

# IMPACT OF GASOLINE PRICES ON INTENTION TO SWITCH TO RENEWABLE ENERGY VEHICLES: EVIDENCE FROM A SURVEY OF VIETNAMESE STUDENTS

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## Article information

Received: 11/2023

Accepted: 3/2024

Available online: 3/2024

## ABSTRACT

In this article, we conducted a study on the transition to green energy by determining whether the increase in oil and gas prices influences the choice of transportation means among students in Vietnam. This study utilized survey results from 520 university students in Ho Chi Minh City during the period from May to September 2022. The regression results indicate that the rise in fuel prices has prompted students to prioritize energy-efficient and environmentally friendly transportation options such as electric motorcycles, thereby promoting Vietnam's green transition. The findings of this study could be beneficial for policymakers and contribute to the repository of knowledge on green transition processes for developing countries. Furthermore, the study demonstrates that various determining factors such as family residence, gender, travel purposes, the ratio of travel expenses to total monthly expenditure, students' educational levels, and the current transportation means significantly impact the transition towards environmentally friendly transportation modes.

Trong bài báo này, chúng tôi tiến hành nghiên cứu về sự chuyển đổi năng lượng xanh thông qua việc xác định xem sự tăng giá của dầu và khí đốt có ảnh hưởng dẫn đến sự thay đổi trong lựa chọn phương tiện giao thông của sinh viên tại Việt Nam không. Nghiên cứu này sử dụng kết quả khảo sát từ 520 sinh viên đại học tại Thành phố Hồ Chí Minh trong giai đoạn từ tháng 5 đến tháng 9 năm 2022. Kết quả hồi quy cho thấy giá xăng dầu tăng đã thúc đẩy các sinh viên ưu tiên lựa chọn các phương tiện giao thông hiệu quả năng lượng và thân thiện với môi trường như xe máy điện, từ đó thúc đẩy sự chuyển đổi xanh của Việt Nam. Kết quả của nghiên cứu này có thể hữu ích cho những người làm chính sách và phần nào đóng góp vào kho tư liệu về quá trình chuyển đổi xanh cho các quốc gia đang phát triển. Hơn nữa, nghiên cứu cho thấy rằng nhiều yếu tố xác định như nơi cư trú của gia đình, giới tính, mục đích đi lại, tỷ lệ chi phí đi lại so với tổng chi tiêu hàng tháng, trình độ học vấn của sinh viên và phương tiện mà sinh viên đang sử dụng hiện tại có ảnh hưởng đáng kể đến việc động cơ chuyển đổi phương tiện giao thông thân thiện với môi trường.

*Keywords: gasoline prices, university student, renewable energy*

## 1. INTRODUCTION

Our research topic aims to examine the impact of fluctuating gasoline prices on Vietnamese students' transportation choices and their intention to switch to renewable energy vehicles. By exploring the potential amplification of public transportation and eco-friendly vehicles, we aim to determine whether adopting green conversion vehicles during financially unstable fuel price periods is beneficial in promoting green vehicle utilization.

To the best of our knowledge, this is the very first attempt to examine the impact of gasoline prices on promoting a green transition to renewable energy vehicles for students. Our research fills this research gap and provides an opportunity for businesses to transform their business models in a more environmentally friendly and sustainable direction. We will focus our research on questions such as whether rising gas prices affect Vietnamese students' choice of mode of transportation, whether public transportation or green vehicles become the solution in the decision of Vietnamese

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students to participate in traffic, and whether rising fuel prices promote a faster green transition in Vietnam.

In a bold commitment at COP26, Vietnam pledged to achieve net-zero emissions by 2050, marking a turning point towards a green future. Prime Minister Phạm Minh Chính (2021, November 12) announced Vietnam's commitment to achieving net-zero emissions by 2050. This commitment includes phasing out coal-fired power plants after 2030 and reducing coal use from 2045 onwards. Additionally, Vietnam aims for a 30% reduction in methane emissions by 2030 compared to 2020 levels, alongside strengthening forest protection and land-use management strategies to further curb greenhouse gas emissions.

A study by the Institute of Strategy and Policy on Natural Resources and Environment (Ministry of Natural Resources and Environment, 2021) found that personal transportation accounts for roughly 30% of Vietnam's total greenhouse gas emissions. A staggering 30% of the country's total emissions stem from motorcycles and cars, spewing pollutants that choke the air and warm the planet. This dependence on personal transport isn't just an environmental concern, it's a recipe for congestion and health problems. But there's hope amidst the smog.

According to the General Statistics Office (2022), Vietnam boasts one of the youngest populations globally. Individuals under 15 years old comprise approximately 25% of the population, while the working-age population (15-64 years old) makes up around 70%. Projections suggest that by 2050, the under-15 age group will shrink to around 20%, while the working-age population will expand to around 75%. As GenZ becomes the primary consumer force, their consumption trends are poised to significantly impact Vietnam's path towards net-zero emissions. Their preference for environmentally friendly products and services will drive businesses to prioritize offering greener options, ultimately shaping Vietnam's sustainable future.

The government, businesses, and consumers must join forces to empower GenZ's green choices. Supportive policies, readily available sustainable options, and widespread awareness will create an environment where eco-conscious consumption thrives. As GenZ's purchasing power rises, their green preferences will ripple through the economy, driving businesses towards sustainable practices and accelerating Vietnam's journey towards a net-zero future.

With a young, environmentally conscious population leading the charge and a collaborative approach driving innovation, Vietnam's green transition promises to be a success story, demonstrating how conscious consumerism can pave the way for a sustainable future.

The study's findings will offer useful insight for policymakers, highlighting the importance of implementing green transition policies for a country's development. The strategy involved in the appropriate relationship between green vehicle use and gasoline prices can boost the utilization of environmentally friendly vehicles in this volatile gas price environment. Our research topic is significant and timely, providing valuable insights into promoting green vehicle utilization and contributing to a more sustainable future.

The structure of the paper is as follows: Section 2 presents the literature review. The research methodology is described in section 3. Next, section 4 shows the research results and discussion. Section 5 provides the conclusions and recommendations.

## 2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

### 2.1. Theoretical framework

#### *Theory of planned behavior*

The present research applied the theory of behavior (TPB) to discover the impact of factors on switching to renewable energy vehicles for Vietnamese students. The TPB is an expansion of the theory of reasoned action (Fishbein and Ajzen, 1977). Within the TPB framework, when someone has the intention of conducting a behavior, such intention shall be affected by the three following factors: Attitude toward a behavior, subjective norm (i.e., the individual's perception of social pressure), perceived behavioral control (i.e., the perceived ease or difficulty of engaging the behavior) (Ajzen, 1991). The TPB suggests that if Vietnamese students have a positive attitude towards renewable energy vehicles, feel social pressure to switch, and believe they have the ability to do so, they are likely to form an intention to switch.

*The price elasticity of demand*

The paper uses the price elasticity of demand to measure how responsive the quantity demanded is to changes in price. Petroleum demand is typically considered inelastic, but the team will investigate if consumers are switching to alternative energy vehicles due to recent petrol price increases and what policies may result. This theory helps explain how changes in gasoline prices impact the intention to switch. As gas prices rise (behavioral belief), students may be more inclined to explore alternative, cost-effective modes of transportation.

*Cost-benefit analysis theory*

Cost-benefit analysis is a method to determine the most cost-effective alternative by estimating the costs and benefits of decisions (Marshall, 1997). We will use this approach to assess the costs and benefits of switching from traditional gasoline-powered vehicles to renewable energy vehicles for Vietnamese students. By conducting a thorough analysis, we aim to provide insights into the feasibility and potential benefits of promoting green vehicle utilization in Vietnam. Students weigh the costs (e.g., expenses related to their current vehicle, monthly spending) against the benefits (e.g., environmental impact, convenience) of switching. The model captures this trade-off by including the SPENDING variable and other relevant factors.

**2.2. Literature review**

As per the scholarly community, there is a noticeable absence of research articles focusing on the influence of gasoline costs on the transition to renewable energy vehicles in Vietnam. Previous studies conducted by Nguyen (2020) and Thanh et al (2008) have explored the impact of gasoline prices on consumer prices in Vietnam, revealing significant effects and pinpointing deficiencies in the existing petrol and oil price management systems. These studies employed the I/O table model and the CPI consumption index. Thanh et al (2008) further found that an increase in gasoline prices led to a decrease in purchasing power for affluent families while simultaneously escalating expenses in the manufacturing industry by 2.56%. Overall, these studies highlight the importance of effective petrol and oil price control strategies in Vietnam to promote

steady economic growth while protecting consumers and industry from negative consequences.

*Renewable energy and gasoline price*

Renewable energy has been widely recognized as a potential substitute for gasoline in both the consumption and production of other energy sources. However, the relationship between oil prices and renewable energy demand is complex and has been the subject of many empirical studies. Some studies, such as Salim and Rafiq (2011) for China and Indonesia, Omri and Nguyen (2014) for 64 countries, Deniz (2019) for oil-exporting countries, Mukhtarov et al. (2020) for Azerbaijan, and Mursed and Tanha (2020) for Bangladesh, India, Pakistan, and Sri Lanka, have found a negative impact of oil prices on renewable energy. However, other studies by Azad et al. (2014), Apergis and Payne (2015), Omri and Nguyen (2015), and Basmati and Roofi (2020) have found a positive relationship between oil prices and renewable energy adoption. On the other hand, recent empirical studies by Marques and Fuinhas (2011) for 24 European Union countries, and Nguyen and Kakinaka (2019) for middle-income countries have found no statistically significant effect of oil prices on the adoption of renewable energy. Additionally, Brini et al. (2017) found no cointegration link between oil prices in Tunisia and renewable energy, while Alege (2018) found a cointegration link between the variables used in 40 Sub-Saharan African countries.

*Transportation and gasoline price*

Many studies have explored the effect of fuel costs on vehicle conversion (Agthe and Billing, 1978; Wang and Skinner, 1984; Dahl and Sterner, 1991; Litman, 2004; Currie and Phung, 2007, 2008; Nowak and Ivan, 2013; Smart, 2014; Ming - Che et al., 2015). The majority of this research demonstrates that gasoline costs have an effect on vehicle conversion that is statistically significant. For instance, Agthe and Billing (1998) examined the effect of gasoline costs on urban bus ridership in Tucson, Arizona, and found that it had a significant impact on the movement of passengers by bus. Ming-Che et al. (2015) discovered through a review in Taiwan that fuel price is a significant regulator of transit demand, with favorable effects on bus and MRT use. Milioti and Karlaftis' (2014) research

demonstrates that gasoline prices have a negligible short- and long-term impact on vehicle switching. In a more recent study, Marcouch and Mourad (2019) employed a large dataset and conducted numerous empirical analyses, however, their findings did not support the premise that consumers' preferences for fuel-efficient vehicles change when gas prices rise.

Another interesting factor in this field is the price elasticity of the conversion of fuel to vehicles. Prior research (Wang and Skinner, 1994; Polemis, 2006; Haire and Machemehl, 2007; Currie and Phung, 2007, 2008) has demonstrated that the price elasticity of gasoline will vary depending on the needs of vehicle users, modes of transportation, and the situation of that country. Because they serve different markets, buses and railroads frequently exhibit differing elasticities, according to Liman (2004) and Nowak and Savage (2013). According to Mattson (2008), not all transit agencies will be affected by changes in gas prices in the same way. Nowak and Savage (2013) similarly discovered that the elasticity between bus passengers and petrol costs is significant when petrol prices climb. The research given demonstrates a significant distinction between short- and long-term pricing elasticity, despite the results being conflicting.

According to our research team, the only two development lines that earlier studies had focused on were the impact of gasoline costs on the shift to a green economy and the impact of gasoline prices on public transportation, such as buses. Also, there hasn't been much research on how energy prices affect students' academic performance and their decision to choose greener transportation. Additionally, there is currently a shortage of research on how the move to renewable energy-powered transportation is impacted by petroleum costs both internationally and in Vietnam. As a result, our paper aims to fill this information vacuum. Also, our study has theoretical and practical ramifications for understanding the numerous factors that affect how Vietnamese students behave in traffic in the modern world.

### 3. RESEARCH METHOD

#### Data

The data for this study was collected from May to September 2022 through a survey of university students in Ho Chi Minh City. The survey was conducted using various messaging platforms, including Messenger, Zalo, Facebook, and email. A total of 600 questionnaires were distributed, and 520 were returned and included in our data collection.

#### Model and estimation

The research methodology aimed to investigate the relationship between the increasing price of gasoline and the shift to green vehicles from motorbikes, while also considering the impact of age, gender, rate of spending on transport, students' monthly spending, and students' living place. To achieve this, we utilized a logistic model and linear regression to test our model. To achieve this objective, we propose the following two main hypotheses:

**H1:** The level at which an increase in gasoline prices would prompt a switch to renewable energy vehicles (TP\_SHIFTING\_LEVEL) significantly influences Vietnamese students' intention to switch to renewable energy vehicles.

**H2:** The monthly expenditure of the students (SPENDING) significantly influences their intention to switch to renewable energy vehicles.

The model can be illustrated as:

$$\begin{aligned}
 Y_i = & \beta_0 + \beta_1.SENIORITY + \beta_2.LIVING\_PLACE \\
 & + \beta_3.GENDER + \beta_4.CURRENT\_VEHICLE \\
 & + \beta_5.SPENDING + \beta_6.TP\_SHIFTING\_LEVEL \\
 & + \beta_7.PERCENT\_COST + \beta_8.PURPOSE\_OTHER \\
 & + \varepsilon_i \quad (1)
 \end{aligned}$$

The model was built based on the Theory of Planned Behavior (TPB), which suggests that behavior is determined by intentions, attitudes (behavioral beliefs), and perceived behavioral control (control beliefs). In our model, the intention to transition to renewable energy vehicles ( $Y_i$ ) serves as a crucial outcome, reflecting students' behavioral intentions (switch or not switch).

In the context of our research, the intention to switch to renewable energy vehicles is influenced by various factors such as the increase in gasoline prices (behavioral belief) and the individual characteristics of the students (control beliefs). The variables in the model represent these factors.

$Y_i$  is the dependent variable,  $i = 0$  (if not switch), and  $i = 1$  represents the switch to eco-friendly transportation. Furthermore, we delve into examining the Attitude factor of TPB by asking respondents to choose their priority environmentally friendly transportation means such as buses, electric motorbikes, electric bicycles, bicycles, etc. SENIORITY is the student's current academic standing (Freshman, Sophomore, Junior, Senior, and others). LIVING\_PLACE is the student's living area (Southern, Northern, Middle, and others); GENDER (Male, Female, and others). CURRENT\_VEHICLE currently uses modes of transportation by responders. SPENDING a monthly expense (unit: VND); TP\_SHIFTING\_LEVEL the rise in gas costs, according to which respondents believe they may switch from their current mode of transportation to a different one; PERCENT\_COST proportion of monthly spending on travel.  $\varepsilon_i$  denotes the error term of our model.

## 4. RESULTS AND DISCUSSION

### 4.1. Statistical Description

Applying the Snowball Sampling approach, a survey was done to learn what Ho Chi Minh City University students thought about the conversion of vehicles to be more environmentally friendly. With a high response rate (92.31%), or 600 responses from 650 questionnaires handed out, the study was conducted from May to September 2022. A total of 520 response samples were chosen for data analysis after the authors eliminated 80 incomplete replies to confirm the validity of the votes.

**Table 1.** Descriptive statistics - Characteristics of respondents

Seniority	N	Gender			Age		Current place of residence				Current Vehicle	
		% male	% female	% other	Mean	SD	% south	% north	% middle	% other	% motorcycle	% other
Freshman	78	27	73	0	19.00	0.91	53	8	38	1	44	56
Sophomore	209	33	66	1	20.00	0.78	91	3	5	1	70	30
Junior	107	36	63	1	20.97	0.97	58	21	19	2	46	54
Senior	90	42	56	2	21.98	0.79	49	28	19	4	47	53
Other	36	50	47	3	22.5	2.16	61	17	17	6	64	36

Note: In circumstances where the sum is less than 100%, the remaining percentage is due to missing data

Source: Compiled from the research team's statistics

In the table above, the characteristics of students traveling by motorcycle or other mode of transportation are analyzed by gender, age, and current domicile. The data indicates that more female first- to fourth-year students than male students utilize their own vehicles on a regular basis. The students' mean ages ranged from 19 to 22 years, and their standard deviations for first-year, second-year, third-year, and fourth-year students ranged from 0.78 to 0.97. The standard deviation for students who have completed five years or more is 2.16. Comparing the characteristics of students who drive their own motorbikes by region, more than 50% of students have families in the South than in the North, the Central, or any other region (less than 30%). Furthermore, only around 45% of first-year, third-year, and fourth-year students ride motorcycles, compared to 70% of second-year students and 64% of other students who do.

#### 4.2. Findings and Discussion

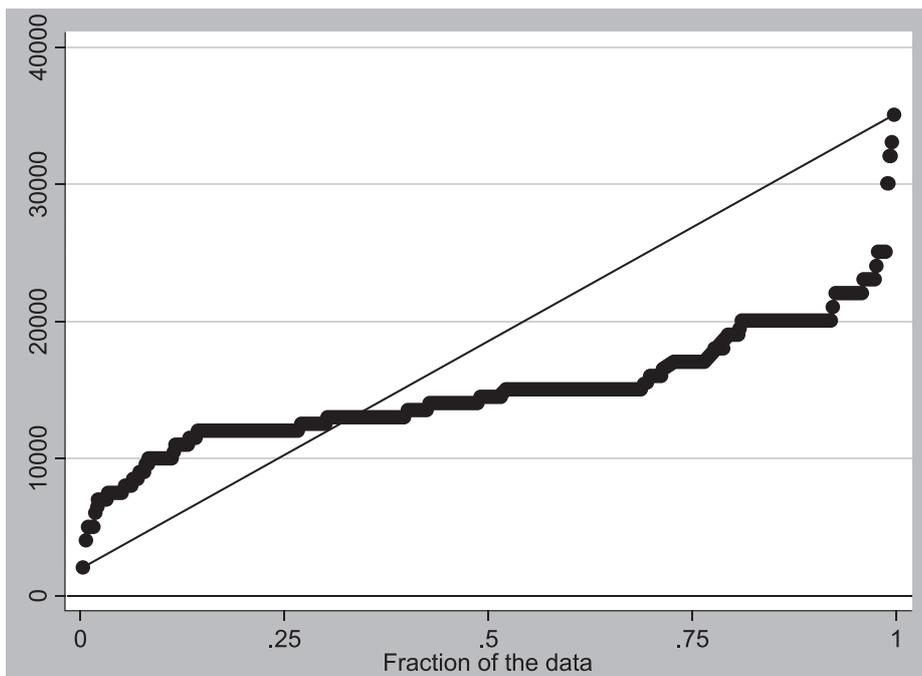
In the following part, we examine the mean, lowest, maximum, and standard deviation of students' monthly spending patterns. Also, we look at respondents' spending habits on transportation and whether they intend to move to other forms of transportation.

**Table 2.** Students' Monthly Spending

Variables	Minimum	Maximum	Mean	Standard Deviation
Monthly spending	200,000	30,000,000	2,529,288	1,865,087
Rate of spending on transport	0.01	0.05	0.2481	0.0725
Rate of gasoline price increase	0.02	0.35	0.14845	0.4457

Source: Authors' calculation

According to our analysis of the information in Table 2, students in Ho Chi Minh City spend on average 2,529,288 VND per month. Furthermore, they spend 25% of their monthly budget on relocation. It's interesting to note that students' choice of mode of transportation is significantly influenced by the rate of increase in gas costs. As petrol costs rise by an average of 14.845%, students typically choose alternative modes of transportation, such as electric motorcycles, electric bicycles, technology vehicles, or even bicycles.



**Graph 1.** TP\_Shifting\_Level quartiles

In addition, the study analyzed the distribution of responses to the query, "To what extent do you anticipate gas prices to rise, and will you switch to a different vehicle?" The results revealed that a staggering 75% of the surveyed students would switch to an alternative mode of transportation if gasoline prices increased by 18,000 VND. Moreover, approximately 90% of the participants claimed that they would make the switch if prices rose to 20,000 VND. Interestingly, only 5% of the respondents would consider changing their vehicle if gasoline prices increased by less than 10,000 VND. This low percentage suggests that small price hikes may not significantly impact students' lives or operating costs. Notably, the graph's sensitivity demonstrated a significant shift in behavior from 10,000 VND to 20,000 VND, with nearly 95% of students opting to switch means of transportation.

For students who intend to switch to using a more environmentally friendly means of transportation, we asked in detail which type of means of transportation they would prioritize using the most. We also performed a Reasonable Ratio Test (G2) to examine the correlation between the independent variables (age, gender, monthly spending, current residence, student's education level, current vehicle in use, increase in gas price) and the dependent variables (switching to green vehicles, switching to motorbikes, switching to bus, technology vehicle, and bicycle) for the go back, move purpose) in the model (1).

The test findings are shown in Table 3, which demonstrates that the transformation model of transportation options, such as electric motorcycles, buses, technological vehicles, and bicycles, all have a substantial impact on the environment. separate variables.

**Table 3.** Test of association between dependent variable and independent variable

Variables	SHIFTING MEANS					
	Green Vehicles R <sup>2</sup> =0.2179	Electric Motorbike R <sup>2</sup> =0.03	Electric Bicycle R <sup>2</sup> =0.011	Bus R <sup>2</sup> =0.012	Grabbike R <sup>2</sup> =0.063	Bicycle R <sup>2</sup> =0.026
	P-Value	P-Value	P-Value	P-Value	P-Value	P-Value
SENIORITY	2.149	1.148	0.892	0.892	0.955	0.989
LIVING_PLACE	0.737	1.418*	0.996	0.996	0.718***	0.796**
GENDER	0.097***	0.983	1.296	1.296*	1.126***	0.571**
CURRENT_VEHICLE	11.2**	1.096	1.195	1.195	2.817***	1.145
TP_SHIFTING_LEVEL	1.000	1.000*	1.000	1.000	0.999	0.999
PERCENT_COST	0.945	10.856*	0.863	1.339	0.097*	5.132
PURPOSE_OTHER	2.102*	1.165	0.733	0.863	0.994	1.028

Note: (\*); (\*\*); (\*\*\*) significant level at 10%, 5%, 1%

Source: Authors' calculation

In this study, the ShiftingMeans\_GreenVehicles dataset was subjected to regression analysis. The dataset included data from various modes of green transportation such as electric motorcycles, electric bicycles, buses, grab bikes, and bicycles. The results revealed that factors such as education level, gender, current mode of transportation, and the purpose of travel significantly influence students' choice of green vehicles. Educated individuals were found to be more inclined toward greener vehicles and showed concern towards traffic-related environmental pollution and vehicle technology advancements. Studies have shown that women exhibit a greater preference for environmentally friendly and fuel-efficient vehicles compared to men (Kronsell et al., 2016; Aldred et al., 2017). Furthermore, individuals who primarily rely on motorcycles are less likely to switch to green transportation due to cultural and socioeconomic factors prevalent in Vietnam. The study also observed that respondents' travel objectives exhibit greater flexibility in their green transportation choices, as compared to predetermined destinations such as work or school.

The study's focus on the switch to electric motorbikes is particularly interesting. The research shows that several factors influence this switch, including living place, TP shifting level, and percent cost. Respondents living in the southern region are less likely to switch compared to those living in other regions, which is in line with Musti's study (2011); Tanaka et al. (2014); Kockelman (2011); Helveston et al. (2015). However, individuals negatively impacted by increasing petrol prices are more motivated to switch to electric motorbikes. It is important to note that the cost of purchasing an electric motorcycle is similar to that of a gasoline-fueled motorcycle, requiring a substantial increase in gasoline costs to persuade Vietnamese students to switch to electric motorbikes. Given Vietnam's fast-

developing economy and high gasoline consumption rates, this could significantly alter user behavior and traffic conditions in the country. Future research suggests that people are more likely to switch to electric motorcycles if they spend a larger portion of their income on fuel, a trend likely to increase as gas prices continue to rise. These findings have significant implications for the Vietnamese market, where electric motorbikes are gaining popularity as an affordable and environmentally friendly mode of transportation.

The study found no significant connection between variables such as living place, TP\_Shifting\_Level, or percent cost and the adoption of electric bicycles in Vietnam. While this may surprise policymakers, it only applies to e-bikes and not other EV models. There may be other factors affecting e-bike usage that were not examined in the study. Further research is needed to understand consumer preferences and habits and promote sustainable transportation solutions as Vietnam experiences economic growth and rising fuel prices.

In keeping with the Bus Regression Model, the findings indicate that gender and bus utilization in Vietnam have a sizable association. Respondents who identify as female are more inclined to switch to buses as their preferred mode of transportation. This result supports the findings of Frankena (1978), Nolan (2003), Tushara et al. (2013), and Ambak et al. (2016) for Malaysia that women have a positive impact on the use of public transportation. However, it differs from earlier studies by Zhao. F et al. (2002) and Dung (2012), Van et al. (2014) for six Asian countries. These findings emphasize the significance of taking gender into account when formulating effective public transportation policies and initiatives, particularly for women.

In contrast, the use of Grabbike in Vietnam is significantly influenced by current residency, mode of transportation, monthly spending, and percent cost. Respondents who live in the South, have expensive freight and commute costs, and experience rising petrol costs are more likely to switch to Grabbike. These findings highlight the importance of considering various criteria when promoting sustainable transportation solutions like Grabbike in Vietnam, and more investigation is required to identify additional factors affecting the uptake of ride-sharing services in the Vietnamese market.

Last but not least, the ShiftingMeans\_Bicycle model also revealed a significant link between location and gender for switching to bicycles. Encouraging bicycle use involves both current location and gender, with females being more inclined to switch. The gender coefficient in the Zhou (2012) studies revealed that female students considerably prefer to ride bicycles. However, residents of the South were less likely to switch due to their geographic location. These results can assist businesses and policymakers in creating policies that effectively encourage bicycle use by targeting specific populations and understanding the factors that influence cycling adoption rates.

After conducting a regression model for various transportation options based on factors such as gender, current mode of transportation, and the impact of gasoline prices, the authors proceeded to measure the correlation coefficients between variables that significantly influence students' choice of transportation, including EV\_lessnoise, EV\_environment, EV\_canfix, EV\_lowEquipCost, EV\_Style, and EV\_Price as shown in Table 4.

**Table 4.** Correlation matrix

Variables	EV						
	Lessnoise	Environment	Lessfuel	Canfix	lowEquipCost	Style	Price
Lessnoise	1.0000						
Environment	<b>0.7452</b>	1.0000					
Lessfuel	0.6614	<b>0.7357</b>	1.0000				
EV Canfix	0.5149	0.5408	0.6145	1.0000			
lowEquipCost	0.4824	0.5047	0.6083	<b>0.7560</b>	1.0000		
Style	0.4514	0.3175	0.3685	0.4795	0.4942	1.0000	
Price	0.5463	0.5323	0.5522	0.5285	0.5735	0.5566	1.0000

Source: Authors' calculation

The measurement revealed two clusters of weak factors that have a high correlation. Firstly, students who prioritize environmental factors also correlate with the factors of low noise and fuel economy. Secondly, those who are concerned about easy repairs also consider low repair costs.

Due to the high correlation between these two clusters of factors, we decided to select environmental factors, low replacement costs, style, and price as key factors to gain a deeper understanding of students' motivations for switching modes of transportation.

**Table 5. regression result of the shifting means for four different modes of green transportation (GreenVehicles, ElectricMotorbike, ElectricBicycle, Bus)**

		SHIFTING MEANS			
		GreenVehicles	ElectricMotorbike	ElectricBicycle	Bus
EV	Environment	1.548	1.099	0.930	1.202*
	lowEquipCost	1.382	0.923	1.031	0.810**
	Style	1.024	1.364***	1.106	0.997
	Price	0.426**	0.841	0.790*	1.108

Source: Authors' calculation

The findings of the experiment, as presented in Table 5, highlight the four key factors that determine consumers' decisions to switch to green transportation modes. These factors include environmental considerations, low repair costs, exterior design, and price.

The study indicates that price is a crucial factor when it comes to switching to green transportation modes in general. This finding is not surprising, as any significant change in transportation mode requires a reasonable investment. Interestingly, the decision to switch to electric motorcycles appears to be heavily influenced by exterior design and style, rather than price or low repair costs. This suggests that the aesthetics of electric motorcycles may not be appealing enough to encourage consumers to switch. Additionally, the price of electric motorcycles can often be higher than that of gasoline-powered scooters, further emphasizing the importance of design in consumer behavior. In contrast, the decision to switch to electric bicycles is largely driven by price considerations, as they tend to be more affordable than electric motorcycles. Finally, the study reveals that environmental factors and low operating costs are critical factors when it comes to students' decisions to switch to buses. This is understandable, as taking the bus aligns with environmentally conscious behavior and can lead to significant cost savings over time. Overall, these findings provide valuable insights into the factors that influence consumers' decisions to switch to green transportation modes, which can inform policy and marketing strategies aimed at promoting sustainable transportation practices.

Based on the regression results of our research, we can conclude the following about our hypotheses:

**H1** is supported by our findings.

**H2** is not supported.

In conclusion, while H1 is supported by our findings, H2 is not. The results from our analysis also suggest that a complex interplay of factors influences the transition to renewable energy vehicles among Vietnamese students. Further research is needed to fully understand these dynamics and inform effective policies and initiatives for promoting sustainable transportation solutions.

## 5. CONCLUSIONS AND POLICY IMPLICATIONS

The study aimed to investigate the relationship between rising gasoline prices and the shift to eco-friendly transportation among university students in Ho Chi Minh City, considering factors such as age, gender, rate of spending on transport, monthly spending, and living place. A total of 520 responses were used for data analysis out of 600 questionnaires distributed. The study used a logistic model and linear regression to develop the model, and the results showed that the rate of increase in gas costs significantly influences students' choice of mode of transportation. On average, students spend 25% of their monthly budget on transportation, with the majority using motorcycles. The study has limitations, including a small sample size and a focus on only one city, so the results may not be generalizable to other areas.

The model developed in the study showed that the shift to eco-friendly transportation was influenced by gender, the current mode of transportation, monthly spending, and the rise in gas costs. However, the impact of age, living place, and purpose of travel on the shift to eco-friendly transportation was not significant.

The policy implication is that the government should provide more incentives for eco-friendly transportation to encourage the shift towards more sustainable forms of transportation. The findings of this study suggest that policies aimed at encouraging the use of eco-friendly transportation should focus on reducing the cost of alternative modes of transportation, particularly electric vehicles. Policymakers should also consider increasing the availability of charging stations and improving the public transportation infrastructure. Furthermore, there is a need to raise awareness about the benefits of eco-friendly transportation among the public.

To better understand the various factors that influence transportation choices, future research may need to employ a multi-disciplinary approach, drawing on insights from fields such as psychology, sociology, urban planning, and transportation engineering. For example, psychological factors such as perceptions of safety, convenience, and comfort can play a role in determining the mode of transportation that a student chooses. Social factors such as peer pressure, cultural norms, and social norms can also influence transportation choices. Ultimately, a more comprehensive understanding of the factors that influence transportation choices can help inform policies and interventions aimed at promoting sustainable and equitable transportation options for students.

Despite these limitations, the study provides valuable insights into the transportation choices of university students in Ho Chi Minh City and suggests potential avenues for future research. By acknowledging the limitations and calling for further investigation, the study contributes to the ongoing conversation around sustainable transportation and offers a foundation for building upon existing research in the field.

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## APPENDIX

### 1. Characteristics of respondents

Variable	Proportion	Std. Err.	Logit	
			[95% Conf. Interval]	
<b>Seniority</b>				
1	0.15	0.0156586	0.1217596	0.1834224
2	0.4019231	0.0215005	0.3605047	0.4447903
3	0.2057692	0.0177281	0.1731127	0.2427774
4	0.1730769	0.0165902	0.1428645	0.2081271
5	0.0692308	0.0111319	0.0503092	0.0945603
<b>Living Place</b>				
0	0.6923077	0.0202398	0.651189	0.7305846
1	0.1269231	0.0145981	0.100902	0.1584718
2	0.1596154	0.0160611	0.1305258	0.1937434
3	0.0211538	0.0063103	0.0117364	0.0378386

Variable	Proportion	Std. Err.	Logit	
			[95% Conf. Interval]	
<b>Gender</b>				
0	0.3557692	0.0209944	0.3156736	0.3979957
1	0.6326923	0.0211402	0.5902682	0.6731561
2	0.0115385	0.0046833	0.0051831	0.0254869
<b>Current Vehicle</b>				
0	0.5653846	0.0217382	0.5222978	0.6075056
1	0.4346154	0.0217382	0.3924944	0.4777022

2. Descriptive statistics for Electric Vehicles

Variable	Obs	Mean	Std.	Min	Max
			Dev.		
EV_lessnoise	520	3.6884	1.1725	1	5
EV_environment	520	3.8519	1.1205	1	5
EV_lessfuel	520	3.9827	1.1335	1	5
EV_lowEquipCost	520	3.7673	1.1653	1	5
EV_price	520	4.0135	0.9931	2	5

3. Variable for EV

Variable	Proportion	Std. Er.	Logit	
			[95% Conf. Interval]	
<b>EV_price</b>				
2	0.1119691	0.0138547	0.0875021	0.1422113
3	0.1505792	0.0157137	0.1222363	0.1841154
4	0.3494208	0.0209488	0.3094639	0.3916111
5	0.3880309	0.0214108	0.3468915	0.4308308
<b>EV_style</b>				
1	0.0907336	0.0126202	0.0688026	0.1187635
2	0.0752896	0.0115933	0.0554474	0.1014696
3	0.2915058	0.0199676	0.2538811	0.3322236
4	0.3204633	0.0205036	0.2815846	0.3620052
5	0.2220077	0.0182603	0.1882073	0.2599347
<b>EV_lowEquipCost</b>				
1	0.0791506	0.011862	0.0587636	0.1058153
2	0.042471	0.0088605	0.0280977	0.0637151
3	0.2200772	0.0182032	0.1864016	0.2579082
4	0.3494208	0.0209488	0.3094639	0.3916111
5	0.3088803	0.0203005	0.2704814	0.3501144
<b>EV_canfix</b>				
1	0.0656371	0.010881	0.047233	0.0905308
2	0.0579151	0.010263	0.0407515	0.0816918
3	0.2104247	0.0179094	0.1773898	0.2477588
4	0.3455598	0.0208945	0.3057369	0.3876734
5	0.3204633	0.0205036	0.2815846	0.3620052
<b>EV_less fuel</b>				
1	0.0675676	0.0110284	0.0488665	0.0927277
2	0.0328185	0.007828	0.0204745	0.052208
3	0.1467181	0.0155462	0.1187278	0.1799598
4	0.3532819	0.0210016	0.3131938	0.3955459
5	0.3996139	0.0215214	0.358174	0.4425425
<b>EV_environment</b>				
1	0.0694981	0.0111733	0.0505049	0.0949199
2	0.0444015	0.0090505	0.0296524	0.0659881
3	0.1583012	0.0160382	0.1292737	0.1924062
4	0.4189189	0.021678	0.3770322	0.462008
5	0.3088803	0.0203005	0.2704814	0.3501144
<b>EV_lessnoise</b>				
1	0.0945946	0.0128585	0.0721762	0.1230527
2	0.0405405	0.0086655	0.0265521	0.0614333
3	0.1930502	0.0173418	0.161243	0.2294155
4	0.4208494	0.0216917	0.3789216	0.4639509
5	0.2509653	0.0190499	0.2154201	0.290206