JDI
JOURNAL OF DEVELOPMENT AND INTEGRATION

JOURNAL OF DEVELOPMENT AND INTEGRATION
No. 87 (2026) 31-40 | jdi.uef.edu.vn

Influence of Attitude, Subjective Norms, Perceived Behavioral Control and Perceived Risk on Generation Z's Intention to Use Electric Vehicle Services in Ho Chi Minh City

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KEYWORDS

Attitude,
intention to use,
perceived behavioral control,
perceived risk,
subjective norms.

ABSTRACT

In the context of increasingly severe climate change, electric vehicle (EV) services have become a viable solution to reduce carbon emissions in large urban areas. Gen Z is considered a key target group in promoting the transition to green transportation. This study uses the Theory of Planned Behavior (TPB) to examine the factors influencing Gen Z's intention to use EV services in Ho Chi Minh City. With 324 valid survey responses analyzed using SPSS 22.0, the results show that Attitude, Subjective Norm, and Perceived Behavioral Control have positive effects. In contrast, Perceived Risk hurts intention to use EV services. This study not only contributes to expanding the application of TPB in the Vietnamese context but also highlights the distinct role of perceived risk in shaping behavioral intention, a role that has often been overlooked in prior domestic research. The findings provide practical implications for EV service providers and managers in designing strategies to effectively engage Gen Z and accelerate the shift toward sustainable mobility.

1. Introduction

Vietnam ranks among the countries with the most severe air pollution, especially in major cities like Hanoi and Ho Chi Minh City (HCMC). Air pollution seriously affects public health and quality of life. The transportation sector is a significant source of greenhouse gas emissions and urban air pollution. By the end of 2023, HCMC had about 10 million vehicles, including over 7.6 million motorcycles and 700,000 cars, emitting approximately 35 million tons of carbon annually, with transportation contributing about 13 million tons.

Globally, the transition from traditional fuel-based transportation to electric mobility has become urgent, with many countries, including EU members, the US, Japan, and China, adopting strong policies such as banning the sale of new gasoline-powered vehicles by 2035, subsidizing EV purchases, and expanding charging infrastructure. This global trend underscores the need for Vietnam to accelerate its transition to sustainable transportation, in line with its commitments to reduce greenhouse gas emissions under the Paris Agreement.

EVs are seen as a strategic solution to reduce pollution and greenhouse gas emissions due to their energy efficiency of around 60%, which is three times higher than that of gasoline or diesel vehicles, and their zero direct CO_2 emissions. Vietnam's EV market is still in its early stage, growing from 900

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http://doi.org/10.61602/jdi.2026.87.04
Submitted: 24-Jun-2025; Revised: 15-Aug-2025; Accepted: 15-Aug-2025; Online first: 5-Jan-2026
ISSN (print): 1859-428X, ISSN (online): 2815-6234

units in 2020 to nearly 4,000 in 2022, with a projection of 1 million EVs by 2028. This growth is driven by increased environmental awareness and supportive government policies, such as reduced registration fees and infrastructure development. VinFast leads the market, boosting consumer confidence and positioning Vietnam globally in the EV industry.

At the local level, HCMC has introduced several initiatives, such as piloting electric bus routes, launching electric taxi services in 2023, and planning a citywide charging station network. These policies aim to promote EV adoption, reduce traffic-related emissions, and align with the city's sustainable urban transport strategy.

Electric taxi services started in major cities in 2023, but research on public attitudes toward shared EV services is limited. China's experience shows that shared EV models effectively reduce urban pollution, offering lessons for Vietnam.

Generation Z (Gen Z) (1997-2012) represents a large urban population segment with strong environmental awareness and a willingness to adopt green technology. Despite supportive policies, EV ownership and use remain low, especially in areas where gasoline motorcycles dominate. Further research is needed on psychological and social factors affecting EV usage intention, including Attitudes, Subjective Norms, Perceived Behavioral Control (financial ability, charging convenience), and Perceived Risk (cost, durability, after-sales service).

Existing studies focus on purchase intention rather than usage behavior. This study extends the TPB by including Perceived Risk, which negatively affects usage intention (Deng, 2023). It examines the moderating effects of Socio-economic factors such as gender, age, income, and education.

The study aims to explore the effects of Attitude, Social norms, Perceived behavioral control, and Perceived risk on EV service usage intention in Vietnam, especially among Gen Z, and to propose policy and marketing strategies to enhance EV acceptance and use. It contributes practical insights for policymakers and businesses and advances the TPB framework in the Vietnamese context.

2. Theoretical model and research methodology

2.1. Theoretical model

2.1.1. Theory of Planned Behavior

This study builds on consumer service behavior theories, focusing on EV services. The Theory of Planned Behavior (TPB) provides the core framework for understanding the psychological determinants of EV adoption, while additional constructs, such as Perceived Risk (PR), and demographic factors, help capture unique motivations and barriers in the Vietnamese Gen Z context.

The Theory of Planned Behavior (TPB), developed by Ajzen (1991) and expanded from the Theory of Reasoned Action (TRA), explains behavioral intention through three key factors: Attitude, Subjective norms (SN), and Perceived behavioral control (PBC). While attitude reflects one's evaluation of a behavior, and SN refers to perceived social pressure, PBC accounts for the perceived ease or difficulty of performing the behavior, making TPB especially useful for studying behaviors influenced by external constraints, such as those related to emerging technologies.

The Theory of Planned Behavior (TPB) has been widely applied to analyze environmentally friendly behaviors, including green transportation. For example, Ji et al. (2024) emphasized behavioral intention as a key predictor of sustainable consumption. To enhance TPB's predictive power, many scholars have extended it by integrating Perceived Risk (PR), a critical barrier to technology adoption. Studies such as Cabeza-Ramírez et al. (2025), Gunawan et al. (2022), and Hu et al. (2025) have shown that various types of risk, including financial, performance, social, and time-related, negatively influence Attitude and Intention toward EVs or green consumption.

In addition to PR, Socio-economic Demographic factors have also been shown to moderate behavioral intention. Several studies (e.g., Buhmann et al., 2024; Gupta et al., 2024) have highlighted significant differences in adoption behavior based on gender, age, education, income, and occupation.

Grounded in this theoretical and empirical foundation, the present study adopts TPB as its core framework, integrates PR, and considers Socio-economic Demographic variables (income, education, and occupation) as moderating factors. This approach aims to capture the unique motivations and barriers to adopting EV services among Vietnam's Gen Z, thereby improving the model's predictive validity.

2.1.2. Electric vehicle service

Electric vehicle (EV) services are an inevitable trend in modern urban areas, where environmental pollution, noise, and the depletion of non-renewable resources are widespread. This type of service uses electrically powered vehicles such as electric cars, motorbikes, bicycles, and scooters to meet the mobility needs of the population. The two most common forms today are electric taxi services and EV sharing services (EVSS).

Electric taxi services involve using electric cars to transport passengers. These taxis help reduce harmful emissions, save on operating costs, and contribute to environmental protection in urban areas. Meanwhile, EV sharing services include the sharing of electric

cars, electric bikes, and electric scooters. This model not only provides mobility flexibility but also helps reduce traffic congestion and the demand for private vehicle ownership.

In summary, EV services represent not only a technological advancement but also a strong commitment toward building a sustainable, green, and intelligent transportation system. This is an important step for modern cities to improve the quality of life and reduce pressure on the environment.

2.1.3. Intention to use

Intention to use EV services refers to an individual's willingness, desire, and commitment to engage in activities related to EV services, such as renting, sharing, or using EVs in the near future. It is considered a key predictor of actual behavior, especially amid growing consumer interest in sustainable, environmentally friendly transportation solutions. According to the TPB (Ajzen, 1991), behavioral intention is shaped by three core factors: attitude toward the behavior (i.e., whether the person views EV use positively or negatively), subjective norms (social pressures or influences from family, friends, or society), and perceived behavioral control (the perceived ease or difficulty of performing the behavior). Kathuria and Nigam (2024) further emphasize that in the EV context, these factors are significantly influenced by environmental awareness, green technology trends, and government incentives.

Gunawan et al. (2022) point out that intention goes beyond mere thoughts or positive attitudes; it also manifests through concrete actions such as information seeking, trial usage, service planning, word-of-mouth recommendations, and long-term commitment. Therefore, accurately measuring and deeply understanding intention to use EV services not only helps businesses formulate effective marketing strategies but also assists policymakers in designing supportive frameworks that promote the adoption of green transportation in line with consumer demand and societal trends.

In the context of major urban centers in Vietnam, such as HCMC, where environmental pressures, traffic congestion, and energy transition demands are rising, researching and fostering Gen Z's intention to use EV services has become more essential than ever.

2.1.4. Attitude

According to Ajzen (1991), Attitude (AT) is one of the three core components in the TPB and plays a crucial role in forming behavioral intention. When individuals have a positive evaluation of a specific behavior, such as EV use, they are more likely to engage in it. This viewpoint has been tested and reinforced by numerous empirical studies worldwide.

Gunawan et al. (2022) in Indonesia found that a positive AT, shaped by factors such as performance expectancy, ease of use, emotional motivation, and financial value, directly influences the intention to use EVs. AT is considered the most important predictor in the TPB model of EV purchase behavior, and communication strategies should focus on building a positive image of EVs to reinforce consumer attitudes.

In addition, studies by Hu et al. (2025), Ji et al. (2024), and Kathuria and Nigam (2024) all agreed that a positive attitude is the primary driver motivating the intention to purchase or use new energy vehicles. These findings suggest that not only purchasing behavior but also the adoption of new technology-based services, such as EVs, is strongly influenced by how users perceive and evaluate them.

Hypothesis 1: Attitude has a positive effect on the intention to use EV services.

2.1.5. Perceived behavioral control

According to Ajzen (1991), within the TPB, Perceived Behavioral Control (PBC) reflects the extent to which an individual perceives a behavior as easy or difficult to perform, as well as their perceived control over performing that behavior. PBC is considered a key predictor that not only influences behavioral intention but also directly affects actual behavior.

Empirical studies worldwide have reinforced the pivotal role of PBC in shaping intentions to use EVs. Buhmann et al. (2024), in a study conducted in Spain, extended the TPB model to examine the intention to use battery EVs (BEVs) and found that PBC had a significantly positive impact, particularly among user groups with favorable characteristics. Similarly, Dutta and Hwang (2021) in Taiwan and Hu et al. (2025) in China confirmed that PBC is one of the most important predictors of intention to purchase EVs and to engage in sustainable consumption.

Ji et al. (2024) found that PBC positively affected the intention to use EVs in the Chinese market. PBC not only enhances behavioral intention but also strengthens consumer loyalty to eco-friendly personal vehicles, indicating the long-term role of this construct in technology acceptance models.

Hypothesis 2: Perceived Behavioral Control has a positive effect on the intention to use EV services.

2.1.6. Subjective norms

Subjective Norm (SN) is defined as the degree to which an individual perceives social pressure from significant others (such as family, friends, or colleagues) to perform or not perform a specific behavior. According to Ajzen (1991), SN reflects perceived social expectations from one's environment, which can significantly influence behavioral intention.

Recent studies support this role, indicating that when individuals feel expected by their close social circle or society at large to engage in a particular behavior, they are more likely to form the intention to do so (Wang, D. et al., 2023; Kathuria & Nigam, 2024).

In China, Hu et al. (2025) and Ji et al. (2024) showed that SN is one of the strongest predictors of EV purchase intention, especially among younger and more educated consumers. Similar results were observed in Indonesia (Gunawan et al., 2022).

In Europe, Buhmann et al. (2024) conducted a study in Spain. They found that high-income individuals and those concerned with social image are particularly influenced by social pressure when choosing sustainable transportation. Cabeza-Ramírez et al. (2025) also emphasized the importance of social influence in green consumption behavior, not only through close personal relationships but also via online communities and mass media.

In India and other developing countries, Dutta and Hwang (2021) showed that SN even surpasses personal attitude in predicting EV purchase intention. Consumers in these contexts are often strongly influenced by social norms, especially in environments where new technologies require social validation for widespread acceptance.

The influence of SN arises not only from traditional referent groups such as family and friends but also from the media, social networks, and public policies that promote green behavior. However, the degree of this influence may vary depending on cultural context, income level, age group, and environmental concern (Cabeza-Ramírez et al., 2025; Gunawan et al., 2022).

Hypothesis 3: Subjective Norms have a positive effect on the intention to use EV services.

2.1.7. Perceived Risk

Perceived risk (PR) is defined as consumers' expectation of potential loss when purchasing or using a product, and as the ability to identify and evaluate risks associated with hazardous events. In the context of EVs, PR includes financial, performance, social, psychological, time, and safety risks. These risks often negatively affect consumers' attitudes and intentions to use EVs, especially among those without practical experience with the technology.

Many studies confirm a significant negative relationship between PR and intention to use EVs. For example, Cabeza-Ramírez et al. (2025) found that financial risk is a significant barrier, whereas performance risk has a lesser impact. Deng (2023) also found that all types of risks negatively affect purchase intention, with functional and financial risks being the most significant.

To better explain usage intentions, researchers have extended the TPB by integrating PR. Hu et al. (2025) demonstrated that incorporating risk factors improves the model's predictive power regarding EV consumer behavior.

Moreover, mediating factors such as infrastructure support, incentive policies, and after-sales services can mitigate the negative impact of PR (Wang, D. et al., 2023). Gunawan et al. (2022) in Indonesia also confirmed PR as an important predictor, while social risk showed a positive effect due to EVs' modern and environmentally friendly image. Other studies across different countries, including Kathuria and Nigam (2024), also report adverse effects of PR, though the degree varies by market.

Hypothesis 4: Perceived Risk has a negative effect on the intention to use EV services.

2.1.8. Socio-economic Demographic

Recent studies indicate that demographic factors significantly influence the intention to use and adopt EVs. Buhmann et al. (2024) found that while experience, education level, and gender do not directly affect the decision to purchase EVs, price sensitivity plays a crucial role in shaping consumer behavior. This suggests that attitudes toward price are more decisive than personal characteristics in the adoption of new technologies.

Cabeza-Ramírez et al. (2025) showed that age, income, vehicle use purpose, and experience with electric or hybrid cars significantly affect purchase intention. Social norms strongly influence individuals under 30, whereas older age groups are less affected. Higher income and prior EV experience also enhance the influence of social norms, increasing willingness to pay.

Deng (2023) emphasized that gender, age, education, and income affect consumers' risk perception when buying new energy vehicles. Males tend to be more proactive in seeking information, while people over 50 are more cautious due to risk concerns. Those with higher levels of education assess risks more accurately, while low-income groups are more sensitive to financial risks. Gupta et al. (2024) observed that residential location and the age group 29-39 negatively affect the intention to use EVs, highlighting the importance of geographic and age-related contexts.

Other studies, including those by Kathuria and Nigam (2024), also confirm the significant roles of gender and age. Women are generally less willing to use EVs than men, and different age groups exhibit distinct environmental awareness and motivations. Wang, D. et al. (2023) noted that women tend to worry more about risks related to EV use, while middle-aged and older individuals show higher purchase intentions.

In summary, demographic characteristics such as age, gender, income, education, and experience play important moderating and influencing roles in the intention to use EV service

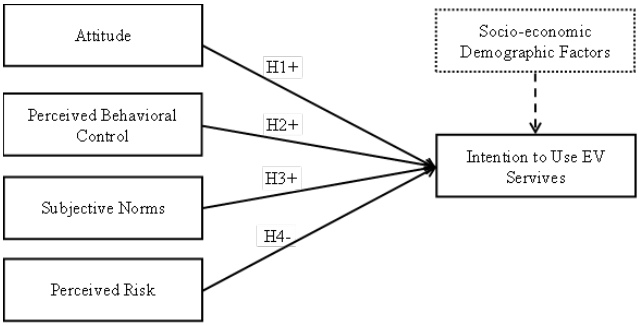

Figure 1. Research Model

2.2. Research methodology

2.2.1. Research design

This study followed a rigorous, systematic scientific process, beginning with an extensive literature review to develop a research model suitable for the Vietnamese context. Key variables were selected and clearly described, while potential relationships among them were identified. The study primarily employed a quantitative research method, using measurement scales adapted from reputable international studies and tailored to fit local cultural and market conditions. After data collection, invalid or incomplete responses were excluded, resulting in 324 valid samples. The data were coded and analyzed using SPSS version 22.0. Descriptive statistics were first used to examine the sample's demographic characteristics and the distributions of the variables. The reliability of the measurement scales was then assessed through Cronbach's Alpha to ensure internal consistency. Exploratory Factor Analysis was conducted to confirm the factor structure and assess the validity of the constructs. Pearson correlation analysis was performed to explore relationships among variables, which served as the basis for multiple linear regression analysis to test the research hypotheses. Prior to regression, key assumptions, including multicollinearity, autocorrelation, homoscedasticity, and residual normality, were thoroughly checked to ensure the robustness and validity of the model.

2.2.2. Questionnaire design

The survey was conducted using an online questionnaire on the Google Forms platform and distributed widely through social media channels. It consisted of three main sections: the first part included screening questions about respondents' age and experience with EV services; the second part covered research variables measured on a 5-point Likert scale; and the third part collected basic personal information such as gender, occupation, income, and education level. To ensure clarity and accuracy, all questions were presented bilingually in Vietnamese and English. Prior to the official launch, the questionnaire was pilot-tested with 10 participants to identify and address any ambiguities, thereby enhancing the quality of responses.

2.2.3. Research variables and Measurement scales

The study examined four main groups of variables. The independent variables included Attitude (AT), Perceived Behavioral Control (PBC), Subjective Norms (SN), and Perceived Risk (PR). The dependent variable was the Intention to Use (PI), while Socioeconomic Demographic Factors were treated as control variables. All variables were measured on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5).

The measurement scales are adapted from reputable prior studies and adjusted to suit the Vietnamese context. Specifically, the AT scale (Hu et al., 2025; Kathuria & Nigam, 2024; Dutta & Hwang, 2021; Salim et al., 2024) measures positive attitudes toward EV services and includes four observed variables; the PBC scale (Le Thanh Nam & Nguyen Ngoc Hien, 2024; Bhutto et al., 2021; Ji et al., 2024) evaluates confidence, perceived control, and convenience with four observed variables; the PN scale (Gunawan et al., 2022; Salim et al., 2024) reflects personal values and environmental responsibility and also has four observed variables; the PR scale (Hu et al., 2025; Salim et al., 2024) measures concerns about risks with three observed variables; and the PI scale (Le Thanh Nam & Nguyen Ngoc Hien, 2024; Ahmad et al., 2024) assesses the intention to use EV services through four observed variables. In total, the study employs 19 observed variables, and all scales have been tested to ensure reliability and validity for model analysis.

2.2.4. Sample design and Data collection

Regarding sample size, Hair et al. (2006) suggest that exploratory factor analysis (EFA) requires a minimum of 5 times the number of observed variables, or at least 95 samples for 19 variables. Additionally, according to Tabachnick et al. (2007), the minimum sample size for linear regression can be calculated as $n = 50 + 8 \times m$ (where m is the number of independent variables), yielding a minimum of 82 respondents for four independent variables.

The survey focused on individuals in Gen Z (born between 1997 and 2012) with an interest in or prior experience with EV services in HCMC. The questionnaire was publicly shared across approximately 30 EV-related Facebook community groups, with varying group sizes. To ensure only eligible respondents continued the survey, screening questions were placed at the beginning of the questionnaire. These mandatory

questions asked participants to confirm their year of birth and whether they had used or intended to use EV services in HCMC. Respondents who did not meet the criteria (e.g., not Gen Z, not residing in HCMC, or not interested in EVs) were automatically disqualified from proceeding.

A total of exactly 350 responses were collected. After applying data-cleaning procedures based on the exclusion criteria outlined above, 324 responses were deemed valid (approximately 92.6%). Responses were removed primarily for failing the screening questions, exhibiting signs of low-quality data (e.g., selecting the same answer throughout), or showing inconsistencies in logic. The survey was conducted using Google Forms, with required fields enabled to minimize missing data.

This study employed a convenience sampling method, collecting data in June 2025 to ensure feasibility and reliability. The data were processed using SPSS version 22. Descriptive statistics were used to analyze the sample characteristics, and appropriate statistical methods were applied to test the research hypotheses.

3. Research results and discussion

3.1. Research results

3.1.1. Respondent profiles

A total of 324 valid responses were collected for this study, all from Gen Z individuals born between 1997 and 2012 (aged 13-28), ensuring alignment with the target population of young, tech-savvy people likely to use EV services in Ho Chi Minh City. Screening questions filtered out respondents outside this age range to maintain sample representativeness. Regarding gender, 59.6% were male (193 respondents), and 40.4% were female (131 respondents), indicating slightly higher interest among males in vehicle-related technologies.

The majority of respondents held a university degree (65.7%), followed by college (14.2%), high school (9.9%), and postgraduate degrees (10.2%), reflecting a well-educated young sample typical of Gen Z. In terms of occupation, most participants were students (72.5%), with office workers (16%), freelancers (10.2%), and business owners (1.2%) making up the remainder. Monthly income varied: 54.6% earned below VND 5 million, 25.6% between VND 5–10 million, 15.1% between VND 10–20 million, and 4.6% above VND 20 million.

Regarding EV service usage, 29.9% of respondents had not yet used EV services but were aware of them; 50.9% had used them 1-2 times; 14.5% had used them 3-5 times; and only 4.9% had used them more than five times. These findings indicate that while many Gen Z individuals are still in the early adoption stage, overall awareness and initial usage experience are relatively high, suggesting the potential for further growth in EV services within this demographic.

3.1.2. Measurement scale reliability

To assess the reliability of the measurement scales, the study employs two commonly used criteria: (1) a Cronbach's Alpha coefficient of at least 0.7 to ensure internal consistency (Hair et al., 2006); and (2) a corrected item-total correlation greater than 0.3 to demonstrate that each observed variable contributes meaningfully to the overall scale (Tho, 2013).

The results presented in Table 1 show that all five measurement scales meet these reliability criteria. Specifically, Cronbach's Alpha values range from 0.822 to 0.876, indicating strong internal consistency. Furthermore, all corrected item-total correlation coefficients exceed 0.3, with the lowest being 0.601. These results confirm that each observed variable contributes effectively to its respective scale.

Therefore, it can be concluded that all five scales - Attitude (AT), Perceived Behavioral Control (PBC), Subjective Norm (SN), Perceived Risk (PR), and Intention to Use (PI) -demonstrate sufficient reliability and are appropriate for further analysis: exploratory factor analysis (EFA).

Table 1. Cronbach's Alpha results

Scale	Symbol	Number of observed variables	Cronbach's Alpha Value	Corrected Item - Total Correlation
Attitude (AT)	AT1	4	0.822	0.659
	AT2			0.654
	AT3			0.651
	AT4			0.620
Perceived Behavioral Control (PBC)	PBC1	4	0.876	0.731
	PBC2			0.710
	PBC3			0.741
	PBC4			0.751
Subjective Norm (SN)	SN1	4	0.831	0.636
	SN2			0.695
	SN3			0.601
	SN4			0.706
Perceived Risk (PR)	PR1	4	0.829	0.707
	PR2			0.721
	PR3			0.638
Intention to Use EV services (PI)	PI1	4	0.868	0.749
	PI2			0.702
	PI3			0.702
	PI4			0.740

3.1.3. Exploratory factor analysis

According to Tho (2013), when conducting exploratory factor analysis (EFA), researchers should adhere to the following criteria: (1) the Kaiser-Meyer-Olkin (KMO) measure should range between 0.5 and 1 ($0.5 \leq KMO \leq 1$), and Bartlett's test must be statistically significant with $p < 0.05$; (2) the number of factors is determined by the Eigenvalue criterion, retaining only factors with Eigenvalue > 1; (3) the total variance explained by the factors should be at least 50% (≥ 50%); (4) convergent validity is achieved when the highest factor loading for each observed variable exceeds 0.5 (> 0.5); and (5) discriminant validity is ensured when the difference between the highest and second highest factor loadings for each variable is greater than 0.3, i.e., Loading_max – Loading_second_max > 0.3.

Table 2. Exploratory factor analysis

	Component			
	PBC	SN	AT	PR
PBC3	0.836		0.157	-0.111
PBC2	0.836		0.108	
PBC1	0.835		0.134	-00.121
PBC4	0.828		0.234	
SN4		0.845		
SN2		0.840		
SN1		0.797		
SN3		0.767		-0.149
AT3			0.811	
AT2	0.132		0.794	-0.124
AT1	0.232		0.783	
AT4	0.133		0.780	
PR2				0.881
PR1				0.870
PR3	-0.136			0.819
Eigenvalues	4.093	2.596	2.096	1.716
Total variance extracted (%)	19.431	37.211	54.782	70.012
KMO	0.809			
Sig. of Bartlett's Test	0.000			

Based on the analysis, 15 observed variables related to factors influencing the use of electric vehicle services were included in the exploratory factor analysis. The EFA results, presented in Table 2, show a KMO value of 0.809 (>0.5), indicating that the collected data is suitable for factor analysis; Bartlett's Test of Sphericity (Sig. = 0.000 < 0.05) is significant, confirming that the observed variables are sufficiently correlated.

The total variance explained by the four extracted factors is 70.012% (>50%), ensuring that the factors capture the majority of the information in the dataset. Specifically, variables related to Perceived Behavioral Control (PBC) load on Component 1 with factor loadings from 0.828 to 0.836; Subjective Norm (SN) variables load on Component 2 with loadings from 0.767 to 0.845; Attitude (AT) variables load on Component 3 with loadings from 0.780 to 0.811; and Perceived Risk (PR) variables load on Component 4 with loadings from 0.819 to 0.881.

Moreover, the difference between the highest and second-highest factor loadings for each variable exceeds 0.3, indicating adequate discriminant validity among the factors. Therefore, all observed variables demonstrate both convergent and discriminant validity, providing a solid foundation for subsequent analyses such as Pearson correlation testing and regression analysis to evaluate the research hypotheses.

3.1.4. Regression analysis

Table 3. Correlation between variables

		AT	PBC	SN	PR	PI
PI	Pearson Correlation	0.527**	0.600**	0.230**	-0.302**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	324	324	324	324	324

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 shows that the independent variables AT, PBC, and SN have a moderate positive linear correlation with the dependent variable PI, with Pearson correlation coefficients in the range of [0.4, 0.6] (Trong & Ngoc, 2013). The variable PR has a moderate negative linear correlation with PI. All Sig. values are less than 0.05, indicating that the linear correlations between these variables and PI are statistically significant at the 1% level.

The results of the multiple linear regression analysis indicate that the model demonstrates a relatively good fit. Specifically, the Durbin-Watson coefficient is d = 1.836, which falls within the acceptable range of [1, 3], as suggested by Trong and Ngoc (2008), indicating the absence of autocorrelation among residuals.

The standardized residual scatterplot shows a random distribution around the horizontal axis with no clear pattern, suggesting homoscedasticity - that is, the residuals have constant variance.

The P-P Plot shows that the data points lie close to the diagonal, indicating that the residuals are approximately normally distributed. In addition, the Histogram of standardized residuals displays a bell-

shaped curve, with most values concentrated between -2 and 2. The mean of the residuals is 3.17E-16 (approximately zero), and the standard deviation is 0.99379 (approximately one), further supporting the normality assumption.

The adjusted R^2 value of 0.513 indicates that the model explains 51.3% of the variance in the dependent variable, with the remainder attributed to error and other unobserved factors.

Multicollinearity was tested using VIF and Tolerance values, all of which met the thresholds (VIF < 2, Tolerance > 0.5), confirming that no multicollinearity issues exist in the model (Table 4).

Finally, statistical significance testing shows that independent variables such as AT, PBC, SN, and PR all have Sig. values < 0.05, indicating a statistically significant effect on the dependent variable PI. Therefore, all proposed research hypotheses are supported (Table 5).

Among the factors influencing Gen Z's intention to use EV services in HCMC, the descending order of impact is as follows: Attitude (β = 0.342), Perceived Behavioral Control (β = 0.422), Subjective Norms (β = 0.152), and Perceived Risk (β = -0.167).

3.2. Research discussion

Hypothesis H2 is accepted, indicating that Perceived Behavioral Control (β = 0.422) has the most substantial positive impact on the intention to use EV services. This finding aligns with the studies of Ajzen (1991), Buhmann et al. (2024), Dutta and Hwang (2021), Hu et al. (2025), and Ji et al. (2024). The observed variables measuring the PBC construct have moderately high mean values, ranging from 3.42 to 3.72. Among the PBC items, PBC2 ("Whether or not I use electric vehicle services is entirely up to me") has the highest mean value of 3.72. This indicates that most Gen Z respondents in HCMC feel confident in their ability to access and use EV services. Enhancing perceived ease of use and convenience can therefore effectively increase their intention to adopt EV services.

Example: The Be Group – BeBike electric project in HCMC provides an easy-to-use booking app and a network of electric bikes in central areas, helping users access and use the service, increasing confidence and usage frequency.

Hypothesis H1 is accepted, confirming that Attitude (β = 0.342) has a direct and positive influence on the intention to use EV services. This result is consistent with previous studies by Ajzen (1991), Gunawan et al. (2022), Hu et al. (2025), Ji et al. (2024), and Kathuria and Nigam (2024), which identified attitude as a key factor in EV adoption behavior. The observed variables measuring the Attitude (AT) construct have relatively high mean values, ranging from 3.45 to 3.80. The item AT1 ("I have a favorable attitude toward using electric vehicle services in Ho Chi Minh City") has the highest mean of 3.80, showing that respondents generally hold positive perceptions toward EV services. Maintaining and strengthening this positive attitude can serve as a foundation to boost usage intention among Gen Z.

Example: VinFast's VF e34 electric car line has raised awareness of EVs in Vietnam through modern design and test-drive programs, thereby enhancing consumers' positive attitudes toward EVs.

Hypothesis H3 is accepted, confirming that Subjective Norms (β = 0.152) also have a positive influence on the intention to use EV services. However, the level of influence is relatively lower

Table 4. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.667	0.227		2.943	0.003		
	AT	0.318	0.039	0.342	8.186	0.000	0.861	1.161
	PBC	0.376	0.038	0.422	9.930	0.000	0.834	1.199
	SN	0.158	0.041	0.152	3.871	0.000	0.982	1.018
	PR	-0.140	0.033	-0.167	-4.201	0.000	0.957	1.045

a. Dependent Variable: PI

Table 5. Results of hypothesis testing

	Hypothesis	Result
H1	Attitude has a positive effect on the intention to use EV services.	Accept
H2	Perceived Behavioral Control has a positive effect on the intention to use EVs services.	Accept
H3	Subjective Norms have a positive effect on the intention to use EV services.	Accept
H4	Perceived risk has a negative effect on the intention to use EV services.	Accept

than that of other factors. This result is consistent with the studies of Ajzen (1991), Wang, D. et al. (2023), Kathuria and Nigam (2024), Hu et al. (2025), Ji et al. (2024), Gunawan et al. (2022), Buhmann et al. (2024), Cabeza-Ramírez et al. (2025), and Dutta and Hwang (2021), which emphasize the role of social influence in promoting sustainable consumption behavior. The observed variables measuring the SN construct have mean values ranging from 3.44 to 3.62. The item SN4 ("I would be more likely to use electric vehicle services if people close to me also did") has the highest mean of 3.62, suggesting moderate social influence from family and friends. Leveraging social networks and peer recommendations could moderately encourage EV adoption.

Example: The GoShare electric motorbike-sharing service in Hanoi and HCMC attracts new users through friend-referral programs, encouraging groups of friends to try EVs together and boosting social influence.

Hypothesis H4 is accepted, showing that Perceived Risk (β = -0.167) negatively affects the intention to use EV services. This finding is in line with the results of Cabeza-Ramírez et al. (2025), Deng (2023), Hu et al. (2025), Wang, D. et al. (2023), Gunawan et al. (2022), and Kathuria and Nigam (2024), which emphasized that concerns about financial costs, safety, and performance risks are significant barriers to EV adoption. The observed variables measuring the PR construct have relatively high mean values, ranging from 1.97 to 2.25. The item PR1 ("I am worried that electric vehicle services may not be reliable or consistent") has the highest mean of 4.03, indicating that concerns about service reliability are the most significant barrier. Reducing perceived risks through reliable service, transparent pricing, and customer support can help increase EV usage among Gen Z.

Example: The VinBus electric bus project in HCMC ensures stable operations and transparent customer service, reducing concerns about reliability and increasing trust and usage among residents.

4. Conclusion, managerial implications and limitations

4.1. Conclusion

This study explores the factors influencing Gen Z's intention to use EV services in HCMC. Key findings show that Attitude (β = 0.342), Perceived Behavioral Control (β = 0.422), and Subjective Norms (β = 0.152) are significant predictors, indicating that Gen Z's intention is shaped by personal beliefs, social pressure, and confidence in using EVs. Perceived risk (β = -0.167) also affects intention, reflecting concerns about cost, safety, and efficiency. This underscores the role of external conditions, including infrastructure, service quality, and policy support. Demographic factors, including income, urban living, gender, and education, moderately influence adoption, primarily through indirect effects such as environmental awareness and risk perception. The study highlights the complex, multi-layered nature of EV adoption behavior among young consumers in a developing country.

4.2. Management implications

This study offers important insights for policymakers, EV service providers, and educational institutions seeking to promote EV usage behavior among young consumers, especially Gen Z, in major urban areas such as HCMC.

First, the three influential factors on the intention to use EV services are Attitude, Subjective Norms, and Perceived Behavioral Control. This indicates that young people tend to choose environmentally friendly transportation if they hold positive perceptions of EVs, feel confident using them, and receive social support from family and peers. Therefore, companies should develop communication campaigns that foster positive attitudes, integrate messages about environmental benefits and convenience, and leverage influencers or Gen Z communities to spread the "green lifestyle" trend.

Second, Perceived Risk remains a notable barrier, reflecting concerns over the cost, safety, and operational efficiency of EVs. Service providers need to enhance the user experience by providing transparent information on pricing, performance, insurance policies, and technical support. Additionally, government and businesses should collaborate to implement incentives and subsidies and to invest in charging infrastructure, to reduce consumer anxiety and build trust.

Third, demographic factors such as income, residence, gender, and education indirectly influence EV usage behavior. Individuals with higher incomes or those living in urban areas are more likely to access and adopt EVs due to better financial conditions and infrastructure. Therefore, companies should identify target customer segments and offer flexible pricing models, rent-use-return schemes, or free trials to reach a broader range of users, especially students and middle-income groups.

Finally, since EV usage behavior has a strong social aspect, organizations and universities can take a leading role in organizing awareness campaigns and hands-on experiences to help cultivate positive habits and attitudes toward green transportation among young people.

4.3. Limitations

This study has several limitations that should be acknowledged. First, the sample is limited to Gen Z in HCMC, so it may not fully reflect the behaviors and intentions of other age groups or consumers in areas

with different social, economic, and infrastructural contexts across Vietnam. Second, most previous studies have focused primarily on the intention to purchase EVs rather than the intention to use EV services, resulting in a lack of comprehensive information about service usage behavior. Third, the research model may not include all important influencing factors; variables such as awareness of government support policies, trust in EV technology, environmental knowledge, and perceptions of price fairness have not been included, although they may significantly affect consumer intention. Finally, the cross-sectional research design limits the ability to track changes over time. These limitations suggest the need for broader, more diverse samples and more comprehensive models to better understand the motivations and behaviors behind adopting EV services.

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