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FACTORS INFLUENCING STUDENTS'INTENTIONS TO USE ELECTRIC RIDE-HAILING SERVICE IN HANOI

CÁC NHÂN TỐ TÁC ĐỘNG TỚI Ý ĐỊNH SỬ DỤNG DỊCH VỤ GỌI XE ĐIỆN CỦA SINH VIÊN TẠI HÀ NỘI

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Abstract

The rapid growth of urban areas and the increasing demand for mobility have heightened concerns about the environmental impact of transportation systems. Electric ride-hailing services (RHS) are becoming increasingly popular as a solution to urban transportation issues and a means of advancing sustainable development. There is a major research gap that needs to be filled, as studies on the topic of electric RHS among students in Hanoi are limited, despite the abundance of research on general consumer adoption reasons. This study examines the factors influencing students' intention to use electric ride-hailing services in Hanoi. To achieve this, the study utilizes the Unified Theory of Acceptance and Use of Technology 2 framework to identify relevant predictors to students' intention to use electric ride-hailing services based on data collected from 264 students in Hanoi. The results reveal that all seven factors significantly impact students' intentions, with Performance Expectancy having the strongest influence. Research results are expected to provide some arguments for managers and policymakers in finding solutions to attract more students to use the friendly form of public transport in the future to promote sustainable transportation solutions in urban areas.

Keywords: *Electric ride-hailing service, students' intentions, UTAUT2.*

Tóm tắt

Tốc độ tăng trưởng nhanh chóng của các khu vực đô thị và nhu cầu di chuyển đã làm gia tăng mối lo ngại về tác động của hệ thống giao thông đối với môi trường. Các dịch vụ gọi xe điện (RHS) đang trở nên ngày càng phổ biến như một giải pháp cho các vấn đề giao thông đô thị và là phương tiện thúc đẩy sự phát triển bền vững. Tuy đã có nhiều nghiên cứu về lý do sử dụng RHS của người tiêu dùng nhưng các nghiên cứu đối với sinh viên trên địa bàn thành phố Hà Nội còn tương đối hạn chế. Vì thế, nghiên cứu này được thực hiện nhằm đánh giá các yếu tố ảnh hưởng đến ý định sử dụng dịch vụ gọi xe điện của sinh viên tại Hà Nội. Để đạt được mục tiêu trên, nghiên cứu đã sử dụng mô hình chấp nhận công nghệ 2 (UTAUT2) nhằm xác định các yếu tố liên quan đến ý định sử dụng dịch vụ gọi xe điện của sinh viên dựa trên dữ liệu được thu thập từ 264 sinh viên trên địa bàn thành phố Hà Nội. Kết quả cho thấy tất cả bảy yếu tố đều tác động đáng kể đến ý định của sinh viên, trong đó Kỳ vọng về hiệu suất có ảnh hưởng mạnh nhất. Kết quả nghiên cứu này được kỳ vọng cung cấp một số luận cứ cho các nhà quản lý, nhà hoạch định chính sách trong việc tìm kiếm các giải pháp thu hút nhiều hơn sinh viên sử dụng phương tiện giao thông công cộng thân thiện trong tương lai với mục tiêu thúc đẩy các giải pháp giao thông bền vững ở khu vực đô thị.

Từ khóa: *Dịch vụ gọi xe điện, ý định của sinh viên, UTAUT2.*

1. Introduction

There is an urgent need to transition to sustainable transport, as the sector currently accounts for 20% of global greenhouse gas (GHG) emissions (World Bank, 2024). In major urban areas like Hanoi and Ho Chi Minh City, road transport is a key contributor to local air pollution, especially particulate matter (PM 2.5), which poses significant health risks. By 2030, annual passenger traffic is expected to exceed 80 trillion passenger-kilometers, a 50% increase from 2015 estimates, potentially adding 1.2 billion cars to global roads (International Transport Forum, 2018). Consequently, improving the sustainability of urban transport is critical for cities facing challenges like air pollution (US EPA, 2019) and traffic congestion (Pishue, 2020).

The growth of Ride-Hailing Services (RHS) and the adoption of electric vehicles (EVs) are key drivers of sustainable transport in the sharing economy. RHS, a mobility-on-demand model, allows users to order rides through a smartphone app, reducing the need for personal vehicle ownership and lowering emissions by promoting shared rides and integrating with public transportation (Chalermpong et al., 2022; Yu et al., 2017). In Vietnam, RHS is growing rapidly, with the 2024 Vietnam Ride-Hailing Market report predicting the market will reach $880 million this year, with a 19.5% annual growth rate from 2024 to 2029. Vietnam also has significant potential to lead in EV demand and production, especially in the electric two-wheeler market (Le & Posada, 2022).

While traditional ride-hailing services like Grab and Be dominate the Vietnamese market, electric ride-hailing is emerging, with Xanh SM offering services since 2023. Unlike gasoline or diesel vehicles, EVs produce zero or significantly lower emissions, potentially reducing emissions by up to three times compared to conventional vehicles (Jenn, 2020). A study of one million ride-hailing trips in Beijing by Yu et al. (2017) showed that electrifying these trips, paired with clean electricity, enhances environmental benefits. Additionally, EVs are quieter, reducing urban noise pollution (Veza et al., 2023). Electric ride-hailing offers both convenience and environmental responsibility, promoting sustainable transport, especially in low-income or vulnerable communities, where EV adoption can foster human development and social inclusion (World Bank, 2024).

To promote the use of EVs for sustainable transport, various studies have explored factors influencing the use of electric RHS. (i) In the early 2010s, research focused on consumer perceptions of EVs and their environmental benefits, identifying technology advancements, financial incentives, and environmental awareness as key factors influencing adoption (Egbue & Long, 2012). Despite the increasing interest in customer preferences and financial aspects (Rayle et al., 2014), the integration of EVs into RHS and factors affecting student adoption remain underexplored. (ii) From 2016 to 2019, research shifted toward the viability of integrating EVs, highlighting the importance of charging infrastructure and economic feasibility (Alonso-Mora et al., 2017). Consumer studies found that ride comfort, cost savings, and environmental benefits significantly influenced the adoption of electric RHS (Narassimhan & Johnson, 2018). However, studies focusing on students or the unique urban environment of Hanoi are still lacking. (iii) More recently, research has expanded to explore various factors affecting consumers' intentions to use electric RHS, such as the role of financial incentives, policy support, the COVID-19 pandemic, and safety concerns (Hardman et al., 2017; Shaheen & Cohen, 2020). Other studies have also investigated ethical attitudes, consumer values (Qian et al., 2023), and how perceived usefulness influences attitudes and intentions (Christie et al., 2024).

However, there are few studies that particularly address electric RHS among the student population in Hanoi. The socio-economic and infrastructural specifics of Hanoi, along with the unique needs and behaviors of students, are underexplored in existing literature. Under such a context, we decide to embark on the topic: “Factors influencing students’ intentions to use electric ride-hailing service in Hanoi”. This study reviewed domestic and international research and systematized the theoretical background on behavioral intention. Using the UTAUT2 model, a questionnaire was developed to collect data from 264 students in Hanoi, and Binary Logistic regression was used for analysis. The research identified key factors influencing consumers’ intentions to use electric ride-hailing services in Hanoi, suggested potential directions for future research, and proposed practical implications for ride-hailing companies and policymakers to improve service quality and design future electric mobility solutions.

2. Theoretical framework

2.1. Definition of electric ride-hailing service

The term "ride-hailing" describes the process by which a client uses a smartphone application to order a customized ride online. It is comparable to a taxi service. The ride-hailing platform, which acts as a middleman between the driver and the passenger, is where the customer orders the ride. Some of the most well-known ride-hailing platforms in Vietnam are Gojek, Grab or Be. Electric ride-hailing refers to the practice of using EVs like electric bikes and cars for RHS.

2.2. Review of related theory: Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al.

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(2003), predicts technology acceptance in organizational contexts through four key determinants: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. These factors are moderated by Gender, Age, Experience, and Voluntariness of Use. Venkatesh et al. (2012) extended UTAUT to create UTAUT2, focusing on consumer technology adoption. UTAUT2 introduces three additional constructs-Hedonic Motivation, Price Value, and Habit-removes the Voluntariness of Use moderator, and links Facilitating Conditions to behavioral intention, while maintaining moderated relationships for the new constructs. Compared to UTAUT, the additions in UTAUT2 significantly improve the explained variance in behavioral intention (from 56% to 74%) and technology use (from 40% to 52%) (Venkatesh et al., 2012). The UTAUT2 model has been widely used to measure technological acceptance in research across various fields such as education (Arain et al., 2019) and health (Yuan et al., 2014); among different user types: students (Azizi et al., 2020), elder people (Macedo, 2017),... ; and in many countries: Spain (Saumell et al., 2019), Vietnam (Nguyen et al., 2024), USA (Yuan et al., 2014). Extensions of the UTAUT2 model have incorporated additional factors such as environmental concern and government support (Cuong et al., 2024) or combine with other models like TAM (Nuswantoro et al., 2024).

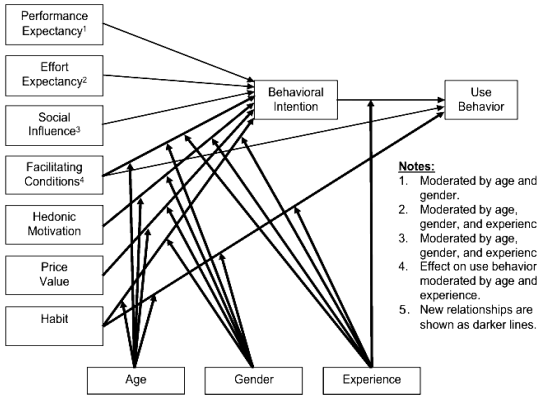

Figure 1. UTAUT2

Source: Venkatesh et.al. (2012).

In this study the authors will use UTAUT2 to investigate how students' intentions to use electric rail-hailing services in Hanoi are influenced by Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value and Habit.

3. Methodology

3.1. Research method

The study's research methodology combines qualitative and quantitative methods. A literature review identified key insights and research gaps in ride-hailing, sustainable transportation, and consumer behavior. In the quantitative phase, data were collected from 264 students in Hanoi through an online survey. The surveys main constructs-Performance Expectancy, (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Hedonic Motivation (HM), Price Value (PV), and Habit (HT)-were taken from the UTAUT2 model. A binary logistic regression was employed to evaluate the relationships between the independent variables (measured on a 5-point Likert scale) and the dependent variable-students' intentions to use electric RHS. We have the binary logistic regression equation as follows:

$$\mathbf{Log_e[P/(1-P)]=B_0 + B_1*PE + B_2*EE + B_3*FC + B_4*PV + B_5*HT + B_6*SI + B_7*HM}$$

3.2. Data Collection Method

Based on the literature review, the authors developed a scale and questionnaire for a quantitative study conducted online via Google Forms, targeting consumers in Vietnam. The survey, distributed to students from various colleges in Hanoi, ran from June 1st to June 20th, 2024. According to Hinkin (1998), the recommended item-to-response ratio for factor analysis is 1:4 to 1:10. With 25 items, an optimal sample size would be between 100 and 250 responses.

3.3. Research model

Based on the analysis of documents regarding theoretical models for the intention to use electric buses in the context of green mobility trends, the authors suggest using the extended UTAUT2 model to develop the research model for this topic. Specifically:

4. Results and Discussion

4.1. Results

4.1.1. Descriptive Statistics

After the questionnaire was distributed, we received 289 responses. By removing partial returns and missing responses (from both the scale and the demographic sections), the final 264 responses were analyzed, which was the appropriate sample size to 25 items in the questionnaire. First, the majority of

Table 1. Research Hypotheses

Variable	Supporting Literature	Hypothesis
Performance Expectancy	Venkatesh et al. (2003); Degirmenci & Breitner (2017)	H1: Performance expectancy positively affects the intention to use electric ride-hailing services among students.
Effort Expectancy	Davis (1989); Tran et al. (Studies in EV usability & ride-hailing)	H2: Effort expectancy positively affects the intention to use electric ride-hailing services among students.
Facilitating Conditions	Venkatesh et al. (2012); Lu et al. (2020)	H3: Facilitating conditions influence students' intention to use electric ride-hailing services in Hanoi.
Price Value	Dodds et al. (1991); Zhou et al. (2021)	H4: Price value positively affects the intention to use electric ride-hailing services among students.
Habit	Limayem et al. (2007)	H5: Habit positively affects the intention to use electric ride-hailing services among students.
Social Influence	Wang et al.; Zhou et al. (2010); Abdekhoda et al. (2022)	H6: Social influence positively affects the intention to use electric ride-hailing services among students.
Hedonic Motivation	Venkatesh et al. (2012); Yuen et al. (2020)	H7: Hedonic motivation positively impacts students' intention to use electric ride-hailing services in Hanoi.

Source: Authors compiled

respondents were female (67%), with male respondents accounting for 33%. Regarding age, the largest group was 20 years old (58.7%), followed by 19-year-olds (20%), with the remainder aged 21 or older. Concerning monthly spending, nearly 70% of respondents reported spending between 1,500,000 VND and 4,500,000 VND per month. Approximately 15% of respondents spent either less than 1,500,000 VND or between 4,500,000 VND and 7,500,000 VND, while only a small proportion spent over 7,500,000 VND monthly. This distribution of spending appears reasonable for university students in Hanoi, reflecting modest budgets amidst the city's high living costs.

4.1.2. Testing the appropriateness of the model

The Hosmer and Lemeshow test is used in this study to assess the model's appropriateness. When assessing the quality of fit of binary, multinomial, and ordinal logistic regression models, the Hosmer and Lemeshow test is frequently used. This table will have three items: Step, Block, Model. We will focus on the Chi-square test results in the Model section.

We test the following pair of hypotheses: (H0): The model is appropriate at 5% level (sig < 0.05); (H1): The model is not appropriate at 5% level (sig > 0.05).

Since the Chi-square significance value in the Model row is less than 0.05, we conclude that the regression model is appropriate at the 5% level. This indicates that our model fits the data well.

Table 2. Omnibus Tests of Model Coefficients

	Tham số	Chi-square	df	Sig.
Step 1	Step	123.594	7	.000
	Block	123.594	7	.000
	Model	123.594	7	.000

Source: Compiled by the author from SPSS 20 software

4.1.3. Assessing the model predictiveability

The classification table is used to assess the predictive accuracy of a logistic regression model by comparing observed and predicted values of the dependent outcome at a user-specified cut-off, such as p=0.50. In the table, out of 42 actual cases where individuals chose not to use electric ride-hailing services, 36 were correctly predicted, resulting in a prediction accuracy of 36/42 = 85.7%. For the 222 cases where individuals actually used electric ride-hailing services, 196 were correctly predicted, giving a prediction accuracy of 196/222 = 88.3%. Overall, the model's prediction accuracy is (36+196)/264 = 89.7%.

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Table 3. Classification Table

Classification Table[a]					
			Predicted		
			BI		Percentage Correct
			Not intend to use electric ride-hailing service	Intend to use electric ride-hailing service	
Step 1	BI	Not intend to use electric ride-hailing service	36	6	85.7
		Intend to use electric ride-hailing service	26	196	88.3
	Overall Percentage				87.9
a. The cut value is .500					

Source: Compiled by the author from SPSS 20 software

Table 4. Variables in the Equation

Var	B	S.E.	Wald	df	Sig.	Exp(B)
PE	.954	.301	10.016	1	.002	2.596
EE	.768	.263	8.543	1	.003	2.156
FC	.525	.244	4.632	1	.031	1.691
PV	.689	.263	5.003	1	.025	1.801
HT	.500	.238	4.391	1	.036	1.648
SI	.557	.245	5.182	1	.023	1.745
HM	.565	.225	6.316	1	.012	1.760
Constant	-1.287	2.489	11.085	1	.001	.000

Source: Compiled by the author from SPSS 20 software

4.1.4. Regression Analysis

According to the result of the Wald Test, the authors obtain model as follow:

Loge[P/(1-P)] = -1.287 + 0.954*PE + 0.768*EE + 0.525*FC + 0.689*PV + 0.500*HT + 0.557*SI + 0.565*HM

The regression analysis reveals that all regulatory variables significantly influence students' intention to use electric RHS: PE has a coefficient (B) of 0.954 (Sig. = 0.002); EE has a coefficient of 0.768 (Sig. = 0.004); FC have a coefficient of 0.525 (Sig. = 0.031); PV has a coefficient of 0.500 (Sig. = 0.001); HT has a coefficient of 0.713 (Sig. = 0.036); SI has a coefficient of 0.557 (Sig. = 0.023); HM has a coefficient of 0.565 (Sig. = 0.012). Each of these analyses confirms that the respective hypotheses (H1 to H7) are valid, demonstrating significant positive effects of the independent variables on the intention to use electric RHS among students in Hanoi.

4.2. Discussion

Research findings point out seven factors positively influencing students' intentions to use electric RHS, consistent with the hypotheses, with performance expectancy emerging as the most significant. Students view EVs as useful due to their environmental benefits, including zero emissions, quiet operation, and advanced technology. This finding is consistent with the study by Christie et al. (2024) on increasing user intention to use electrical RHS. The study emphasizes the significance of price value and effort expectancy. Services and apps that are easy to use and offer competitive prices greatly impact students' choices. Research shows that Generation Z, known for being tech-savvy and having moderate incomes, leans towards environmentally friendly transportation like electric buses when prices are favorable. Nguyen and Pojanis (2023) found that students' intentions to use electric buses are influenced by environmental awareness, but price is still crucial. Cecere et al. (2018) also highlight that price reduction is a key factor in moving consumers from non-intention to intention to purchase electric vehicles. The research paper also highlights the

positive effects of hedonic motivation, social influence, facilitating conditions, and habit on students' intentions to use electric RHS. The excitement of new experiences and positive outcomes encourage continued use. Recommendations from friends and family, along with factors like fast internet and good customer service, strengthen these associations and may foster habits and referrals. These findings align with Yuen et al. (2020), Abdekhoda et al. (2022), Lu et al. (2020), and Limayem et al. (2007).

The authors highlight a multifaceted approach to understanding student adoption of electric RHS, focusing on psychological factors (hedonic motivation, social influence, habit), practical benefits (performance expectancy, effort expectancy, price value), and facilitating conditions. This approach helps electric ride-hailing providers develop effective strategies for targeting this customer segment.

5. Conclusion

Using a sample of 264 students, the study examined the effects of seven factors on intentions to use an electric ride-hailing service in Hanoi. The research results support all the proposed hypotheses. Performance expectancy, Price value, effort expectancy are the three most significant factors. To promote the adoption of electric ride-hailing services among students in Hanoi, both the government and businesses must align with key adoption factors. The government can boost performance expectancy by expanding charging infrastructure and offering incentives like tax reductions and subsidies for electric vehicles. Public awareness campaigns on the eco-benefits of EVs, along with the implementation of low-emission zones and emissions reduction targets, will further support adoption. For businesses, enhancing effort expectancy through user-friendly apps and competitive pricing, such as student discounts and loyalty programs, will increase accessibility. To leverage social influence, businesses should utilize social media and referral programs to encourage peer recommendations. Marketing efforts should focus on the hedonic appeal of electric ride-hailing, highlighting novelty and environmental benefits. Lastly, maintaining high service quality with reliable vehicles and excellent customer support will strengthen both performance expectancy and user habits. By addressing these factors, the government and businesses can create a supportive ecosystem that accelerates adoption and advances Vietnam's sustainability goals. A key limitation of this study is the imbalanced sample, with more female (67%) than male (33%) respondents, potentially introducing bias. Future research should use a more balanced sample to improve generalizability and strengthen recommendations for policymakers and industry stakeholders.

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