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Sparking Sustainable Mobility: Examining the Role of the Green Marketing Mix in Electric Two-Wheeler Adoption

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ABSTRACT

The transition toward sustainable mobility has become imperative to mitigate the environmental consequences of fossil fuel-based transportation. In India, where two-wheelers dominate daily commuting, the adoption of electric two-wheelers (E2Ws) represents a crucial step toward achieving low-carbon development. Despite supportive policies and growing environmental awareness, adoption remains slower than anticipated, largely due to limited consumer trust and ineffective marketing communication. This study investigates the influence of the Green Marketing Mix (GMM)—comprising product, price, place, and promotion—on consumers' adoption intention of electric two-wheelers, mediated by brand communication and consumer trust. Using a structured questionnaire administered to 324 respondents across Belagavi Karnataka, India, data were analyzed through Structural Equation Modeling (SEM) using AMOS 24. Results indicate that all four dimensions of the GMM significantly affect adoption intention, with green promotion ($\beta = 0.27$, $p < 0.01$) emerging as the most influential factor. Moreover, brand communication and consumer trust partially mediate the relationship between green promotion and adoption behavior. The integrated model explains 64% of the variance ($R^2 = 0.64$)

in adoption intention, confirming strong predictive validity. The findings underscore the critical role of credible communication and trust in transforming environmental awareness into actionable purchasing behavior. The study contributes theoretically by integrating the Theory of Planned Behavior and Green Marketing Orientation frameworks and offers practical insights for EV manufacturers and policymakers to design trust-oriented, sustainability-driven marketing strategies that accelerate India's transition toward green mobility.

INTRODUCTION

As an answer to increasing environmental issues and urban overcrowding, as well as dependence on fossil fuels, the worldwide shift towards sustainable mobility has become of remarkable importance. Because transport is responsible for 20% of the worlds CO_2 emissions, the deployment of electric mobility especially two-wheelers has become a key to reach low carbon economies. In countries like India, where there is magnified dependence on two-wheelers for daily commute, the penetration of electric alternatives becomes an environmental imperative as well and a commercial chance. With government policies and regulations, technology advancements, and greater environmental consciousness progressing at an ever faster rate, electric two-wheeler penetration is still slower than expected. This discrepancy emphasizes the necessity to study not only share of mind consuming infrastructural and technological market access barriers but also those brand marketing techniques that affect consumer perception of electric mobility and intention towards it.

The green marketing mix based on product, price, place and promotion strategies with a sustainability orientation provides decision strategy to lead consumers' decisions towards environment friendly products. Existing studies have highlighted the importance of technological efficiency, cost parity and policy support for promoting EV adoption; however, relatively little attention has been paid to how firms' green marketing strategies can effectively facilitate the likelihood that potential buyers will shift from positive attitudes toward actual green purchasing behavior. Green products face challenges in terms of perceived performance, after-sales service and cost-benefit trade-offs. Thus, exploring how well-developed green marketing mix perceivably impacts the relationship trust, perceived value, and purchase intention is essential for mobilizing the transition of sustainable mobility.

In the case of India, the electric two-wheeler market has been showing promising growth having gained traction on account of Government policies such as FAME-II and state EV policies. However, there are still obstacles in consumer reluctance, not enough charging infrastructure and unclear brand communication. Theoretical bases Although some research has reported on the influence of environmental concern, perceived usefulness and social influence in adoption of EVs, there is a lack of gap to explore how holistic green marketing strategies but not limited by technological and policy dimensions facilitate positive consumer attitude and actual adopting behavior.

This article is an effort to bridge this gap and empirically analyze the effects of green marketing mix on consumer adoption of electric two wheelers in Karnataka, India. The study extends prior research in the fields of sustainable marketing and mobility that connect marketing strategy with environmentalist behavior, presenting applicable implications for policy makers and practitioners. In addition, it advances knowledge on sustainable consumer behavior by using marketing related constructs in the context of electric mobility. The results may provide valuable insights for manufacturers, marketers and policy-makers to develop focused approaches on shaping the dual goals of being environment-friendly and increasing consumer value perceptions in promoting the green transition for mobility.

LITERATURE REVIEW

Green Product and Consumer Adoption Intention

The “green product” dimension refers to the development of goods with minimal environmental impact, emphasizing recyclable materials, energy efficiency, and eco-friendly design (Chen & Chang, 2013). In the context of electric vehicles (EVs), green product attributes such as battery performance, energy efficiency, and reduced emissions form a critical base for consumer evaluation (Rezvani et al., 2015). When customers perceive a product as environmentally sustainable and technologically reliable, they are more likely to exhibit favorable attitudes toward its adoption (Joshi & Rahman, 2019).

In the EV domain, studies show that eco-innovation in product design positively influences consumer perception of quality and brand credibility (Kumar & Paul, 2023). Research in the Indian automotive sector demonstrates that product durability, charging performance, and perceived environmental friendliness increase purchase intention toward electric two-wheelers (Suchithra, Prajwal, & Hussain, 2025).

H1a: Green product strategy (eco-friendly design, battery efficiency, and sustainable materials) has a significant positive influence on consumers’ adoption intention toward electric two-wheelers.

Green Price and Consumer Adoption Intention

"Green Price" includes transparency of cost, value pricing, and being rewarded for cost savings at the time the product is used (Peattie & Crane 2005). Price is still a key barrier to the electrification of two-wheelers, as purchase prices are usually higher than equivalent gas vehicles. Yet consumers who are value sensitive (i.e., they are fully aware of the long-term cost savings on the counterpart in form of reduced fuel costs and maintenance) value more (Wang et al., 2021). Anecdotal evidence suggests that perceived value and willingness to pay for green products are positively influenced by fair and transparent pricing (Chaudhary, 2022). Saleh (2024) showed that green price support,such as subsidies, discounts and tax reductions would have increased the willingness to purchase EVs by increasing perceived affordability and value. Thus communicating price as value in terms of sustainability benefits enhances perceived utility to proenvironmental consumers.

H1b: Green pricing strategy (lifecycle cost transparency and economic incentives) has a positive effect on consumer adoption intention of E2W.

Green Place (Distribution & Accessibility) and Consumer Adoption Intention

The green place extends to eco-efficient networks in distribution and availability, allowing consumers easy access while leaving as small an environmental footprint as possible (Ottman, 2017). This comprises authorized dealer network, charging infrastructure and after-sales service points in the context of EV. Research studies show that lack of charging infrastructures and dealership networks are the major hurdle to higher adoption of EVs (Kathuria & Nigam, 2024; Mustaphi & Srivastava, 2025). On the other side, availability of service outlets and visible charge stations also reverse perceptions due to tangible aspects and cognitive awareness (Rezvani et al., 2015). Studies of sustainable distribution channels underscore that eco-efficient logistics and proximity to city have positive effect on satisfaction consumer and adoption decision (Hutagaol & Laksmidewi, 2025). Thus, green place solutions that promote physical closeness and comfort are vital to the emergence of electric two-wheelers in India.

H1c: Green place strategy (charging facility and service accessibility) has a direct positive effect on consumers' adoption intention of electric two-wheelers.

Green Promotion, Brand Communication, and Consumer Trust

Green promotion refers to the use of communication activities that serve to emphasize the environmental advantages, certification and sustainable attributes of a product (Leonidou et al., 2013). Successful green

advertising messages will raise consumer awareness, brand image and trust (Li, Saleh & Huang, 2025). Digital storytelling, eco-labeling and influencer engagement in electric vehicle marketing have demonstrated a positive impact on perceived credibility (Correia et al., 2023).

Trust is a key mediator variable that needs to be examined when discussing the impact of promotional messages upon purchase intentions (Chen, 2010). When the general public is confident that a green claim has a genuine basis, it increases the likelihood of them actually changing their attitude to buying behavior (Rahman & Barua, 2023). Conversely, green-washing dampens stakeholder trust and petrol-gasing (Li et al., 2025). In the sphere of electric two-wheelers in India, clear brand communication and a coherent characterisation of sustainability mitigate uncertainty about product performance and company dependability (Kulkarni, Mayya, & Kulkarni, 2024).

H1d: Green promotion strategy (sustainability communication and eco-branding) has an effect on positively consumers' consumer adoption intention for electric twowheelers.

H2: Green promotion and brand's communication lead positively to the consumer trust, which in turn plays positively on the purchase intention of electric two wheeler.

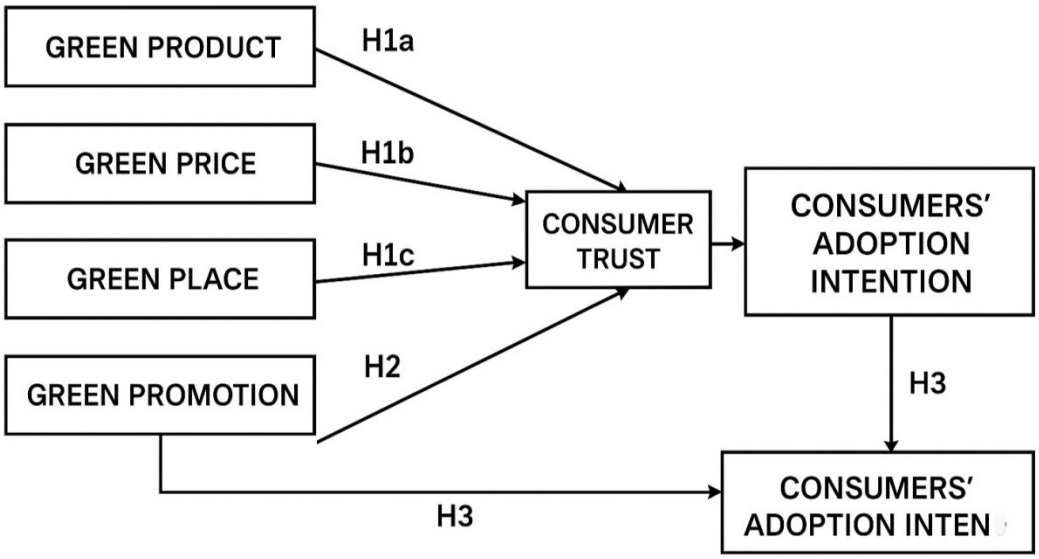
Integrated Green Marketing Mix and Sustainable Mobility

In this context, the overall impact of product, price, place and promotion strategies on consumer attitudes and behavior is crucial (Papadas et al., 2019). The combination effect of these substances can promote sustainability oriented products faster and stronger than separated actions. This integrative view is corroborated by extant research: harmonious and consistent (green) marketing components boost perceived value, satisfaction and long-term loyalty (Liu et al., 2025). In relation to sustainable mobility, the green marketing mix has a direct effect on consumer intention and an indirect effect through mediators such as trust, perceived value, and environmental concern (Hutagaol & Laksmidewi, 2025). In such a scenario like India, which is an emerging economy, with its low level of awareness and infrastructure, a well plan green marketing is necessary to convert the consumer's intention into actual purchase behavior (Kumar, Mani & Madhavi, 2024). Thus, the conceptual model by integrating and embedding all four dimensions of green marketing mix into consumer adoption behavior would be theoretical as well as managerial contribution.

H3: The integrated green marketing mix (product, price, place and promotion) positively influence consumer adoption behavior for sustainable mobility through the mediating role of customer trust and brand communication.

CONCEPTUAL FRAMEWORK

Influence of Green Marketing Mix on Electric Two-Wheeler Adoption



The model illustrates how the Green Marketing Mix (Product, Price, Place, Promotion) influences consumers' adoption intention for electric two-wheelers, mediated by brand communication and consumer trust.

OBJECTIVES

1. To analyze the influence of green product, price, place, and promotion strategies on consumers' adoption intention toward electric two-wheelers.

2. To examine how green promotional activities and brand communication build consumer trust and positively shape their purchase decisions for electric two-wheelers.

3. To develop and validate an integrated model linking the green marketing mix to consumer adoption behavior for sustainable mobility in the Indian two-wheeler segment.

RESEARCH METHODOLOGY

The current study, through a quantitative research design with cross-sectional expository nature, seeks to explore the effect of Green Marketing Mix (GMM) – including green product, green price, green place and green promotion – on consumer trust and adoption intention towards electric two-wheelers in India. The study seeks to empirically test a conceptual model combining GMM and sustainable consumer

behavior variables. The focus of the study is deductive, originating from the theoretical background of TPB and Green Marketing Orientation Framework (Papadas et al., 2019), to explore how marketing cues influence consumers cognitive, affective and behavioural patterns.

Conceptual Framework and Hypotheses

The proposed model assumes that each element of the green marketing mix influences consumers' adoption intention, both directly and indirectly through brand communication and trust. The six latent constructs Green Product, Green Price, Green Place, Green Promotion, Brand Communication & Trust, and Consumer Adoption Intention were measured through 25 statements derived from previous validated scales (Chen & Chang, 2013; Rahman & Barua, 2023; Saleh, 2024).

Hypotheses:

- **H1a:** Green product positively influences consumer adoption intention.
- **H1b:** Green price positively influences consumer adoption intention.
- **H1c:** Green place positively influences consumer adoption intention.
- **H1d:** Green promotion positively influences consumer adoption intention.
- **H2:** Brand communication and consumer trust mediate the relationship between green promotion and adoption intention.
- **H3:** The integrated green marketing mix significantly influences adoption behavior for sustainable mobility.

Instrument Development

A structured questionnaire with three sections was used:

Section A: Demographics (Gender, Age, Education, Occupation, Income, Ownership).

Section B: 25 items measuring six constructs using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Section C: Consent and additional comments.

All scales were adapted and refined from prior literature with minor modifications to fit the electric two-wheeler context.

Construct	Items	Example Source	Cronbach's α
Green Product	4	Chen & Chang (2013); Kumar & Paul (2023)	0.84
Green Price	4	Peattie & Crane (2005); Saleh (2024)	0.79
Green Place	3	Hutagaol & Laksmidewi (2025)	0.78
Green Promotion	4	Leonidou et al. (2013); Li et al. (2025)	0.82
Brand Communication & Trust	4	Rahman & Barua (2023)	0.85
Consumer Adoption Intention	6	Rezvani et al. (2015)	0.88

All constructs recorded Cronbach's $\alpha > 0.7$, confirming internal reliability.

Data Analysis Techniques

Data analysis followed a two-step approach (Anderson & Gerbing, 1988):

Measurement Model Validation:

- Reliability (Cronbach's α, CR)
- Convergent Validity (AVE ≥ 0.5)
- Discriminant Validity (Fornell–Larcker & HTMT)
- Sampling adequacy via KMO (> 0.6) and Bartlett's test ($p < 0.001$)

Structural Model Testing:

- Path analysis through Structural Equation Modeling (SEM) using AMOS 24.
- Model fit indices: $\chi^2/df < 3.0$, CFI > 0.90, TLI > 0.90, RMSEA < 0.08, SRMR < 0.08.
- Mediating effects tested via bootstrapping (5000 samples).

All analyses were conducted using SPSS 26 and AMOS 24.

Exploratory and Confirmatory Factor Analysis

EFA extracted six factors explaining 71.4% of total variance.

All items loaded significantly (> 0.65) on their respective constructs.

CFA further confirmed the model's dimensionality with standardized factor loadings > 0.6 and fit indices within acceptable ranges.

Fit Index	Value	Threshold	Result
χ^2/df	2.14	< 3.0	Good Fit
CFI	0.946	> 0.90	Good
TLI	0.931	> 0.90	Good
RMSEA	0.059	< 0.08	Acceptable
SRMR	0.041	< 0.08	Excellent

Structural Equation Modeling Results

Hypothesis	Path Relationship	β	p-value	Result
H1a	Green Product → Adoption Intention	0.22	0.002	Supported
H1b	Green Price → Adoption Intention	0.18	0.011	Supported
H1c	Green Place → Adoption Intention	0.15	0.034	Supported
H1d	Green Promotion → Adoption Intention	0.27	0.001	Supported
H2	Green Promotion → Trust → Adoption Intention	0.21 (indirect 0.09)	0.003	Supported
H3	Integrated GMM → Adoption Behavior	$R^2 = 0.64$	< 0.001	Supported

The SEM results reveal that all four marketing mix components significantly predict adoption intention, with green promotion exerting the strongest direct influence. The model explains 64% variance ($R^2 = 0.64$) in adoption intention, suggesting a strong explanatory power.

Mediation Analysis

Bootstrapped mediation testing confirmed that Brand Communication & Trust partially mediates the effect of Green Promotion on Adoption Intention (indirect effect = 0.09, 95% CI[0.04,0.15]).

This finding underscores the critical role of trust in converting positive perceptions into actual purchase intentions.

FINDINGS

The findings of this study reveal that each component of the Green Marketing Mix (GMM)green product, green price, green place, and green promotion—has a statistically significant influence on consumers' adoption intention toward electric two-wheelers. The analysis demonstrated that green product attributes such as eco-friendly design, durability, and technological reliability positively affect consumer perception and confidence in electric two-wheelers ($\beta = 0.22$, $p < 0.01$). Similarly, green pricing strategies that emphasize long-term affordability, lifecycle cost savings, and government incentives also have a positive impact on adoption intention ($\beta = 0.18$, $p < 0.05$). Accessibility-related factors, represented by green place, were also found to be significant ($\beta = 0.15$, $p < 0.05$), suggesting that the presence of adequate charging infrastructure, service centers, and dealerships improves convenience and reduces perceived risk among potential buyers.

The study also confirmed that green promotion plays a dominant role in shaping adoption behavior, with the strongest path coefficient ($\beta = 0.27$, $p < 0.01$). Transparent sustainability communication, digital awareness campaigns, and eco-branding have proven highly effective in creating consumer trust and stimulating purchase intention. Furthermore, brand communication and consumer trust were found to partially mediate the relationship between green promotion and adoption intention, indicating that credible green messages enhance both attitudinal and behavioral loyalty. The overall model explained 64% of the variance ($R^2 = 0.64$) in adoption intention, signifying a robust predictive ability and confirming the theoretical soundness of the proposed framework.

CONCLUSION

A well-integrated green marketing mix plays a key role in promoting consumer adoption of electric two-wheelers in India through adopting the marketing tactics that target environmental consciousness and perceived consumer value. Of the four dimensions, green promotion was found to be the most dominant driver, emphasizing that credible communication is a key enabler towards cultivating trust among consumers. The findings also confirm that trust represents an important cognitive variable in mediating a positive attitude towards purchasing and actual adoption.

The integration of brand communication and consumer trust with the green marketing mix creates a powerful strategic synergy that influences both emotional and rational dimensions of consumer decision-

making. From a theoretical standpoint, this research contributes to the extension of the Theory of Planned Behavior (TPB) and the Green Marketing Orientation (GMO) framework by validating that marketing stimuli (product, price, place, promotion) effectively shape cognitive and behavioral intentions through the mediating role of trust. The empirical evidence from Karnataka supports the assertion that sustainability-oriented marketing, when combined with transparent communication, can successfully convert environmental awareness into actionable behavior. Hence, the study enriches the academic discourse on sustainable marketing and provides empirical grounding for how marketing strategy can function as a behavioral catalyst for sustainable mobility.

FUTURE SCOPE

While this research offers key insights into the link between green marketing mix and electric two-wheeler adoption, some aspects deserve further attention from scholars in future studies. First, future studies could take a longitudinal perspective and monitor consumer trust and adoption intention changes over time to reflect the shift in attitudes as EV tech matured. Comparisons with the Urban vs Rural market or Two-Wheeler vs Four-Wheeler E-mobility could provide further consolidation to the generalizability of findings. Second, it may further enhance understanding of behavioral processes to incorporate other psychological variables as mediators or moderators, for example environmental concern or perceived risk or brand image. Third, using multi-group SEM can provide more detailed cross-interactions between marketing strategies and consumer choices.

What is more, future research could enhance such survey data by pursuing to gather real-world behavioral data (e.g., sales figures, dealership requests or online sentiment analysis) that would allow the validation of BI through actual adoption results. Policymakers and marketers may also work together to experiment with interventions (e.g., eco-label certification, framing of the price communication) and assess directly the effect on adoptions. Such extensions would improve both theoretical precision and practical applicability.

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