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Driving the Future: Unpacking Factors Influencing Passengers' Switch to Electric Taxis in Ho Chi Minh City

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KEYWORDS

Perceived environmental benefits,
perceived cost incentives,
service quality,
social influence,
switching intention,
city pollution.

ABSTRACT

This study investigates key factors influencing passengers' intention to switch from conventional taxis to electric taxis in Ho Chi Minh City, Vietnam. Employing a quantitative approach with a sample of 284 commuters, Partial Least Squares Structural Equation Modeling (PLS-SEM) and Importance-Performance Map Analysis (IPMA) were utilized for data analysis. Findings revealed that perceived environmental benefits (PEB), perceived cost incentives (PCI), and service quality (SQ) significantly influenced switching intention (SWI), while social influence (SI) had no direct effect but indirectly affected intention through perceived environmental benefits. Among these factors, service quality exhibited the strongest direct influence, followed closely by perceived environmental benefits. IPMA highlighted that service quality and perceived environmental benefits had high importance and relatively high performance, emphasizing their strategic relevance for promoting electric taxi adoption. These insights provide valuable guidance for policymakers and businesses aiming to enhance electric taxi usage through improved service quality and environmental communication strategies.

1. Introduction

Urban transportation is undergoing a significant transformation as cities strive to implement sustainable mobility solutions. The adoption of electric vehicles (EVs) has emerged as a key strategy in reducing carbon emissions and addressing environmental concerns associated with traditional fuel-based transportation (Wang et al., 2018). In this context, electric taxi services have gained increasing attention as a viable alternative to conventional taxis, offering environmental, economic, and service-related benefits (Axsen et al., 2012). However, despite the potential advantages, the adoption rate of electric taxis remains relatively low in many developing cities, including Ho Chi Minh City, Vietnam.

Understanding the factors influencing passengers' switching intention to electric taxis is crucial for promoting the widespread adoption of this sustainable transportation mode. Previous studies have explored the determinants of consumer adoption of electric vehicles (Rezvani et al., 2018), ride-hailing services (Rayle et al., 2016), and mobility-as-a-service (MaaS) solutions (Sochor et al., 2018). However, research focusing specifically on passenger switching intention from conventional taxis to electric taxis is still limited, particularly in emerging markets like Vietnam.

This study aims to investigate the key determinants of switching intention to electric taxi services in Ho Chi Minh City by examining the role of perceived

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environmental benefits, perceived cost incentives, service quality, and social influence. The study draws on established theories in consumer behavior and sustainable mobility adoption to develop a conceptual framework. Specifically, this research will employ Partial Least Square Structural Equation Modeling (PLS-SEM) to empirically test the relationships between these factors and passengers' intention to switch to electric taxis. Three research questions were proposed to guide this research:

RQ1: What are the the factors affecting commuter's switching intention to electric taxi services in Ho Chi Minh City?

RQ2: Which factors have the highest importance for influencing switching intention?

RQ3: How do passengers perceive the performance of these factors in the adoption of electric taxi services?

To address the research objective of examining the key factors influencing passengers' switching intention to electric taxi services in Ho Chi Minh City, this study is guided by three research questions. First, RQ1 explores what factors significantly affect commuters' intention to switch from conventional to electric taxis, focusing on constructs such as perceived environmental benefits, perceived cost incentives, service quality, and social influence. Second, RQ2 investigates which of these factors are most important in shaping switching intention, based on the relative effects identified through Partial Least Squares Structural Equation Modeling (PLS-SEM) and the Importance-Performance Map Analysis (IPMA). Finally, RQ3 examines how commuters perceive the current performance of these influencing factors, offering practical insights for policymakers and service providers. Together, these research questions capture both the structural relationships and actionable implications, contributing to a comprehensive understanding of electric taxi adoption behavior in a rapidly urbanizing city context.

The findings of this study provide valuable insights for policymakers, taxi service operators, and urban mobility planners in designing effective strategies to promote the adoption of electric taxis. As cities worldwide grapple with traffic congestion, rising emissions, and sustainability challenges, the transition to electric-powered transportation has become a key priority. Understanding the factors that drive passengers' switching intention enables decision-makers to develop targeted policies, optimize infrastructure investments, and implement consumer-focused incentives that facilitate widespread adoption. By identifying the critical drivers of switching behavior, this research contributes to the broader discourse on sustainable transportation and green mobility solutions, particularly in rapidly urbanizing cities like Ho Chi Minh City. The study's insights not only help refine local transportation policies but also offer a framework for other metropolitan areas aiming to transition toward cleaner, more energy-efficient mobility systems.

2. Literature Review

2.1. Research background

Many cities worldwide have introduced electric taxi services to reduce carbon emissions, improve air quality, and promote green urban mobility (Hosseini et al., 2021). However, the transition to electric taxis faces challenges related to consumer adoption, cost considerations, service reliability, and infrastructure development, particularly in developing cities such as Ho Chi Minh City, Vietnam.

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh, Morris, Davis, and Davis (2003), serves as the leading theoretical foundation for this study. UTAUT explains technology adoption behavior by identifying key determinants such as performance expectancy, effort expectancy, social influence, and facilitating conditions. In the context of electric taxis, social influence, perceived cost incentives, and perceived environmental benefits are key drivers of consumer adoption decisions, aligning with the UTAUT framework. Additionally, service quality plays a crucial role in shaping consumer perceptions, as a well-functioning, reliable, and comfortable service enhances user experience and switching intention.

In addition, it is important to contextualize switching intention within the broader literature on consumer switching behavior. The Push-Pull-Mooring (PPM) model, originally developed in migration studies and later extended to consumer behavior (Bansal et al., 2005), offers a useful lens. This framework explains switching intention as a function of push factors (negative aspects of the current service, such as dissatisfaction), pull factors (positive features of the alternative service, such as environmental benefits or better quality), and mooring factors (personal or social constraints that hinder switching, such as habits or perceived switching costs). In the context of electric taxis, perceived service quality and environmental advantages can be conceptualized as pull factors, drawing passengers toward the new option, while factors like poor service or high emissions from conventional taxis may act as push factors. Integrating this behavioral theory provides a more comprehensive understanding of the psychological and contextual drivers behind passengers' intention to switch from conventional to electric taxi services.

Existing research on electric vehicle adoption primarily focuses on private ownership rather than shared mobility solutions such as electric taxis (Hosseini et al., 2021). While studies on ride-hailing services (Li et al., 2021) and sustainable mobility (Hardman,

2019) provide valuable insights, there is a gap in understanding how these factors interact to influence passengers' intention to switch from conventional taxis to electric taxis. This study aims to bridge this gap by examining the role of perceived environmental benefits, perceived cost incentives, service quality, and social influence in shaping switching intention, using Structural Equation Modeling (SEM) and Importance-Performance Map Analysis (IPMA).

Given the Vietnamese government's increasing efforts to promote green transportation, understanding passenger preferences and barriers to electric taxi adoption is critical. By applying UTAUT to the electric taxi context, this study provides a theoretical and empirical foundation for enhancing sustainable urban transportation policies and business strategies.

2.2. Research model and hypothesis development

2.2.1. Switching Intention and Consumer Behavior (SWI)

The concept of switching intention refers to an individual's willingness to discontinue using one service in favor of another, often driven by perceived benefits and external influences (Hosseini et al., 2021). Within the transportation sector, switching intention has been widely studied in contexts such as ride-hailing services (Li et al., 2021), mobility-as-a-service (MaaS) adoption (Mladenovic et al., 2021), and electric vehicle (EV) adoption (Hardman, 2019). The transition from traditional to electric taxi services shares similarities with these contexts, as users weigh factors such as cost, service quality, convenience, and environmental impact (Hosseini et al., 2021)

2.2.2. Perceived Environmental Benefits (PEB)

Sustainability concerns play a crucial role in shaping consumers' transportation choices, particularly as they become more environmentally conscious. Perceived environmental benefits, such as reduced carbon emissions and improved air quality, have been shown to positively influence individuals' attitudes toward electric mobility solutions (Hosseini et al., 2021). However, beyond shaping attitudes, such perceptions can also act as direct triggers of switching behavior, especially when consumers view electric taxis as a greener and more responsible alternative to conventional options. In this context, passengers who recognize the environmental value of electric taxis may be more inclined to discontinue their use of traditional taxis and switch to electric ones (Lee and Sohn, 2020). Supporting this perspective, Zhang and Zhang (2014) found that increased awareness of environmental benefits significantly raises the likelihood of adopting electric vehicles. Therefore, this study hypothesizes that passengers who perceive a high level of environmental benefits may develop a stronger intention to switch from conventional taxis to electric alternatives (H1).

H1: Perceived Environmental Benefits (PEB) have a positive effect on Switching Intention (SWI) to electric taxi services.

2.2.3. Perceived cost incentives (PCI)

Cost-related factors, including operational savings and fare competitiveness, are widely recognized as critical drivers of switching behavior in the transportation sector (Liao et al., 2019). Economic incentives—such as subsidies, tax benefits, and fuel cost savings—have been consistently identified as important motivators for adopting electric vehicles (Lee & Sohn, 2020). In the context of electric taxis, the perceived economic viability of the service plays a pivotal role in influencing passengers' willingness to move away from conventional taxis. When commuters view electric taxis as more cost-effective—whether due to lower fares, long-term fuel savings, or policy-driven incentives—they are more likely to consider switching (Bühler et al., 2022). Moreover, innovative pricing strategies, such as dynamic fare models, have been shown to further strengthen consumer acceptance and decision-making (Hardman, 2019). Based on this rationale, the study hypothesizes that passengers who perceive electric taxis as a financially viable alternative are more likely to form an intention to switch from conventional taxi services (H2).

H2: Perceived cost incentives (PCI) have a positive effect on Switching Intention (SWI) to electric taxi services.

2.2.4. Service Quality (SQ)

Service quality is a critical factor influencing not only customer satisfaction and loyalty but also switching decisions, particularly in the transportation sector. In ride-hailing and taxi services, perceived quality dimensions—such as reliability, comfort, and safety—have a strong impact on users' preferences and service selection (Bühler et al., 2022). While previous studies in shared mobility have primarily linked service quality to satisfaction and continued use, there is increasing evidence that it also plays a direct role in shaping passengers' intention to switch from traditional to alternative services (Hosseini et al., 2021). In the context of electric taxis, maintaining or exceeding the service quality of conventional taxis is essential for attracting new users and motivating behavioral change (Zhang et al., 2023). Therefore, this study hypothesizes that when passengers perceive electric taxis as offering a superior or comparable service experience, they are more likely to form an intention to switch from conventional taxi services (H3).

H3: Service Quality (SQ) has a positive effect on Switching Intention (SWI) to electric taxi services.

Additionally, research on shared mobility services has shown that passengers are more willing to pay a premium for services that provide higher comfort and reliability (Zhang et al., 2023). If electric taxis offer a quieter, cleaner, and technologically advanced experience, passengers may rationalize slightly higher fares by attributing value to these quality aspects.

Moreover, passengers who consistently receive a high level of service quality from electric taxis may develop long-term cost-benefit perceptions, where they see electric taxis as a better investment in terms of convenience, maintenance, and overall experience. This aligns with studies on ride-hailing apps, where higher service quality has been linked to perceived economic advantage and increased customer loyalty (Hosseini et al., 2021). This makes (H4), even though does not directly contribute to the purpose of this research, relevant as it emphasizes the underlying indirect pathways that shape switching intention to capture the broader behavioral relationships in the proposed model.

H4: Service Quality (SQ) positively affects Perceived Cost Incentive (PCI) for electric taxi services.

2.2.5. Social Influence (SI)

Social influence is a key factor in driving behavioral change and shaping individual decisions regarding new technologies (Ajzen, 1991). According to the Theory of Planned Behavior (TPB), subjective norms—such as peer influence, social expectations, and media exposure—play a significant role in determining behavioral intentions (Hosseini et al., 2021). In the context of electric vehicle adoption, prior studies have shown that positive word-of-mouth and favorable media coverage can significantly increase individuals' likelihood of changing their transportation choices (Zhang et al., 2023). Applying this to electric taxi services, when passengers perceive that these services are socially endorsed and gaining popularity, they may feel more confident and motivated to transition away from conventional taxis. Thus, this study hypothesizes that when electric taxis are perceived as widely accepted and positively recommended by others, passengers are more likely to form an intention to switch (H5).

H5: Social Influence (SI) has a positive effect on Switching Intention (SWI) to electric taxi services.

In the case of electric taxi adoption, individuals who receive positive endorsements from peers, family, and media about the environmental benefits of electric taxis are more likely to perceive them as eco-friendly. Studies on electric vehicle (EV) adoption have shown that social endorsement plays a critical role in reinforcing perceptions of environmental sustainability (Zhang et al., 2023). Additionally, when individuals see an increasing number of people using electric taxis or hear about government and societal efforts to promote green mobility, their perceived environmental benefits of these services become more salient.

Furthermore, social media and influencer marketing play a critical role in shaping public perception, particularly in the context of environmentally sustainable behaviors. Campaigns that emphasize the reduced carbon footprint of electric taxis can effectively raise awareness and influence individuals' evaluation of their environmental benefits (Hosseini et al., 2021). When individuals are consistently exposed to positive social signals—such as endorsements from peers, community leaders, or online influencers—they are more likely to internalize these messages. As a result, social influence can substantially enhance the perceived environmental benefits of electric taxis, positioning them as a desirable and eco-friendly transportation alternative. Investigating this pathway is crucial, as it deepens our understanding of how environmental awareness is socially constructed and offers practical insights for leveraging social communication strategies to promote the adoption of green mobility solutions. This enhancement highlights the indirect influence mechanisms that contribute to switching intention, making the inclusion of (H6) not only relevant but necessary for explaining the broader dynamics within the proposed model.

H6: Social Influence (SI) positively affects Perceived Environmental Benefits (PEB) of electric taxi services.

Moreover, this study also suggests some potential indirect effects that need to be examined to elaborate on the influencing factors. Prior studies suggest that service quality not only directly influences customers' intentions but also shapes their perception of cost-related factors. Higher service quality often enhances customers' perceived value, making them more likely to perceive the service as economically attractive. Consequently, this favorable economic perception can increase their intention to switch to a new service (Kim et al., 2018). Social influence can shape consumers' perceptions regarding the environmental benefits of adopting new technologies. When individuals perceive that significant others or society endorse electric taxis as environmentally beneficial, they are more likely to internalize these environmental advantages, which in turn strengthens their switching intention (Hosseini et al., 2021).

With the discussion above, the following two hypothesis (H7 and H8) were established to test the mediating role of PCI and PEB.

H7: Perceived Cost Incentives (PCI) mediate the relationship between Service Quality and Switching Intention toward electric taxis.

H8: Perceived Environmental Benefits (PEB) mediate the relationship between Social Influence and Switching Intention toward electric taxis.

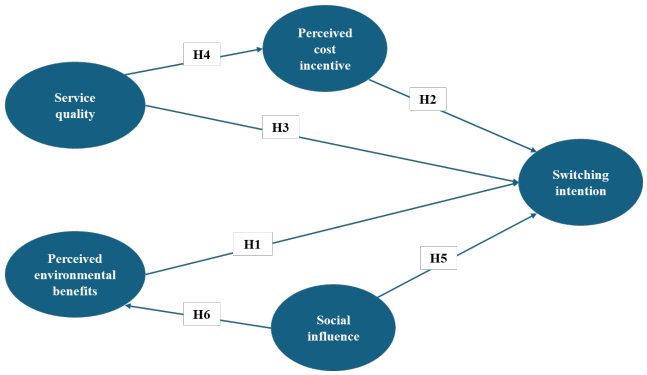

Figure 1. Research model

3. Research method

This study employed a quantitative approach using survey research methodology to empirically investigate factors influencing passengers' switching intention from conventional taxis to electric taxis in Ho Chi Minh City. The study specifically focused on testing the relationships between perceived environmental benefits, perceived cost incentives, service quality, social influence, and switching intention.

Ho Chi Minh City was selected as the context for this research due to several compelling reasons. Firstly, the city is Vietnam's largest and fastest-growing urban area, facing significant challenges related to traffic congestion, air pollution, and sustainability, making it an ideal environment to study electric mobility solutions. Secondly, there is increasing demand for sustainable transportation in the city, with active promotion of electric vehicles to mitigate environmental impacts. Thirdly, local government initiatives and supportive policies, including incentives and infrastructure development for electric vehicles, provide a practical context for examining policy impacts on commuter behavior. Finally, Ho Chi Minh City has a high frequency of taxi usage, making it a relevant setting for investigating factors influencing passengers' switching intentions.

A non-probability convenience sampling strategy was adopted due to its practicality in reaching a large number of participants efficiently. Commuters were targeted at public transportation hubs, commercial districts, and online mobility-related forums, ensuring that respondents had experience using taxi services and were potential adopters of electric taxis. This approach allowed for a broad cross-section of urban passengers to be included in the study. A total of 284 valid responses were collected and analyzed. To improve data quality, responses were screened to ensure completeness and consistency, and outliers were checked and removed if necessary. The final sample size was deemed appropriate for Partial Least Squares Structural Equation Modeling (PLS-SEM), following Hair et al.'s (2016) guidelines for structural model analysis. By employing a diverse yet accessible sampling strategy, this study provides valuable insights into urban commuters' perceptions and switching behaviors regarding electric taxis in an emerging market context.

As shown in the demographic summary, the sample reflects a diverse range of age groups (with a strong representation of working-age individuals), a balanced gender distribution (Male: 52.3%, Female: 47.7%), and a majority of respondents with at least undergraduate-level education. The occupational profile includes both students and a large proportion of working individuals (employed and self-employed: 65.4%), which aligns with the primary commuter base in urban settings like Ho Chi Minh City. Moreover, the inclusion of multiple income brackets and transportation modes ensures that a broad spectrum of economic and commuting backgrounds is captured.

While convenience sampling inherently limits statistical generalizability, the variety and diversity across key demographic dimensions suggest that the sample provides a reasonable approximation of the urban commuting population in Ho Chi Minh City. Additionally, the study acknowledges this limitation in the manuscript and recommends future research to adopt probability-based or stratified sampling approaches for enhanced external validity.

Validated measurement scales from previous studies (Table 2) were adapted and modified to fit the context of electric taxis. Each construct—perceived environmental benefits, perceived cost incentives, service quality, social influence, and switching intention—was measured using multiple-item scales

Table 1. Demographic description of the studied sample

Demographic Variable	Category (%)
Gender	Male (52.3%), Female (47.7%)
Age Group	18–24 (34.8%), 25–34 (40.1%), 35–44 (15.2%), 45+ (9.9%)
Education Level	High School or below (17.6%), Undergraduate (59.5%), Graduate or higher (22.9%)
Occupation	Student (24.7%), Employed (55.3%), Self-employed (10.1%), Unemployed/Retired (9.9%)
Monthly Income (VND)	<5M (20.5%), 5–10M (44.8%), 10–15M (24.6%), >15M (10.1%)
Frequency of Taxi Use	Daily (10.4%), Weekly (30.2%), Monthly (34.6%), Rarely (24.8%)
Main Transportation Mode	Motorbike (49.6%), Ride-hailing Taxi (20.3%), Bus (15.4%), Private Car (9.8%), Bicycle/Walk (4.9%)

Table 2. Measurement model estimates

Construct	Measurement Items	Manifest variable	Outer weight	Outer loading	rho_A	CR value	Cronbach's alpha (α)	AVE
Switching Intention (SWI), extracted from Wang et al., 2018); Lin & Filieri (2015)	I intend to use electric taxis instead of conventional taxis in the near future.	SWI1	0.276	0.879	0.924	0.945	0.923	0.812
	I plan to switch to electric taxis whenever they are available.	SWI2	0.265	0.892				
	If given the option, I prefer to use an electric taxi instead of a traditional taxi.	SWI3	0.275	0.911				
	I recommend using electric taxis to my friends and family.	SWI4	0.293	0.923				
Perceived Environmental Benefits (PEB), extracted from Axsen et al., (2012)	Using an electric taxi reduces carbon emissions compared to a conventional taxi.	PEB1	0.238	0.840	0.887	0.916	0.885	0.686
	Electric taxis contribute to better air quality in the city.	PEB2	0.232	0.770				
	Choosing an electric taxi is an environmentally responsible choice.	PEB3	0.241	0.834				
	Electric taxis help reduce fuel consumption and dependence on fossil fuels.	PEB4	0.259	0.854				
	The use of electric taxis is an effective solution for sustainable urban transportation.	PEB5	0.237	0.842				
Perceived Cost Incentives (PCI), extracted from Liao et al., (2019); Zhang et al., (2014)	Using an electric taxi is more cost-effective than using a conventional taxi.	PCI1	0.399	0.930	0.905	0.934	0.894	0.824
	The fare of an electric taxi is reasonable compared to a regular taxi	PCI2	0.381	0.907				
	The fuel/energy cost savings of electric taxis make them an attractive option.	PCI3	0.320	0.887				
Service Quality (SQ), extracted from Kim et al., (2018); Cheng et al., (2019)	The electric taxi service is reliable (e.g., available when needed).	SQ1	0.329	0.856	0.874	0.910	0.869	0.718
	The ride quality (e.g., smoothness and quietness) is superior in an electric taxi.	SQ2	0.269	0.797				
	The electric taxi app is easy to use for booking and payments.	SQ4	0.287	0.857				
	I feel safe and secure when using an electric taxi.	SQ5	0.293	0.877				
Social Influence (SI), extracted from Ajzen (1991); Barth et al., (2016)	People important to me (e.g., family, friends) think I should use electric taxis.	SI1	0.213	0.837	0.913	0.932	0.909	0.733
	I see many people using electric taxis, which makes me want to try them	SI2	0.226	0.813				
	Media and advertisements influence me to consider using electric taxis.	SI3	0.235	0.857				
	Society views using electric taxis as a positive and responsible choice.	SI4	0.228	0.870				
	If more people switch to electric taxis, I will be more likely to do so as well.	SI5	0.265	0.901				

Table 3. Discriminant Validity Assessment and Heterotrait-monotrait (HTMT)

	PCI	PEB	SI	SQ	SWI
PCI					
PEB	0.547				
SI	0.506	0.640			
SQ	0.494	0.496	0.395		
SWI	0.580	0.755	0.540	0.794	

on a 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree).

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed using SmartPLS software for data analysis. Due to the exploratory nature of this research and the relatively small sample size, PLS-SEM was chosen as the appropriate analytical approach (Hair et al., 2016). The research model was reflective, and the analysis followed four essential steps. Firstly, indicator loadings were evaluated, where loadings exceeding 0.7 indicated adequate reliability by capturing more than half of the variance within the respective construct. Secondly, internal consistency reliability was assessed using composite reliability (CR), with acceptable values above 0.9. Cronbach's alpha was also calculated, though it typically yields lower reliability estimates compared to CR.

The third step involved assessing convergent validity through Average Variance Extracted (AVE), with values equal to or greater than 0.50 deemed acceptable (Hair et al., 2016). The fourth and final step evaluated discriminant validity (HTMT), ensuring constructs were empirically distinct, with the recommended cutoff for discriminant validity indices ranging between 0.395 and 0.794. The author also includes certain measures such as R-square, Q-square, or f-square to demonstrate explanatory power, predictive relevance, and effect sizes of independent variables on dependent variables as recommended by Hair et al. (2016).

Importance - Performance Map Analysis (IPMA) was conducted to complement the primary structural model evaluation by offering practical insights into priority areas for improvement. IPMA assesses both the importance (total effects) and performance (mean values) of each construct in influencing switching intention (SWI). This approach helps to identify key factors that have strong effects on SWI but relatively low performance, indicating potential areas for strategic enhancement. By visualizing the importance-performance trade-off, policymakers and service providers can prioritize improvements in specific aspects that will maximize adoption of electric taxis. Constructs with high importance and low performance should receive immediate attention, while those with high importance and high performance should be maintained and leveraged for further adoption growth.

4. Results and Discussion

4.1. Measurement model

The measurement model demonstrated strong reliability and validity across all constructs (Table 2). All indicator loadings were substantially above the recommended threshold of 0.70, confirming item reliability. Construct reliability was also robust, with composite reliability (CR) values ranging from 0.910 to 0.945, exceeding the acceptable criterion of 0.70, and rho_A values between 0.874 and 0.924, indicating strong internal consistency. Cronbach's alpha values (α) further supported reliability, ranging from 0.869 to 0.923. Additionally, the average variance extracted (AVE) for all constructs ranged from 0.686 to 0.824, surpassing the recommended level of 0.50, thus confirming the convergent validity of the measurement model (Hair et al., 2016).

4.2. Discriminant validity

Discriminant validity was assessed using the Heterotrait-monotrait ratio (HTMT) criterion. All HTMT values among the constructs ranged between 0.395 and 0.794 (Table 3), below the conservative threshold of 0.85 recommended by Hair et al. (2016). This indicates that each construct is sufficiently distinct from others, confirming the discriminant validity of the measurement model.

4.3. Path model

The structural model was evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM) with a significance level set at $\alpha = 0.05$ (Table 4 and Figure 2). Results indicated that perceived environmental benefits (PEB), perceived cost incentives (PCI), and service quality (SQ) significantly influenced passengers' switching intention (SWI) to electric taxis. Thus, hypotheses H1 (PEB → SWI), H2 (PCI → SWI), and H3 (SQ → SWI) were accepted. Additionally, service quality significantly influenced perceived cost incentives (SQ → PCI), supporting hypothesis H4. However, the direct relationship between social influence (SI) and switching intention (SWI) was not statistically significant, leading to the rejection of hypothesis H5 (SI → SWI). However, H6 (SI → PEB) was supported, which indicates a potential mediator role of PEB on the effect of SI on SWI. This is made clear when we come to the test of indirect effects.

The strong influence of service quality and perceived environmental benefits suggests that both experiential and value-driven factors play a central role in shaping switching intention. Service quality, in particular, emerged as the most influential factor, reinforcing the importance of operational performance—such as ride comfort, reliability, and ease of booking—in motivating behavioral change. The confirmed path from SQ to PCI also indicates that service excellence can enhance perceived economic value, even beyond actual cost savings. Meanwhile, the lack of a significant direct relationship between SI and SWI emphasizes that social influence may not be a standalone driver of switching behavior; rather, it shapes environmental perceptions, which then influence intention indirectly.

Table 4. Result of structural model evaluation

Hypothesis	Path Coefficient	t-value	p-value	Confidence Interval at 95%		Conclusion
Direct Effect				2.5%	97.5%	
H1: PEB → SWI	0.393	7.896	0.000	0.282	0.484	Accepted
H2: PCI → SWI	0.101	2.368	0.018	0.015	0.185	Accepted
H3: SQ → SWI	0.477	11.712	0.000	0.396	0.557	Accepted
H4: SQ → PCI	0.442	8.575	0.000	0.333	0.538	Accepted
H5: SI → SWI	0.054	1.199	0.231	-0.032	0.138	Rejected
H6: SI → PEB	0.575	12.590	0.000	0.476	0.656	Accepted
Indirect Effect						
H7: SQ → PCI → SWI	0.045	2.184	0.029	0.007	0.088	Accepted
H8: SI → PEB → SWI	0.226	6.660	0.000	0.162	0.287	Accepted

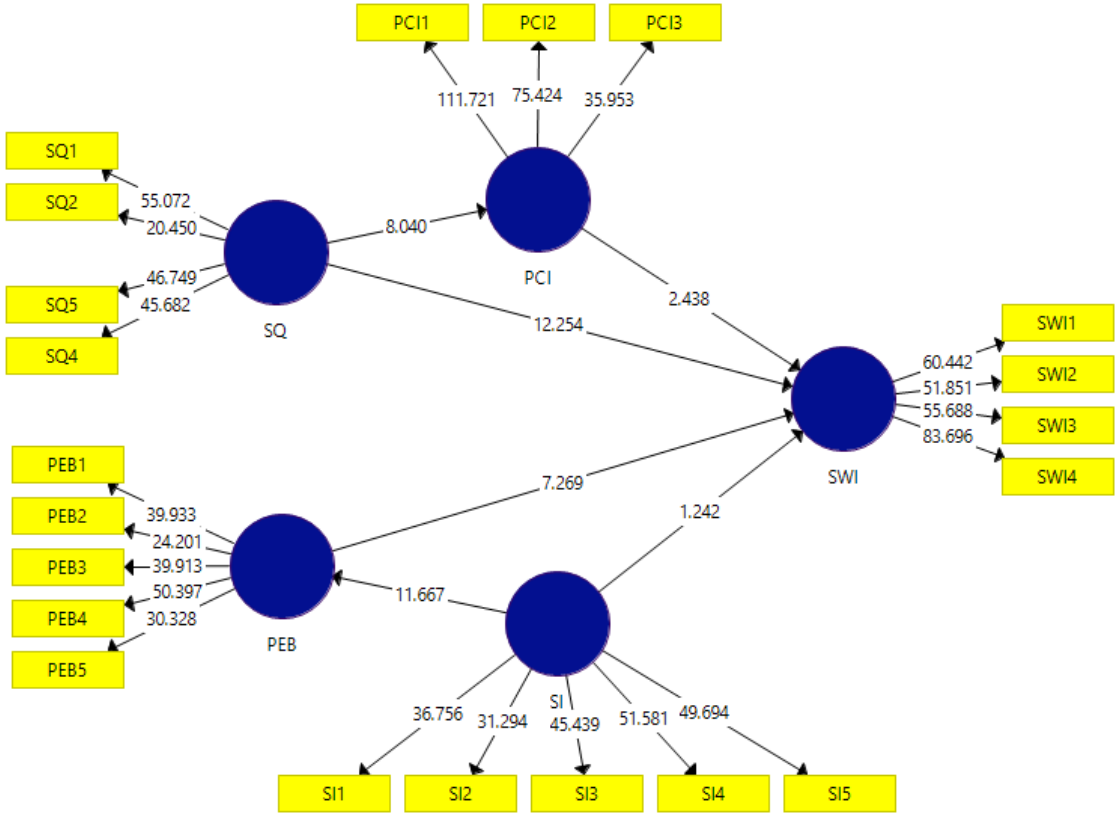

Figure 2. Path model analysis and results

This indirect effect pathway highlights the importance of communication strategies that frame electric taxis as not only socially approved but also environmentally beneficial. Collectively, the results underscore the need for integrated approaches that combine service quality enhancement with environmental messaging to effectively drive adoption of electric taxi services.

Among the examined factors, service quality demonstrated the strongest direct effect on switching intention, followed by perceived environmental benefits. These findings highlight the critical importance of maintaining high service quality and emphasizing the environmental advantages of electric taxis in strategies designed to enhance passenger switching behaviors.

Indirect effects analysis revealed that service quality indirectly influenced switching intention through perceived cost incentives (H7: SQ → PCI → SWI), and social influence indirectly affected switching intention via perceived environmental benefits (H8: SI → PEB → SWI). All indirect paths were statistically significant at $\alpha = 0.05$. This highlights the mediating roles played by perceived cost incentives and perceived environmental benefits, respectively. Although SI does

not exert a significant effect on SI, it demonstrates an indirect effect by shaping passengers' perceptions of environmental benefits (PEB), which in turn positively influences switching intention.

These findings highlight the critical role of mediating mechanisms in understanding switching behavior. Service quality, beyond its direct effect, contributes to switching intention by enhancing passengers' perception of cost efficiency—suggesting that high-quality service may not only satisfy users but also justify the switch economically. Similarly, social influence operates through an attitudinal pathway, where exposure to social norms and positive messaging increases environmental awareness, which in turn motivates behavioral change. These results suggest that efforts to promote electric taxi services should not only focus on improving direct service features but also invest in shaping perceptions—both economic and environmental—through well-targeted communication and experience design. This layered influence reinforces the importance of addressing both rational and normative drivers in sustainable mobility strategies.

The R Square (R^2) values indicate how well the model explains each dependent variable. The adjusted R^2 for SWI was 0.686, showing strong explanatory power. PEB had a moderate adjusted R^2 of 0.329, while PCI showed a weaker explanation at 0.193 (Table 5). According to Hair et al. (2017), there is no universally accepted threshold for R^2 values, as their interpretation depends on various contextual factors, including the complexity of the model (e.g., presence of mediating relationships) and the nature of the study. Therefore, R^2 values should not be judged in absolute terms but rather evaluated in relation to model structure and explanatory purpose.

Table 5. R-Square results

	R-Square	R-Square Adjusted
PCI	0.196	0.193
PEB	0.331	0.329
SWI	0.690	0.686

Based on the f^2 values (Table 6) and guidelines from Hair et al., (2017), Service Quality (SQ) had a large effect on Switching Intention (SWI) ($f^2 = 0.541$), followed by Perceived Environmental Benefits (PEB) with a medium effect ($f^2 = 0.287$). Perceived Cost Incentives (PCI) showed a small effect ($f^2 = 0.022$), while Social Influence (SI) had a large effect on PEB ($f^2 = 0.495$) but no meaningful direct effect on SWI ($f^2 = 0.006$). These results highlight that SQ and PEB are the most influential factors driving switching intention, whereas SI operates mainly through its indirect pathway via PEB. The predictive relevance of the model is further evaluated through the Q^2 values presented in the next paragraph.

Table 6. Effect size results (f-square)

	PCI	PEB	SI	SQ	SWI
PCI					0.022
PEB					0.287
SI		0.495			0.006
SQ	0.243				0.541

The predictive relevance of the model was assessed using the Stone-Geisser's Q^2 values. Following Hair et al. (2019) guidelines, Q^2 values between 0 and 0.25 indicate low predictive accuracy, between 0.25 and 0.5 indicate moderate predictive accuracy, and values above 0.5 reflect high predictive accuracy. In this study, Switching Intention (SWI) showed high predictive relevance ($Q^2 = 0.554$), while Perceived Environmental Benefits (PEB) and Perceived Cost Incentives (PCI) demonstrated moderate predictive accuracy with Q^2 values of 0.221 and 0.157, respectively (Table 7). These findings confirm the model's strong capability in predicting key endogenous variables, particularly the switching intention (SWI).

Table 7. Q-square results

Factor	SSO	SSE	Q^2 (=1-SSE/SSO)
PCI	825	695.728	0.157
PEB	1375	1070.66	0.221
SI	1375	1375	
SQ	1100	1100	
SWI	1100	491.116	0.554

4.4. Importance-Performance Matrix Analysis (IPMA)

The Importance-Performance Map Analysis (IPMA) (Figure 3) visually illustrates that service quality (SQ) and perceived environmental benefits (PEB) emerged as factors with both high importance (high total effects) and relatively high performance, indicating that these factors are effectively driving switching intention. However, perceived cost incentives (PCI) showed lower importance despite moderate performance, suggesting limited influence on passengers' switching intention compared to other factors. Social influence (SI), positioned centrally, exhibits moderate levels of both importance and performance. Thus, service quality and perceived environmental benefits should be prioritized in strategic efforts, given their significant influence and strong current performance levels.

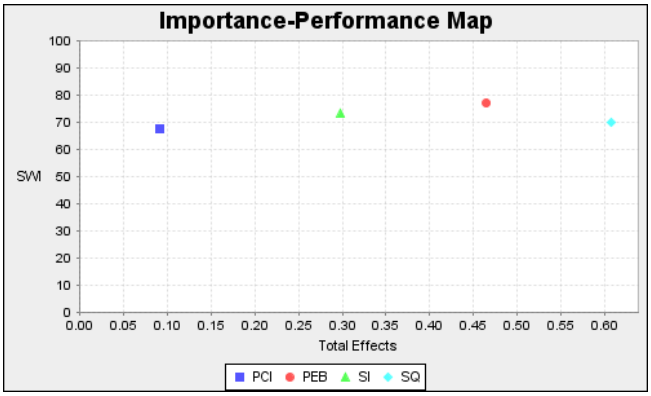

Figure 3. Importance-Performance analysis (IPMA)

5. Conclusion

This study investigated factors influencing passengers' intention to switch from conventional taxis to electric taxis in Ho Chi Minh City, Vietnam, using a sample of 284 commuters. The results revealed that perceived environmental benefits, perceived cost incentives, and service quality significantly and positively influenced passengers' switching intention. Notably, service quality exhibited the strongest direct effect, highlighting the critical role that high-quality service plays in attracting consumers to adopt electric taxis. Perceived environmental benefits also had a substantial impact, underscoring the significance of environmental consciousness among commuters. Social influence did not directly affect switching intention; however, it significantly influenced switching intention indirectly through perceived environmental benefits, emphasizing the importance of social norms and communication in shaping environmental perceptions. Additionally, the Importance-Performance Map Analysis (IPMA) results further indicated that service quality and perceived environmental benefits have high importance and relatively high performance, confirming their strategic priority. Meanwhile, perceived cost incentives demonstrated lower importance despite moderate performance, suggesting that although financial incentives are beneficial, they may not be as critical as service quality and environmental messaging in driving switching behavior.

5.1. Theoretical Implications

The findings contribute significantly to existing theoretical frameworks by providing empirical validation of a comprehensive model integrating perceived environmental benefits, perceived cost incentives, service quality, and social influence in the context of electric taxi adoption. Specifically, this research extends the Unified Theory of Acceptance and Use of Technology (UTAUT) by highlighting the indirect pathway through which social influence shapes consumer intention via environmental perceptions. These insights broaden the understanding of the complex interplay among environmental attitudes, economic considerations, social dynamics, and perceived service attributes in technology adoption literature.

5.2. Practical Implications

For policymakers and electric taxi operators, these findings offer valuable guidance for strategy formulation. Given the strong influence of service quality, operators should prioritize investments in reliable, comfortable, and technologically sophisticated service features, such as comfortable seating, quiet and smooth rides, advanced safety systems, and well-maintained vehicles. Emphasizing user-friendly digital platforms for bookings and payments—such as intuitive mobile apps with seamless booking and payment processes—can substantially enhance user experience and satisfaction. Furthermore, policymakers should actively support infrastructure development, including widespread charging stations and dedicated parking spaces for electric taxis. Consistently communicating the environmental benefits through public campaigns, advertising, and collaboration with influential community figures or social media influencers can effectively leverage social norms and perceptions, further promoting the adoption of electric taxis among the commuting public. Given the IPMA findings, stakeholders should prioritize improving service quality (SQ), as it has both high importance and strong influence on switching intention. Enhancing reliability, ride comfort, digital convenience, and overall passenger experience will significantly drive adoption. Additionally, efforts should focus on effectively communicating the environmental benefits (PEB) of electric taxis, as this factor also plays a crucial role in influencing passenger decisions. Public awareness campaigns, eco-labeling, and strategic messaging through social media and

influencers can reinforce the perception that electric taxis are a superior and environmentally responsible alternative to conventional taxis.

Moreover, stakeholders, including local governments and service providers, are recommended to continuously enhance service quality by regularly training drivers, upgrading vehicle conditions, and incorporating feedback mechanisms for ongoing improvement. Targeted marketing campaigns that clearly illustrate the comparative environmental benefits and financial savings of electric taxis can significantly shift public perceptions and behaviors. Additionally, leveraging popular social media platforms and collaborating with community influencers, celebrities, or environmental advocates can amplify positive social influence. Such strategic initiatives would indirectly boost consumers' perceived environmental benefits, ultimately enhancing their intention to adopt electric taxi services.

5.3. Limitations and future direction

Several limitations should be noted in interpreting these findings. First, this study utilized a convenience sampling approach within a single urban setting, Ho Chi Minh City, limiting the generalizability of the results to other geographic or cultural contexts. Additionally, the cross-sectional design prevents drawing robust causal conclusions about the relationships among constructs over time. Finally, self-reported data from surveys can introduce biases such as social desirability and recall errors, potentially affecting measurement accuracy.

To address these limitations, future research could employ longitudinal studies to better capture changes in consumer attitudes and behaviors over time, providing stronger causal inference. Replicating this study in different cities or international contexts would enhance the generalizability and comparative insights into electric taxi adoption. Further exploration of additional moderating or mediating factors, such as governmental incentives, infrastructure readiness, or cultural differences, would provide a more nuanced understanding of the adoption process. Investigating the impact of specific marketing strategies or communication channels on consumer perceptions and intentions could also yield valuable practical insights for stakeholders.

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