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From Thinking Green to Riding Green: A Study on Influencing Factors in Electric Vehicle Adoption

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Abstract: Recent changes in national and international environmental policy place a lot of emphasis on electric vehicles (EVs) as they reduce ecological damage by eliminating emissions. However, given the products' novelty, consumers have expressed mixed emotions about EV purchases. Skepticism surrounding EV reliability is a significant concern for potential adopters, primarily due to a lack of essential support. As a result, to resolve the problem of consumers' mixed emotions toward EVs, it is necessary to understand how consumer environmental concerns (EC), attitudes, subjective norms and perceived behavioral control shape consumers' intentions. Leveraging the modified and expanded version of the Theory of Planned Behavior (TPB), the current study developed and validated a conceptual model and hypotheses through cross-sectional research. Employing the snowball sampling method, we collected data from 274 respondents via an online survey. The study establishes that social pressure can impact individual ATT, fostering enduring benefits for respondents' EC and behavioral intentions. Consequently, active involvement by EV manufacturers in advocating sustainable consumption is paramount to catalyzing future market growth. Our research is a ground-breaking attempt to determine EV interest among consumers. The nuanced findings hold implications for marketers/practitioners involved on the supply side of the EV business.

Keywords: electric vehicle; purchase intention; theory of planned behavior; uncertainty avoidance

1. Introduction

Choosing EVs over fossil-fuel vehicles is a major step towards saving the environment. The automobile industry prides itself on bourgeoning new sustainable vehicle consumption trends, keeping up with greening consumer preferences, and its indispensable position in ecological betterment. Ranging from luxurious variants to affordable variants, EVs afford more opportunities for profits and brand development. The trend can be seen in a number of automobile runways, photo shoots, and social media brands, indicating their EC and intention to shift [1,2]. In terms of meeting consumer needs, EVs' role is pivotal in offering green satisfaction, cheaper rides, better mileage, lesser refueling stops, and quieter under-hood components churning out comparable performance. One of the other substantial reasons for the increasing consumption and demand of EV for the industry is the implication of higher tax benefits and government incentives, compared to the other fossil-fuel variants [3–5]. Moreover, consumer versatility keeps the price point competitive and increases consumer demands and profitability.

However, unlike other industrial sectors, the automobile industry's contribution to environmental pollution is more noticeable post-product purchase, which involves envi-

ronmental hazards involving resource-depleting fuel extraction, carbon emissions, and waste of non-biodegradable plastics [6–8]. Scrap disposal is another issue arising from the automobile industry, which can lead to the oversaturation of landfills with hazardous vehicle wastes such as oils and plastics [9–11]. The repercussions of ineffective waste management systems and automobile-related policies extend far beyond immediate concerns, encompassing a spectrum of social, health, ecological, and economic challenges. The accumulation of nonrecycled waste not only strains industries that rely on natural resources but also poses a serious threat to biodiversity and the health of vulnerable communities [12]. As a result of the alarming emission rates from automobiles, the crisis in the most populated country [13] further aggravates the matter, leading to a rise in temperature, extreme weather events, and disruptions to ecosystems.

The Indian automobile industry contributes significantly to pollution due to its position as a top global player in vehicle production. As a consequence, recent government policies compel stakeholders to adopt EVs to preserve the environment and ecosystem [14–17]. Thus, various automobile associations, government agencies, and societies have gradually adopted EVs as a form of transportation. In spite of this, citizens have mixed attitudes toward EVs, including uncertainty over a number of anti-consumption factors, such as novelty avoidance, perceived unreliability of cars, perceived performance issues, public distrust, and economic factors [18–20].

In light of this, we conceptualize a model where EC primarily influences the variables related to the TPB, which proposes that consumers' attitudes (ATT), levels of perceived behavioral control (PBC), and subjective norms (SN) significantly influence the formation of their behavioral intentions [21–23]. In addition, the model gauges the role of uncertainty avoidance (UA) as a moderator between ATT, SN, PBC and intention (IN) [24,25]. This conceptual model offers a focused outlook on sustainable consumption, and takes a more conscientious approach to nature management, which will benefit present and future generations [26].

The following section offers a theoretical outlook concerning the selection of the aforementioned theories, followed by a model conceptualized from the theories. The subsequent methodology section sets the stage for testing the model. This is followed by the analysis section, which presents the results after testing the model, which are then discussed in the next section. Implications and future research directions are drawn from the discussion.

2. Literature Review and Hypotheses Development

2.1. Sustainable Consumerism in India

The landscape of consumer behavior in India is going through a significant transformation, under the rising influence of green consumerism. Fueled by a burgeoning middle class and an increased consciousness of environmental issues, Indian consumers are increasingly placing importance on sustainability in their buying choices [27,28]. From eco-friendly products to renewable energy solutions, green consumerism has emerged as a powerful trend that marketers cannot afford to overlook. The rising concern for the environment and its impact on future generations is one of the key driving forces behind this shift [29,30]. Furthermore, the government's initiatives to promote clean energy and reduce pollution have further fueled green consumerism. Policies such as tax incentives for EVs and subsidies for solar power encourage individuals to make environmentally responsible choices [31,32]. For marketing researchers, exploring green consumerism in India presents an exciting opportunity. By delving into the motivations, preferences, and purchasing patterns of environmentally concerned consumers, marketers can tailor their strategies to effectively engage this burgeoning market [32]. This approach is justified for two main reasons: first, during the diffusion phase, improving externalities takes time and is beyond immediate control [20]. Therefore, we contend that efforts spent on uncontrollable factors do not yield productive results, and second, examining the driving factors offers a more focused outlook on actual adoption, and thereby has proven beneficial for marketers and

the industry, leading to increased network sizes (i.e., the number of product users), and consequently the complementarities [21].

2.2. Theory of Planned Behavior

In our study, we rely on the TPB as the theoretical foundation. The TPB posits that an individual's intention to engage in a specific behavior is influenced by three key determinants: ATT toward the behavior, SN, and PBC [25,27,33]. These determinants shape behavioral intentions, which, in turn, impact actual behavior [34].

In the realm of management research, the TPB stands out as a theoretical framework with numerous strengths. Firstly, it allows researchers to identify and evaluate beliefs associated with specific behaviors within a given population [35]. Secondly, TPB's efficacy is evident in the success of behavioral interventions, such as the transformation of unhealthy dietary habits among young individuals [36]. However, a noticeable gap exists in environmental interventions stemming from TPB studies, underscoring the need for more initiatives focusing on pro-environmental behaviors [37]. Lastly, the TPB provides a flexible structure that can be expanded by incorporating additional variables from related theories [38]. In our study, we consider the aforementioned direct predictors along with EC to assess behavioral outcomes.

Our case concerning consumer behavior in the automotive industry, particularly during the diffusion phase of eco-friendly variants, finds support in the TPB. As the EC gains prominence and governments pressure businesses to adopt sustainable practices, the TPB offers a valuable lens for understanding and influencing consumer intentions. Based on the TPB, individual ATTs, SNs, and PBC collectively shape individuals' behavioral intentions. In the context of the automotive sector, TPB translates to consumers' ATTs toward EVs, the influence of SNs promoting environmental responsibility, and the perceived control individuals have over sustainable choices. Acknowledging the time required to improve externalities, the literature aligns with TPB's emphasis on PBC, suggesting that certain factors may be beyond immediate control during the diffusion phase. The narrative also underscores the importance of focusing on factors within immediate control, reflecting TPB's principles. Moreover, the literature highlights the success of strategies that focus on driving factors, contributing to increased network sizes (i.e., the number of consumers adopting EVs) and the development of complementarities. Therefore, the TPB emerges as a robust theoretical framework for elucidating the factors influencing consumer behavior and adoption patterns of EVs in the Indian context.

2.2.1. Environmental Concern

Hu et al. [39] defined EC as the level of awareness individuals have regarding environmental problems. It also includes their support for efforts to solve these problems, and their willingness to personally contribute to their solutions. The importance of EC as a predictor of ecological decision-making, such as energy saving, trash recycling, and green buying behavior, has been emphasized by a number of researchers [40–42], indicating that EC drives consumers' eco-friendly intentions and behavior. EC has long been linked to positive ATT and behavioral intentions towards eco-friendly items. Also, greater degrees of EC are correlated with more favorable ATT towards eco-friendly products/services [43,44] when looking at green consumption as a particular behavior connected to environmental protection. These results support the hypothesis that EC significantly influences consumers' propensities to make green purchases. ATT, SN, and PBC are all TPB factors connected to EC in previous research (see, for example [27]). Previous studies have foregrounded the association between EC and behavioral intentions which is mediated by the TPB factors discussed [27]. These findings were published in two separate studies. As a result, in our context, the link between EC and the desire to buy EVs must be evaluated.

Behavioral intention is a "psychological construct" that encapsulates an individual's personal inclination and readiness to participate in a specific behavior. In our study, this refers to an individual's subjective likelihood and eagerness to exhibit eco-friendly behavior

through embracing EV. This intention is not merely a passive state but represents a conscious decision and a genuine desire to engage in environmentally conscious actions. This is particularly true in the realm of purchasing eco-friendly products, such as EVs [45,46]. Several factors contribute to this behavioral intention. ATTs, which encompass an individual's evaluations and feelings toward a particular behavior, play a significant role. It can be argued that positive ATTs toward EVs create a foundation for individual willingness to actively choose environmentally friendly products. Beliefs, societal norms, and the perception of one's control over the actions of others also shape behavioral intentions. In essence, an individual's intention to act in an environmentally friendly manner is influenced by their personal ATTs, societal expectations, and the belief that they have control over their decisions and actions.

In the realm of eco-friendly consumer behavior, the term "behavioral intention" is frequently used. This concept refers to an individual's inclination to make purchases aligned with their environmental values and beliefs. For instance, in our study, this translates to consumers' willingness to choose EVs as part of their commitment to promoting sustainability. This intentional selection of products that embody environmental values signifies a concerted effort by consumers to contribute to sustainable practices through their purchasing decisions. Awareness of environmental issues, personal values, the perceived advantages of green goods, and faith in eco-friendly businesses are all key motivators for EC purchases [46]. Accordingly, we present the following hypotheses:

Hypothesis 1 (H1). *EC favorably affects consumer's ATT towards EVs.*

Hypothesis 2 (H2). *EC favorably affects consumer's SN towards EVs.*

Hypothesis 3 (H3). *EC affects the PBC towards EVs.*

Hypothesis 4 (H4). *EC favorably affects consumer's intention to purchase EVs.*

2.2.2. Attitude

The extent to which individuals view a behavior favorably or unfavorably is known as their ATT towards that behavior. This perspective, as articulated by previous research [40], encompasses not only the subjective evaluation of the behavior's merits but also the individual's perceived likelihood of engaging in such behavior [47]. Moreover, Sadiq et al. [48] emphasize the significance of considering the perceived repercussions of the behavior in the formation of ATT, underscoring its pivotal role in predicting behavioral intentions [49,50]. The interplay between customers' evaluations and ATT is consequential, as favorable assessments often lead to more positive behavioral intentions [51]. A pertinent example of this phenomenon can be observed in the context of the Indian consumer market, where environmentally conscious ATTs of individuals significantly influence their intention to purchase EVs. The growing trend of green consciousness in India aligns with findings in literature. This affirms ATT's influential role in shaping consumer preferences, especially in domains related to sustainability. Notably, extensive research consistently demonstrates a positive association between ATT and behavioral intention, particularly in the context of eco-friendly products [52,53]. Hence, the linkage between positive environmental ATTs and the inclination to adopt eco-friendly products, such as EVs, underscores the practical relevance of understanding and leveraging ATT to foster sustainable consumer behaviors. Hence, we propose:

Hypothesis 5 (H5). *ATT positively affects consumer's intention to purchase EVs.*

2.2.3. Subjective Norm

The phenomenon of individuals aligning their behavior with societal and cultural expectations is called SN [53]. SN plays a pivotal role in shaping human actions in a given

context. According to the Theory of Reasoned Action, the intentions behind an individual's engagement in a specific behavior are significantly influenced by normative beliefs. These beliefs, emanating from individuals such as peers, friends, or family members, exert a compelling influence on behavior, irrespective of the individual's personal agreement with them. For instance, a person's inclination towards environmentally friendly actions has been empirically linked to the positive impact of social norms in prior studies [54].

Moreover, SN relevance extends beyond interpersonal relationships to encompass the broader societal landscape, particularly in consumer behavior. Take, for example, the burgeoning EV market. Governmental policies favoring sustainable transportation alternatives could significantly impact consumer intentions to purchase EVs. In light of this argument, our hypothesis posits that the interplay between SN and consumer intentions is not only confined to personal relationships [54] but extends to socio-cultural and policy-driven contexts. Acknowledging the significant impact of SNs arising from influential sources and governmental policies, we contend that these factors are crucial for devising effective strategies that shape consumers' choices and sustainable behavior. As such, we propose:

Hypothesis 6 (H6). *SN positively affects consumer's intention to purchase EVs.*

2.2.4. Perceived Behavioral Control

PBC is defined as "the perceived ease or difficulty of performing the behavior" [40]. The significance of PBC within consumer decision-making processes cannot be overstated, as it encapsulates not only individual ATTs towards specific behaviors but also considers societal influences at play. PBC, as conceptualized by Ajzen [40], extends beyond behavioral intention, taking into account the constraints and opportunities individuals perceive in executing a desired behavior, including the availability of resources and opportunities [55]. Ajzen's [40] TPB introduced PBC as a critical variable, representing an individual's confidence in their ability to perform a particular behavior. This variable integrates control beliefs, encompassing facilitating or hindering factors, with perceived power [56–58]. The amalgamation of these elements in PBC becomes particularly pertinent in the context of sustainable choices, as evidenced by previous research linking PBC with intentions [59–61].

In the realm of sustainable consumption, the connection between PBC and intentions is paramount, especially in a context such as EV purchase. Consumer confidence in their ability to make environmentally conscious decisions, considering factors like financial resources, charging infrastructure, and overall convenience, directly influences their intentions to opt for EVs. For instance, individuals with a high level of perceived behavioral control may be more inclined to choose EVs if they perceive themselves as having the necessary resources and opportunities to support such a sustainable choice.

Research findings consistently show that individuals who perceive a higher level of control over their environmentally friendly choices are more likely to adopt EVs. Additionally, real-world examples of successful interventions promoting PBC, such as government incentives for EV purchases or the development of extensive charging infrastructure, further emphasize the practical relevance of this relationship. Hence, we hypothesize:

Hypothesis 7 (H7). *PBC affects consumer's intention to purchase EVs.*

2.2.5. Uncertainty Avoidance

In the field of marketing, a variable of considerable academic value is "uncertainty avoidance". It means how much people in a society or organization disdain, doubt, face confusions, while considering the events they cannot plan for [62]. Recent studies on green marketing have shown that UA is becoming more critical. According to the literature on UA in green marketing, people with different levels of UA may react differently to environmental claims, eco-labels, and eco-friendly products. In order to effectively address

consumer concerns and preferences connected to environmental problems, marketers may benefit from a deeper understanding of UA [63]. Consumers' actions and decisions about eco-friendly goods are influenced by a number of factors, including cultural norms and tolerance for risk [62]. In our case, the lack of externalities concerning EVs fuels the UA factor.

Hence, to evaluate TPB interplays, this research uses uncertainty avoidance as a moderator. Considering the hindrance scenario, we propose an argument that TPB factors may not translate directly to intention, even if consumers are impacted by ECs. According to studies, Indians view vehicle purchases as high-involvement behavior [64]. Therefore, the aforementioned non-translation often happens during high-involvement transactions in nations where UA is fairly high [62,63]. As a means of considering this phenomenon, we have included the UA concept in our analysis. Psychological factors such as UA have had mixed results in previous research [64], which examined the relationship between TPB variables and intentions. Hence, considering the mixed outputs, to ensure the role of UA in our equation, we present the following hypotheses:

Hypothesis 8a (H8a). *UA moderates the relationship between ATT and the intention to purchase EVs.*

Hypothesis 8b (H8b). *UA moderates the relationship between SN and the intention to purchase EVs.*

Hypothesis 8c (H8c). *UA moderates the relationship between PBC and the intention to purchase EVs.*

3. Research Method

In this study, the primary focus is to assess consumers' behavioral intention using EC as a measure. The relationship between EC and behavioral intention is influenced by several mediating factors, namely ATT, SN, and PBC. Furthermore, the study introduces UA as a moderator, as depicted in the conceptual model (refer to Figure 1).
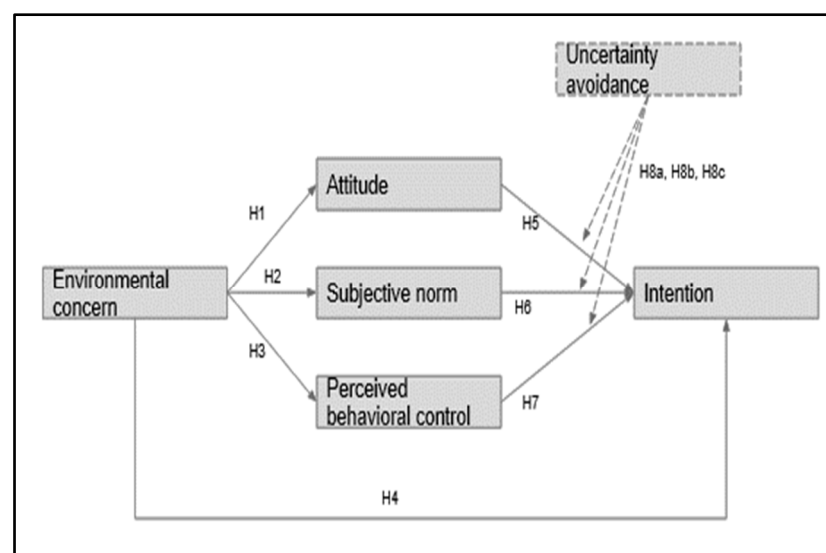
Figure 1. Conceptual model (Source: authors' own).

3.1. Measures

In order to establish the content validity of the scales utilized in this research, we employed pre-validated instruments [65]. To eliminate ambiguity, redundancy, and improve clarity, the items were carefully evaluated by three academicians from two departments

of a central government-funded technical institute in India. The measurement items for the variables were derived from existing green marketing studies, ensuring their relevance and appropriateness.

3.2. Pretesting

In the current research, we assessed variables using pre-validated scales. To ensure content and language appropriateness, two subject experts and three managers with over five years of experience in the automobile industry reviewed the initial questionnaire draft. Minor modifications were incorporated based on their feedback to simplify the language and enhance its relevance to the present study. Subsequently, we conducted a pilot test at a centrally funded technical institute, involving thirty students, to validate the questionnaire's effectiveness in terms of clarity, impartiality, and the generation of valid results. Researchers actively observed participant responses during the survey, addressing any challenges through engagement. Minor adjustments were made to the research instrument based on student feedback, ultimately finalizing the questionnaire.

3.3. Sample, Data Collection, and Common Method Bias

While scholars have extensively examined green consumption in terms of demand and supply, our research uniquely deduces and augments this trend, particularly within the Indian milieu, for the following reasons: first, India has become the most populated country in the world [13], making it an ideal place to learn about eco-friendly products. Second, several studies have shown that more consumers choose sustainable items because of their emphasis on environmental well-being [14]. Third, Prakash et al. [25] suggests that consumers of Indian origin are more environmentally concerned of economic effect than those from Brazil, Russia, Germany, Canada, Australia, and America. Although in the past few years, Indian researchers have paid a lot of attention to green products driven by sustainability [26,27], there has been insufficient research on individuals' behavior in relation to eco-friendly products such as EVs.

The data collection method for this study involved an online survey. To collect primary data, respondents were recruited using snowball sampling. In our research, we employed the snowball sampling method to recruit participants. Considering the lack of a reliable sample frame, snowball sampling was chosen due to its effectiveness in reaching a niche audience of individuals with specific experiences and perspectives related to EV adoption. The authors initiated the survey by emailing it to their network connections on their Meta accounts and on LinkedIn, with a particular targeting strategy aimed at Indian nationals. Later, the survey was forwarded to their Indian peers. The email invitations included a request to participate in the online survey and provided the necessary links. In order to focus on understanding young Indians' consumption intentions, respondents were asked to ensure they were born after 1983 (under 40 years of age according to the classifications given by Horng et al. [66]). Approximately 500 contacts were sent survey invitations in the last week of April 2023. We assured respondents that their responses would be treated confidentially and anonymously, since the information was intended for publication in scientific journals. Two follow-up emails were sent, with a 15-day gap between them, to encourage participation. By the end of May 2023, a total of 321 responses were received, yielding an estimated response rate of 64%. Among these, 47 responses were excluded for reasons such as missing values, homogenous selections (e.g., 1-1-1, 6-6-6) on all items, and incomplete questionnaires, resulting in 274 valid responses available for further analysis. The resulting study sample contained a diverse and representative sample to capture a wide range of individual differences. The final sample revealed that 29% of the responses were sourced from North India, 24% from South India, 17% from East India, and 30% from West India. A total of 57% of respondents were males and 43% were females. There were about 42% private sector employees, 21% government employees, and the rest were self-employed or unemployed. In order to account for possible heterogeneity in responses, we included participants from diverse demographic, psychographic, and environmental backgrounds.

Snowball sampling inherently carries bias risk, as participants are often connected through pre-existing social networks. Moreover, EV adoption is influenced by diverse sociodemographic factors, making it difficult to find a truly representative sample. Recognizing the potential biases, the authors applied Harman's single-factor test, consolidating items for the confirmatory measurement model into one dimension without rotation. The analysis assessed overall variance, revealing 38.76% explained variance from a single source. This suggests that our study did not suffer from any substantial biases in the method used.

4. Data Analysis

In our research, we employed Partial Least Squares Structural Equation Modeling (PLS-SEM) as the primary analytical technique. PLS-SEM is a versatile and robust method particularly suitable for complex models [56], making it an ideal choice for examining the intricate relationships among variables in our study. PLS-SEM is a variance-based approach that prioritizes predictive capabilities and is especially useful in scenarios where the emphasis is on understanding and predicting latent constructs. It accommodates both reflective and formative measurement models, allowing for a flexible and comprehensive analysis of complex theoretical frameworks [57]. To execute the PLS-SEM analysis, we utilized Smart-PLS v. 4.0.9.6 software, a widely recognized and user-friendly tool specifically designed for PLS-SEM modeling. The SmartPLS v. 4.0.9.6 platform facilitates the entire research process, including model specification, identification, estimation, and evaluation [58]. As a result, researchers have a seamless, intuitive platform.

4.1. Measurement and Structural Model

A priori reflective measurement model was conducted to assess the reliability and validity of the constructs before analyzing the structural model. In Appendix A, we present the results of the final measurement model.

Convergent validity of a construct refers to the degree to which multiple methods of measuring a construct provide the same results [56,57]. In other words, the convergent validity of a construct helps in determining the extent to which the same results can be obtained by using various methods to assess a construct [48]. Values of Average Variance Extracted (AVE), Composite Reliability (CR) and rho_A are used to determine convergent validity [40,53,55]. Table 1 indicates adequate convergent validity, with AVE values above 0.5 for all constructs. CR and rho_A are another criterion for measuring the constructs' validity. All factors showed a CR and rho_A above 0.70, indicating acceptable convergent validity [27].

Table 1. Discriminant validity.

	ATT	**EC**	**IN**	**PBC**	**SN**
ATT	0.864				
EC	0.796	0.911			
IN	0.566	0.675	0.857		
PBC	−0.006	−0.125	0.112	0.892	
SN	0.796	0.792	0.614	−0.097	0.883

Source: authors' own.

A construct's discriminant validity refers to how well it captures a phenomenon that other constructs may not capture [48]. In order to ensure discriminant validity, the square root of AVE should be greater than the correlation between constructs [26,27]. This study found that the square root of AVE for the study constructs was greater than the correlations between constructs (see highlighted diagonal values in Table 1). Accordingly, the study constructs demonstrate adequate discriminant validity. This means that they are truly distinct from each other and measure a phenomenon that other constructs may not.

4.2. Indirect Effects

The conceptual model (Figure 1) illustrates the interrelationship between the variables, with ATT, PBC and SN serving as mediators between EC and outcome factors such as intention. To gain a deeper understanding, researchers conducted additional analyses to examine the role of ATT, PBC and SN as mediators. The results in Table 2 indicate that except ATT and PBC, SN positively and significantly influence consumers' intentions. Taking these results together with the study's conceptual model suggests that SN partially mediates between EC and intention. However, this is not true for ATT and PBC since their indirect links were insignificant.

Table 2. Indirect effects.

Path Description	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (丨O/STDEV丨)	*p* Values
EC → ATT → In	−0.57	−0.52	0.08	0.715	0.475
EC → PBC → In	−0.16	−0.16	0.013	1.204	0.229
EC → SN → In	0.181	0.176	0.078	2.328	0.020

Source: authors' own.

4.3. Hypothesis Test Results

To assess the proposed model, PLS-SEM was employed in this study. Consequently, the conventional goodness-of-fit indices commonly used in covariance-based SEM were deemed less relevant [65]. However, certain indices, such as the standardized root mean square residual (SRMR) and the normed fit index (NFI), were still utilized during the PLS-SEM analysis. According to Hooper et al. [67], an SRMR value below 0.08 (or at least below 0.10) and an NFI value above 0.90 (or at least above 0.70 for acceptability) are recommended. In the present study, the SRMR value was 0.08, and the NFI value was 0.78. These findings indicate that the model achieved an acceptable level of fit. With the indices meeting the acceptability criteria, the model was considered suitable for further analysis. Subsequently, the structural model was examined, and the results are presented in Table 3. Furthermore, the outcomes revealed that the proposed model exhibited sufficient explanatory power for behavioral intention, as evidenced by the adjusted R-squared value of 0.521.

Table 3. Structural results.

Hypothesis	(O/STDEV)	*p* Values (<0.05)	Supported
EC → ATT (H1)	30.848	0.000	Yes
EC → SN (H2)	29.526	0.000	Yes
EC → PBC (H3)	1.445	0.149	No
EC → In (H4)	15.594	0.000	Yes
ATT → In (H5)	0.718	0.473	No
SN → In (H6)	2.33	0.020	Yes
PBC → In (H7)	2.471	0.013	Yes
ATT*UA → In (H8a)	1.32	0.187	No
SN*UA → In (H8b)	1.032	0.302	No
PBC*UA → In (H8c)	0.625	0.532	No

Source: authors' own.

Our study unveils compelling and novel insights into the relationship between EC and consumer decision-making regarding EVs. The noteworthy findings from the analysis (refer to Table 3), particularly those supporting hypotheses H1, H2, H4, H6, and H7, contribute significantly to the current understanding of factors influencing EV adoption.

The standardized coefficient estimates underscore EC's robust and distinctive impact on key determinants. Notably, the direct influence of EC on ATT is remarkably strong (β = 0.796; t = 30.848, *p* < 0.01), surpassing the effects on SN (β = 0.792; t = 29.526, *p* < 0.01), PBC (β = 0.129; t = 2.471, *p* < 0.05), including the effect of SN on ATT (β = 0.229; t = 2.330, *p* < 0.05). This highlights the pivotal role of EC in shaping positive ATTs toward EVs. Our research also unravels a significant and positive direct influence of EC on IN (β = 0.558; t = 6.334, *p* < 0.01). Moreover, the indirect pathways reveal a noteworthy finding—a significant indirect effect of EC on intention through SN (t = 2.328). This indirect pathway underscores the nuanced influence of EC, not only directly shaping intentions but also indirectly through SN. Importantly, our study investigates the moderation effect of UA on the relationship between TPB variables and purchase intention. The findings indicate no significant moderation (H8a, H8b, H8c) by UA, adding clarity to the understanding of how individual uncertainties may not hinder the influence of TPB variables on EV adoption. These findings collectively contribute novel insights by elucidating the unique strength of EC in driving positive ATT and PI toward EVs. The identification of direct and indirect pathways enriches our understanding of the complex interplay between EC, SNs, and PI.

5. Discussion and Implications

The following discourse delves into the dynamics of sustainable consumption in the context of EVs, shedding light on implications for stakeholders both in the realms of supply and demand. This investigation yields two noteworthy contributions to the literature.

Firstly, it introduces a novel approach by scrutinizing the TPB model and putting to the test a modified version to elucidate consumers' tendencies toward selecting EVs. The refined model posits that social pressure influences individual ATT, fostering enduring benefits for respondents' environmentally conscious behavioral intentions. Consequently, active involvement by EV manufacturers in advocating sustainable consumption is paramount to catalyzing future market growth.

Secondly, the reassessment of the TPB model provides deeper insights into human decision-making behavior, enhancing the model's accuracy. The refined model suggests that the influence of social pressure extends beyond mere ATT formation. It plays a pivotal role in shaping enduring benefits for respondents' behavioral intentions. In the context of EVs, this translates into a long-term commitment to sustainable consumption practices. For instance, our research indicates that individuals who feel compelled by societal expectations are more likely to not only purchase an EV but also exhibit sustained EC behavior. This includes adopting energy-efficient driving. In this manner, our research contributes to the TPB by expanding its scope to include EC as a key determinant, identifying novel direct and indirect pathways, and exploring individual differences through the lens of UA. These contributions enhance the theoretical framework, making it more adaptable and comprehensive in understanding and predicting individuals' EC behaviors.

In terms of the examined hypotheses, our results confirm the positive and significant impact of EC on ATT (H1). Likewise, the relationships between EC and SN (H2) and EC and intentions (H4), as established by Paul et al. [41], are also affirmed as positive and significant. These findings underscore the considerable influence of EC on TPB variables and behavioral outcomes, excluding PBC in the case of EVs. Consequently, we assert that these results contribute to existing literature on green products by demonstrating that while EC may positively affect ATT, reshape social norms, and influence the intention to adopt EVs, it exerts no influence on PBC, largely due to the financial aspect associated with sustainability. Consequently, stakeholders on the supply side should strive to maintain price parity between EVs with sustainable features and traditional counterparts, transparently communicating the advantages and disadvantages of both categories to the demand side.

Similarly, TPB variables were found to influence behavioral intention, excluding ATT. This divergence may be attributed to other influential factors that surpass the impact of ATT, such as SN, social pressures, or situational factors. Recognizing that ATT may not always be the sole or strongest determinant of intention, we recommend that supply side

stakeholders concentrate on the social (SN) and financial (PBC) dimensions [67] when promoting eco-friendly EVs. Rather than exclusively targeting individual ATTs, marketing communications could adopt a broader focus on the population.

Lastly, UA was identified to have no moderating effect on the relationships between TPB variables and purchase intentions, indicating a lack of uncertainty among Indian youth concerning EVs. It is conceivable that other influential factors, such as EC, financial considerations, or technological familiarity, play a more dominant role in shaping EV purchase intentions, diluting the moderating effect of UA [68]. Moreover, participants may exhibit a level of homogeneity in perceiving EV adoption as a positive and progressive step, reducing the moderating influence of UA. This scenario suggests a collective positive orientation towards EVs, minimizing variations in the moderating variable. Researchers may delve into identifying alternative moderating factors such as self-efficacy, trust, technical anxiety, that could impact the relationship between individuals' psychological variables and EV adoption. For the EV industry, recognizing the robustness of the TPB framework, irrespective of UA, allows for a more targeted approach to marketing strategies. Emphasizing factors that consistently influence consumer intentions, such as ATTs and subjective norms, could be more effective in driving EV adoption.

The findings of our study, which investigates the dynamics of sustainable consumption in the realm of EVs from a marketing perspective, hold significant industrial implications that can guide stakeholders in the rapidly evolving market for eco-friendly transportation. The study, rooted in the TPB model, provides insights that can shape marketing strategies, enhance consumer engagement [69], and drive the growth of sustainable products [70], specifically in the context of EVs. One of the pivotal implications from a marketing standpoint is the undeniable influence of EC on consumers' ATT toward EVs. As corroborated by previous research and affirmed by our study, this positive and significant impact suggests that marketing efforts should strategically leverage and communicate the environmental benefits of EVs. Emphasizing aspects such as reduced carbon footprint, energy efficiency, and overall ecological advantages could resonate strongly with EC consumers, fostering a more favorable ATT toward the adoption of EVs.

However, it is imperative for marketers to recognize the nuanced nature of this impact. While EC positively shapes ATT, our results indicate that it does not extend its influence to PBC, mainly due to the financial considerations associated with sustainable features. This reveals a critical challenge and opportunity for marketers. To address this, marketing strategies should focus on transparently communicating the value proposition of EVs, elucidating the long-term cost savings, government incentives, and overall economic benefits. By addressing the financial concerns, marketers can effectively bridge the gap between EC and economic feasibility, thereby promoting a more positive PBC among potential consumers.

The study also highlights the role of SN and behavioral intentions in influencing consumers' decisions regarding EVs. The positive and significant relationships established in the hypotheses suggest that social pressures and collective intention play crucial roles in shaping individual preferences. From a marketing perspective, this underscores the importance of community and social engagement initiatives. Brands should actively foster a sense of belonging and shared responsibility among consumers. Collaborative marketing campaigns, testimonials, and community events can be instrumental in building a positive social norm around the adoption of EVs.

Moreover, the study reveals that ATT may not be the sole or strongest determinant of behavioral intentions, with other factors such as SN and PBC exerting stronger influences in certain situations. This implies that marketing efforts should not solely rely on individual ATTs but must also strategically target social and financial dimensions. Instead of narrowly focusing on individual ATTs, marketers should adopt a holistic approach that addresses the broader population. This could involve tailoring marketing messages to highlight the collective impact of adopting EVs and providing clear information on the financial aspects associated with their purchase and maintenance.

6. Limitations and Future Research Directions

Pertaining to some limitations in the present study, this research sheds light on future directions for research.

Firstly, self-reports were used to accumulate data on the research variables, as individuals are the appropriate source of behavioral data. As a result, bias could compromise our findings in the research.

Secondly, non-probability-based sampling was executed to carry out this study. Although the sample size is considered sufficient, it may be argued that it lacks diversity. Therefore, future research should aim to utilize a more systematic sampling approach that includes participants from various locations in order to enhance the heterogeneity of the sample.

Lastly, future studies may also consider adding more variables to extend the TPB model, such as antecedents, mediators and moderators.

7. Conclusions

In the present study, the theoretical framework TPB was used to build a model for understanding the factors influencing consumers' purchase intention in the EV domain. Additionally, this is one of the pioneering studies to examine the moderating effect of UA on consumers' intention to purchase EVs. We proposed eight hypotheses to gain a deeper understanding of consumers' purchase intention towards EV by analyzing the data collected from 274 respondents. The results conclude that out of eight hypotheses, only five hypotheses were found to be significant, while the remaining were not. The findings also showcase that UA had no moderating effect on the relationship between TPB variables and intention to purchase EVs. With the results of our study, the automotive industry and marketers can gain a better understanding of consumers' thoughts and selection patterns when it comes to buying electric vehicles.

Appendix A

Table A1. Items, construct reliability and validity.

Variable [Adapted from]	Outer Loadings (Item Label)	Items	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
ATT [53–55]	0.886 (ATT1)	Owning an electric vehicle aligns with my values and beliefs.	0.829	0.858	0.898	0.746
	0.925 (ATT2)	I believe that using an electric vehicle positively contributes to environmental conservation.				
	0.789 (ATT3)	I think electric vehicles are practical and convenient for daily use.				

Table A1. *Cont.*

Variable [Adapted from]	Outer Loadings (Item Label)	Items	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted
EC [27]	0.823 (EC1)	I am concerned about the impact of transportation on the environment	0.898	0.898	0.936	0.830
	0.850 (EC2)	I consider environmental factors when making purchasing decisions.				
	0.843 (EC3)	I actively seek information about eco-friendly products, including electric vehicles.				
IN [17,25,37]	0.888 (IN1)	I intend to purchase an electric vehicle in the next five years.	0.644	0.683	0.846	0.734
	0.846 (IN2)	I am actively considering an electric vehicle as my next vehicle.				
PBC [52]	0.899 (PBC1)	I feel confident in my ability to use and maintain an electric vehicle.	0.874	0.928	0.921	0.795
	0.977 (PBC2)	Financial considerations are a significant factor affecting my ability to adopt an electric vehicle.				
	0.821 (PBC3)	I believe that government incentives and infrastructure support positively influence my ability to adopt an electric vehicle.				
SN [61]	0.874 (SN1)	My friends/family think using an electric vehicle is a good idea.	0.859	0.863	0.914	0.780
	0.923 (SN2)	People whose opinions I value encourage me to consider an electric vehicle.				
	0.885 (SN3)	Considering the recent Governmental policy changes and increasing number of electric vehicles ownerships, society, in general, views using electric vehicles positively.				
UA [63,64]	0.899 (UA1)	When considering new products or services, I stick with familiar brands or options rather than exploring unfamiliar alternatives	0.628	0.792	0.832	0.714
	0.755 (UA2)	I feel comfortable when faced with marketing messages that introduce innovative features or concepts that I am not familiar with				
	0.751 (UA3)	In making purchase decisions, I tend to rely on established and well-known brands rather than trying out new or lesser-known brands, even if they offer potentially innovative or beneficial features				

Source: Authors' own.

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