-Godfrey to test heteroskedasticity. The model is not subject to heteroskedasticity if Prob (F-statistic) and Prob (Obs*Chi-squared) > $\alpha=0.05$.
- Jarque - Bera to check if the residuals of the model follow the standard normal distribution. The residuals of the model are normally distributed if Prob (Jarque - Bera) > 0.05.

IV. ANALYSIS OF FACTORS AFFECTING THE DEMAND FOR ELECTRIC MOTORBIKES OF VIETNAM'S GEN Z

A) General Information About Survey Participants

Number of participants: 328

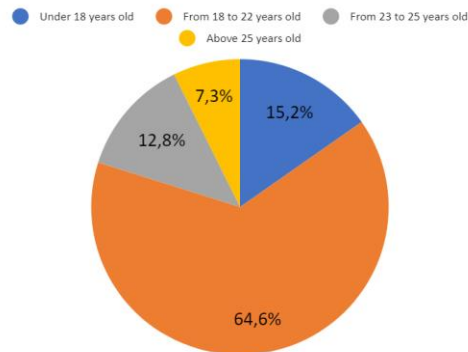
Figure 1: Gender of Survey Participants



Source: Survey results

There were 328 people participating in the survey, of which 96 men (29.3%), 217 women (66.2%) and 15 who did not want to specify (4.6%).

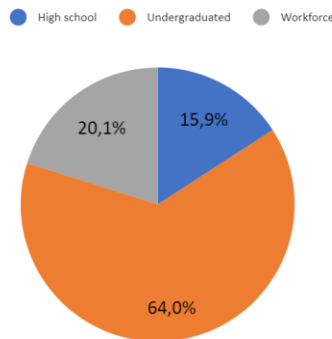
Figure 2: Age of Survey Participants



Source: Survey results

Regarding the age of survey respondents, 50 people were under 18 (15.2%), 212 people were aged 18-22 (64.6%), 42 people were aged 23-25 (12.8%) and 24 people were over 25 (7.3%).

Figure 3: Education Level of Survey Participants

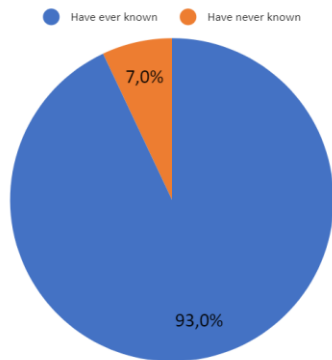


Source: Survey results

Of the 328 survey participants, 210 were students (64%), 66 people worked (20.1%), and 52 people (15.9%) were high school students.

B) General Results Of Electric Motorbikes

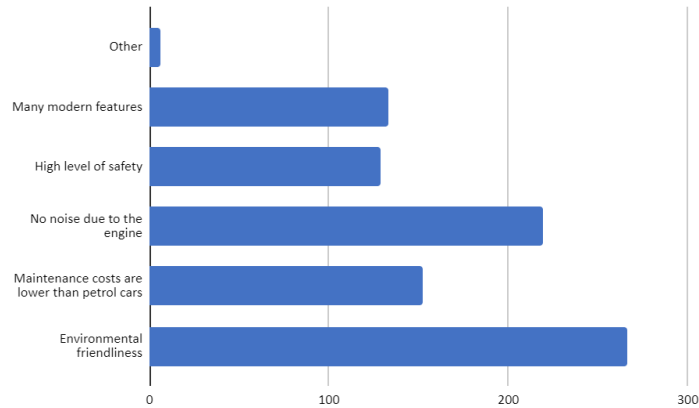
Figure 4: Young People's Awareness of Electric Motorbike Products



Source: Survey results

Of the 328 survey participants, 305 knew enough to respond about electric motorbikes (93%); the other 23 did not (7%).

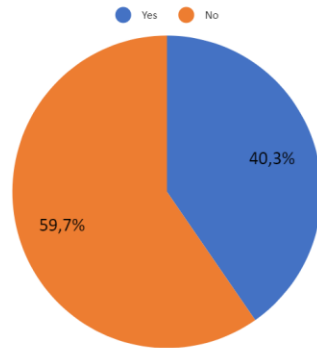
Figure 5: Advantages of Electric Motorbikes



Source: Survey results

Of the 305 people who have known enough about electric motorbikes, the number of people who thought that the vehicle is environmentally friendly was 266 people (87.2%) followed by 219 people who thought that electric bikes are not noisy thanks to the engine (71.8%); Next, 136 people said that electric motorbikes have lower maintenance costs than petroleum cars (64.2%), 133 thought they have modern features (43.6%) and 129 thought they were safe to use (42.3%).

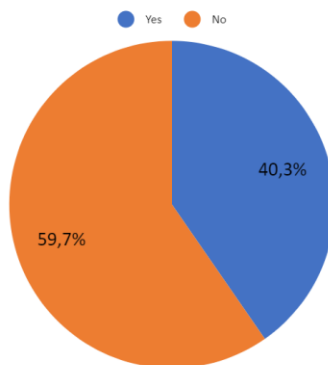
Figure 6: Percentage of Respondents Using/Owning Electric Motorbikes



Source: Survey results

Of the 305 people who have known about electric scooters, there are 123 people using/owning the product (40.3%), 182 people not using/owning the product (59.7%).

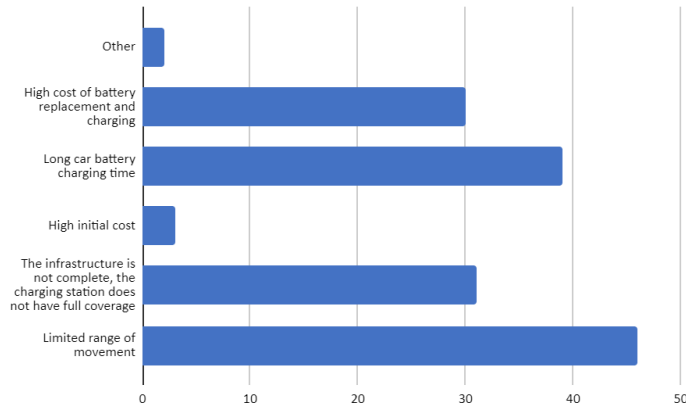
Figure 7: Desire to Use/Own An Electric Motorbike For Those Who Have Not Used/Own The Product



Source: Survey results

Among the 182 people who have not used/owned the product, when asked about their desire to use/own electric bikes in the future, there were 120 people who wanted to use/own one (65.9%) and 62 people who did not (34.1%).

Figure 8: Reasons For Not Using/Owning Electric Motorbikes



Source: Survey results

With 62 respondents who did not want to use/own an electric scooter, the most listed reason was limited mobility, followed by the long battery charging time, incomplete infrastructure, non-widespread charging stations, high cost of battery replacement and charging, high initial cost ... were the reasons mentioned.

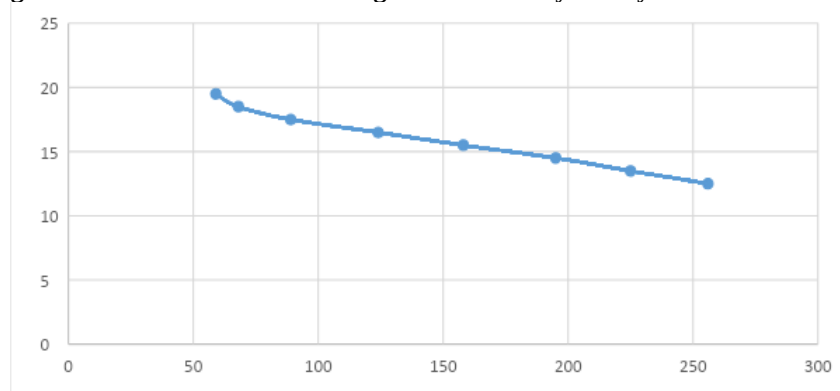
C) Analysis of Factors Affecting the Demand of Electric Motorbikes

Table 1: Relationship between Price and Willingness, Ability to Pay to Buy Electric Motorbike

P - Price (million VND)	Q - Able to and willing to buy	Not willing to
12.5	256	49
13.5	225	80
14.5	195	110
15.5	158	147
16.5	124	181
17.5	89	216
18.5	68	237
19.5	59	246

Source: Survey results

Figure 9: Effect of Price on Willingness and Ability to Buy Electric Motorbike



Source: Survey results

Table 2: Results of Estimating the Relationship between P and Quantity Demanded Of Electric Motorbikes

Dependent Variable: LOG(Q)		
Method: Least Squares		
Date: 06/12/23 Time: 14:07		
Sample: 1 8		

Included observations: 8				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.56109	0.732286	19.88443	0.0000
LOG(P)	-3.511127	0.264749	-13.26208	0.0000
R-squared	0.967012	Mean dependent var		4.862854
Adjusted R-squared	0.961514	S.D. dependent var		0.554492
S.E. of regression	0.108780	Akaike info criterion		-1.386663
Sum squared resid	0.070998	Schwarz criterion		-1.366803
Log likelihood	7.546652	Hannan-Quinn criter.		-1.520613
F-statistic	175.8829	Durbin-Watson stat		0.782830
Prob(F-statistic)	0.000011			

Source: Estimated results

From the calculated results, it is clear that the price of electric motorbikes and the quantity demanded are inversely related. The link between P and quantity demanded (Q) is illustrated by the following equation:

$$\text{LOG (Q)} = -3.511127 \cdot \text{LOG (P)} + 14.56109$$

It demonstrates that the demand for electric motorcycles declines by 3,511127% when the price goes up by 1%.

Checking model if fits:

- The coefficients are statistically significant because the coefficient Prob (P)=0.0000 < 0.05; Prob (C)=0.0000 < 0.05
- The regression model is suitable, because Prob coefficient (F-statistic) = 0.000011 < 0.05
- The coefficient of determination R-squared and Adjusted R-squared are 0.967012 and 0.961514 respectively, both are > 0.6

Table 3: Autocorrelation Defect Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.702675	Prob. F(2,4)	0.2918
Obs*R-squared	3.678800	Prob. Chi-Square(2)	0.1589

Source: Model test results

Table 3 indicates that the Prob. F and Prob. Chi-Square are > 0.05. There are no autocorrelation flaws in the model.

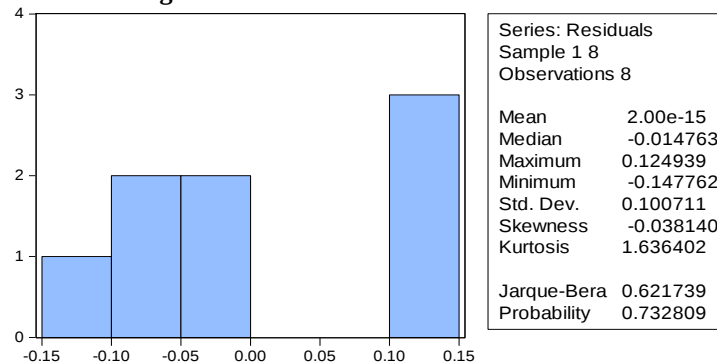
Table 4: Checking For Variable Error Variance

Heteroskedasticity Test: White			
F-statistic	0.733531	Prob. F(2,5)	0.5256
Obs*R-squared	1.814812	Prob. Chi-Square(2)	0.4036
Scaled explained SS	0.324830	Prob. Chi-Square(2)	0.8501

Source: Model test results

The Probability values are shown in Table 4. Prob values. F and Prob. Chi-Square > 0.05. The model does not have variable variance flaws.

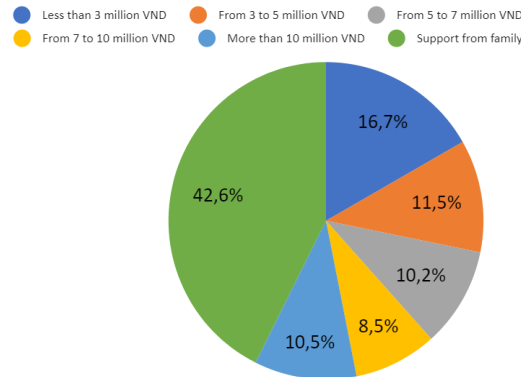
Figure 10: Normal Distribution Residuals



Source: Model test results

The model's residuals have a normal distribution, and the model's Jarque-Bera probability values are > 0.05 .

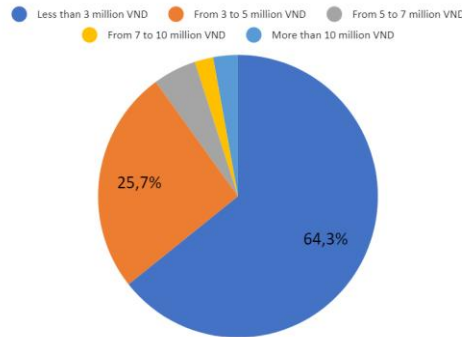
Figure 11: Income of Survey Respondents



Source: Survey results

Regarding the income of the 305 people who knew about electric motorbikes that participated in the survey, 51 have incomes under 3 million VND (16.7%), 35 have incomes from 5 to 10 million VND (11.5%), 31 have incomes from 10 to 15 million dong (10.2%), 27 have income from 15 to 20 million dong (8.5%), 26 have income from 20-25 million dong (10.4%), 32 with income from 25 to 30 million VND (10.5%), and 130 receive allowance (42.6%).

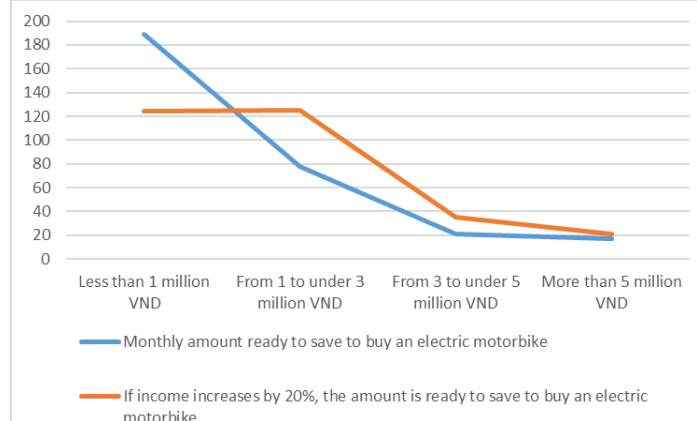
Figure 12: Survey Respondents Who Receive Allowance



Source: Survey results

Out of the 130 people who receive allowance, 90 are provided with less than 3 million VND/month (69.2%); 26 receive from 3 to under 5 million VND/month (20%); 7 receive from 5 to less than 7 million VND/month (5.4%); 3 receive from 7 to less than 10 million VND/month (2.3%) and 4 receive over 10 million VND/month (4.1%).

Figure 13: Amount Ready to Save to Buy an Electric Motorbike



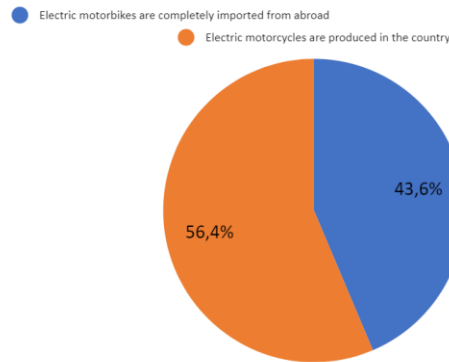
Source: Survey results

With the 305 survey responses, it shows that when income increases, consumers are willing to save more money to buy electric motorbike products. Specifically, at the income level according to the statistics of the study, there was 189 people who were willing to save less than 1 million VND monthly, 78 who were willing to save 1 to under 3 million VND monthly, 21 who were willing to save 3 to under 5 million VND, and 17 who were willing to save over 5 million VND monthly. If income were to increase by 20%, the number of people that answered that they were willing to spend their income on saving to buy will increase, specifically: the number of people willing to save less than 1 million VND were 124 people, 125 said from 1 to under 3 million, 35 said from 3 to under 5 million, 21 said over 5 million. This shows that when income increases, consumers are willing to save at higher levels for the purchase of electric motorbike products. The data shows that the average income of the survey respondents was 4.35 million VND (according to the research team's calculation), the amount of money that was ready to be saved for buying electric motorbikes is 1.43 million VND, when income was hypothetically increased by 20%, the amount ready to be saved to buy electric motorbikes was 1.90 million VND.

$$\Delta S/\Delta I = (1.90 - 1.43) / 0.2 * 4.35 = 0.54$$

It shows that when income (including allowances for those who have not yet generated income) increases by 1 million VND, survey respondents would be willing to save 540,000 VND more for buying electric bikes.

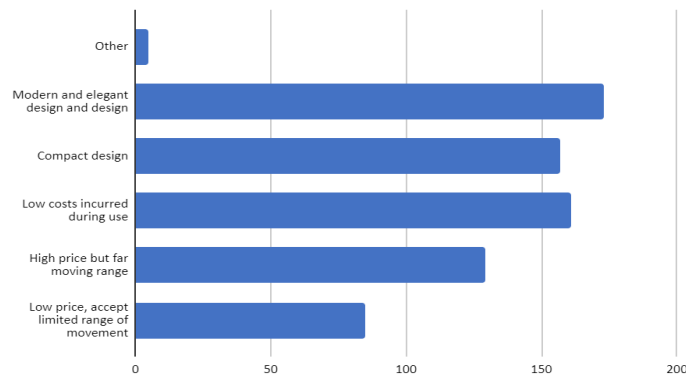
Figure 14: Preferred Type of Electric Motorbike



Source: Survey results

Among the 305 survey participants, 172 people preferred domestically produced electric motorbikes (56.4%); 133 people preferred electric motorbikes imported entirely from abroad (44.6%).

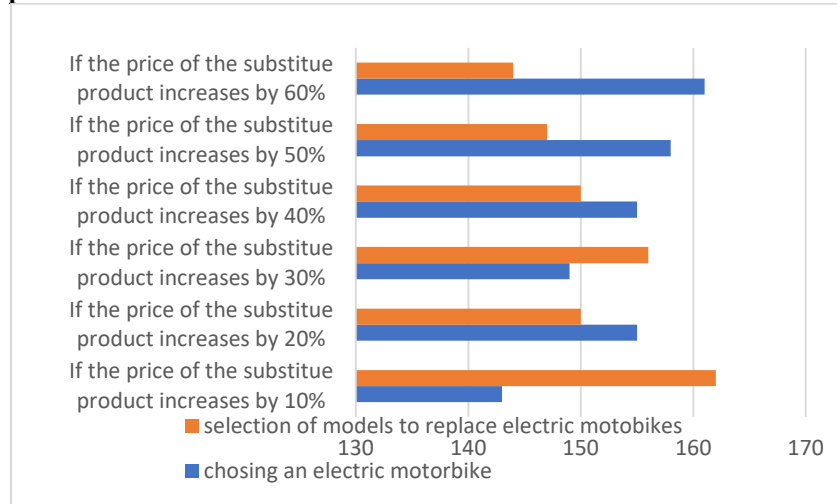
Figure 15: Types of Electric Motorbikes that Young People Desire



Source: Survey results

When surveying about the type of electric motorbike that young people are looking for, 173 people (56.7%) looked towards modern and luxurious car designs and models; 157 people (51.5%) wanted the product to have a compact design; 161 people (52.8%) wanted low costs incurred during use; 129 people (42.3%) want high-priced products with long range; 85 people (27.9%) wanted low prices and accept limited range of movement...

Figure 16: Impact of Substitute Goods' Prices on Demand of "Made In Vietnam" Electric Motorbikes



Source: Survey results

Products that can replace electric motorbikes are conventional gasoline-powered motorbikes. Although these vehicles can cause environmental pollution and have occasionally high gas prices, using this mode of transportation still ensures convenience during travel, use...

Thus, when the price of substitute products increases, the amount of electric motorbikes that consumers are willing and able to buy will also increase (in line with demand theory).

Table 5: Results of Estimating the Relationship between Price of Substitute Goods and Demand for Electric Motorbikes

Dependent Variable: Q				
Method: Least Squares				
Date: 07/14/23 Time: 10:05				
Sample: 1 6				
Included observations: 6				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PTT	1.714287	0.501891	3.415653	0.0269
C	113.0000	11.95169	9.454729	0.0007
R-squared	0.744681	Mean dependent var		153.5000
Adjusted R-squared	0.680851	S.D. dependent var		6.503848
S.E. of regression	3.674235	Akaike info criterion		5.701768
Sum squared resid	54.00000	Schwarz criterion		5.632355
Log likelihood	-15.10530	Hannan-Quinn criter.		5.423900
F-statistic	11.66668	Durbin-Watson stat		3.166667
Prob(F-statistic)	0.026887			

Source: Survey results

The estimation findings reveal a direct correlation between the demand for electric motorbikes (Q) and the price of substitute goods (PTT), which is illustrated by the following equation:

$$Q = 1.714287 \text{ PTT} + 113$$

It shows that when the price of substitute goods increases by 1 million VND, the demand for electric motorbikes will increase by 1,714287 product units.

Checking if model fits:

- The coefficients are statistically significant because the coefficient Prob (P)=0.0269 < 0.05; Prob (C)=0.0007 < 0.05
- Regression model is suitable, because Prob coefficient (F-statistic) = 0.026887 < 0.05
- The coefficients of determination R-squared and Adjusted R-squared are 0.744681 and 0.680851, which is > 0.6

Table 6: Autocorrelation Defect Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.400002	Prob. F(2,2)	0.4167
Obs*R-squared	3.500002	Prob. Chi-Square(2)	0.1738

Source: Survey results

Table 6 indicates that the Prob. F and Prob. Chi-Square are > 0.05 . There are no autocorrelation flaws in the model.

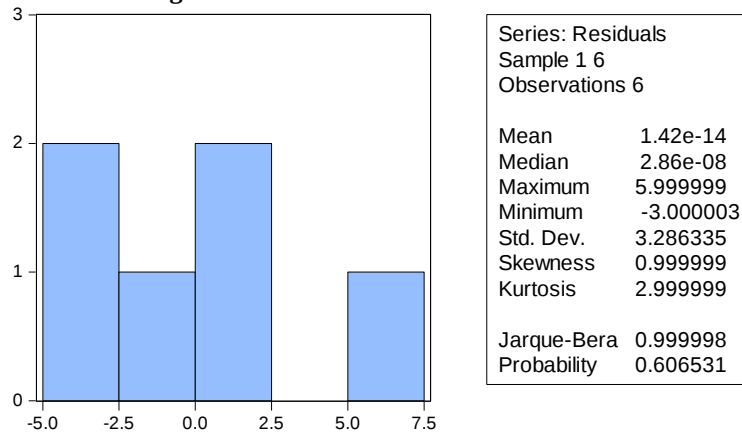
Table 7: Checking For Variable Error Variance

Heteroskedasticity Test: White			
F-statistic	0.977876	Prob. F(2,3)	0.4710
Obs*R-squared	2.367857	Prob. Chi-Square(2)	0.3061
Scaled explained SS	1.052381	Prob. Chi-Square(2)	0.5909

Source: Survey results

The Probability values are shown in Table 7. Prob values. F and Prob. Chi-Square > 0.05 . The model does not have variable variance flaws.

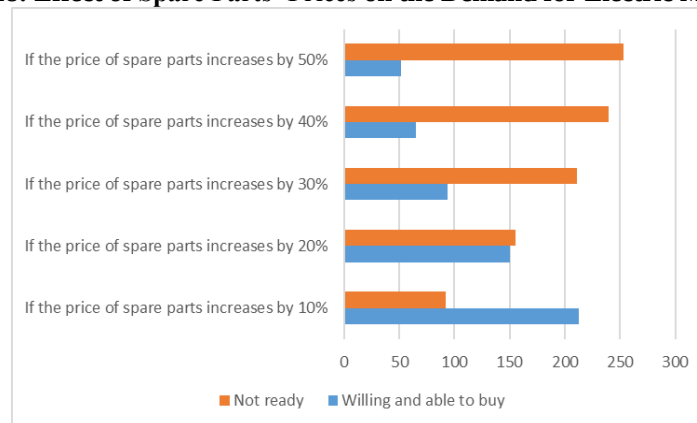
Figure 17: Normal Distribution Residuals



Source: Survey results

The residuals of the model follow a normal distribution, Prob values (Jarque-Bera) in the model > 0.05

Figure 18: Effect of Spare Parts' Prices on the Demand for Electric Motorbikes



Source: Survey results

Electric motorbikes need some spare parts, especially batteries. The price of additional goods ranges from 1,500,000 to 3,000,000 VND.

Thus, when the price of spare parts increases, the survey results show that the willingness and ability to buy motorbikes (demand for electric motorbikes) decreases, which is consistent with demand theory.

Table 8: Estimated Results of the Relationship between Price of Spare Parts and Demand for Electric Motorbikes

Dependent Variable: QSS				
Method: Least Squares				
Date: 06/12/23 Time: 15:42				
Sample: 1 5				
Included observations: 5				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	643.9000	81.79994	7.871644	0.0043
PBS	-0.180889	0.027802	-6.506381	0.0074
R-squared	0.933823	Mean dependent var		114.8000
Adjusted R-squared	0.911764	S.D. dependent var		66.59354
S.E. of regression	19.78130	Akaike info criterion		9.096526
Sum squared resid	1173.900	Schwarz criterion		8.940301
Log likelihood	-20.74131	Hannan-Quinn criter.		8.677234
F-statistic	42.33299	Durbin-Watson stat		1.393270
Prob(F-statistic)	0.007374			

Source: Model estimation results

From the estimated results, we see that there is an inverse relationship between the price of spare parts (PBS) and the demand of electric motorbikes (QSS), specifically the relationship between PBS and QSS is shown by the following equation:

$$QSS = -0.180889 \text{ PBS} + 643.9000$$

That shows that when the price of additional goods increases by 1 thousand VND, the demand for electric motorbikes will decrease by 0.180889 product units.

Checking if model fits:

- The coefficients are statistically significant because the coefficient Prob (P)=0.0074 < 0.05; Prob (C)=0.0043 < 0.05
- The regression model is suitable, because Prob coefficient (F-statistic) = 0.007374 < 0.05
- The coefficient of determination R-squared and Adjusted R-squared are 0.933823, respectively; 0.911764 > 0.6

Table 9: Autocorrelation Defect Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.070035	Prob. F(2,1)	0.4411
Obs*R-squared	4.027250	Prob. Chi-Square(2)	0.1335

Source: Model test results

Table 9 shows that the Prob values. F and Prob. Chi-Square > 0.05. There are no autocorrelation flaws in the model.

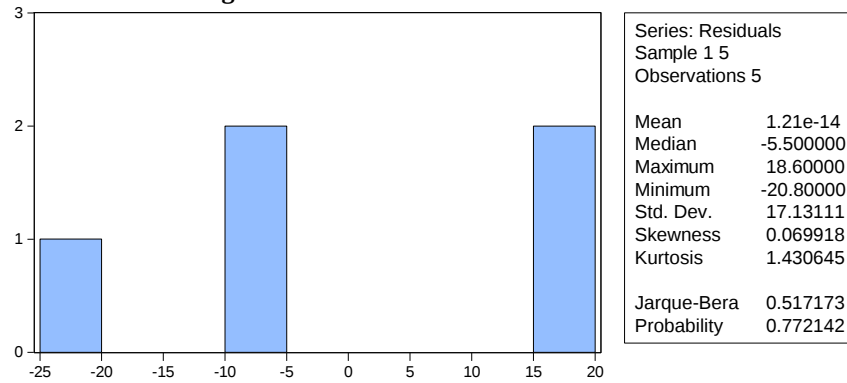
Table 10: Checking For Variable Error Variance

Heteroskedasticity Test: White			
F-statistic	0.079714	Prob. F(2,2)	0.9262
Obs*R-squared	0.369143	Prob. Chi-Square(2)	0.8315
Scaled explained SS	0.028615	Prob. Chi-Square(2)	0.9858

Source: Model test results

According to Table 10, the Prob. F and Prob. Chi-Square are > 0.05. The model does not have variable variance flaws.

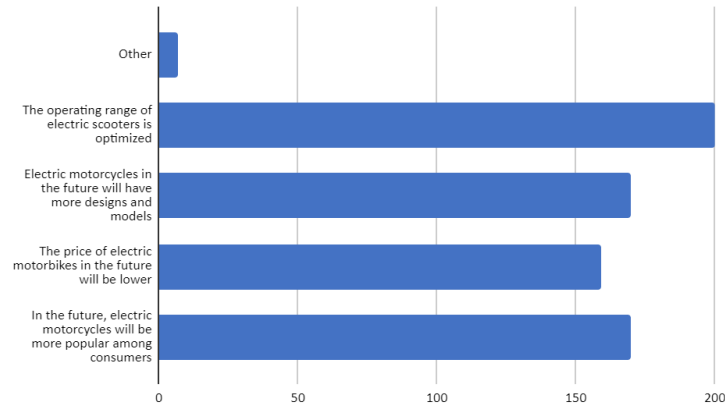
Figure 19: Normal Distribution Residuals



Source: Model test results

The residuals of the model follow a normal distribution, Prob values (Jarque-Bera) in the model > 0.05

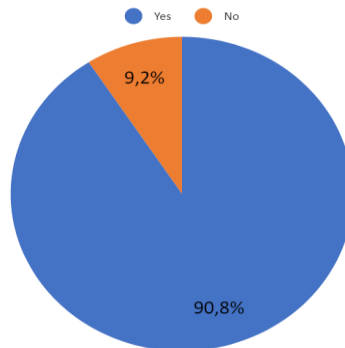
Figure 20: Expectations of Consumers (Young People) with Electric Motorbikes



Source: Survey results

Among the 305 survey participants, when asked about their expectations for changes in electric motorbike products, the results showed that 200 people (65.6%) expected for the range of electric motorbikes to be optimized. 170 people (55.7%) expected electric motorbikes to be more popular among consumers in the future and have more designs and models; 159 people (52.1%) expected the price of electric motorbikes to be lower in the future; In addition, there are some more expectations about the product such as in the future electric motorbikes will be easier to use...

Figure 21: Young People's Confidence/Support for Electric Motorbikes



Source: Survey results

Regarding consumer confidence/support for electric motorbikes, the majority of survey respondents showed support and confidence (90.8%), only 9.2% of survey respondents did not.

V. SOME EXCHANGES AND DISCUSSIONS

Many respondents agree that a clear advantage of electric motorbikes is that they are *environmentally friendly*. However, the usage and ownership rates are still low, meaning it is still necessary to promote the advantages of the vehicle, to show consumers more clearly the necessity of “greenifying” means of transport to contribute to the protection of the environment and limiting climate change.

In addition, it is necessary to recognize the limitations of electric motorbikes, especially the problem of travel range, charging time or high battery replacement cost... As a result, companies need more technological advancements to improve the quality of the vehicle. Additionally, businesses should develop plans for expanding charging infrastructure and battery replacement systems, establishing technical guidelines and standards for these systems, and ensuring their compatibility and safety.

With the survey results, the research team also built an equation showing the relationship between price and quantity demanded of electric motorbikes “ $\text{LOG}(Q) = -3.511127 \cdot \text{LOG}(P) + 14.56109$ ”. The results showed that lower prices will stimulate consumer demand for this means of transport. Therefore, manufacturers need to take measures to reduce costs and provide incentives for consumers to boost demand.

The survey results also showed that: If income increases, the amount of money that consumers are willing to save to buy electric motorbikes also increases. Domestically produced electric motorbikes are more favored than imported electric motorbikes. The type of electric motorbike that young people want are ones with modern and luxurious designs, low costs incurred during use, compact design and long range, which are also points that manufacturers should take note of when building solutions to better meet market demands.

Regarding electric motorbikes’ competing products, when the price of those increase, the result is a change in the behavior of consumers switching to electric vehicles. Therefore, companies need to develop a pricing strategy to ensure competitiveness with other motorbikes.

There should be support from the government in phasing out inefficient old gasoline cars. The United States, Germany, China, Mexico, and India are just a few of the numerous nations and towns around the world that have adopted vehicle replacement programmes. The Vietnamese government can draw from these nations’ experiences and local conditions to create a plan with specific development objectives to promote the usage of electric two-wheelers (E2W). The government should also implement regulations on periodic inspection and maintenance of motorbikes. In order to resume operation, vehicles that don’t meet the pollution standards must be modified. Highly polluting vehicles can be replaced with cleaner ones by putting in place a vehicle replacement programme.

As an alternative, a low emission/zero emission zone (LEZ/ZEZ) or environmental zone might be established at the city level to restrict access to heavily polluting cars in a specific area. To join the LEZ, a vehicle must comply with certain emissions regulations. Alternatively, highly polluting vehicles must pay a fee to enter, with fees scaling proportionate to the polluting capabilities of the vehicle. The implementation of LEZ contributes to the reduction of air pollution in a given area and also facilitates the transition to cleaner vehicles.

The survey results also noted that reduction in the price of spare parts such as batteries will help increase the use of electric motorbikes. Therefore, it is necessary to develop power grids and increase the rate of renewable energy production to maximize the potential of electric vehicles, which is also a way to help Vietnam soon achieve the goal of bringing net emissions to “zero” in the future. out in 2050.

With confidence and support for electric motorbikes at such a high rate (91%), factors such as operating range, make, model and price are some of the areas that manufacturers should improve on to catch the increasing demands of the market for electric motorbikes.

VI. CONCLUSION

In summary, the study has pointed out the factors affecting the demand for electric motorbikes of Vietnamese youth nowadays. Through survey results, data analysis and processing, combining qualitative and quantitative research methods, the research team has pointed out the influencing factors and the degree of impact of these factors on demand for electric motorbikes of Vietnamese youth. The research results are consistent with the theory of demand for goods and previous empirical studies. In addition, the article contributes and offers some policy implications to stimulate the demand for electric motorcycles of young Vietnamese, thereby minimizing the negative impacts of fossil fuel-powered vehicles on the environment. The research paper is the basis and premise for further studies on the factors affecting the demand, the general intention of consumers about environmentally friendly vehicles, contributing to the sustainable development.

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