

The Influence of Environmental Concerns on Electric Vehicle Purchase Decisions in Emerging Urban Markets: An Integrated Generalized Structured Component Analysis Approach

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Abstract

This study examines the factors influencing electric vehicle (EV) purchase decisions in Bangkok, employing Integrated Generalized Structured Component Analysis (IGSCA) to test a causal relationship model. We investigated the mediating roles of Information Search and Evaluation of Alternatives in the relationship between Perception of Needs and the final Purchase Decision (modeled as Vehicle Brand preference). Data were collected from potential EV buyers using a validated questionnaire. The analysis utilized IGSCA for its ability to handle mixed-factor component models, complemented by confirmatory factor analysis to validate the measurement model. Additionally, we employed moderation analysis to examine the interaction effects between key variables. The structural equation modeling revealed significant mediation effects, with the model demonstrating robust fit and explaining a substantial portion of Vehicle Brand variance. Notably, the hypothesized moderating role of Evaluation of Alternatives was statistically significant ($\beta = 0.108, p < 0.001$), revealing that EA strengthens the relationship between Information Search and Vehicle Brand. These findings suggest a paradigm shift in EV marketing strategies, emphasizing the importance of engaging consumers in comprehensive evaluation processes. For policymakers, our results underscore the need for a holistic approach to EV promotion, integrating consumer education with infrastructure development. This research advances the understanding of consumer behavior in emerging technology markets, providing a valuable framework for future studies on sustainable transportation adoption. Our methodological approach offers a robust template for analyzing complex consumer decision-making processes in high-involvement purchases.

Keywords: Electric Vehicles, Consumer Behavior, IGSCA, Purchase Decision, Perception of needs

JEL Classifications: D12, D91, L62, M31, O33, Q53, R41

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1. Introduction

The global electric vehicle (EV) market has experienced remarkable growth in recent years, driven by technological advancements, stringent climate policies, and shifting consumer preferences. According to the International Energy Agency [IEA] (2023), global EV sales surpassed 10 million units in 2022, accounting for 14% of total vehicle sales. This surge is primarily attributed to proactive government interventions in major economies such as China, the European Union (EU), and the United States (US), which have implemented aggressive policies to promote EV adoption and expand infrastructure. The transition toward electromobility is further influenced by environmental concerns, energy security considerations, and rising fossil fuel costs, reinforcing the urgency for sustainable transportation solutions (Hu et al., 2025).

As one of Southeast Asia's key automotive manufacturing hubs, Thailand is undergoing a rapid transformation in EV production and adoption, facilitated by government incentives, private sector investments, and evolving consumer behavior. Under the EV3.0 and EV3.5 policies, the Thai government has set an ambitious goal to position the country as a leading EV production base in the ASEAN region. By 2023, the country recorded a 497% increase in battery electric vehicle (BEV) registrations, reaching 50,028 units, while plug-in hybrid electric vehicle (PHEV) registrations rose by 77% to 62,982 units (Energy Policy and Planning Office, 2023). To stimulate demand, the government has introduced subsidies of up to THB 150,000 per unit, import tax reductions, and excise duty exemptions, significantly improving the affordability of EVs for Thai consumers (Lazzeroni et al., 2021).

Despite this impressive growth, multiple challenges hinder the widespread adoption of EVs in Thailand. The high upfront costs, concerns over charging infrastructure, consumer skepticism regarding battery longevity, and uncertainties surrounding resale value remain critical barriers to entry. Furthermore, the Thai automotive industry, valued at USD 53 billion, is facing a downturn in both domestic and international demand, attributed to rising household debt and the rapid industry-wide transition away from internal combustion engine (ICE) vehicles (Li et al., 2020; Reuters, 2025). Given these market complexities, this study aims to explore the following key research questions: (1) To what extent do environmental concerns influence EV purchase decisions in Bangkok's urban market? (2) What role do information search and evaluation of alternatives play in shaping consumer choices? (3) How do brand perceptions, government incentives, and infrastructure availability affect EV adoption in emerging markets such as Thailand? Thailand's EV transition is closely linked to broader macroeconomic and geopolitical factors. The post-pandemic economic recovery has introduced inflationary pressures, fluctuating interest rates, and volatile oil prices, all of which directly impact consumer purchasing power and EV affordability. (Buhmann & Rialp Criado, 2023). Additionally, global supply chain disruptions, particularly in semiconductors and critical battery materials driven by US-China trade tensions continue to challenge EV production costs and market scalability (Yeğın & Ikram, 2022; IEA, 2023).

In response, the Thai government has set carbon neutrality and net-zero emission targets for 2050 and 2065, respectively, emphasizing EV infrastructure development, renewable energy integration, and financial incentives for manufacturers and consumers (Energy Policy and Planning Office, 2023). Partnerships with major international automakers, including BYD, Tesla, and Great Wall Motors, further underscore Thailand's strategic positioning as an EV manufacturing and export hub in the region.

However, the transition remains uneven, as Thailand's automotive sector, historically dominated by ICE vehicles, undergoes a structural shift marked by declining production and slower adaptation among legacy automakers (IEA, 2023).

Furthermore, challenges related to EV charging accessibility, the resilience of Thailand's energy grid, and long-term sustainability pose additional uncertainties for widespread EV adoption.

Bangkok, as Thailand's economic and technological center, serves as an ideal case study for examining EV adoption in an emerging urban market. Unlike developed EV ecosystems, Bangkok's transition is occurring simultaneously with infrastructure expansion and policy evolution, providing an opportunity to assess the interplay between government incentives, consumer behavior, and technological readiness in a rapidly growing economy.

This study employs Integrated Generalized Structured Component Analysis (IGSCA) to investigate the determinants of EV purchase decisions, particularly the mediating roles of perception of needs, information search, and evaluation of alternatives. The findings will be valuable to policymakers seeking to refine EV incentive structures and infrastructure planning, automobile manufacturers aiming to optimize marketing strategies and product positioning, and urban planners working to integrate sustainable transportation solutions into Bangkok's mobility framework.

By bridging business research with sustainable mobility policy, this study contributes to consumer behavior literature while offering practical insights for accelerating EV adoption in developing economies. The findings will be instrumental in shaping Thailand's transition to a low-carbon transportation system, supporting both national and regional sustainability objectives.

2. Literature Review

2.1 Purchase Decision (PD)

Purchase Decision-making (PD) for electric vehicles (EVs) is influenced by technological, economic, and psychosocial factors. Bi et al. (2023) note that this process varies with product complexity and consumer knowledge. Key determinants include price, range capabilities, and charging infrastructure (Irfan et al., 2021; Plananska et al., 2023), modulated by government policies (Irfan et al., 2021). Consumer cognition plays a crucial role, with Meise et al. (2014) emphasizing the need for factual information. Green advertising (Bi et al., 2023) and personality traits (Irfan et al., 2021) significantly impact purchase intentions. Socio-cultural factors, including masculinity perceptions (Plananska et al., 2023) and regional variations (Chen et al., 2025), add complexity to PD. Technological innovations like Dynamic Wireless Power Transfer (Lazzeroni et al., 2021) and state policies (Li et al., 2020) further influence adoption. The pandemic has introduced additional variables (Raza & Masmoudi, 2020), while future impact considerations shape long-term decisions (Srivastava et al., 2023). This multifaceted nature of EV PD necessitates a holistic approach, balancing immediate practical concerns with long-term sustainability considerations.

2.2 Perception of needs (PN)

Perception of Needs (PN) in electric vehicle (EV) adoption integrates environmental, economic, and technological factors. Bi et al. (2023) highlight environmental consciousness as a primary driver, with consumers viewing EVs as environmentally friendly, cost-effective, and user-friendly. Irfan & Ahmad (2021) emphasize technological interest and information availability as crucial PN factors.

Zhang et al. (2022) reveal that positive EV experiences enhance purchase likelihood and highlight cross-cultural differences, noting stronger EV perception in China due to greater environmental emphasis. They also stress the influence of advertising, customer reviews, and social networks on PN formation. The complexity of PN in the EV context, influenced by sociocultural factors and personal experiences, necessitates that businesses consider these multifaceted aspects in their marketing strategies. This approach aligns with the findings of Bi et al. (2023), Irfan & Ahmad (2021), and Samarasinghe et al. (2024), emphasizing the need for comprehensive consumer engagement in the evolving EV market.

2.3 Information search (IS)

The Information Search (IS) process in electric vehicle (EV) acquisitions represents a critical nexus of consumer behavior and technological innovation. This process transcends mere data collection, embodying a complex interplay of cognitive processing and socio-technological adaptation (Hahnel et al., 2014; Rezvani et al., 2015; Hayes, 2022). Digital platforms have revolutionized IS dynamics, creating an information ecosystem where consumer-generated content coexists with manufacturer specifications, challenging traditional information asymmetries (Yeğin & Ikram, 2022; Hu et al., 2025). However, the persistence of experiential channels (Samarasinghe et al., 2024) underscores the multisensory nature of high-involvement purchases, suggesting a hybrid model of information acquisition.

The hierarchical structure of IS, culminating in expert consultations (Rezvani et al., 2015), reveals a sophisticated consumer journey, where trust and verification intertwine. This process not only informs purchase decisions but also shapes the broader narrative of sustainable transportation, positioning IS as a pivotal factor in the societal transition towards electromobility.

2.4 Evaluation of alternatives (EA)

The Evaluation of Alternatives (EA) in consumer decision-making, particularly in the context of electric vehicle (EV) purchases, emerges as a critical juncture in the multifaceted buying process (Kotler & Keller, 2016). This pivotal stage encompasses a complex interplay of factors, including technical specifications, pricing structures, accessibility, and the pervasive influence of digital marketing ecosystems (Rezvaniet al., 2015; Zhanget al., 2011; Buhmann & Rialp Criado, 2023).

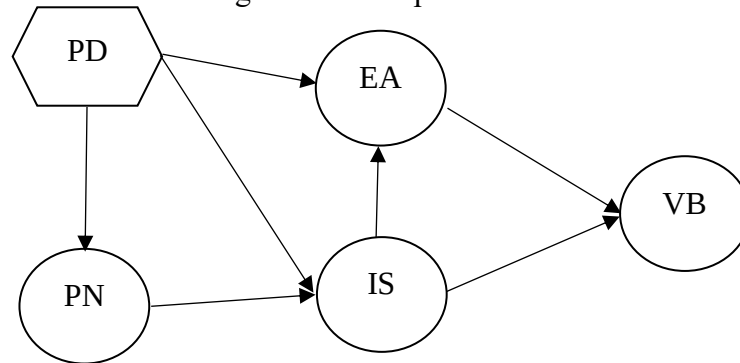
The literature consistently underscores the significance of comparative analysis in EV adoption decisions. Rezvani et al. (2015) and Axsen & Kurani (2013) converged on the primacy of technical attributes, price points, and market availability in shaping consumer preferences. Samarasinghe et al. (2024) further refined this understanding, highlighting the critical role of range capacity and charging infrastructure in the decision matrix.

Importantly, Chen et al. (2020) illuminated the growing influence of user-generated content and social media narratives in modulating consumer perceptions (Buhmann & Rialp Criado, 2023), particularly among potential adopters lacking direct EV experience. This digital discourse creates a rich tapestry of information that both informs and complicates the evaluation process, necessitating sophisticated analytical approaches to consumer behavior in the rapidly evolving EV market landscape.

Given the significance of an electric vehicle purchase, the consumer's decision-making process is understood as a critical progression. This journey moves from an awareness of needs (PN), through an information search (IS) and an evaluation of alternatives (EA), culminating in a purchase decision (PD) and a final brand choice

(VB). Thus, the relationship among 1) PD, 2) PN, 3) EA, 4) IS, and 5) VB has a correlated influence in a causal relationship, summarized in Figure 1.

Figure 1: Conceptual Model



Note: Hexagon denotes component whereas eclipse indicates factors

Source: Author's own elaboration

3. Methodology

3.1 Population and Sample

This study examines potential electric vehicle (EV) buyers in Bangkok, specifically individuals aged 20 and above who intend to purchase an EV in the near future. A sample size of 200 respondents was deemed statistically sufficient for quantitative research, particularly for Structural Equation Modeling (SEM) and Exploratory Factor Analysis (EFA), following the recommendations of Hair et al. (2010) and Meise et al. (2014). To ensure data adequacy, the Kaiser-Meyer-Olkin (KMO) Test and Bartlett's Test of Sphericity were conducted, confirming the suitability of the dataset for factor analysis.

To accurately identify potential buyers, a pre-screening survey was employed, incorporating clear selection criteria. Respondents were required to demonstrate a concrete intention to purchase an EV within the next one to three years, possess basic knowledge of EV technology, and have sufficient financial capacity to afford an EV. Additionally, geographic factors were considered, prioritizing individuals residing in urban areas with established charging infrastructure, as accessibility to charging stations is a crucial determinant of EV adoption. Data collection utilized a mixed-mode approach, combining online and offline surveys to maximize reach and representation. The online survey was distributed through digital platforms such as Google Forms, social media (Facebook, Line, and Twitter), and EV consumer groups, with additional support from EV dealerships and user communities. The offline survey involved face-to-face interviews and questionnaire distribution at EV service centers, automotive exhibitions, and major shopping malls in key urban locations. To enhance data reliability and mitigate selection bias, convenience sampling and purposive sampling techniques were applied, ensuring that only genuinely interested and financially capable individuals were included. Quality control measures were implemented, including filtering out ineligible respondents, identifying duplicate responses, and applying the Mahalanobis Distance Test to detect statistical outliers. These rigorous procedures ensured that the final dataset was robust, representative, and suitable for advanced statistical analysis.

3.2 Measures

This study employed Integrated Generalized Structured Component Analysis (IGSCA) as it effectively examines the causal relationships between complex variables

involved in EV purchase decisions. IGSCA was deemed appropriate for this study as it accommodates both reflective and formative variables, mitigating biases commonly associated with traditional Structural Equation Modeling (SEM). Additionally, IGSCA handles non-normal data distributions and supports mediation and moderation analyses, allowing for precise evaluation of variable influences within the consumer decision-making process. To assess the reliability and validity of the measurement model, this study adhered to established statistical criteria. The Average Variance Extracted (AVE) should exceed 0.5, Cronbach's alpha (α) should be greater than 0.6, and DG-rho (ρ) should surpass 0.7, following the recommendations of Benitez et al. (2020) and Hair Jr et al. (2020). Furthermore, discriminant validity was evaluated using the heterotrait-monotrait (HTMT) ratio, which should be below 0.85, as suggested by Henseler et al. (2015), with an acceptable upper threshold of 0.90, as per Gold et al. (2001) and Teo et al. (2008). Additionally, the Variance Inflation Factor (VIF) was examined, confirming that values below 5 are considered acceptable, thereby mitigating concerns related to multicollinearity (Hair et al., 2015). Structural Equation Modeling (SEM) was conducted to investigate the causal relationships among latent variables, utilizing the IGSCA framework to address biases arising from mixed factor-component measurement models, as outlined by Hwang et al. (2020). Moreover, IGSCA was regarded as a suitable estimator due to its ability to incorporate comprehensive data and its distribution-free nature, reinforcing its robustness in handling complex data structures, as highlighted by Hwang et al. (2023).

4. Results

4.1 Measurement model

The validity of the construct was evaluated by using convergent validity and discriminant validity techniques, which were supported by analyzing the α and ρ values presented in Table 4 (Benitez et al., 2020; Hair Jr et al., 2020). The reliability measurements surpassed the recommended thresholds proposed by scholars ($\alpha > .6$; $\rho > .7$; AVE $> .5$) (Benitez et al., 2020; Hair Jr et al., 2020; Manosuthi et al., 2022), providing compelling evidence for the reliability of the construct (see Table 1).

Table 1: Reliability and Validity, HTMT and VIF of Component and Factors

Total sample (n = 200)					Total sample	
Construct	AVE	α	ρ	HTMT	Estimate	95% CI
PD (Component)	.821	.963	.956	PD $\leftrightarrow$ PN	0.744	[0.553 ;0.883]
EA (factor)	.743	.829	.921	PD $\leftrightarrow$ IS	0.716	[0.598 ; 0.83]
PN (factor)	.821	.963	.956	PD $\leftrightarrow$ EA	0.781	[0.667;0.882]
IS (factor)	.701	.756	.903	PD $\leftrightarrow$ VB	0.811	[0.753;0.894]
VB (factor)	.931	.923	.937	PN $\leftrightarrow$ IS	0.737	[0.520; 0.892]
				PN $\leftrightarrow$ EA	0.848	[0.743 ; 0.943]
				PN $\leftrightarrow$ VB	0.643	[0.432 ; 0.811]
				IS $\leftrightarrow$ EA	0.841	[0.438; 0.8521]
				IS $\leftrightarrow$ VB	0.819	[0.654 ; 0.957]
				EA $\leftrightarrow$ VB	0.747	[0.615 ; 0.891]
VIF						
VB as response variable						
IS					4.33	

Total sample (n = 200)				Total sample		
Construct	AVE	α	ρ	HTMT	Estimate	95% CI
				EA		4.33
				IS as response variable		
				PD		2.124
				PN		2.124
				EA as response variable		
				PD		1.782
				IS		1.782
				PN as response variable		
				PD		1.124

Note: PD = Purchase Decision (component), EA = Evaluations of alternatives (factor), PN = Perception of needs(factor), IS = information search (factor), and VB = Vehicle Brand (factor)

Source: Author's own analysis

In terms of establishing discriminant validity, the HTMT (heterotrait-monotrait) values displayed in Table 1 fall within the acceptable range: less than .85 according to a strict interpretation (Henseler et al., 2015) and less than .90 in an acceptable sense (Gold et al., 2001; Teo et al., 2008). According to Rasoolimanesh (2022), HTMT is suitable for assessing discriminant validity in reflective constructs or factor-based models, which do not apply to the PD, which consists of composite-based variables. In such cases, Rasoolimanesh et al. (2022) recommend employing a comprehensive collinearity test to determine discriminant validity. The analysis conducted on the components using the variance inflation factor (VIF) yielded values below 5 (refer to Table 1), indicating the absence of significant multicollinearity concerns (Hair et al., 2015).

Table 2: Estimates of weights, loadings, and their 95% CI

Item	$\bar{X}$	IS	λ^*	95% CI (λ^*)
Perception of needs (PN)				
You're interested in electric cars.	5.88	0.89	0.963	[.917,.972]
You realize that electric cars are popular today.	5.99	0.78	0.91	[.854,.952]
You're interested in electric cars because of technology.	5.99	0.87	0.913	[.862,.958]
Presentation of product information, electrical power, media, advertisements and websites.	5.83	0.93	0.845	[.739,.957]
Information search (IS)				
You've been searching for electrical car product information on social media sites.	5.9	0.89	0.756	[.601,.896]
You're looking for electric car product information at the Thailand International Motor Expo.	5.55	1.32	0.897	[.85,.946]

Item	$\bar{X}$	IS	$\hat{\lambda}$	95% CI ($\hat{\lambda}$)
You've been searching for electrical car product information from people who've used it before.	5.75	1.11	0.894	[.795,.966]
You're asking for electric car product information from a salesman.	5.61	1.31	0.794	[.712,.876]
Evaluation of alternatives (EA)				
Electric Cars uses marketing communications through social media.	5.87	0.98	0.829	[.850,.950]
You see channels for purchasing electric cars through social networks.	5.98	0.97	0.913	[.835,.964]
You choose a website on a social media network to find the electric car product features that you are interested.	5.92	1.12	0.878	[.798,.958]
You chose electric cars because they have features that interest you.	5.95	1.02	0.825	[.74,.909]
Purchase Decision (PD)				
You decide to buy an electric car through social media channels.	5.65	1.15	0.757	[.689,.845]
You decided to buy an electric car on the advice of a friend or acquaintance.	5.6	1.28	0.767	[.709,.805]
You decided to buy an electric car by searching for information.	5.87	0.99	0.771	[.701,.943]
You decided to buy an electric car on your own.	5.83	1	0.794	[.641,.817]
You decided to buy an electric car based on the quality of the product.	5.93	0.91	0.789	[.703,.875]
Efficient and durable.	6.1	0.89	0.912	[.873,.952]
There is consistency in service and standard.	6.12	0.88	0.883	[.826,.929]
Quality level, price-appropriate.	6.07	0.89	0.873	[.826,.929]
The pattern is unique and suitable for your needs.	6.09	0.93	0.862	[.799,.913]
Before-after-service	6.04	0.71	0.889	[.836,.935]
Product usage tracking	6.05	0.89	0.887	[.841,.933]
Listening to customer complaints or suggestions about goods and services.	6.03	0.85	0.888	[.836,.928]

Item	$\bar{X}$	IS	$\hat{\lambda}$	95% CI ($\hat{\lambda}$)
Information about warranty, like whom to call, where, how.	6.01	0.76	0.838	[.758,.907]
Notification to consumers in advance of purchase.	6.06	0.87	0.826	[.735,.911]
Clear warranty notice to the buyer.	6.05	0.89	0.855	[.774,.921]

Source: Author's own analysis

Verification of the Measurement Model

In our rigorous examination of the measurement model, we employed confirmatory factor analysis to scrutinize five critical variables: purchase decision, evaluations of alternatives, perception of needs, information search, and vehicle brand. Adhering to the methodological framework proposed by Manosuthi et al. (2022) for IGSCA, we conducted a meticulous Confirmatory Factor Analysis (CFA). The assessment of construct validity was bifurcated into convergent and discriminant validity evaluations. Convergent validity was established through the application of stringent criteria: factor loadings surpassing the 0.7 threshold and average variance extracted (AVE) exceeding 0.5. Concurrently, discriminant validity was confirmed by the Heterotrait-Monotrait (HTMT) ratio, which was maintained below the critical value of 0.85.

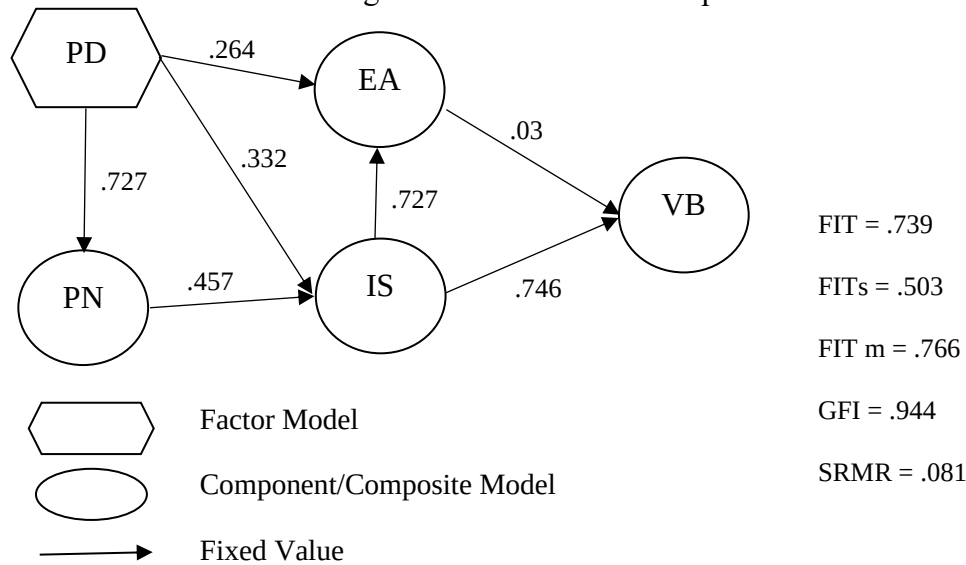
Our analysis revealed that all observed variables demonstrated statistically significant factor loadings (p-value < 0.01), underscoring their salience in elucidating the factors affecting consumers' decision to buy electric vehicles in Bangkok. The factor loadings exhibited a robust range from 0.756 to 0.963, as meticulously documented in Table 2. This comprehensive statistical approach not only validates the measurement model but also provides a solid foundation for understanding the complex dynamics of consumer decision-making in the burgeoning electric vehicle market.

4.2 Analysis and structural model

Additionally, the measurement model accounts for 97.0% of the variance in the constrained model and 97.2% in the unconstrained model. Based on Cho et al. (2020), the recommended criteria state that GFI should be equal to or higher than .93, while SRMR should be lower than .08. The results indicate that the constrained model does not fit well because the SRMR value exceeds the recommended threshold, even though the GFI does not meet the criteria. However, the constrained model satisfies both the GFI and SRMR criteria.

The examination of the moderating effect of potential EV buyers was conducted through a rigorous assessment of fit indices. The analysis yielded compelling results, with the constrained model demonstrating robust goodness-of-fit metrics: FIT = .739, GFI = .944, FITs = .503, FITm = .766, and SRMR = .081. These values, as illustrated in Figure 2, provide strong evidence of the model's congruence with the empirical data, aligning with the criteria established by Cho et al. (2020) and corroborated by Meliana & Pangaribuan (2024).

Figure 2: Causal Relationship Model



Note: Hexagon Denotes component whereas eclipse indicates factors. PD = purchase Decision, EA = Evaluations of alternatives, PN = Perception of needs, IS information search, and VB = vehicle VB
Source: Author's own analysis

The causal relationship model revealed a nuanced network of direct and indirect effects. Purchase Decision (PD) emerged as a pivotal construct, exhibiting a significant direct effect on Evaluation of Alternatives (EA) ($\beta = .264$) and an indirect influence mediated through EA ($\beta = .007$). Furthermore, PD demonstrated substantial direct effects on Perception of Needs (PN) ($\beta = .727$) and Information Search (IS) ($\beta = .332$). The indirect effect of PD on Vehicle Brand (VB) manifested through multiple pathways. Notably, PD exerted an indirect influence on VB via PN ($\beta = .727$), with PN subsequently impacting IS ($\beta = .457$) and ultimately VB ($\beta = .746$). This cascading effect resulted in a combined direct and indirect effect of statistical significance ($\beta = .247$). Interestingly, the indirect pathway from PD through IS to VB ($\beta = .07$) did not reach statistical significance. The analysis also revealed that PD had a statistically significant direct or indirect effect on IS ($\beta = .07$) and an indirect effect on VB ($\beta = .247$). Results show that Perceived Need for electric vehicles (PN) positively correlates with Information Search behavior (IS), with higher need perception intensifying information seeking and expanding Alternative Evaluation (EA). Despite EA's importance in decision-making, external factors, including manufacturer marketing strategies, consumer experiences, and government incentives, may exert greater influence on Electric Vehicle Brand (VB). Causal analysis reveals that PN indirectly influences VB through IS and EA as mediating variables ($\beta = 0.247$, $p < 0.05$). When consumers recognize the necessity for electric vehicles, they engage in information gathering and alternative assessment, ultimately affecting brand preference. Notably, EA has no significant direct effect on VB, indicating that while consumers compare features across brands, final decisions are more influenced by external factors such as brand value perception, market positioning, or promotional offers.

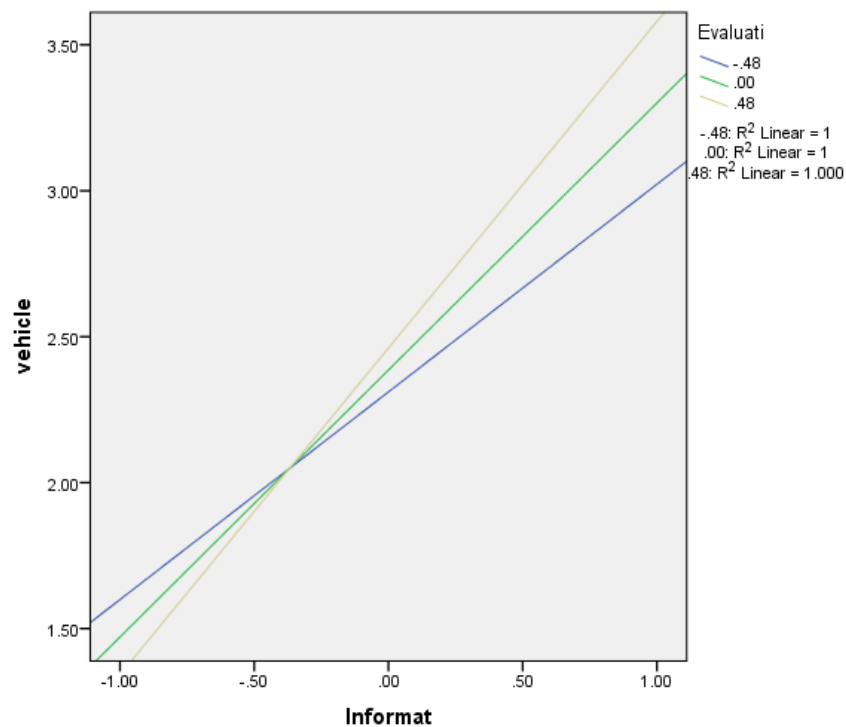
Table 3: Parameters in Analysis Consumers' Decision to Buy Electric Vehicle.

Constrained model		
Relationship	β	95% CI
Direct effect		
PD-> PN	.727*	[.587;.754]
PD-> IS	.332*	[-.002;.581]
PN-> IS	.457*	[.187;.862]
PD-> EA	.264	[.147;.488]
IS-> EA	.727*	[.461;.854]
IS-> VB	.746*	[.215;1.144]
EA-> VB	0.03	[-.392;.514]
Indirect effect		
PD -> PN -> IS -> VB	.247*	[.074;.808]
PD -> EA -> VB	.007	[.148;.608]
PD -> IS -> VB	.247*	[.023;.748]
PN -> IS -> VB	.340*	[.158;.669]
PN -> IS -> EA -> VB	.009	[.033;.792]
IS -> EA -> VB	0.02	[.033;.592]
Fit indices		
FIT		.739
FITs		.503
FITm		.766
GFI		.944
SRMR		.081

Note: * significance level of .05; PD = purchase Decision, EA = Evaluations of alternatives, PN = Perception of needs, IS information search , and VB = vehicle Brand

Source: Author's own analysis

Figure 3: The Moderation Results



Source: Author's own analysis

The analysis reveals that Evaluation of Alternatives moderates the relationship between Information Search and Vehicle Brand. Specifically, the association between Information Search and Vehicle Brand is amplified for individuals who demonstrate higher engagement in alternative evaluation processes. The results indicate a statistically significant positive moderation effect of Evaluation of Alternatives on the relationship between Information Search and Vehicle Brand ($\beta = 0.108$, $p < 0.001$). This finding suggests that as consumers' propensity to evaluate alternatives increases, the impact of information search on Vehicle Brand is strengthened. The regression model accounted for 49.7% of the variance in Vehicle Brand ($R^2 = 0.497$, $F(3, 196) = 64.551$, $p < 0.001$). This substantial explanatory power suggests that Information Search, Evaluation of Alternatives, and their interaction are significant predictors of consumer preferences in the automotive market. The model's predictive capacity, explaining nearly half of the variance in brand preferences, underscores the importance of these factors in consumer decision-making processes within the automotive sector. Prior to analysis, all predictor variables underwent mean centering to mitigate multicollinearity and facilitate the interpretation of interaction effects. Table 1 presents the unstandardized regression coefficients for the model components. The research findings demonstrate that Perceived Need for electric vehicles (PN) positively influences Information Search behavior (IS) and Alternative Evaluation (EA). Analysis reveals that PN has an indirect effect on Vehicle Brand (VB) through the mediating variables of IS and EA ($\beta = 0.247$, $p < 0.05$). However, EA does not have a significant direct influence on VB, suggesting that final purchasing decisions are influenced more by external factors than by product feature comparisons. Interestingly, EA significantly moderates the relationship between IS and VB ($\beta = 0.108$, $p < 0.001$), indicating that consumers with a higher tendency to evaluate alternatives are more influenced by the information they search for compared to those who make decisions primarily based on feelings or brand image. Therefore, businesses should develop communication strategies that emphasize comparative information to reach these consumer segments.

5. Discussion

This study provides a comprehensive examination of the factors influencing electric vehicle (EV) purchasing decisions among consumers in Bangkok, a rapidly evolving urban market shaped by proactive government policies and expanding infrastructure aimed at promoting sustainable transportation. In Thailand, policy interventions such as tax reductions and subsidies amounting to as much as THB 150,000 per vehicle have contributed to a 497% increase in battery electric vehicle (BEV) registrations in 2023 (Energy Policy and Planning Office, 2023). These incentives significantly reinforce the direct effect of purchase decision-making (PD) on consumer interest. This aligns with existing research demonstrating that policy measures, particularly subsidies and the expansion of charging infrastructure, enhance the economic feasibility and convenience of EV adoption, thereby reducing key consumer barriers (Hardman et al., 2018). In Bangkok, the interplay between government incentives and the expansion of charging networks not only raises environmental awareness but also fosters greater engagement in information search (IS) and evaluation of alternatives (EA), thereby alleviating key adoption barriers such as range anxiety and limited charging accessibility (Hardman et al., 2018).

The integration of perception of needs (PN), IS, and EA into the decision-making model, analyzed through integrated generalized structured component analysis

(IGSCA), provides deeper insight into consumer behavior. Mediation analysis reveals that PN exerts a significant indirect effect on Vehicle Brand (VB) via IS and EA ($\beta = 0.247$, $p < 0.05$). This finding suggests that when consumers in Bangkok perceive EVs as essential, whether due to environmental concerns or government incentives, they are more likely to engage in extensive information gathering and rigorous evaluation of alternatives before forming brand preferences. These results align with Patt et al. (2019), who found that access to private charging infrastructure, such as at-home and workplace charging, significantly enhances EV purchase readiness by mitigating range anxiety. In the context of Bangkok, characterized by urban sprawl and long commuting distances (Srivastava et al., 2023), the increasing availability of residential and workplace charging solutions likely strengthens the mediating role of PN, IS, and EA in shaping consumer preferences (Samarasinghe et al., 2024).

Furthermore, a critical dimension often overlooked in functional adoption models is the role of psychological distance. Our findings, which show a strong link between Perception of Needs (PN) and Information Search (IS), may be moderated by this perceived distance. Even if consumers express high 'Environmental Concerns' (as per the title), if they perceive climate change as a temporally or geographically distant threat (Trope & Liberman, 2010), this 'Perception of Need' may remain abstract. Future research should investigate whether policy incentives are merely bridging a financial gap (Yin et al., 2022) or if they are successfully reducing the psychological gap between abstract concern and tangible purchase action, thereby accelerating the translation of PN into IS and subsequent evaluation (EA).

Further analysis underscores the importance of workplace charging infrastructure in influencing EV demand, particularly among long-distance commuters. Chakraborty et al. (2019) highlighted that workplace charging serves as a critical complement to home charging, reducing dependency on public charging stations. This is particularly relevant in Bangkok, where high urban density necessitates convenient charging options (Srivastava et al., 2023). The availability of such infrastructure reinforces the link between PN and IS, prompting consumers to assess EV brands based on their compatibility with daily routines, including charging preferences (e.g., Level 2 vs. DC fast charging). This dynamic, where external infrastructure considerations influence internal cognitive processes, offers a more refined perspective on how Bangkok's urban and policy environment shapes EV adoption behavior (Sanguesa et al., 2021).

The findings further contextualize Thailand's EV transition, which is advancing under the EV3.0 and EV3.5 policies aimed at establishing the country as a regional EV hub. Collaborations with global automakers such as BYD and Tesla signal strong momentum in the industry's expansion (Srivastava et al., 2023). The study confirms that government incentives play a crucial role in amplifying PD's direct effect, consistent with Hardman et al. (2018), who emphasized the significance of policy-driven affordability in stimulating adoption. Nevertheless, challenges such as high upfront costs, concerns over battery longevity, and limited charging accessibility persist. Despite the surge in EV registrations in 2023 (Energy Policy and Planning Office, 2023), infrastructure development must keep pace with demand. The mediating role of IS, driven by PN ($\beta = 0.457$, $p < 0.05$), highlights Thai consumers' reliance on information to navigate these obstacles. In Bangkok, where digital platforms and experiential channels such as motor expos serve as primary sources of consumer information, strategic promotional efforts must address both affordability concerns and infrastructure readiness (Singh et al., 2020). When examined within a broader global economic context, additional complexities emerge. Supply chain disruptions, inflationary pressures, and market volatility exacerbated by U.S.-China trade tensions and semiconductor shortages (IEA, 2023) have significantly impacted EV production costs

and consumer purchasing power worldwide, including in Thailand (Fu, 2024). These economic conditions heighten the importance of IS and EA, as Thai consumers face rising costs and supply uncertainties despite government subsidies (Reuters, 2025). Furthermore, Meliana & Pangaribuan (2024) cautioned that policy-driven incentives may diminish in effectiveness as charging infrastructure reaches saturation, an issue of growing relevance for Thailand amid global economic instability. These findings suggest that Thai policymakers must strategically align financial incentives with infrastructure investment to sustain EV adoption in a volatile economic landscape.

The mediation analysis provides further insight into the causal mechanisms underlying EV adoption. PN's indirect influence on VB through IS ($\beta = 0.340$, $p < 0.05$) and IS's subsequent impact on EA ($\beta = 0.727$, $p < 0.05$) illustrate a sequential process: an increased awareness of environmental issues or policy-driven incentives leads consumers to seek information, which subsequently informs the evaluation of alternatives (Hu et al., 2025). However, the lack of a direct effect of EA on VB ($\beta = 0.03$, $p > 0.05$) suggests that while comparative evaluations are integral to the decision-making process, external factors such as brand reputation and financial incentives may ultimately determine final brand choice. This observation aligns with Hu et al. (2025), who emphasized the influence of infrastructure over intrinsic vehicle attributes in shaping consumer decisions. Moderation analysis further reveals that EA significantly strengthens the relationship between IS and VB ($\beta = 0.108$, $p < 0.001$), explaining 49.7% of VB variance (Singh et al., 2020). This suggests that consumers who engage deeply in EA enhance the impact of their gathered information on brand preference, a trend particularly relevant in Bangkok's diverse EV market, where considerations such as charging compatibility and total cost of ownership play a decisive role (Zhang et al., 2022). These findings underscore the necessity for manufacturers and policymakers to provide comprehensive, comparative information ranging from infrastructure compatibility to financial incentives to engage consumers who prioritize extensive evaluation before making purchase decisions. Taken together, these findings offer a holistic understanding of EV purchasing behavior by elucidating the interplay between cognitive processes and contextual influences. By synthesizing insights from Patt et al. (2019) and Dutta & Hwang (2021) with empirical evidence from Bangkok, this study underscores the role of policy support, infrastructure availability, and charging behavior in shaping consumer decision-making. Thailand's EV market presents a complex dynamic in which strong financial incentives coexist with infrastructure constraints and global economic pressures (Buhmann & Rialp Criado, 2023). These insights yield actionable implications for policymakers and industry stakeholders, emphasizing the need for strategic infrastructure expansion and consumer education initiatives to accelerate EV adoption in an increasingly competitive and uncertain market.

6. Conclusion and Recommendation

This study illuminates the intricate dynamics of consumer behavior in the emerging electric vehicle (EV) market, revealing a complex interplay of psychological, social, and economic factors. Our findings demonstrate that Perception of Needs (PN) and Evaluations of Alternatives (EA) are primary drivers of consumer interest in EVs, while Information Search (IS) plays a sophisticated mediating role through its impact on attitudes and Vehicle Brand perceptions (VB). Crucially, we uncovered a significant moderating effect of Evaluation of Alternatives on the relationship between Information Search and Vehicle Brand, providing a more nuanced understanding of consumer decision-making processes.

These results both affirm and challenge existing consumer behavior paradigms, suggesting the need for a more dynamic, process-oriented theoretical framework that integrates insights from cognitive psychology, behavioral economics, and neuroscience. For industry stakeholders, our findings necessitate a shift towards marketing strategies that engage consumers in active evaluation processes, leveraging techniques such as comparative analyses and interactive decision aids. Policymakers should adopt a holistic approach to EV promotion, combining educational programs with initiatives to enhance EV visibility and accessibility.

We propose applying advanced statistical techniques, integrating qualitative methods, and conducting longitudinal studies to capture the dynamic nature of attitude formation and decision-making in this rapidly evolving market. This research not only advances our theoretical understanding of consumer behavior in emerging technology markets but also provides actionable insights for industry and policy. As the automotive sector transitions towards electrification, these findings will be instrumental in shaping strategies to accelerate EV adoption, contributing significantly to global sustainability efforts.

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