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DETERMINANTS OF ELECTRIC VEHICLE PURCHASE INTENTION AMONG FIRST-TIME CONSUMERS IN INDONESIA: AN EXTENDED THEORY OF PLANNED BEHAVIOR APPROACH

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Abstract

The transition toward low-emission mobility in Indonesia remains constrained by low electric vehicle adoption rates, despite policy commitments and fiscal incentives. Existing literature predominantly focuses on second-car buyers, leaving a critical gap in understanding the decision-making processes of first-time car buyers who face higher perceived risks and lack prior ownership experience. This study extends the Theory of Planned Behavior (TPB) by integrating environmental concern as an antecedent, monetary and non-monetary policy incentives as external drivers, and uncertainty avoidance as a cultural moderator. Using a quantitative cross-sectional design, data were collected from 363 urban Indonesian first-time car buyer respondents who have never owned an electric vehicle but intend to purchase one. Partial Least Squares Structural Equation Modeling (PLS-SEM) revealed that environmental concern significantly shapes attitude, perceived behavioral control, and purchase intention. Non-monetary incentives directly and significantly influence purchase intention, while monetary incentives demonstrate effectiveness only when moderated by high uncertainty avoidance. Subjective norm, perceived behavioral control, product attributes, and direct monetary incentives show negligible independent effects. Notably, uncertainty avoidance significantly moderates the relationships between attitude, product attributes, and both incentive types with purchase intention, highlighting uncertainty avoidance as both a direct psychological barrier ($\beta = -0.295$) and a selective moderator of incentive effectiveness in emerging markets. The model explains 39.7% of the variance in purchase intention with moderate predictive relevance. The findings advance green consumer behavior theory by contextualizing TPB within high-uncertainty-avoidance cultures and provide actionable insights for policymakers and marketers to design hybrid incentive schemes and risk-mitigation communication strategies.

Keywords: Electric Vehicles, Purchase Intention, Extended Theory of Planned Behavior, Environmental Concern, Uncertainty Avoidance

INTRODUCTION

Global decarbonization efforts have positioned battery electric vehicles (BEVs) as a strategic instrument for reducing transportation-related greenhouse gas emissions, which account for approximately 24% of global energy-related CO_2 emissions (International Energy Agency [IEA], 2023). In Indonesia, the government has committed to achieving Net Zero Emissions by 2060, supported by fiscal incentives such as value-added tax exemptions, luxury goods sales tax reductions, and low-interest financing schemes (Bappenas, 2021; Ministry of Energy and Mineral Resources, 2023). Despite these interventions, EV market penetration remains below 1%, indicating a persistent intention-behavior gap that cannot be explained solely by economic or infrastructural factors (Gaikindo, 2024; Gunawan et al., 2022).

Existing empirical studies on EV adoption have predominantly focused on second-car buyers or general consumer segments, overlooking the unique psychological and financial dynamics of first-time car buyers. Unlike replacement buyers, first-time buyers lack prior vehicle ownership experience, face higher initial capital requirements, and exhibit greater sensitivity to technological uncertainty and operational risks (Chu & Spires, 2000; Zhang et al., 2021). Furthermore, findings regarding the role of subjective norms and product attributes remain inconsistent across emerging markets (Kusuma & Kusumastuti, 2025; Saputra & Andajani, 2023), suggesting that standard behavioral models may require contextual adaptation. Cultural dimensions, particularly uncertainty avoidance, have been underexplored despite their proven influence on technology adoption in collectivist societies (Hofstede Insights, 2023; Mitchell, 1999).

To address these gaps, this study employs an extended Theory of Planned Behavior (eTPB) framework to examine how psychological antecedents, policy incentives, and cultural moderation collectively shape EV purchase intention among first-time consumers in Indonesia. The research objectives are threefold: (1) to evaluate the direct effects of environmental concern, attitude, subjective norm, perceived behavioral control, product attributes, and policy incentives on purchase intention; (2) to assess the moderating role of uncertainty avoidance across key behavioral pathways; and (3) to derive theoretical and practical implications for accelerating sustainable mobility transitions in emerging markets. By integrating environmental psychology, behavioral economics, and cross-cultural theory, this study offers a nuanced understanding of early-stage EV adoption dynamics that extends beyond conventional TPB applications.

REVIEW OF LITERATURE

The Theory of Planned Behavior (TPB) posits that behavioral intention is driven by attitude toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). While TPB has been widely applied to green consumption, its explanatory power diminishes in high-involvement, technology-intensive contexts where external enablers and cultural filters significantly alter decision pathways (Ivanova & Moreira, 2023; Yadav & Pathak, 2017). Consequently, recent scholarship advocates for theory extension through contextual antecedents and moderators (Hair et al., 2022).

Environmental Concern as an Antecedent

Environmental concern (EC) represents a multidimensional construct encompassing cognitive awareness, affective worry, and conative willingness to act pro-environmentally (Dunlap & Jones, 2002). Within the Norm Activation Model, EC triggers personal norms that precede rational evaluation, thereby shaping attitudes toward sustainable technologies (Schwartz, 1977). Empirical studies confirm that EC significantly influences attitude and perceived behavioral control in EV contexts, though its direct effect on purchase intention remains debated (Dutta & Hwang, 2021; Alberto & Riza, 2023). In emerging markets, EC often operates as a value catalyst rather than a direct purchase driver, necessitating mediation through policy perception and risk assessment (Rafiq et al., 2024).

Policy Incentives: Monetary vs. Non-Monetary

Government interventions reduce adoption barriers through fiscal and operational mechanisms. Monetary incentives (MIPM), such as subsidies and tax exemptions, directly lower upfront costs, addressing price elasticity constraints in developing economies (Sierzchula et al., 2014; Jenn et al., 2018). Non-monetary incentives (NMIPM), including dedicated lanes, preferential parking, and regulatory exemptions, enhance daily usability and social signaling (Hardman et al., 2017; Bjerkan et al., 2016). Recent evidence suggests that NMIPM may exert stronger long-term effects by normalizing EV usage and reducing operational anxiety, particularly in congested urban environments (Farheen Ehsan et al., 2024; Setiawan et al., 2022).

Cultural Moderation: Uncertainty Avoidance

Hofstede's uncertainty avoidance (UA) dimension captures societal tolerance for ambiguity and risk (Hofstede, 2001). High-UA consumers exhibit heightened sensitivity to technological novelty, demanding credible information, institutional guarantees, and predictable outcomes before committing to high-cost purchases (Mitchell, 1999; Laros & Steenkamp, 2004). In EV adoption, UA strengthens the impact of clear product specifications and policy certainty on purchase intention, while weakening reliance on abstract social norms (Zhang et al., 2020; Xu & Liu, 2022). Indonesia's relatively high UA score (70/100) suggests that cultural risk aversion may filter psychological and policy drivers differently than in low-UA contexts like India or Scandinavia (Hofstede Insights, 2023; Rafiq et al., 2024).

Theoretical Integration

This study synthesizes TPB with environmental psychology and institutional theory to propose an eTPB model tailored to first-time buyers in high-UA emerging markets. By positioning EC as an exogenous antecedent, differentiating incentive types, and testing UA as a cross-path moderator, the framework addresses prior inconsistencies and aligns with calls for culturally grounded behavioral modeling (Kumar & Kumar, 2023; Park et al., 2023).

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RESEARCH METHOD

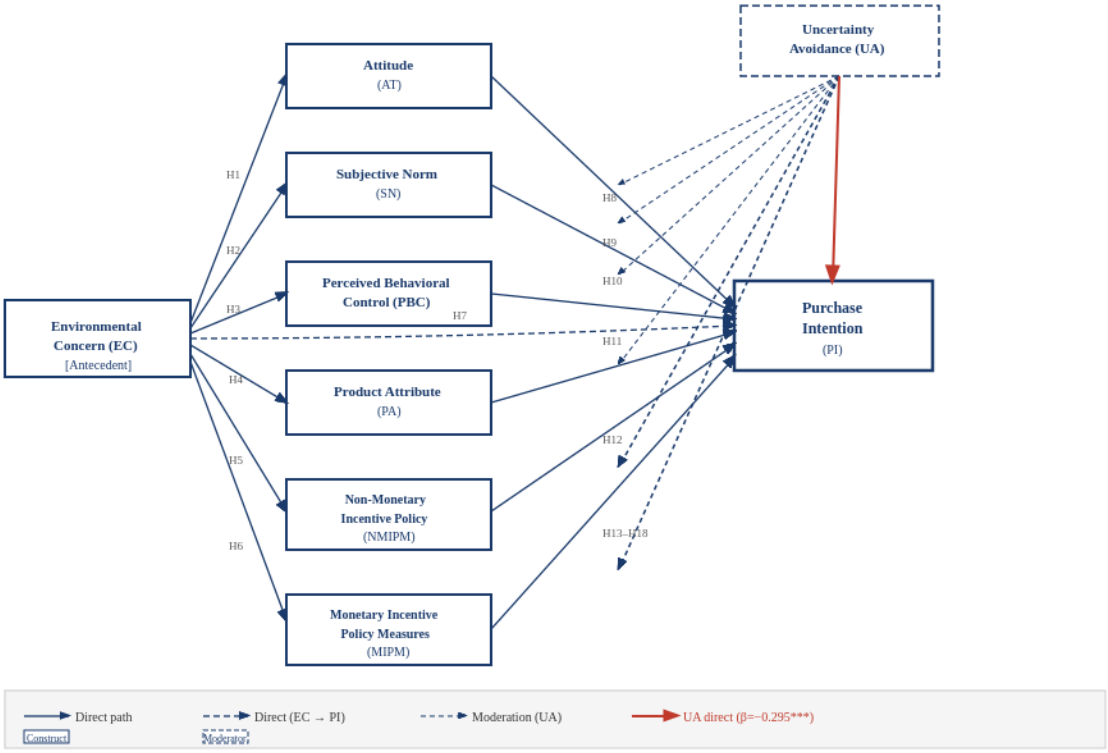


Figure 1.
Research Model: Extended Theory of Planned Behavior for EV Purchase Intention

This study employs a quantitative, cross-sectional, causal-explanatory design to test hypothesized relationships among latent constructs. The target population comprises urban Indonesian consumers aged 25–64 who have never owned an EV but express intention to purchase one as their first vehicle. A purposive sampling technique was applied, with inclusion criteria of: (1) never having owned an electric vehicle, (2) urban domicile, (3) aged 25–64, and (4) interest in EV purchase. This yielded 363 valid responses collected via structured online questionnaires distributed across major metropolitan areas (Jabodetabek, Surabaya, Bandung, Medan, Makassar).

Instrument Development and Validation

Measurement items were adapted from validated scales measuring environmental concern (Dunlap & Jones, 2002), TPB constructs (Ajzen, 1991; Fishbein & Ajzen, 2010), policy incentives (Hardman et al., 2017; Kusuma & Kusumastuti, 2025), and uncertainty avoidance (Hofstede, 2001). All items utilized a five-point Likert scale. Prior to main data collection, a wording test with 10 pilot respondents and a pre-test with 30 participants confirmed content validity, linguistic clarity, and contextual relevance. Exploratory factor analysis confirmed unidimensionality (KMO > 0.70, Bartlett's $p < 0.001$), while Cronbach's Alpha exceeded 0.77 for all constructs.

Data Analysis Technique

Partial Least Squares Structural Equation Modeling (PLS-SEM) was selected due to its robustness with non-normal data, flexibility in complex model testing, and superior predictive orientation (Hair et al., 2022). Analysis followed a two-stage procedure using SmartPLS 4.0: (1) evaluation of the measurement model (outer loadings ≥ 0.70, composite reliability ≥ 0.70, AVE ≥ 0.50, HTMT < 0.85); and (2) assessment of the structural model (R^2, f^2, Q^2, bootstrapping with 5,000 subsamples, t-value > 1.96, $p < 0.05$). Sample size adequacy was verified using the 10-times rule; with Purchase Intention receiving 12 structural paths, the minimum required sample was 120, well exceeded by the final 363 valid responses (Hair et al., 2022), and common method bias was mitigated through procedural design and Full Collinearity VIF testing (Kock, 2015).

RESULTS AND DISCUSSION

Measurement Model Assessment

All indicators demonstrated satisfactory reliability and validity. Outer loadings ranged from 0.742 to 0.925, composite reliability values spanned 0.861–0.911, and AVE values exceeded 0.50 for all constructs. Discriminant validity was confirmed via HTMT ratios (< 0.85) and Fornell-Larcker criteria, ensuring conceptual distinctiveness among constructs.

Table 1.
Measurement Model Results

Construct	Items	Outer Loading	Composite Reliability	AVE
Environmental Concern	4	0.764–0.870	0.872	0.701
Attitude	4	0.742–0.822	0.872	0.687
Subjective Norm	3	0.821–0.871	0.883	0.716
Perceived Behavioral Control	3	0.818–0.836	0.886	0.741
Product Attribute	4	0.870–0.925	0.896	0.732
Monetary Incentive	4	0.876–0.903	0.900	0.692
Non-Monetary Incentive	3	0.916–0.920	0.891	0.732
Uncertainty Avoidance	5	0.754–0.853	0.899	0.690
Purchase Intention	4	0.866–0.916	0.861	0.676

Source: Processed data with SmartPLS 4 (2025)

Structural Model and Hypothesis Testing

The structural model explained 39.7% of the variance in purchase intention (R^2 = 0.397) with moderate predictive relevance (Q^2 = 0.240). Hypothesis testing revealed significant positive effects of environmental concern on attitude (β = 0.242, $p < 0.001$), perceived behavioral control (β = 0.227, p = 0.001), and purchase intention (β = 0.135, p = 0.003). Both monetary (β = 0.110, p = 0.025) and non-monetary incentives (β = 0.170, p = 0.003) significantly predicted purchase intention, with attitude (β = 0.087, p = 0.046) and

perceived behavioral control (β = 0.082, p = 0.046) retaining TPB-consistent effects. Subjective norm (β = 0.038, p = 0.450) and product attributes (β = 0.091, p = 0.082) showed no significant direct effects.

Table 2.
Structural Path Coefficients and Hypothesis Testing

Hypothesis	Path	β	t-value	p-value	Decision
H1	EC → Attitude	0.242	3.567	0.000	Accepted
H2	EC → Subjective Norm	0.071	1.024	0.306	Rejected
H3	EC → PBC	0.227	3.344	0.001	Accepted
H4	EC → Product Attribute	0.234	3.288	0.001	Accepted
H5	EC → Monetary Incentive	0.269	4.178	0.000	Accepted
H6	EC → Non-Monetary Incentive	0.216	3.050	0.002	Accepted
H7	EC → Purchase Intention	0.135	2.968	0.003	Accepted
H8	Attitude → Purchase Intention	0.087	1.999	0.046	Accepted
H9	Subjective Norm → Purchase Intention	0.038	0.755	0.450	Rejected
H10	PBC → Purchase Intention	0.082	1.994	0.046	Accepted
H11	Monetary Incentive → Purchase Intention	0.110	2.244	0.025	Accepted
H12	Non-Monetary Incentive → Purchase Intention	0.170	2.984	0.003	Accepted

Source: Processed data with SmartPLS 4 (2025)

Moderation Effects of Uncertainty Avoidance

Uncertainty avoidance significantly strengthened four key pathways: attitude → purchase intention (β = 0.121, p = 0.007), product attribute → purchase intention (β = 0.119, p = 0.003), monetary incentive → purchase intention (β = 0.136, p = 0.003), and non-monetary incentive → purchase intention (β = 0.135, p = 0.011). These findings align with risk-reduction theory, indicating that high-UA consumers rely on clear psychological cues, tangible product specifications, and institutional guarantees to mitigate adoption anxiety (Mitchell, 1999; Zhang et al., 2020).

Table 3.
Moderation Effects of Uncertainty Avoidance

Interaction Term	β	t-value	p-value	f^2	Decision
UA × Attitude → PI	0.121	2.697	0.007	0.028	Accepted

UA × Subjective Norm → PI	0.057	1.114	0.266	0.006	Rejected
UA × PBC → PI	0.050	1.157	0.248	0.004	Rejected
UA × Product Attribute → PI	0.119	3.018	0.003	0.025	Accepted
UA × Monetary Incentive → PI	0.136	3.016	0.003	0.029	Accepted
UA × Non-Monetary Incentive → PI	0.135	2.538	0.011	0.027	Accepted

Source: Processed data with SmartPLS 4 (2025)

Critical Discussion of Non-Significant Findings

The non-significance of subjective norm (H2, H9) and its interaction with UA (H14) challenges universal TPB assumptions but aligns with diffusion of innovation theory. First-time buyers operate as independent evaluators rather than social conformists, relying on rational cost-benefit analysis and institutional signals over peer pressure (Rogers, 2003; Armitage & Conner, 2001). In Indonesia's early-stage EV market, normative structures remain underdeveloped, reducing social influence potency. Similarly, UA's inability to moderate PBC → PI (H15) reflects a threshold effect: when baseline relationships are weak ($f^2 < 0.02$), cultural amplification lacks structural leverage (Hair et al., 2022). These results underscore the necessity of contextualizing behavioral models to adoption phases and demographic profiles.

CONCLUSION

This study demonstrates that an extended Theory of Planned Behavior framework effectively explains electric vehicle purchase intention among first-time consumers in Indonesia. Environmental concern emerges as a foundational antecedent shaping attitude, perceived control, and policy sensitivity, while subjective norm and product attributes exhibit negligible direct effects. Non-monetary policy incentives are the sole policy variable with consistent direct effects on purchase intention. Monetary incentives become effective only when consumers exhibit high uncertainty avoidance, functioning as a risk-reduction mechanism. Most critically, uncertainty avoidance emerges as the dominant direct barrier ($\beta = -0.295$), suppressing purchase intention more powerfully than any individual predictor. The model accounts for 39.7% of purchase intention variance, validating its applicability in high-risk-aversion emerging markets.

Theoretically, this research revises universal TPB assumptions by contextualizing psychological drivers within cultural and adoption-stage filters, demonstrating that environmental concern can directly influence intention when institutional trust is established. Practically, policymakers should prioritize non-monetary operational incentives as the most consistently effective lever, while designing monetary incentives specifically to target high-uncertainty-avoidance consumer segments. Marketers must explicitly address UA — the dominant adoption barrier — through transparent warranty assurances, extended test-drive programs, and risk-mitigation communication rather than attitude-building campaigns alone. Infrastructure developers such as PT PLN should expand fast-charging networks in

residential and commercial areas, as infrastructure availability directly reduces the range anxiety that elevates consumer uncertainty avoidance.

Limitations include the cross-sectional design, urban sample concentration, and reliance on self-reported data. Future research should employ longitudinal tracking, expand to rural and semi-urban markets, integrate second-car buyer comparisons, and incorporate digital literacy and brand trust as additional antecedents. By bridging behavioral theory, cultural psychology, and sustainable mobility policy, this study provides a scalable framework for accelerating EV adoption in developing economies.

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