THE IMPACT OF SMART MOBILITY ECOSYSTEM ON THAI CONSUMERS' PURCHASE INTENTION FOR NEW ENERGY VEHICLES: THE MEDIATING ROLE OF PERCEIVED SMART TECHNOLOGY BENEFITS

Lei Niu [1*]

Shun-Chieh Chang [2]

Praphaphan Wunsuk [3]

Qifeng Wei [4]

Sarawut Ramjan [5]

[1-5] Innovation College, North-Chiang Mai University

[*] **Corresponding Author, E-mail:** g676302030@northcm.ac.th

Abstract: This study explored the impact of the Smart Mobility Ecosystem on Thai consumers' purchase intention for new energy vehicles (NEVs), with a focus on the mediating role of Perceived Smart Technology Benefits. Grounded in the Technology Acceptance Model and supplemented by the Value-Based Adoption Model, which emphasizes perceived value in consumer technology adoption, the research employed Structural Equation Modeling to validate the proposed framework. Specifically, it aimed to 1) examine the direct effect of SME on purchase intention, 2) assess the influence of SME on PSTB, 3) evaluate the impact of PSTB on purchase intention, and 4) test the mediating role of PSTB. A total of 412 valid responses were collected from Thai consumers with prior exposure to NEVs or smart mobility services through stratified random sampling. Data analysis involved descriptive statistics, confirmatory factor analysis, and SEM using AMOS software. Reliability and validity were ensured through factor loadings and Cronbach's Alpha. The results revealed that SME significantly affected both PSTB and purchase intention. Moreover, PSTB had a strong direct effect on purchase intention and significantly mediated the relationship between SME and consumer decision-making. These findings highlight the critical role of perceived benefits in driving NEV adoption and offer valuable insights for policymakers and manufacturers aiming to promote smart, sustainable mobility in Thailand.

Keywords: smart mobility ecosystem, perceived smart technology benefits, purchase intention, new energy vehicles, structural equation modeling

Introduction

In response to mounting global concerns over climate change and environmental degradation,

many countries are accelerating the transition toward electric and intelligent mobility solutions. New Energy Vehicles (NEVs) have emerged as a sustainable alternative to conventional fuel-powered vehicles, offering significant potential to reduce greenhouse gas emissions and promote green transportation (Kashem et al., 2024). As NEV technologies evolve, consumer purchasing behavior is shifting from focusing on basic vehicle functions to evaluating the broader experience enabled by smart technologies.

Thailand, as an emerging market, is at a critical stage in its shift toward electric and smart mobility. While the government has implemented policies such as tax incentives and infrastructure support to promote NEV adoption, consumer purchase rates remain relatively modest. Traditional barriers-such as price sensitivity, range anxiety, and limited charging stations-only partly explain this lag. In the digital age, consumers' perceptions of smart technological features integrated into vehicles are becoming increasingly influential in shaping their purchase intentions (Brinkmann & Bhatiasevi, 2023).

The smart mobility ecosystem integrates advanced technologies such as AI-assisted driving, Internet of Things connectivity, Vehicle-to-Grid energy systems, and shared or subscription-based mobility models. These innovations are redefining the driving experience, offering enhanced convenience, efficiency, and personalization (Bi et al., 2023). Within this ecosystem, how consumers perceive the benefits of these smart technologies—referred to as Perceived Smart Technology Benefits—plays a critical role in influencing their attitudes toward adopting NEVs (Suvittawat, 2024).

Despite growing interest in smart mobility, empirical research on Thai consumers' behavioral responses to these technologies remains limited. Existing studies often focus on macro-level policies or technical feasibility, with insufficient attention to consumer-level perceptions, particularly in emerging markets like Thailand. There is a clear need for context-specific insights into how smart mobility innovations impact consumer decision-making.

To address this gap, this study draws on the Technology Acceptance Model to construct a theoretical framework. It examines key components of the smart mobility ecosystem-such as AI features, IoT connectivity, V2G integration, and shared mobility models-and evaluates how consumers perceive these elements in terms of convenience, cost savings, environmental value, and enhanced driving experience, and how these perceptions influence their intention to purchase smart-enabled NEVs.

Research Objective (s)

To examine the effect of the smart mobility ecosystem on Thai consumers' purchase intention for new energy vehicles.

To examine the effect of the smart mobility ecosystem on consumers' perceived smart technology benefits.

To examine the effect of perceived smart technology benefits on Thai consumers' purchase

intention for new energy vehicles.

To examine the mediating role of perceived smart technology benefits in the relationship between the smart mobility ecosystem and purchase intention for new energy vehicles.

Literature Review

This study is grounded in the Technology Acceptance Model, a well-established theory for understanding how individuals adopt and accept new technologies (Davis & Granić, 2024). In the context of the rapidly evolving mobility landscape, particularly with the introduction of smart features into electric vehicles (EVs), this model provides a strong foundation to explore how consumers perceive these technologies and how such perceptions influence their purchase intention for new energy vehicles (NEVs)(Zhang et al., 2023). The conceptual framework of this study is based on a review of recent literature and aims to investigate the direct and indirect effects of the smart mobility ecosystem on purchase intention, with perceived smart technology benefits serving as a mediating variable.

Theoretical Foundation

The Technology Acceptance Model (TAM), proposed by Davis (1989), suggests that perceived usefulness and perceived ease of use are key factors influencing an individual's intention to adopt new technologies (Davis & Granić, 2024). TAM has been widely applied across sectors such as e-commerce, healthcare, and smart transportation. In the context of New Energy Vehicles (NEVs), smart features—like AI-assisted driving, IoT-based updates, and predictive maintenance—enhance perceived usefulness and reduce complexity, thus improving consumer acceptance (Pang et al., 2023; Wei et al., 2021).

To strengthen the theoretical framework, this study also incorporates the Value-Based Adoption Model (VBAM), which emphasizes perceived value as a balance between benefits (e.g., convenience, cost savings, environmental contribution) and sacrifices (e.g., price, complexity) (Mensah & Mwakapesa, 2025). VBAM is particularly relevant for smart mobility, where consumers assess the overall value of integrated technologies rather than just their functionality. Together, TAM and VBAM offer a more comprehensive lens to understand Thai consumers' purchase intention for smart-enabled NEVs.

Smart Mobility Ecosystem and Purchase Intention

The smart mobility ecosystem encompasses the integration of advanced technologies into vehicles and transportation networks to create seamless, efficient, and connected mobility experiences(Alam et al., 2024). These technologies include AI for driver assistance and automation, IoT-enabled in-vehicle connectivity, V2G energy exchange, and subscription-based or shared vehicle access models.

Several studies have shown that consumers are increasingly interested in mobility solutions that are intelligent, adaptive, and aligned with digital lifestyles (Paiva et al., 2021). In particular, tech-savvy and urban consumers in emerging markets like Thailand are more likely to be attracted to NEVs when

these vehicles provide more than just environmental benefits-such as convenience, personalization, and smart control interfaces. As such, SME characteristics can enhance consumer trust and enthusiasm, ultimately strengthening purchase intention. Based on this, the following hypothesis is proposed:

Hypothesis H1. The smart mobility ecosystem has a positive and significant effect on consumer purchase intention for new energy vehicles.

Smart Mobility Ecosystem and Perceived Smart Technology Benefits

The way consumers interpret and evaluate the benefits derived from smart vehicle features significantly shapes their acceptance of NEVs. This refers to perceived smart technology benefits, which encompass several key dimensions: functional benefits (e.g., energy efficiency, low maintenance), emotional benefits (e.g., convenience, enjoyment), and environmental benefits (e.g., emissions reduction).

For example, studies have highlighted how features like adaptive cruise control, auto-parking, voice-command systems, and seamless smartphone integration improve the overall user experience and generate strong positive associations with the technology (Haryadi et al., 2023). These perceptions become pivotal in shaping consumers' belief in the value of smart NEVs. Based on this, the following hypothesis is proposed:

Hypothesis H2. The smart mobility ecosystem has a positive and significant effect on perceived smart technology benefits.

Perceived Smart Technology Benefits and Purchase Intention

Once consumers perceive clear and substantial benefits from NEV technologies, their willingness to purchase tends to increase. These benefits contribute not only to functional value but also enhance emotional satisfaction and a sense of modernity, which are crucial in influencing high-involvement purchase decisions such as vehicle acquisition.

According to Aiolfi (2023), consumers who enjoy interacting with intelligent systems (e.g., smart home assistants) are more inclined to adopt other AI-driven innovations, such as smart NEVs. Moreover, consumers who perceive NEVs as cost-saving, convenient, and ecologically responsible are more likely to transition from conventional vehicles(Aiolfi, 2023). Based on this, the following hypothesis is proposed:

Hypothesis H3. Perceived smart technology benefits have a positive and significant effect on consumer purchase intention for new energy vehicles.

The Mediating Role of Perceived Smart Technology Benefits

Although the smart mobility ecosystem directly affects consumer decisions, a key mechanism of influence lies in how consumers internalize and interpret the technology. In other words, the effect of SME on purchase intention is not purely structural but is psychologically mediated by how beneficial consumers perceive these smart technologies to be.

This mediating pathway is supported by previous research showing that perceived value acts as

a critical bridge between innovation and behavioral intention (Hu et al., 2023). For NEVs, this implies that the more users perceive the smart features as beneficial, the more likely they are to form a strong intention to adopt, regardless of their original stance on EVs or sustainability. Based on this, the following hypothesis is proposed:

Hypothesis H4. Perceived smart technology benefits mediate the relationship between the smart mobility ecosystem and consumer purchase intention for new energy vehicles.

Methodology

This study employed a quantitative approach using a structured questionnaire and Structural Equation Modeling (SEM) to investigate the relationships among Smart Mobility Ecosystem, Perceived Smart Technology Benefits, and Purchase Intention, including mediating effects. Data were collected from Thai consumers with prior exposure to NEVs or smart mobility services through stratified random sampling in major cities. Of 500 distributed questionnaires, 412 valid responses were retained. SME, PSTB, and PI were measured using established scales from Section: Smart Mobility Ecosystem, Bu et al. (2025), and Suvittawat (2024), respectively(Bu et al., 2025; Suvittawat, 2024). Data were analyzed using SEM via AMOS, with model reliability and validity assessed through CR, AVE, and fit indices.

Results

1. Descriptive Statistical Analysis

This study analyzed 412 valid responses from Thai consumers with prior exposure to new energy vehicles (NEVs) or smart mobility services. The gender distribution was nearly even, with 51.9% male and 48.1% female, providing balanced representation.

Most respondents were aged 26-40 (45.1%), followed by those aged 18–25 (27.9%), indicating a predominantly young to middle-aged sample-typically more receptive to technology adoption. Older age groups, 41–60 and over 60, comprised 19.9% and 7.0%, respectively.

In terms of income, 37.6% of participants reported monthly earnings between ฿10,001 and ฿20,000, with 20.6% earning between ฿20,001 and ฿35,000. Respondents earning above ฿50,000 accounted for 7.5%, suggesting a sample concentrated in the lower to middle-income brackets.

Regarding vehicle ownership, 40.8% currently own a vehicle, and 40.5% had owned one in the past, indicating strong familiarity with automotive use. Only 9.5% had never owned a vehicle, while 9.2% owned more than one.

Overall, the sample reflects a diverse consumer base with relevant experience in vehicle use and exposure to smart technologies, aligning well with the study's focus on smart mobility perception and purchase intention for NEVs.

Table 1: Descriptive Statistical Analysis

Attitude	classification indicators	Frequency	Percent (%)
1. Gender	Male	214	51.9
	Female	198	48.1
2. Age	18–25	115	27.9
	26–40	186	45.1
	41–60	82	19.9
	Over 60	29	7.0
3. Income Level	฿10,000 or below	73	17.7
	฿10,001–20,000	155	37.6
	฿20,001–35,000	85	20.6
	฿35,001–50,000	55	13.3
	Above ฿50,000	31	7.5
	Prefer not to say	13	3.2
4. Past Vehicle	Never owned	39	9.5
Ownership	Owned before, but sold	167	40.5
	Currently own one	168	40.8
	Currently own more than one	38	9.2

2. Empirical Analysis

The structural equation modeling (SEM) results support the proposed framework, demonstrating that the Smart Mobility Ecosystem (SME) has a significant positive effect on both Perceived Smart Technology Benefits (PSTB) ($\beta = 0.65$) and Purchase Intention (PI) ($\beta = 0.24$). Furthermore, PSTB has a strong direct impact on PI ($\beta = 0.57$), confirming its mediating role between SME and purchase intention.

Each first-order construct under SME-including AI Integration, IoT Connectivity, V2G Capabilities, and Shared Mobility Preferences-shows high standardized factor loadings (all ≥ 0.72), indicating robust construct validity. Similarly, PSTB is effectively captured through four dimensions: Convenience, Cost Efficiency, Environmental Impact, and Driving/Usage Experience Enhancements, all with factor loadings above 0.70 (see Figure 1)
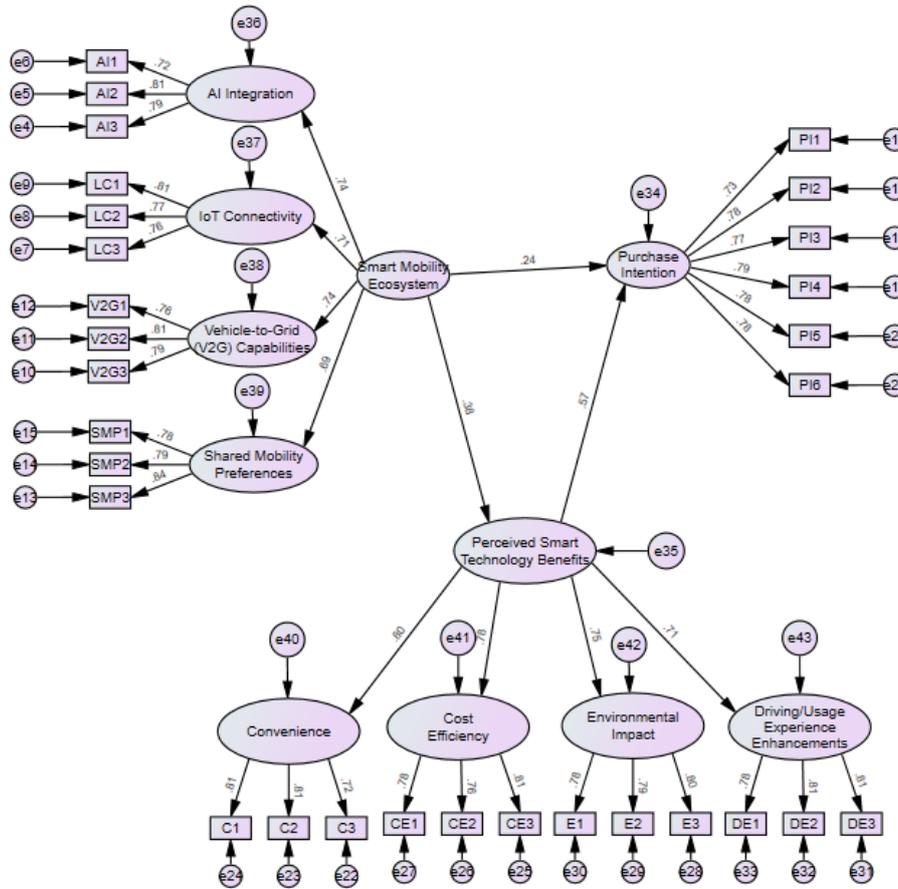
Figure 1: Structural Equation Modeling

Source: This study compiles

Table 3: Path Analysis and Hypothesis Testing

Hypothesis	Path	Path Coefficient	Relationship
H1	SME→PI	0.243**	Supported
H2	SME→PSTB	0.379**	Supported
H3	PSTB→PI	0.571**	Supported
H4	SME→PSTB→PI	0.278**	Supported

Note: *Sig at 0.05 level, **Sig at 0.01 level, ***Sig at 0.001 level

Table 3 presents the results of the path analysis conducted using Structural Equation Modeling (SEM). All four hypothesized relationships in the proposed model are supported, demonstrating strong statistical significance and theoretical alignment.

First, the Smart Mobility Ecosystem (SME) was found to have a positive and significant direct effect on Purchase Intention (PI), with a standardized path coefficient of 0.243 (p < 0.01). This supports Hypothesis H1, indicating that the integration of smart technologies into the mobility ecosystem

enhances consumers' intention to purchase new energy vehicles (NEVs).

Second, the SME also showed a significant positive effect on Perceived Smart Technology Benefits (PSTB), with a coefficient of 0.379 ($p < 0.01$), supporting Hypothesis H2. This implies that consumers perceive notable advantages-such as convenience, cost-efficiency, and enhanced driving experiences-from smart features embedded in mobility ecosystems.

Third, PSTB demonstrated a strong and significant impact on PI, with a path coefficient of 0.571 ($p < 0.01$), providing empirical support for Hypothesis H3. This result highlights that consumer perceptions of smart technology benefits are a key determinant in shaping purchase intentions.

Finally, the mediation analysis confirmed that PSTB significantly mediates the relationship between SME and PI. The indirect effect was 0.278, with a bias-corrected 95% confidence interval of [0.165, 0.436], which excludes zero, indicating statistical significance. Therefore, Hypothesis H4 is supported, confirming a partial mediation, as the direct effect also remained significant.

Overall, the findings demonstrate that the smart mobility ecosystem not only directly influences purchase intention but also indirectly shapes it through perceived smart technology benefits. These results validate the conceptual framework based on the Technology Acceptance Model, offering practical implications for policymakers and marketers seeking to promote NEVs in emerging markets like Thailand.

Discussion

The findings of this study supported the Technology Acceptance Model (TAM), showing that the Smart Mobility Ecosystem (SME) significantly influenced Thai consumers' purchase intention (PI) for new energy vehicles (NEVs), validating H1. Smart features-such as AI-assisted driving, IoT connectivity, and shared mobility-were found to enhance consumers' willingness to adopt NEVs, especially in digitally evolving markets like Thailand. SME also had a significant impact on Perceived Smart Technology Benefits (PSTB), confirming H2. Consumers perceived smart features as convenient, efficient, and environmentally beneficial, which positively shaped their view of NEVs. Emphasizing these benefits may help manufacturers enhance product appeal. The direct effect of PSTB on PI (H3) highlighted the importance of perceived value in purchase decisions. Consumers who saw clear advantages-such as cost savings and enhanced driving experiences-were more likely to consider NEVs, echoing Aiolfi's (2023) findings on technology adoption.

Finally, PSTB significantly mediated the relationship between SME and PI (H4), indicating that consumers' interpretation of smart features-not just their presence-drove purchase behavior (Hu et al., 2023). In sum, while advancing smart mobility infrastructure is vital, consumers' perceived benefits are key to driving adoption. These insights suggest the need for both technological innovation and effective communication strategies.

Conclusion

This study found that the Smart Mobility Ecosystem (SME) significantly influenced Thai consumers' intention to purchase new energy vehicles (NEVs), both directly and indirectly through Perceived Smart Technology Benefits (PSTB). The results indicated that consumers' perceived convenience, cost-efficiency, and environmental value of smart technologies played a crucial mediating role in shaping purchase decisions. These findings suggest that beyond technological advancement, effectively communicating the benefits of smart features remains essential to driving NEV adoption. The study provided practical insights for stakeholders aiming to promote smart and sustainable mobility in emerging markets like Thailand.

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