

RESEARCH

Impact of environmental concern on purchase decision of electric vehicles in coimbatore district*Nirmaladevi¹, Megalatha^{1*}***Abstract**

Environmental concern has emerged as a decisive psychological determinant of pro-environmental consumer behaviour globally, yet its specific causal relationship with electric vehicle (EV) purchase decisions in Indian Tier district contexts remains insufficiently examined. Anchored in the Value-Belief-Norm (VBN) theory and the Theory of Planned Behaviour (TPB), this study investigates the impact of environmental concern operationalised across four dimensions: environmental knowledge, perceived environmental threat, ecological values, and pro-environmental attitude-on the EV purchase decision of consumers in coimbatore district. A structured, pre-tested questionnaire was administered to 400 respondents selected through stratified random sampling from urban and semi-urban localities of coimbatore district. Data were analysed using descriptive statistics, one-way ANOVA, Pearson correlation, multiple regression analysis, and Confirmatory Factor Analysis (CFA) within a Structural Equation Modelling (SEM) framework using AMOS 24. The results reveal that all four dimensions of environmental concern exert a statistically significant and positive influence on EV purchase decisions, collectively accounting for 71.3% of variance ($R^2 = 0.713$). Perceived environmental threat ($\beta = 0.362$) and pro-environmental attitude ($\beta = 0.298$) are the strongest predictors. The SEM model demonstrates excellent fit (CFI = 0.951, RMSEA = 0.048, SRMR = 0.052), validating the proposed theoretical framework. Significant differences in environmental concern levels were identified across gender, age, and place of residence. The findings generate actionable recommendations for EV manufacturers, eco-marketers, and Tamil Nadu state policymakers seeking to leverage environmental consciousness as a strategic lever for accelerating sustainable mobility adoption in coimbatore district.

Keywords: *Environmental concern, electric vehicle purchase decision, value-belief-norm theory, sustainable mobility, coimbatore district, sem, pro-environmental behaviour, perceived environmental threat.*

1. Introduction

The interplay between human environmental consciousness and consumption behaviour has occupied a central position in sustainability science for over four decades. As global temperatures breach successive milestones and the Intergovernmental Panel on Climate Change (IPCC).

Intensifies calls for immediate systemic decarbonisation, the spotlight has fallen with particular sharpness on the transportation sector responsible for approximately 27% of global greenhouse gas emissions (IEA, 2023). Electric vehicles (EVs) have emerged as the technological linchpin of sustainable transportation transitions, offering the promise of zero tailpipe emissions, superior energy efficiency, and compatibility with renewable energy grids. India's EV trajectory has been remarkable.

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Within Tamil Nadu, coimbatore district represents a strategically important and understudied EV market. With a district population exceeding 3.46 million and a strong industrial base in textiles, pumps, and engineering goods, coimbatore exhibits the demographic and economic characteristics that predispose consumers to EV consideration. The district's Air Quality Index (AQI) frequently records 'Moderate' to 'Poor' readings in congested urban zones such as Gandhipuram, Ukkadam, and Singanallur, creating a locally tangible environmental stimulus that may activate environmental concern among residents. Despite the intuitive alignment between environmental concern and EV adoption, the precise mechanisms through which environmental consciousness translates into concrete vehicle purchase decisions-particularly in the socioeconomic and cultural context of coimbatore district-have not been empirically mapped with adequate rigour. Most existing Indian EV adoption studies adopt an undifferentiated treatment of environmental factors, bundling ecological concern into composite indices without disaggregating its constituent dimensions. This study addresses that gap by operationalising environmental concern as a four-dimensional construct and testing causal pathways using both multiple regression and structural equation modelling. The study's empirical and methodological contributions are significant [1]. By integrating the Value-Belief-Norm (VBN) theory with the Theory of Planned Behaviour in an original, coimbatore-specific framework, and by deploying SEM as the primary structural analysis tool, this research provides a level of theoretical specificity and analytical rigour that surpasses prior Indian EV-environment studies [2].

2. Review of literature

The relationship between environmental concern and sustainable consumer behaviour has a rich intellectual lineage between verbal commitment, actual commitment, affect, and knowledge components a Maloney and Ward

were among the first to systematically measure environmental concern, distinguishing recognition of environmental concern's multidimensionality that this study operationalises through four distinct constructs [3]. New Environmental Paradigm (NEP) scale, subsequently revised by, provided the field with a widely validated instrument for measuring ecological worldview, serving as the conceptual ancestor of the Ecological Values construct deployed here [4].

In the sustainable mobility literature, demonstrated that environmental self-identity-closely related to ecological values-significantly predicted willingness to pay a premium for EVs among Italian consumers, even after controlling for economic utility [5]. Their finding that environmental identity operated through attitudinal pathways underscores the importance of disaggregating environmental concern into its cognitive, affective, and value-based components [6]. Showed in a Swedish context that environmental knowledge moderated the relationship between general environmental concern and EV adoption, with knowledgeable consumers translating ecological concern into concrete vehicle consideration more effectively. The role of perceived environmental threat has received particular attention in the post-COVID-19 period, as heightened public sensitivity to systemic environmental risks intensified. Found that risk perception regarding air pollution significantly mediated the relationship between environmental values and green product purchase intention among consumers in Delhi [7]. Demonstrated across multiple product categories that consumers' general pro-environmental disposition translated most strongly into purchase decisions for products with clear, communicable environmental benefits a category that EVs squarely represent [8]. In the Tamil Nadu context, noted a divergence between articulated environmental concern in surveys and actual EV purchase behaviour in smaller Tamil Nadu cities, highlighting an attitude-behaviour gap [9].

The current study addresses that gap by testing not merely the existence of environmental concern but its relative predictive power across four dimensions [10]. Demonstrated in a Chinese consumer study that the pathway from environmental concern to EV purchase intention was fully mediated by personal moral norms, consistent with VBN theory's predictions and providing a cross-cultural benchmark for the current study's findings. Meta-analysis of 47 EV adoption studies found that environmental attitudes ranked third in average effect size, but were the strongest predictor in markets with mature EV awareness-suggesting that as Coimbatore EV literacy grows, environmental concern may ascend further in the predictive hierarchy [11].

3. Objectives of the study

- To assess the level of environmental concern among electric vehicle consumers and prospective buyers in Coimbatore district across the four dimension environmental knowledge, perceived environmental threat, ecological values, and pro-environmental attitude.
- Environmental knowledge, perceived environmental threat, ecological values, and pro-environmental attitude.
- To examine the nature and strength of the relationship between each dimension of environmental concern and the purchase decision of electric vehicles.
- To determine the relative predictive power of the four environmental concern dimensions on EV purchase decisions using multiple regression and SEM analysis.
- To analyse the moderating influence of demographic variables-gender, age, residence type, and monthly income-on the environmental concern-EV purchase decision relationship.

- To offer strategic recommendations for EV manufacturers, environmental marketers, and policymakers to leverage environmental concern as a sustainable mobility adoption lever in Coimbatore district.

4. Research hypotheses

The following null hypotheses were formulated for empirical testing, grounded in the VBN-TPB integrated framework.

Table 1: Research hypotheses

Hypothesis	Statement
H ₀₁	There is no significant difference in the composite environmental concern level across gender groups of consumers in Coimbatore district.
H ₀₂	There is no significant difference in the level of environmental concern across different age groups of consumers.
H ₀₃	There is no significant difference in environmental concern levels across urban, semi-urban, and rural residents of Coimbatore district.
H ₀₄	Environmental Knowledge (EK) has no significant impact on the EV purchase decision of consumers in Coimbatore district.
H ₀₅	Perceived Environmental Threat (PET) has no significant impact on the EV purchase decision of consumers in Coimbatore district.
H ₀₆	Ecological Values (EV-val) have no significant impact on the EV purchase decision of consumers in Coimbatore district.
H ₀₇	Pro-environmental Attitude (PEA) has no significant impact on the EV purchase decision of consumers in Coimbatore district.
H ₀₈	The four dimensions of environmental concern collectively do not significantly predict EV purchase decisions in Coimbatore district.

5. Methodology

5.1. Research Design

This study employs a positivist, explanatory research design to test theoretically derived hypotheses concerning the environmental concern-EV purchase decision relationship. A quantitative cross-sectional survey approach was adopted as the primary data collection strategy. The research integrates descriptive, correlational, and causal-predictive analyses, with the SEM approach providing the most rigorous test of the proposed structural relationships. Data were collected during the period October 2024 to January 2025.

5.2. Study Area: Coimbatore District

Coimbatore district comprises the coimbatore corporation area and six municipalities-mettupalayam, Pollachi, Palladam, Tiruppur, Udumalpet, and Valparai-spanning 7,649 sq. km. The district's geographic and socioeconomic diversity, ranging from dense urban neighbourhoods to semi-urban townships and rural agricultural pockets, enriches the study's scope. The district's industrial economy supports a vehicle ownership rate significantly above the Tamil Nadu average, making it an ideal site for EV adoption research. Coimbatore city's frequent 'Moderate' AQI readings create locally perceptible environmental stimuli that may heighten environmental concern among residents.

5.3. Population, Sample Size, and Sampling

The target population encompasses all adult residents of coimbatore district aged 21 years and above who own, have recently purchased, or are actively considering purchasing a vehicle. The sample size of 400 was determined using Cochran's (1977) formula for unknown population proportions: $n = Z^2pq/e^2 = (1.96)^2 \times 0.5 \times 0.5 / (0.05)^2 = 384.16$, rounded up to 400 for statistical robustness and to facilitate stratified sub-group analyses. Stratified random sampling was employed, with primary strata defined by residence type urban (n = 200, 50%), Semi-urban (n = 120, 30%), and Rural

(n = 80, 20%). Secondary stratification by vehicle ownership status yielded: current EV owners (n = 112, 28%), intending EV purchasers (n = 168, 42%), and conventional vehicle owners with EV awareness (n = 120, 30%). Within each stratum, simple random sampling was applied. Data were collected through field surveys at automobile showrooms, petrol stations, IT parks, educational institutions, and residential societies, supplemented by a bilingual (English-tamil) online survey (Table 1).

5.4. Measurement Instrument and Scales

The primary data collection instrument was a structured questionnaire comprising six sections:

- Socio-demographic profile (9 items).
- Environmental knowledge scale (8 items adapted from Frick et al., 2004).
- Perceived environmental threat scale (7 items adapted from Slovic, 1987, contextualised to vehicular emissions and urban air quality in coimbatore).
- Ecological values scale (6 items adapted from the Revised New Ecological Paradigm Scale, Dunlap et al., 2000).
- Pro-environmental attitude scale (7 items adapted from Cheah and Phau, 2011).
- EV Purchase decision scale (8 items operationalising purchase intention, willingness to pay a premium, and timing of intended purchase).

All constructs were measured on a five-point Likert scale (1 = Strongly disagree to 5 = Strongly agree). Content validity was established through an expert panel review (n = 5) and cognitive interviewing with 10 target-population members. The instrument was pilot-tested on 40 respondents not included in the final sample. Cronbach's Alpha values from the pilot ranged from 0.824 (Environmental knowledge) to 0.893 (Perceived environmental threat), demonstrating strong internal consistency [12].

5.5. Analytical Strategy

Data were analysed using IBM SPSS Statistics Version 26 for descriptive statistics, one-way ANOVA, independent samples t-test, Pearson correlation, and multiple linear regression. IBM AMOS Version 24 was used for Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM). The analytical sequence followed Anderson and Gerbing's (1988) Two-step approach measurement model (CFA) first, structural model second. Model fit was evaluated using χ^2/df , GFI, AGFI, NFI, CFI, RMSEA, SRMR, and PNFI indices.

6. Data analysis and interpretation

Socio-demographic profile of respondents (Table 2) presents the socio-demographic characteristics of the 400 respondents. Males constitute 58.5% of the sample. The 26-35 age groups are the largest cohort (32.5%), followed by 36-45 years (27.0%). Urban residents form 50% of the sample. Graduates (45.5%) and postgraduates (30.8%) together account for 76.3%. Monthly income in the ₹30,001 - ₹50,000 bracket predominates (34.0%). Private-sector employees are the largest occupational group (40.3%), followed by business/self-employed (25.5%). Current EV owners constitute 28% of the sample.

Table 2: Socio demographic profile of respondents (n = 400)

Variable	Category	Frequency	%	Cum. %
Gender	Male	234	58.5	58.5
	Female	166	41.5	100.0
Age Group	21-25 years	64	16.0	16.0
	26-35 years	130	32.5	48.5
	36-45 years	108	27.0	75.5
	46-55 years	68	17.0	92.5
	Above 55 years	30	7.5	100.0
Residence Type	Urban	200	50.0	50.0
	Semi-urban	120	30.0	80.0
	Rural	80	20.0	100.0
Education	HSC / Diploma	70	17.5	17.5
	Undergraduate	182	45.5	63.0
	Postgraduate	123	30.8	93.8
	Professional / PhD	25	6.3	100.0
Monthly Income	Below ₹ 20,000	52	13.0	13.0
	₹ 20,001 – ₹ 30,000	90	22.5	35.5
	₹ 30,001 – ₹ 50,000	136	34.0	69.5
	₹ 50,001 – ₹ 80,000	82	20.5	90.0
	Above ₹ 80,000	40	10.0	100.0
Vehicle Ownership	Current EV Owner	112	28.0	28.0
	Intending EV Purchaser	168	42.0	70.0
	Conventional Vehicle Owner (EV-aware)	120	30.0	100.0

6.1. Reliability and Convergent Validity

(Table 3) presents Cronbach's alpha, Average Variance Extracted (AVE), and Composite Reliability (CR) for all constructs. All values meet or exceed accepted thresholds (Alpha > 0.70; AVE > 0.50; CR > 0.70). Confirming strong internal consistency and convergent validity. Discriminant validity was established using the Fornell-larcker criterion the square root of AVE for each construct exceeds its highest correlation with any other construct.

Table 3: Reliability and validity statistics

Construct	No. of Items	Cronbach's α	AVE	Composite Reliability
Environmental Knowledge (EK)	8	0.824	0.531	0.861
Perceived Environmental Threat (PET)	7	0.893	0.578	0.904
Ecological Values (EV-val)	6	0.847	0.544	0.879
Pro-environmental Attitude (PEA)	7	0.871	0.562	0.897
EV Purchase Decision (EVPD)	8	0.886	0.558	0.909

6.2. Descriptive Statistics of Constructs and Key Items

(Table 4) presents mean scores and standard deviations for the five constructs and representative items. Perceived environmental threat records the highest mean (4.41), indicating acute consciousness of local vehicular emission hazards. Environmental knowledge records the lowest mean (3.79), signalling an awareness deficit. Ecological values (4.28) and Pro-environmental Attitude (4.17) reflect strong, deeply-held environmental orientations. The EV Purchase decision scale records a mean of 4.02, indicating broadly favourable but not uniformly decisive purchase intent.

Table 4: Descriptive statistics of constructs and representative items

Construct / Representative Item	Mean	Std. Dev.
Environmental knowledge (EK)-composite	3.79	0.64
I know that vehicular emissions are a primary cause of urban air pollution in coimbatore.	4.12	0.73
I understand how electric vehicles reduce carbon dioxide and particulate matter emissions.	3.88	0.81
I am aware of the health consequences of PM2.5 pollution from fossil-fuel vehicles.	3.61	0.89
I can distinguish between battery EVs (BEV), plug-in hybrids (PHEV), and hybrid (HEV) types.	3.44	0.94
Perceived environmental threat (PET)-Composite	4.41	0.51
I feel that vehicular air pollution in coimbatore poses a serious health risk to my family.	4.58	0.61
I believe the environmental damage from conventional petrol/diesel vehicles is already severe.	4.44	0.65
Climate change and air pollution pose direct threats to my community's future well-being.	4.39	0.67
I worry about the long-term environmental impact of the vehicle choice I make today.	4.21	0.72
Ecological values (EV-val)-composite	4.28	0.57
I believe humans have a moral obligation to protect the natural environment for future generations.	4.47	0.62
I prefer to buy products and services that minimise ecological harm, even at a higher price.	4.19	0.74
The balance of nature is fragile and easily disrupted by excessive human consumption.	4.18	0.76
Pro environmental attitude (PEA)-composite	4.17	0.6
Switching to an EV would align with my personal commitment to protecting the environment.	4.38	0.63
I feel a sense of personal responsibility to choose vehicles that cause less air pollution.	4.29	0.66
Buying an EV would make me feel that I am contributing positively to coimbatore's environment.	4.04	0.8
EV purchase decision (EVPD)-composite	4.02	0.71
I intend to purchase an electric vehicle as my next vehicle within the next two years.	4.18	0.74
I am willing to pay a price premium for an EV over a comparable conventional petrol vehicle.	3.84	0.88
Environmental protection is a primary reason for my interest in buying an electric vehicle.	4.29	0.68

6.3. One-Way ANOVA and t-test Demographic Differences in Environmental Concern:

To test hypotheses H_{01} , H_{02} , and H_{03} , independent samples t-test (gender) and one-way ANOVA (age group, residence type).

Were conducted on the composite environmental concern (EC) score. (Table 5) summarises the results.

Table 5: Demographic differences in environmental concern-ANOVA and t-test results

Group / Category	EC Mean	Std. Dev.	Test Statistic	p-value	Decision
Gender (Independent t-test)			t = -3.47	0.001**	Reject H_{01}
Male (n = 234)	4.06	0.52			
Female (n = 166)	4.31	0.48			
Age Group (One-way ANOVA)			F = 14.83	0.000**	Reject H_{02}
21–25 years (n = 64)	3.94	0.61			
26–35 years (n = 130)	4.21	0.54			
36–45 years (n = 108)	4.38	0.49			
46–55 years (n = 68)	4.29	0.52			
Above 55 years (n = 30)	4.17	0.58			
Residence Type (One-way ANOVA)			F = 9.61	0.000**	Reject H_{03}
Urban (n = 200)	4.32	0.50			
Semi-Urban (n = 120)	4.11	0.55			
Rural (n = 80)	3.84	0.63			

EC = Composite Environmental Concern score ** Significant at 1% level Post-hoc Tukey HSD confirmed pairwise significance for age and residence groups.

Female respondents demonstrate significantly higher environmental concern (4.31) than males (4.06), rejecting H_{01} . This aligns with Zelezny et al. (2000) meta-analytic finding of consistent gender differences in environmentalism.

The 36-45 age cohort exhibits peak environmental concern (4.38), reflecting a pattern where life-stage environmental engagement peaks in middle adulthood. The urban-rural gradient (Urban 4.32 > Semi-urban 4.11 > Rural 3.84) reflects the urban exposure effect daily proximity to vehicular congestion and pollution in coimbatore city's arterials makes environmental threat more cognitively salient for urban residents.

6.4. Pearson Correlation Analysis

(Table 6) presents the Pearson correlation matrix for all five constructs. All four environmental concern dimensions are significantly and positively correlated with EV purchase decision, with r values ranging from 0.541 (EK) to 0.689 (PET), validating the study's core premise. Inter-construct correlations among EC dimensions (0.482 to 0.674) confirm they are related but empirically distinct constructs.

Table 6: Pearson correlation matrix (n = 400)

Construct	EK	PET	EV-val	PEA	EVPD
Environmental Knowledge (EK)	1.000	-	-	-	-
Perceived Environmental Threat (PET)	0.574**	1.000	-	-	-
Ecological Values (EV-val)	0.482**	0.613**	1.000	-	-
Pro-environmental Attitude (PEA)	0.531**	0.674**	0.648**	1.000	-
EV Purchase Decision (EVPD)	0.541**	0.689**	0.601**	0.654**	1.000

** Correlation is significant at the 0.01 level (2-tailed).

6.5. Multiple Regression Analysis

Multiple linear regression was conducted with EV Purchase Decision (EVPD) as the dependent variable and the four environmental concern dimensions as independent variables. Multicollinearity was assessed VIF values ranged from 1.74 to 2.31, well below the critical threshold of 10. The Durbin-watson statistic (1.93) confirms no significant autocorrelation. (Table 7) presents the full regression results.

Model Summary: R = 0.844; R² = 0.713; Adjusted R² = 0.709; F (4, 395) = 246.21; p < 0.001

Table7: Multiple regression results predictors of EV purchase decision (n = 400)

Independent Variable	B	Std. Error	Beta (β)	t-value	p-value	VIF
(Constant)	0.341	0.142	-	2.40	0.017*	-
Environmental Knowledge (EK)	0.214	0.041	0.196	5.22	0.000**	1.74
Perceived Env. Threat (PET)	0.397	0.048	0.362	8.27	0.000**	2.18
Ecological Values (EV-val)	0.261	0.044	0.238	5.93	0.000**	2.31
Pro-environmental Attitude (PEA)	0.323	0.047	0.298	6.87	0.000**	2.27

Dependent Variable: EV Purchase Decision (EVPD) | * p < 0.05 | ** p < 0.01

The model is highly significant (F = 246.21, p<0.001) and explains 71.3% of variance in EV purchase decisions-a high explanatory power, establishing environmental concern as the dominant predictive framework. Perceived Environmental Threat is the strongest predictor (β = 0.362).

Followed by Pro-environmental Attitude ($\beta = 0.298$), Ecological values ($\beta = 0.238$), and Environmental Knowledge ($\beta = 0.196$). All four structural hypotheses H_{04} through H_{07} are rejected, and H_{08} is likewise rejected. The regression equation $EVPD = 0.341 + 0.214 (EK) + 0.397 (PET) + 0.261 (EV-val) + 0.323 (PEA)$.

6.6. Structural Equation Modeling (SEM) Results

Anderson and Gerbing's (1988) two-step SEM procedure was followed. The CFA measurement model was assessed first, followed by the structural model (Table 8) presents model fit indices (Table 9) presents standardised path coefficients.

Table 8: SEM model fit indices

Fit Index	Recommended Threshold	Measurement Model	Structural Model	Interpretation
χ^2 / df (CMIN/DF)	< 3.0	2.14	2.29	Excellent fit
GFI (Goodness of Fit Index)	> 0.90	0.933	0.921	Good fit
AGFI (Adjusted GFI)	> 0.85	0.914	0.901	Good fit
NFI (Normed Fit Index)	> 0.90	0.944	0.936	Good fit
CFI (Comparative Fit Index)	> 0.90	0.961	0.951	Excellent fit
RMSEA	< 0.06	0.042	0.048	Excellent fit
SRMR	< 0.08	0.047	0.052	Good fit
PNFI (Parsimony NFI)	> 0.50	0.712	0.698	Acceptable

Table 9: SEM standardized path coefficients (n = 400)

Structural Path	Std. Beta (β)	Standard Error	Critical Ratio (CR)	p-value	Supported?
EK → EVPD (Direct)	0.201	0.043	4.67	***	Yes
PET → EVPD (Direct)	0.368	0.051	7.22	***	Yes
EV-val → EVPD (Direct)	0.242	0.046	5.26	***	Yes
PEA → EVPD (Direct)	0.304	0.049	6.20	***	Yes
EK → PEA (Indirect via attitude)	0.317	0.055	5.76	***	Yes
PET → PEA (Indirect via attitude)	0.429	0.058	7.40	***	Yes

$p < 0.001$ EK = Environmental Knowledge; PET = Perceived Environmental Threat; EV-val = Ecological Values; PEA = Pro-environmental Attitude; EVPD = EV Purchase Decision.

The SEM model demonstrates excellent fit across all indices (CFI = 0.951, RMSEA = 0.048, SRMR = 0.052), validating the VBN-TPB integrated framework. All direct structural paths are significant ($p < 0.001$) Perceived Environmental.

Threat is the Strongest direct predictor ($\beta = 0.368$), consistent with regression results. Crucially, the SEM reveals significant indirect effects both EK and PET exert substantial effects on EVPD through PEA as mediator, confirming VBN theory's causal chain logic. This mediation structure-invisible in regression-only frameworks-underscores the methodological value of the SEM approach deployed here [13].

7. Key findings

- All four dimensions of environmental concern exert statistically significant and positive impacts on EV purchase decisions in coimbatore district, collectively explaining 71.3% of variance ($R^2 = 0.713$)-establishing environmental concern as the dominant predictive framework for EV adoption in this context.
- Perceived Environmental Threat (PET) is the strongest predictor of EV purchase decision (regression $\beta = 0.362$; SEM $\beta = 0.368$), establishing that the cognitive recognition of concrete, locally perceptible environmental hazards from conventional vehicles is the most potent driver of EV consideration.
- Pro-Environmental Attitude (PEA) is the second-strongest predictor ($\beta = 0.298$) and acts as a partial mediator of the EK→EVPD and PET→EVPD structural pathways, confirming VBN theory's prediction of attitudinal mediation in pro-environmental behaviour.
- Environmental Knowledge (EK) is the weakest direct predictor ($\beta = 0.196$) but exerts a meaningful indirect effect on EVPD through PEA ($\beta = 0.317$), indicating that knowledge must be metabolised into attitudinal change to drive purchase decisions-challenging purely information-deficit models of EV promotion.
- Female respondents exhibit significantly higher composite environmental concern (mean = 4.31) than male respondents (mean = 4.06, $t = -3.47$, $p < 0.001$).

- Recommending gender-differentiated EV communication strategies with environmental messaging potentially more resonant for female buyers.
- The 36-45 age group records the highest environmental concern (mean = 4.38) of all age cohorts, identifying middle-aged consumers as the primary environmentally-driven EV target segment in coimbatore district.
- An urban-rural gradient in environmental concern is confirmed (Urban 4.32 > Semi-urban 4.11 > Rural 3.84), suggesting that environmental threat salience is partially contingent on daily pollution exposure, and that rural EV promotion may require distinct environmental framing strategies.
- Environmental knowledge records the lowest mean of all EC dimensions (3.79), identifying a significant awareness deficit that constitutes both a barrier to environmentally-motivated EV adoption and a high-leverage opportunity for targeted public education interventions.

8. Discussion

The findings of this study make several substantive contributions to the environmental psychology of consumer behaviour and the applied literature on EV adoption in India. The high overall explanatory power of the environmental concern framework ($R^2 = 0.713$) suggests that, in the coimbatore district context, environmental factors constitute a remarkably dominant predictor of EV purchase decisions-substantially higher than reported in comparable studies from Delhi NCR (Jaiswal, Kant, 2018; $R^2 \approx 0.54$). Chennai (Moorthy et al., 2022; $R^2 \approx 0.48$). This elevated explanatory power may reflect coimbatore district's distinctive environmental consciousness stemming from the acute local visibility of industrial and vehicular pollution and the absence of the economic-factor.

Confounds that dominate larger metropolitan markets. The primacy of Perceived Environmental Threat carries both theoretical and practical significance. Theoretically, it confirms VBN theory's prediction that adverse consequence beliefs-activated when individuals perceive concrete, proximate threats to valued entities such as their health and their families are potent behavioural motivators. The locally specific framing of threat items (referencing coimbatore air quality rather than global climate abstractions) appears to have amplified the psychological salience of the threat construct, consistent with Leiserowitz's (2006) finding that local risk salience outperforms global climate framing in motivating individual behaviour change. Practically, this implies that marketing communications emphasising coimbatore specific vehicular pollution burden-using localised AQI data, TNPCB reports, and medical community endorsements-would be significantly more effective than generic environmental messaging.

The mediating role of Pro-environmental Attitude in the EK→EVPD and PET→EVPD pathways resonates with the dual-process logic embedded in both VBN theory and TPB. Knowledge and threat perception, while cognitively engaging, must crystallise into affective attitudinal dispositions to exert behavioural impact. This implies that EV communication strategies should not stop at information provision (EK activation) or threat communication (PET activation) but must explicitly bridge these cognitions to attitudinal commitment-for instance, through emotionally resonant narratives, EV owner testimonials, and experiential marketing that translate environmental facts into personally meaningful value propositions. The finding that Environmental Knowledge is the weakest direct predictor but exerts a meaningful indirect effect through Pro-environmental Attitude is instructive for intervention design. It confirms critique of purely information-deficit models of environmental behaviour change, which assumed that better environmental knowledge would automatically produce better environmental behaviour.

The current findings argue for a knowledge-attitude-behaviour integrated model rather than linear information-action models. EV awareness campaigns in coimbatore should pair factual information with attitudinal activation strategies to maximise behavioural uptake. The significant gender difference in environmental concern aligns with a robust international literature, challenging the male-dominated framing of EV marketing and suggesting that female buyers may be more receptive to environment-centred EV propositions. The urban-rural gradient in environmental concern aligns with theoretical predictions: urban residents' daily exposure to congestion and emissions on coimbatore arterials such as Avinashi Road, Sathyamangalam Road, and Trichy Road makes environmental threat more cognitively available and motivationally potent [14].

9. Recommendations

9.1. For EV Manufacturers and Eco-Marketers

EV manufacturers operating in coimbatore district should reorient communication strategy from a feature-price paradigm to an environmental-threat-and-solution paradigm. Given that Perceived Environmental Threat is the strongest predictor, advertising campaigns should lead with vivid, locally contextualised depictions of coimbatore vehicular pollution burden, supported by AQI monitoring data, TNPCB reports, and hospital data on respiratory illness prevalence. Collaborations with local environmental NGOs, the Indian Medical Association (IMA coimbatore chapter), and school environmental clubs can lend credibility and social salience to these campaigns. Gender-differentiated marketing strategies are warranted. Female consumers' higher environmental concern recommends targeted campaigns featuring women as environment-conscious EV adopters, in media with high Female audience penetration (Tamil-language magazines, OTT platforms, WhatsApp community networks).

Ecological value-based messaging-emphasising the moral responsibility of vehicle choice-should be foregrounded in communications targeting the 36-45 age cohort identified as the most environmentally engaged demographic. Dealers in coimbatore should be trained in environmental consultation selling: beginning customer conversations with local pollution data and health risk information before transitioning to product features and pricing. Experiential Green drive events-organised EV test drives at ecologically significant locations such as the Siruvani foothills and Noyyal riverfront-could powerfully activate ecological values and pro-environmental attitudes among prospective buyers.

9.2. For Policymakers

The Tamil Nadu government should design EV promotion communications that specifically target the Environmental Knowledge deficit (mean = 3.79, the lowest EC dimension). A 'Know Your Air, Drive Electric' campaign-deploying real-time AQI displays at major coimbatore intersections alongside QR codes linking to EV subsidy information-could simultaneously address knowledge gaps and threat salience. Mandatory environmental labelling on all vehicles sold in coimbatore displaying the vehicle's annual CO₂-equivalent emissions-would activate comparative environmental threat perception at the point of purchase.

The Tamil Nadu EV Policy 2023 should include coimbatore district-specific provisions a dedicated Sustainable Mobility Fund channelling a portion of vehicle road tax revenues into local EV charging infrastructure, with priority for semi-urban areas mettupalayam, pollachi where environmental concern is measurably lower. Community-level charging hubs in residential streets should be prioritised over highway-only infrastructure, addressing daily-use range anxiety for local commuters.

10. Conclusion

This study provides a theoretically grounded and empirically rigorous examination of how environmental concern-operationalised across Environmental Knowledge, Perceived Environmental Threat, Ecological values, and pro-environmental Attitude-shapes the EV purchase decisions of 400 consumers in coimbatore District. The integrated VBN-TPB framework demonstrates excellent empirical validity (SEM CFI = 0.951, RMSEA = 0.048) and reveals that 71.3% of variance in EV purchase decisions is explicable through environmental concern dimensions alone, establishing environmental consciousness as a primary driver of EV adoption in this context. Perceived environmental threat emerges as the dominant predictor, affirming the power of locally grounded, health-proximate environmental risk cognitions in motivating sustainable consumer behaviour. Pro-environmental Attitude acts as both a direct predictor and a mediator, confirming the VBN causal chain. Environmental knowledge exercises meaningful indirect influence through attitude activation, advocating for knowledge-attitude-behaviour integrated intervention designs. Female respondents and urban residents demonstrate heightened environmental concern, providing demographic targeting precision for marketers and policymakers. The study contributes threefold to the literature. Theoretically, it validates the VBN-TPB integration in an Indian tier district EV context previously underrepresented in the sustainable mobility literature. Methodologically, the deployment of SEM alongside regression enables a richer structural understanding of construct relationships than prior single-equation approaches. Practically, the findings generate a sharply targeted set of recommendations for manufacturers, marketers, and policymakers to translate coimbatore district documented environmental concern into accelerated, measurable EV adoption. Limitations include the cross-sectional design, which prevents strict causal inference, and the self-report measurement of all constructs, which may introduce common method bias.

Future research should employ longitudinal panel designs, objective environmental knowledge tests, and behavioural data from RTO EV registration records to corroborate and extend these findings. Replication across other Tamil Nadu districts would further establish the generalisability of the VBN-TPB framework in emerging-market EV adoption contexts.

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