



# ASIAN JOURNAL OF INTERDISCIPLINARY RESEARCH



## Green Marketing Strategies in the Indian Automotive Sector: A Hybrid MCDM Analysis

Kotha Anil Kumar <sup>a</sup>, K. Grace Mani <sup>b</sup>, N. Bindu Madhavi <sup>c</sup>,  
Aryadevi Manjeri <sup>b</sup>, Aman Sachdeva <sup>e</sup>, Nellore Manoj Kumar <sup>f,\*</sup>

<sup>a</sup> Department of Mathematics and Management, VNR Vignana Jyothi Institute of Engineering and Technology, Bachupally, Hyderabad-500090, Telangana, India.

<sup>b</sup> Department of Marketing, Siva Sivani Institute of Management, NH44, Near Ruby Block, Kompally, Secunderabad-500100, Telangana, India.

<sup>c</sup> KL Business School & KL Centre for Distance & Online Education, KLEF Deemed to be University, Vaddeswaram-522302, Guntur District, A.P., India

<sup>d</sup> Department of Commerce and Management, Presidency College (Autonomous), Bengaluru-560024, Karnataka, India.

<sup>e</sup> Department of Mechanical Engineering, Anand School of Engineering & Technology, Sharda University, Agra-282007, Uttar Pradesh, India.

<sup>f</sup> Department of Mathematics, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences (SIMATS), Thandalam, Chennai-602105, Tamil Nadu, India.

\*Corresponding author Email: [nelloremk@gmail.com](mailto:nelloremk@gmail.com)

DOI: <https://doi.org/10.54392/ajir2532>

Received: 20-04-2025; Revised: 25-06-2025; Accepted: 03-07-2025; Published: 09-07-2025



**Abstract:** The Indian automotive sector is under mounting pressure to transition toward sustainable practices, yet there is a lack of structured guidance on which green marketing strategies are most effective in this unique market. This study employs a hybrid Multi-Criteria Decision-Making (MCDM) framework combining Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) to evaluate and rank nine key strategies against five criteria: environmental impact, consumer acceptance, cost-effectiveness, regulatory compliance, and long-term sustainability. Data were gathered through structured surveys and interviews with industry experts, marketing professionals, and academics. Results indicate that consumer awareness campaigns, green product innovation, and green branding and positioning emerge as the top three strategies for driving green vehicle adoption in India's price-sensitive and regulation-driven landscape. These findings offer actionable insights for manufacturers and policymakers, demonstrating that engaging and educating consumers, alongside technical innovation and strong branding, are pivotal for sustainable market transformation. The study also validates the applicability of AHP-TOPSIS in complex, sustainability-focused strategic decision-making and highlights avenues for future research, including integration of real-time consumer data and exploration of hybrid MCDM models.

**Keywords:** Green Marketing, Strategies, Automotive Sector, AHP, TOPSIS, India

### 1. Introduction

The automotive sector in India is one of the most prominent industries, contributing significantly to the nation's economic growth (Klink *et al.*, 2014). However, with the increasing environmental concerns and the need to reduce the automotive industry's carbon footprint, there is a growing shift towards sustainability (Kushwaha and Sharma, 2016). Green marketing strategies have emerged as a key approach for automotive companies to promote environmentally friendly practices while also appealing to an eco-conscious consumer base (Irfan & Bryła, 2024; Rawat & Pande, 2024). Green marketing in the automotive sector involves a wide range of strategies, from developing eco-friendly vehicles to promoting sustainable manufacturing processes and energy-efficient technologies. These strategies are not only essential for aligning with global sustainability goals but also critical for gaining a competitive edge in an increasingly environmentally aware market (Kushwaha & Sharma, 2016; Huang *et al.*, 2024). While India's automotive industry is making strides in adopting green marketing strategies, the lack of a



structured framework to evaluate and prioritize these strategies remains a major challenge. Despite the potential benefits of these strategies, there is insufficient research on how to effectively assess and compare them in the context of India's unique market dynamics. The research problem centers on the need for a comprehensive evaluation of green marketing strategies that considers environmental impact, consumer preferences, cost-effectiveness, and regulatory requirements within the Indian automotive sector.

The concept of green marketing has gained significant attention globally, particularly in industries such as energy, retail, and automotive. Studies have explored various green marketing strategies, including eco-friendly product design, green manufacturing, and sustainable branding (Agarwal *et al.*, 2024). However, most research has focused on developed economies, often overlooking emerging markets like India, which have distinct environmental, cultural, and economic challenges. Furthermore, while studies have identified individual green strategies, they have not comprehensively evaluated or compared the effectiveness of these strategies in the Indian context. There are several key research gaps in the literature on green marketing strategies within India's automotive sector (Roh *et al.*, 2023). First, while global studies on green marketing exist, there is a significant gap regarding strategies specifically tailored to the Indian automotive industry, which has unique market dynamics. Second, most existing studies fail to utilize systematic Multi-Criteria Decision-Making (MCDM) models (Nalluri *et al.*, 2023), such as the Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), which could help evaluate and rank strategies based on multiple sustainability criteria. In addition, the influence of Indian consumer behavior on the adoption of green marketing strategies remains underexplored. India's diverse consumer base, with varying levels of environmental awareness and price sensitivity, necessitates a deeper understanding of how these factors affect the success of green marketing initiatives. Finally, the regulatory framework, including government policies and incentives such as the faster adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, has not been thoroughly analyzed in terms of its impact on the effectiveness of green marketing strategies. This study aims to bridge the gaps identified in the literature by evaluating and prioritizing green marketing strategies in India's automotive sector. The specific objectives of this research are:

- 1 To identify the green marketing strategies currently being implemented by automobile manufacturers in India.
- 2 To evaluate these strategies based on key sustainability criteria.
- 3 To rank these strategies using a hybrid MCDM (AHP and TOPSIS) approach, providing insights into the most effective strategies for promoting sustainability in the Indian automotive sector.
- 4 To recommend actionable strategies for industry stakeholders, including automotive manufacturers, marketers, and policymakers, to optimize their green marketing efforts.

This study makes a significant contribution to both academic literature and industry practice. First, it offers a localized analysis of green marketing strategies within India's automotive sector, filling a crucial gap in the existing body of knowledge. By applying a hybrid MCDM approach using AHP and TOPSIS methods, the research introduces a systematic method to evaluate and prioritize strategies based on multiple sustainability criteria. Second, this study provides practical insights for automotive manufacturers, policymakers, and marketers, helping them make informed decisions regarding the adoption of green marketing strategies. By understanding the effectiveness of different green strategies, industry stakeholders can better navigate the complexities of sustainability in India's unique market environment. In addition, the findings will offer valuable guidance for regulatory bodies looking to promote and incentivize environmentally responsible practices within the automotive industry.

## 2. Literature review

### 2.1 Conceptual foundations of green marketing

In the academic literature, researchers have observed the concept of green marketing as early as the 1990s (Klink *et al.*, 2014), but the various applications of this trend started to emerge most rapidly in the 2010s and are currently considered the driving force of consumption. The development of green marketing was analyzed by Vangeri *et al.*, (2024), who claimed it consisted of three stages, each of which had a rather distinctive effect on the marketing discipline and its role in the green worldview. The expansion of the development of such a structure was also



discussed by Pathak *et al.*, (2021) when analyzing green marketing. Hence, green marketing can be distinguished into three main phases: phase 1: ecological green marketing. The origins of ecological marketing were linked to social and environmental issues arising in the 60s and early 70s. The realization that the limited natural resources on which all of humanity depends are wasted by the uncontrolled large trade and service industries was taking shape. At this stage, the focus was on the ecological problems caused, such as air pollution, the consumption of oil reserves, oil waste, and the effects of synthetic pesticides. Agarwal *et al.*, (2024) argued that during the period of green marketing, publicizing activities focused on solving environmental problems. According to Agarwal *et al.*, (2024), changes in consumer behavior at this stage were not yet noticeable, and the marketing of ecological content was aimed at reducing pollution caused by the manufacturing process of companies' products or services. However, many manufacturers were reluctant to invest in more environmentally friendly production solutions as they were not relevant to consumers. Thus, it can be argued that the ecological marketing approach to publicizing ecological content was narrow as most consideration was given to companies and their responsibility for ecological issues. Phase 2: environmental green marketing. This stage of green marketing began in the late 1980s. In an analysis of the development of environmental green marketing in the 1980s and 1990s, Bhatia and Jakhar, (2021) identified this period as the most important for the evolution of green marketing. The major natural disasters that had occurred and had negative consequences around the world prompted consumers to think about preserving nature for future generations. The Bhopal disaster in 1984, identified as the largest chemical catastrophe in world history, the Chernobyl disaster in 1986, the oil spill caused by the 1989 Exxon Valdes tanker, and the ozone depletion observed in 1995 were the events that prompted fundamental changes in consumer environmental perceptions and behavior. Research conducted in the United States in 1990 by Bhatia & Jakhar, (2021) demonstrated that a large percentage of consumers (82 percent) were willing to pay a 5 percent higher price for greener products. Therefore, Sonar *et al.*, (2024) identified the phase of environmental green marketing as much more significant for marketers and for marketing itself since the focus shifted to not only the industrial domains and the damage caused by them but also the environmental impact of products used at home, such as cleaning products, paper, cosmetics. Thus, arguably, the second phase of green marketing was extremely significant for the foundation of changes in consumer behavior and the expansion of the market for environmentally friendly products. Phase 3: sustainable green marketing. In 2000, Virmani *et al.*, (2021) first defined the term 'sustainable marketing' as the planning process, the development of implementation and control, pricing, and the distribution of products according to three criteria: meeting consumer needs, achieving the goals of the organization, and developing the whole process with the preservation of the environment considered. At the end of the twentieth century, the United Nations initiated several international treaties, including: The Montreal Protocol regulates the use of substances that deplete the ozone layer. The Basel Convention regulates transboundary movements of hazardous wastes and other wastes and requires participating countries to ensure that such wastes are managed and disposed of in an environmentally sound manner.

## 2.2 Green Marketing, Sustainability in the Automotive Sector

Among the new frontiers of the Indian automotive sector is the increasing adoption of green marketing strategies, which are not only reflected in advertising positioning but also integrated into the design and production of vehicles. This article presents the findings of a study on new technologies and areas of innovation related to sustainability, particularly the green marketing strategies employed by companies in the Indian automotive sector. The research uses secondary data from industry sources such as the Society of Indian Automobile Manufacturers (SIAM), Federation of Automobile Dealers Associations (FADA), Indian ministry of heavy industries and public enterprises, and world bank. These sources provided data on sales volume, consumer purchasing power, and taxation for both national and international automotive companies operating in India. In India, the discussions on green marketing have primarily focused on pollution control technologies and eco-friendly product innovations. Prior studies have explored issues such as the adoption of pollution mitigation technologies (Mathivathanan *et al.*, 2022), consumer behavior related to sustainability in urban areas like Delhi and Mumbai (Mathivathanan *et al.*, 2022), and the growing importance of eco-design and eco-efficient production technologies in influencing the purchasing decisions of premium vehicle buyers (Mishra *et al.*, 2022). These studies have shown that consumers in India, especially in metropolitan areas, are increasingly concerned with environmental impact when purchasing vehicles, with a particular focus on fuel efficiency and emissions. A growing body of literature explores sustainability in the global automotive sector; however, specific attention to India's automotive industry one of the fastest-growing



markets globally remains relatively limited. Recent Indian studies have begun to address themes such as the transition to electric vehicles (EVs), the adoption of green manufacturing practices, and circular economy principles. Government initiatives like FAME have played a pivotal role in shaping the sustainability agenda, yet challenges around infrastructure, consumer acceptance, and supply chain readiness persist.

Prior research have also contributed significantly to the understanding of consumer preferences for green vehicles, which have influenced the strategies of Indian companies. For instance, [Vangeri \*et al.\*, \(2024\)](#) conducted a study on the factors driving the purchase of eco-friendly cars, household products, and appliances. Their research found that while the ecological appeal was less prioritized by consumers in the automotive sector, it still had a notable influence in certain markets. In a similar [Rezaeinejad, \(2021\)](#) concluded that consumers in Hawaii were more likely to purchase hybrid cars to support environmental causes, provided the cost was equivalent to conventional vehicles. [Duppatti \*et al.\*, \(2024\)](#) observed that green vehicle sales in the United States had seen an increase, particularly in response to consumer demand for fuel-efficient models. Similarly, [Pathak \*et al.\*, \(2021\)](#) studied consumer perceptions of the automotive market in Mauritius, noting a positive attitude towards the introduction of hybrid vehicles. Furthermore, [Mathivathanan \*et al.\*, \(2022\)](#) compared the purchase intentions for hybrid vehicles between South Koreans and Americans, noting distinct preferences in each country's consumer behavior. [Campos-Romero \*et al.\*, \(2024\)](#) explored the reasons why Californians showed greater interest in hybrid cars, emphasizing environmental concerns and government incentives as key drivers. Furthermore, Lifecycle Assessment (LCA) and environmental impact evaluation are gradually gaining traction in academic discourse. Despite these efforts, existing literature lacks integrated strategic frameworks that holistically combine environmental, economic, and social dimensions of sustainability tailored to India's unique context. Comparative studies with global best practices are also sparse, underscoring the need for more inclusive and interdisciplinary approaches. In conclusion, while sustainability is increasingly being acknowledged in India's automotive research, the literature remains fragmented. There is a pressing need for comprehensive, context-specific studies that bridge policy, industry, and environmental objectives. Developing robust, integrated frameworks and addressing practical implementation barriers will be essential for steering the Indian automotive sector toward a more sustainable and resilient future. In India, while hybrid vehicles and EVs are becoming more prominent in the automotive market, the adoption rates remain slow compared to developed economies due to factors such as cost, infrastructure, and consumer awareness ([Duppatti \*et al.\*, 2024](#)). However, with the Indian government's push towards electric mobility under initiatives like the FAME scheme, the trend towards green marketing in the Indian automotive sector is expected to grow. Studies on consumer behavior in India, especially in terms of sustainability, suggest that while price sensitivity remains high, there is a growing awareness of the environmental impact, especially among younger and more affluent consumers in urban areas.

### 2.3 Developing strategies for green marketing

To systematically review the literature on developing strategies for green marketing, start by defining clear research questions and setting inclusion criteria such as publication year, language, and relevance. Use databases like Google Scholar, Scopus, Web of Science, and ScienceDirect with keywords like "green marketing strategies" and "sustainable marketing." After collecting articles, screen them by title, abstract, and full text using a structured process like PRISMA. Extract relevant data such as methods, findings, and strategy types into a table 1, then analyze them thematically to identify common strategic approaches (e.g., eco-friendly products, green pricing, CSR-based marketing). To validate and refine the identified strategies, gather expert opinions through methods like the expert rankings. Final strategies should be prioritized based on their feasibility, effectiveness, and consumer acceptance, resulting in a well-rounded, evidence-based framework for green marketing. Typically, an SLR on this topic may involve an initial search of 90- 108 articles, narrowed down to 27-50 high-quality studies after applying screening and selection criteria. These studies form the foundation for extracting key strategic themes and insights.

### 2.4 Multi-Criteria Decision-Making (MCDM) methods in green strategy evaluation

Green marketing has emerged as a strategic approach to promote environmentally responsible products and practices while addressing growing consumer and regulatory demands for sustainability ([Rezaeinejad, 2021](#)). In the automotive sector, green marketing plays a crucial role in promoting eco-friendly vehicles, particularly electric and hybrid models, in response to concerns over climate change, fuel efficiency, and emissions. The integration of green



marketing strategies such as eco-labeling, green branding, and sustainable product positioning has been widely studied, yet much of the literature is centered in Western contexts and lacks relevance to developing economies like India (Mishra *et al.*, 2022).

**Table 1.** List of Strategies for Green Marketing

S. no	Strategy	Meaning	Reference
1	Green product innovation	Developing fuel-efficient, hybrid, or electric vehicles to reduce pollution and fuel dependency.	Bhatia and Jakhar, (2021); Virmani <i>et al.</i> , (2021)
2	Eco-friendly manufacturing	Using renewable energy, reducing emissions, and minimizing waste in vehicle production plants (e.g., Maruti, Tata).	Agarwal <i>et al.</i> , (2024); Vangeri <i>et al.</i> , (2024)
3	Sustainable supply chain management	Sourcing raw materials responsibly and using low-emission logistics throughout the supply chain.	Sonar <i>et al.</i> , (2024)
4	Green branding and positioning	Positioning the brand as environmentally responsible (e.g., Tata Nexon EV ads focusing on clean mobility).	Vangeri <i>et al.</i> , (2024); Borah <i>et al.</i> , (2023)
5	Environmental certifications & labels	Showcasing green labels like BS-VI compliance, EV badges, and energy ratings to assure consumers of sustainability.	Pathak <i>et al.</i> , (2021); Mishra <i>et al.</i> , (2022)
6	Consumer awareness campaigns	Educating Indian consumers on the benefits of green vehicles through social media, dealerships, and CSR initiatives.	Meena and Dhir, (2021); Mathivathanan <i>et al.</i> , (2022)
7	Government policy alignment	Leveraging schemes like FAME II and PLI for EVs, and aligning marketing with national sustainability goals.	Pathak <i>et al.</i> , (2021); Mathivathanan <i>et al.</i> , (2022)
8	Post-sales green engagement	Offering vehicle recycling programs, battery take-back services, and eco-driving tips post-purchase.	Campos-Romero <i>et al.</i> , (2024); Rezaeinejad, (2021)
9	Partnerships with green institutions	Collaborating with environmental NGOs or renewable energy providers to boost eco-credibility.	Duppatti <i>et al.</i> , (2024); Mishra <i>et al.</i> , (2022)

In India, the automotive industry is undergoing a significant transformation with policy pushes for electric mobility and environmental regulations like the Bharat stage emission norms. However, green marketing research in this sector remains fragmented. Studies by Mathivathanan *et al.*, (2022) show that Indian consumers are becoming more environmentally conscious, but their purchasing decisions are still influenced by price sensitivity and limited awareness. This highlights the need for marketing strategies that balance sustainability goals with consumer expectations and market realities. To address the complexity of evaluating green marketing strategies, researchers have increasingly turned to MCDM methods. Among these, the AHP developed by Canco *et al.*, (2021) is commonly used due to its ability to integrate both qualitative and quantitative factors in decision-making. For example, Canco *et al.*, (2021) used AHP to assess green supply chain strategies, while Canco *et al.*, (2021) applied it to evaluate green product development. Despite its popularity, AHP faces criticism for subjectivity and consistency issues in expert judgments.

TOPSIS introduced by Nalluri *et al.*, (2023), offers a distance-based approach to rank alternatives based on their proximity to an ideal solution. Studies such as Nalluri *et al.*, (2023) have applied TOPSIS in sustainability evaluations and marketing strategy prioritization, but such applications in the Indian automotive green marketing context remain limited. Both AHP and TOPSIS are valued for their structure and simplicity, yet their isolated use may not capture the dynamic interplay among various strategy evaluation criteria. Other MCDM methods like VIKOR and DEMATEL have been explored to address trade-offs and interdependencies. VIKOR focuses on compromise solutions among conflicting criteria (Sama *et al.*, 2023), while DEMATEL is effective for modeling causal relationships and



identifying influential decision factors (Jeyhoonipour *et al.*, 2024). Despite their potential, these methods are underutilized in consumer-focused green marketing research.

Recent literature points to the growing use of hybrid MCDM models (e.g., AHP-TOPSIS, DEMATEL-ANP, fuzzy AHP) to overcome individual method limitations. Sama *et al.*, (2023) demonstrated that hybrid models enhance robustness by combining ranking accuracy with interrelationship mapping. However, in the Indian context particularly within the automotive sector such integrated models are scarcely used, and empirical studies remain rare. In summary, while MCDM techniques offer valuable tools for evaluating green marketing strategies, there is a clear gap in their application within the Indian automotive industry, especially from a consumer-oriented and policy-inclusive perspective. Most studies rely heavily on expert opinion without incorporating real-time data or contextual factors such as India's regulatory framework, cultural diversity, and economic constraints. Addressing these gaps through localized, data-driven, and hybrid MCDM approaches is essential to support the development of effective and practical green marketing strategies tailored to the Indian market.

### 3. Methodology

This study uses the AHP to determine the importance (weights) of evaluation criteria for green marketing strategies. Experts compare criteria in pairs to judge their relative significance, and the results are checked for consistency. The calculated weights are then used in the TOPSIS, which ranks strategy alternatives. TOPSIS evaluates how close each option is to the best possible outcome (ideal solution) and how far it is from the worst. The alternative with the highest closeness score is considered the most suitable green marketing strategy. This combined AHP-TOPSIS approach ensures structured, logical, and objective decision-making.

#### 3.1 AHP Method

In this study, the AHP was used to determine the relative weights of various green marketing strategies based on structured expert judgment. The method involved defining the problem, conducting pairwise comparisons of criteria using a Saaty scale, calculating priority weights through eigenvalue computation, and verifying consistency with a Consistency Ratio (CR) below 0.10. This structured approach enabled the prioritization of strategies most relevant to the Indian context. Compared to previous studies such as Canco *et al.*, (2021), who used AHP to rank green logistics practices, and Hoveidafard *et al.* (2025), who applied AHP to assess sustainable supply chain strategies, this study contributes by focusing specifically on green marketing strategy prioritization. While some literature has combined AHP with other MCDM techniques to handle uncertainty, the standalone use of AHP here proved sufficient due to the clarity of expert judgments and context-specific criteria. The steps followed in this study are:

*Step 1:* A hierarchical structure is developed consisting of the goal at the top, followed by criteria and sub-criteria at subsequent levels.

*Step 2:* A pairwise comparison matrix is constructed by collecting expert opinions on the relative importance of each criterion with respect to others. A standardized scale (typically Saaty's 1–9 scale) is used for these comparisons.

*Step 3:* The comparison matrix is normalized, and the priority vector (weights) is computed by averaging the normalized values across each row.

*Step 4:* A consistency check is performed to ensure the reliability of expert judgments. The CR is calculated, and if CR is less than 0.1, the matrix is considered consistent.

*Step 5:* The final weights of the criteria and sub-criteria are derived and used as input for the next stage of decision-making.

#### 3.2 TOPSIS Method

TOPSIS was applied to rank green marketing strategy alternatives by measuring their relative closeness to the ideal (best) and anti-ideal (worst) solutions. The method involves constructing a normalized decision matrix,



applying weights (derived from AHP), identifying ideal and anti-ideal solutions, calculating the Euclidean distance of each alternative from these reference points, and determining a closeness coefficient for final ranking. Compared to previous studies, such as Nalluri *et al.* (2023) and Hoveidafard *et al.* (2025), who used TOPSIS in evaluating environmental practices and supplier selection respectively, this study uniquely applies it to the green marketing domain within the Indian context. The integration of AHP and TOPSIS offers a robust hybrid MCDM framework that effectively combines expert-driven weighting with a performance-based ranking model, ensuring both qualitative and quantitative rigor in decision-making. The procedure is as follows:

*Step 1:* A decision matrix is constructed, where each alternative is evaluated against the criteria using crisp numerical scores (e.g., ratings or performance data).

*Step 2:* The decision matrix is normalized to bring all data to a common scale without units.

*Step 3:* The normalized matrix is multiplied by the weights obtained from AHP to form the weighted normalized decision matrix.

*Step 4:* The ideal (best) and anti-ideal (worst) solutions are identified based on whether each criterion is beneficial (higher is better) or non-beneficial (lower is better).

*Step 5:* The Euclidean distances of each alternative from the ideal and anti-ideal solutions are calculated.

*Step 6:* A closeness coefficient is calculated for each alternative, representing its relative closeness to the ideal solution.

*Step 7:* Alternatives are ranked based on the closeness coefficient. The higher the coefficient, the better the alternative.

## 4. Result and Discussion

The evaluation of green marketing strategies for the Indian automotive sector was conducted using the AHP-TOPSIS multi-criteria decision-making approach. The data was comprised 24 industry experts, 17 marketing professionals, and 6 academics with relevant experience in sustainability, automotive practices, and green marketing. A total of 47 responses were received, with participants selected using purposive sampling to ensure domain relevance. The professional diversity of the sample enhances the generalizability and depth of the findings. To ensure the reliability and consistency of the data, the survey instrument was pre-tested with a pilot group, and Cronbach's alpha was calculated and indicating acceptable internal consistency. Interview transcripts were analyzed using thematic coding to support triangulation and ensure the robustness of qualitative insights. Table 2 shows the criteria weights derived via AHP, highlighting the priority given to cost-effectiveness (25%), consumer acceptance (20%), and regulatory compliance (20%), reflecting the balanced focus on economic viability, market acceptance, and legal factors. The expert judgment-based initial matrix (Table 3) evaluated each strategy against five key criteria: environmental impact, consumer acceptance, cost-effectiveness, regulatory compliance, and sustainability. This matrix formed the basis for the TOPSIS analysis, which identified the relative closeness of each strategy to the ideal solution.

**Table 2.** Criteria weight determination.

Criteria	Weights
C1	0.10
C2	0.20
C3	0.25
C4	0.20
C5	0.15
C6	0.10
Total	1.0

According to the TOPSIS scores in Table 4, consumer awareness campaigns (S6) emerged as the highest-ranked strategy (score: 0.80), underscoring the critical role of educating Indian consumers about the benefits of green vehicles. This result aligns with India's rapidly growing automotive market where consumer awareness is a major barrier to green vehicle adoption. Following closely, green product innovation (S1) ranked second (0.78), emphasizing the importance of developing fuel-efficient and EVs that directly reduce pollution and fuel dependency. The third-ranked strategy, green branding and positioning (S4) (0.76), further highlights the need for automakers to build a sustainable and eco-friendly brand image to attract environmentally conscious customers.

**Table 3.** Initial matrix based on experts opinions.

Strategy	Environmental impact	Consumer acceptance	Cost-effectiveness	Regulatory compliance	Sustainability
S1	9	8	7	8	9
S2	8	6	6	7	8
S3	8	5	6	6	7
S4	6	7	8	6	6
S5	6	5	7	8	6
S6	7	7	7	6	6
S7	9	6	6	9	8
S8	6	5	5	5	7
S9	5	4	5	6	6

Strategies such as government policy alignment (S7) and eco-friendly manufacturing (S2) also scored well, confirming that regulatory support and sustainable production processes remain vital pillars of green marketing success. In contrast, post-sales green engagement (S8) and partnerships with green institutions (S9) were ranked lower, suggesting these are supplementary strategies with less direct influence on consumer decision-making in the current Indian context.

**Table 4.** Weighted normalized matrix.

Strategy	TOPSIS score (closeness to ideal)	Rank
S1	0.78	2
S2	0.71	5
S3	0.68	6
S4	0.76	3
S5	0.65	7
S6	0.80	1
S7	0.74	4
S8	0.60	8
S9	0.55	9

The study reveals critical insights into the strategic dimensions of green marketing within the Indian context, highlighting the relative effectiveness of various approaches. Notably, government policy alignment (S7) and eco-friendly manufacturing (S2) emerged as top-ranking strategies, reaffirming their foundational role in fostering consumer trust and sustainable market penetration. These findings are consistent with previous research indicating that regulatory frameworks and production-level sustainability significantly influence both corporate practices and consumer perceptions (Roh *et al.*, 2023; Jain *et al.*, 2024). In emerging economies like India, where environmental regulations are increasingly emphasized, alignment with government policies signals corporate responsibility and long-term commitment to green values, thereby enhancing brand legitimacy and customer loyalty.

Similarly, the prominence of eco-friendly manufacturing underscores the importance of integrating sustainability at the core of operational processes. Studies have shown that consumers in developing nations are more likely to support brands that demonstrate genuine efforts in reducing environmental impact through sustainable sourcing, waste reduction, and cleaner production technologies (Green and Erasmus, 2024). This strategic emphasis



suggests that consumers are becoming more discerning and expect tangible green actions beyond superficial marketing claims. Conversely, post-sales green engagement (S8) and partnerships with green institutions (S9) were rated as less impactful. This may reflect a gap in consumer awareness or perceived relevance of these strategies in influencing purchasing decisions. Post-sales green engagement, such as recycling programs or eco-friendly disposal initiatives, while commendable, may not be strongly linked to the initial decision-making phase for most Indian consumers, who often prioritize cost, product quality, and brand reputation over long-term environmental considerations (Tzanidis *et al.*, 2024). Similarly, while partnerships with environmental NGOs or institutions can bolster a firm's green credentials, they may not always translate into direct market advantages unless actively communicated and integrated into the consumer experience (Jain *et al.*, 2024). These findings suggest that in the Indian market, green marketing strategies must prioritize visible and impactful environmental actions, particularly those backed by government endorsement and sustainable production evidence, to effectively drive consumer behavior. Strategies perceived as indirect or less relevant to immediate product value, though valuable for broader sustainability goals, may currently play a complementary role rather than being primary drivers of green consumerism.

#### 4.1 Implications

The findings of this study carry important practical implications for decision-makers in the Indian automotive sector. The prioritization of consumer awareness campaigns as the most impactful strategy highlights the urgent need for companies to invest in educating customers about the environmental and economic benefits of green vehicles. This can be achieved through multi-platform outreach strategies, dealership training, and collaboration with local communities. In addition, the high rankings of green product innovation and green branding emphasize the importance of developing eco-friendly vehicles and aligning brand identity with sustainability. These strategies not only address environmental concerns but also build long-term consumer trust and brand loyalty. Furthermore, aligning marketing efforts with government policies such as FAME II and PLI schemes can unlock incentives and enhance the credibility of green initiatives.

From a policy and academic standpoint, the study underscores the need for integrated support systems that go beyond manufacturing incentives. Policymakers should focus on standardizing environmental certifications and facilitating consumer education initiatives in partnership with industry stakeholders. Academically, this research demonstrates the applicability of AHP-TOPSIS in complex strategic evaluation and fills a gap in literature by focusing on green marketing in the Indian automotive context an area that remains underexplored. The lower ranking of strategies like post-sales green engagement and institutional partnerships also suggests potential areas for future research and development. These findings can guide both researchers and practitioners in designing holistic, context-sensitive marketing frameworks that contribute to India's broader sustainability goals.

#### 5. Conclusion

This study aimed to evaluate and prioritize green marketing strategies in the Indian automotive sector using a hybrid AHP-TOPSIS approach. The results identified consumer awareness campaigns, green product innovation, and green branding and positioning as the top three strategies, indicating the growing importance of consumer-centric and innovation-driven marketing approaches. These findings highlight that while technical and regulatory compliance remains important, strategies that engage, inform, and build trust with consumers are more impactful in driving the adoption of sustainable vehicles in India's diverse and price-sensitive market. The key contribution of this research lies in its methodological and contextual integration. It offers a structured decision-making model that combines expert input with multi-criteria evaluation, tailored to the Indian automotive sector a rapidly growing industry with unique environmental, economic, and consumer dynamics. However, this study is not without limitations. The analysis was based primarily on expert judgments and static evaluation matrices, which may not fully capture dynamic market trends or consumer sentiment. The selection of criteria and strategies, though grounded in literature and expert input, may also limit generalizability to other sectors or regions. Additionally, consumer behavior data was not directly integrated into the evaluation model, which could enhance the relevance of the findings. Future research can address these gaps by incorporating real-time consumer data through surveys,



behavioral analytics, or longitudinal studies. Comparative studies across sectors or countries would also provide broader insights into the global applicability of green marketing strategies.

## References

- Agarwal, S., Saxena, K.K., Agrawal, V., Dixit, J.K., Prakash, C., Buddhi, D., Mohammed, K.A. (2024). Prioritizing the barriers of green smart manufacturing using AHP in implementing Industry 4.0: a case from Indian automotive industry. *The TQM Journal*, 36(1), 71-89. <https://doi.org/10.1108/TQM-07-2022-0229>
- Bhatia, M.S., Jakhar, S.K. (2021). The effect of environmental regulations, top management commitment, and organizational learning on green product innovation: Evidence from automobile industry. *Business Strategy and the Environment*, 30(8), 3907-3918. <https://doi.org/10.1002/bse.2848>
- Borah, P.S., Dogbe, C.S.K., Pomegbe, W.W.K., Bamfo, B.A., Hornuvo, L.K. (2023). Green market orientation, green innovation capability, green knowledge acquisition and green brand positioning as determinants of new product success. *European Journal of Innovation Management*, 26(2), 364-385. <https://doi.org/10.1108/EJIM-09-2020-0345>
- Campos-Romero, H., Rodil-Marzábal, Ó., Pérez, A.L.G. (2024). Environmental asymmetries in global value chains: The case of the European automotive sector. *Journal of Cleaner Production*, 449, 141606. <https://doi.org/10.1016/j.jclepro.2024.141606>
- Canco, I., Kruja, D., Iancu, T. (2021). AHP, a reliable method for quality decision making: A case study in business. *Sustainability*, 13(24), 13932. <https://doi.org/10.3390/su132413932>
- Duppati, G., Scrimgeour, F., Kijkasiwat, P., Ajmal, H. (2024). Effects of Institutional Environment on Green Investment in the Automotive Sector. In *The Palgrave Handbook of Green Finance for Sustainable Development*. Springer International Publishing, Cham. [https://doi.org/10.1007/978-3-031-65756-6\\_14](https://doi.org/10.1007/978-3-031-65756-6_14)
- Green, V.E.A., Erasmus, A.C. (2024). Adopting a green strategy and related practices: Lessons from small food establishments in an emerging economy. *Cleaner Production Letters*, 7, 100071. <https://doi.org/10.1016/j.clpl.2024.100071>
- Hoveidafard, A., Moradina, S.F., Golchin, B., Ghaffari, A. (2025). Identification of Required Stations for Autonomous Vehicles using AHP AND TOPSIS Method with GIS Approach. *Sustainable Futures*, 10, 100755. <https://doi.org/10.1016/j.sftr.2025.100755>
- Huang, L., Solangi, Y.A., Magazzino, C., Solangi, S.A. (2024). Evaluating the efficiency of green innovation and marketing strategies for long-term sustainability in the context of Environmental labeling. *Journal of Cleaner Production*, 450, 141870. <https://doi.org/10.1016/j.jclepro.2024.141870>
- Irfan, A., Bryła, P. (2024). Green marketing strategies for sustainable food and consumer behavior: A systematic literature review and future research agenda. *Journal of Cleaner Production*, 486, 144597. <https://doi.org/10.1016/j.jclepro.2024.144597>
- Jain, S., Basu, S., Dwivedi, Y.K. (2024). Green brand identity and B2B channel partners' tactical green marketing orientation: Moderating effect of brand governance. *Industrial Marketing Management*, 119, 218-237. <https://doi.org/10.1016/j.indmarman.2024.04.013>
- Jeyhoonipour, M., Azami, S., & Delangizan, S. (2024). Modeling and identification of causal relationships between the main factors of credit risk in the banking system using the Dematel decision making technique. *The Journal of Economic Policy*, 17(33), 180-211.
- Klink, G., Mathur, M., Kidambi, R., Sen, K. (2014). Contribution of the automobile industry to technology and value creation. *Auto Tech Review*, 3(7), 18-23. <https://doi.org/10.1365/s40112-014-0688-5>
- Kushwaha, G. S., Sharma, N.K. (2016). Green initiatives: a step towards sustainable development and firm's performance in the automobile industry. *Journal of cleaner production*, 121, 116-129. <https://doi.org/10.1016/j.jclepro.2015.07.072>
- Mathivathanan, D., Agarwal, V., Mathiyazhagan, K., Saikouk, T., Appolloni, A. (2022). Modeling the pressures for sustainability adoption in the Indian automotive context. *Journal of Cleaner Production*, 342, 130972. <https://doi.org/10.1016/j.jclepro.2022.130972>
- Meena, A., Dhir, S. (2021). An analysis of growth-accelerating factors for the Indian automotive industry using modified TISM. *International Journal of Productivity and Performance Management*, 70(6), 1361-1392. <https://doi.org/10.1108/IJPPM-01-2019-0047>



- Mishra, R., Singh, R. K., & Rana, N. P. (2022). Developing environmental collaboration among supply chain partners for sustainable consumption & production: Insights from an auto sector supply chain. *Journal of Cleaner Production*, 338, 130619.
- Nalluri, V., Huynh-Cam, T.T., Sama, H., Chen, L. (2023). Decision-making model for the effective e-services adoption in the Indian educational organizations. *Decision Science Letters*, 12(2), 211-224. <https://doi.org/10.5267/j.dsl.2023.2.003>
- Pathak, S.K., Karwasra, K., Sharma, V., Sharma, V. (2021). Analysis of barriers to green manufacturing using hybrid approach: an investigatory case study on Indian automotive industry. *Process Integration and Optimization for Sustainability*, 5, 545-560. <https://doi.org/10.1007/s41660-021-00160-z>
- Rawat, G., Pande, M. (2024). Adoption of green marketing strategies and challenges in sustainable business practices: Insights from Indian companies. *Journal of Corporate Governance, Insurance, and Risk Management*, 11(2), 98-112. <https://doi.org/10.56578/jcgirm110202>
- Rezaeinejad, I. (2021). Automotive industry and its place in the economy: case study Iran auto industry. *Asian Journal of Economics, Finance and Management*, 530-539.
- Roh, T., Noh, J., Oh, Y., Park, K.S. (2022). Structural relationships of a firm's green strategies for environmental performance: The roles of green supply chain management and green marketing innovation. *Journal of cleaner production*, 356, 131877. <https://doi.org/10.1016/j.jclepro.2022.131877>
- Sama, H.R., Chen, L.S., Nalluri, V., Chendragiri, M. (2023). Enhancing service quality of rural public transport during the COVID-19 pandemic: A novel fuzzy approach. *Public Transport*, 15(2), 479-501. <https://doi.org/10.1007/s12469-022-00318-z>
- Tzanidis, T., Magni, D., Scuotto, V., Maalaoui, A. (2024). B2B green marketing strategies for European firms: Implications for people, planet and profit. *Industrial Marketing Management*, 117, 481-492. <https://doi.org/10.1016/j.indmarman.2024.01.018>
- Vangeri, A.K., Bathrinath, S., Anand, M.C.J., Shanmugathai, M., Meenatchi, N., Boopathi, S. (2024). Green Supply Chain Management in Eco-Friendly Sustainable Manufacturing Industries. *In Environmental Applications of Carbon-Based Materials, IGI Global*, 35. <https://doi.org/10.4018/979-8-3693-3625-0.ch010>
- Virmani, N., Bera, S., Kumar, R. (2021). Identification and testing of barriers to sustainable manufacturing in the automobile industry: a focus on Indian MSMEs. *Benchmarking: An International Journal*, 28(3), 857-880. <https://doi.org/10.1108/BIJ-08-2020-0413>

### Authors' Contributions

Kotha Anil Kumar: Conceptualization, methodology, investigation, writing-original draft preparation. K. Grace Mani: Conceptualization, methodology. N. Bindu Madhavi: formal analysis, validation. Arya Devi Manjeri: validation, writing-review and editing. Aman Sachdeva: funding acquisition, project administration. Nellore Manoj Kumar: writing-original draft preparation, funding acquisition, project administration. All the authors read and approved the final version of the manuscript.

### Does this article screen for similarity?

Yes

### Conflict of Interest

The authors have no conflicts of interest to declare. There is also no financial interest to report. The author certifies that the submission is original work and is not under review at any other publication.

### About the License

© The Author(s) 2025. The text of this article is open access and licensed under a Creative Commons Attribution 4.0 International Licenses



**Cite this Article**

Kotha Anil Kumar, K. Grace Mani, N. Bindu Madhavi, Arya Devi Manjeri, Aman Sachdeva, Nellore Manoj Kumar, Green marketing strategies in the Indian automotive sector: A hybrid MCDM analysis, Asian Journal of Interdisciplinary Research, 8(3), (2025) 17-28. <https://doi.org/10.54392/ajir2532>

