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Designing a Hyper-Personalized Marketing Model for Clean Fuel Campaigns Using a Grounded Theory Approach

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A B S T R A C T

In the last decade, personalized marketing, and particularly hyper-personalized models, have faced multiple challenges in the field of energy and clean fuels. The first major challenge is the lack of comprehensive and adaptive models for predicting customer behavior and designing targeted campaigns that enhance engagement, loyalty, and personalized purchasing experiences. Moreover, existing studies have primarily been conducted in general industries or traditional e-commerce, while there is a clear lack of comparative research in the field of clean energy and the environment. The purpose of this study is to design a hyper-personalized marketing model for clean fuel campaigns by utilizing a grounded theory approach and analyzing customer behavior to optimize customer experience, loyalty, and the effectiveness of digital advertising. This model, with a focus on integrating behavioral, psychological, and contextual data, enables advanced and targeted personalization. The research methodology is mixed-method and grounded theory. In the qualitative phase, behavioral and psychological analyses of customers, along with interviews with digital marketing experts, were conducted, and data coding was performed to extract patterns. In the quantitative phase, big data from consumers and social networks were analyzed, and artificial intelligence–based clustering and predictive algorithms were employed. The findings indicate that integrating behavioral and psychological data with artificial intelligence predictive models significantly enhances personalized purchasing experiences and customer loyalty. Furthermore, the use of targeted and context-based advertising increases campaign effectiveness while reducing marketing costs. The proposed model also allows for expansion in other clean energy and environmental industries and largely bridges the existing research gaps in deep personalization and long-term ROI.

Keywords: *Hyper-personalized marketing model, clean fuel campaigns, grounded theory approach*

1. Introduction

The contemporary marketing landscape has undergone a fundamental transformation over the last two decades, driven by the convergence of artificial intelligence (AI), big data, and digital technologies. One of the most significant developments within this transformation is the shift toward personalized and hyper-personalized marketing, which leverages vast data resources, advanced analytics, and emerging technologies to create targeted, adaptive, and individualized campaigns for consumers. Traditional one-size-fits-all approaches are increasingly viewed as insufficient, particularly in highly competitive markets where consumer expectations are evolving rapidly. Instead, firms are turning to personalization not only to enhance customer experiences but also to achieve sustainable competitive advantage, loyalty, and long-term engagement (Kumar et al., 2019; Mathew, 2025).

Personalization is no longer a novelty but has become an essential element of modern marketing strategies. Early frameworks of value creation emphasized co-creation, where firms engaged customers in designing and shaping experiences (Prahalad & Ramaswamy, 2004). Building on this foundation, hyper-personalization represents the next phase, where firms integrate AI-driven tools, predictive analytics, and real-time data to anticipate customer needs and preferences before the consumer explicitly expresses them. The move toward grounded theory and AI-enabled personalization requires both technological infrastructure and a shift in managerial thinking toward customer-centric value delivery (Gupta et al., 2025; Masoudi, 2024).

The role of AI in personalized marketing is well-documented in the literature. AI enables firms to collect, analyze, and apply insights from large-scale data across touchpoints, providing actionable intelligence for targeted campaigns (Katikar, 2024). AI-based personalization tools range from recommender systems to dynamic pricing engines, customer journey mapping, and automated communication platforms. As research shows, the adoption of these tools enhances engagement and conversion rates by delivering relevant, timely, and personalized messages (Chandra et al., 2022; Tong et al., 2021). Furthermore, AI provides scalability and efficiency, allowing firms to manage vast consumer bases without diluting the depth of personalization (Parsakia & Jafari, 2023).

The integration of the Internet of Things (IoT) into retail and marketing ecosystems has further accelerated the rise of hyper-personalization. By linking smart devices, wearables, and connected platforms, firms gain access to real-time behavioral and contextual data, enabling adaptive campaigns that respond dynamically to consumer activities (Gupta et al., 2025). These advancements, while beneficial, also raise challenges related to data security, ethical concerns, and consumer privacy. Striking a balance between value creation and privacy protection is critical for the long-term legitimacy of personalized marketing strategies (Mandeep et al., 2024).

From a strategic perspective, personalization has profound implications across industries, including retail, hospitality, sports, and clean energy. In sports, for instance, the integration of AI-driven personalization is reshaping how stakeholders engage fans, enhance experiences, and develop monetization strategies (Rahmani et al., 2024). Similarly, in hospitality, digital marketing and personalized social media engagement have been shown to influence customer trust and loyalty, highlighting the broader role of personalization in service-intensive industries (Tatar & Eren-Erdoğmuş, 2016). These insights underscore the cross-industry relevance of personalized marketing, suggesting that the benefits are not confined to traditional consumer goods sectors but extend across diverse economic and cultural contexts.

Technological innovations such as chatbots and virtual assistants illustrate the operationalization of AI-driven personalization in customer service. By automating real-time interactions and tailoring responses to consumer needs, these technologies enhance customer satisfaction and reduce operational costs (Chung et al., 2020). Similarly, explainable sentiment analysis models in domains such as the textile industry illustrate the evolving sophistication of personalization strategies, where firms not only deliver customized messages but also interpret and explain underlying consumer sentiments (Kasimu et al., 2023). This interpretability is critical for ensuring transparency and consumer trust, particularly in data-intensive contexts.

Blockchain technology represents another innovation with significant implications for personalization. By ensuring secure, transparent, and verifiable transactions, blockchain addresses critical issues related to consumer trust and data integrity in personalized campaigns (Rejeb et al., 2020). As consumers become increasingly aware of data privacy risks, the ability of blockchain to support ethical personalization by decentralizing and safeguarding information has been recognized as a promising direction for future research and practice.

Despite these advances, several challenges remain. One central issue is the trade-off between personalization and

privacy. While consumers appreciate customized experiences, concerns about surveillance, data misuse, and lack of consent persist (Mandeep et al., 2024). This dilemma requires firms to adopt ethical personalization frameworks, integrating privacy-by-design principles into AI-driven systems (Mathew, 2025). Moreover, personalization must be contextualized within cultural and social frameworks, as consumer attitudes toward data sharing and digital interactions vary across regions and demographics (Patel, 2023). For example, cross-national studies indicate differences in how customers in India and Nigeria perceive personalized marketing, underscoring the necessity of localized strategies.

The conceptual foundations of hyper-personalization also intersect with broader digital marketing paradigms. Personalization strategies are increasingly being combined with immersive and interactive approaches, including virtual reality (VR), augmented reality (AR), and gamification, to create memorable customer experiences (Tong et al., 2021). These interactive elements align with the trend of experience-driven marketing, where customer engagement extends beyond transactional relationships to encompass emotional, social, and symbolic dimensions. This evolution reflects a deeper shift in marketing logic: from delivering products to co-creating holistic, personalized experiences (Prahalad & Ramaswamy, 2004).

The adoption of hyper-personalized marketing is particularly relevant in emerging domains such as clean energy and sustainability campaigns. Research indicates that consumer behavior in these industries is highly influenced by social awareness, cultural norms, and grounded theory interventions (Masoudi, 2024). For instance, campaigns that leverage behavioral data, AI-driven clustering, and real-time analytics can tailor messages to encourage eco-friendly choices and build long-term loyalty among environmentally conscious consumers. By aligning personalization with sustainability goals, firms can simultaneously achieve marketing effectiveness and contribute to societal transformation.

In addition to enhancing customer relationships, hyper-personalized marketing provides firms with critical managerial insights. Advanced data mining techniques allow managers to identify gaps in consumer knowledge, predict future trends, and optimize campaign performance (Katikar, 2024; Parsakia & Jafari, 2023). These insights not only improve operational decision-making but also facilitate proactive strategies for innovation and market positioning. Furthermore, personalization aligns closely with the strategic objectives of digital transformation, where firms leverage grounded theory capabilities to adapt to rapidly changing market conditions (Mathew, 2025).

However, effective implementation of personalized marketing requires alignment across multiple organizational dimensions, including technological infrastructure, managerial support, cultural sensitivity, and regulatory compliance. Managerial commitment to supporting grounded theory innovation plays a critical role in overcoming internal resistance and ensuring integration into business processes (Masoudi, 2024). Similarly, socio-cultural factors influence how consumers interpret and respond to personalized initiatives, emphasizing the importance of incorporating local insights into global strategies (Patel, 2023).

Emerging scholarship has also emphasized the role of personalization in fostering trust and loyalty, particularly in digital environments where customers may feel disconnected from brands. Social media personalization, for example, has been shown to increase trust and loyalty by reinforcing consumer-brand relationships (Tatar & Eren-Erdoğmuş, 2016). Likewise, personalization strategies that utilize real-time interactions and immersive campaigns foster deeper engagement and emotional attachment, contributing to long-term loyalty and advocacy (Chandra et al., 2022).

Looking forward, the evolution of hyper-personalized marketing will depend on how firms address critical research and practice gaps. Scholars highlight the need for integrative frameworks that combine AI, IoT, blockchain, and data analytics with ethical and cultural considerations (Rahmani et al., 2024; Rejeb et al., 2020). Moreover, as personalization expands into new industries, including sports, energy, and healthcare, there is a growing demand for domain-specific models that balance effectiveness with ethical responsibility.

In summary, hyper-personalized marketing represents a paradigm shift in contemporary marketing practice, driven by AI, big data, and emerging digital technologies. It reflects an evolution from co-creation toward predictive and adaptive value delivery, where firms anticipate and fulfill customer needs through advanced analytics and real-time interventions (Kumar et al., 2019; Prahalad & Ramaswamy, 2004). The integration of personalization into industries as diverse as retail, hospitality, sports, and clean energy underscores its versatility and transformative potential. Nonetheless, unresolved challenges regarding privacy, ethics, and cultural alignment necessitate continued scholarly inquiry and managerial innovation. The present

study contributes to this ongoing discourse by designing a hyper-personalized marketing model for clean fuel campaigns, grounded in a grounded theory approach that integrates behavioral, psychological, and contextual dimensions to enhance personalization, customer experience, and campaign effectiveness.

2. Methods and Materials

The present study, aiming to design a hyper-personalized marketing model for clean fuel campaigns, adopts a mixed-method approach to integrate both qualitative and quantitative data and provide a comprehensive analysis of the subject. From the perspective of purpose, the research is applied in nature, and based on the grounded theory approach, in the qualitative stage it seeks to identify the dimensions and key components of the hyper-personalized marketing model and develop an initial conceptual model, while in the quantitative stage it validates and measures the extracted model. In terms of data collection, the research is descriptive-survey, and from a methodological perspective, it employs a mixed-method approach that combines numerical investigation with an in-depth analysis of human perceptions.

In the qualitative phase, the research method was exploratory-cognitive and designed based on grounded theory. The statistical population in this phase consisted of experts and specialists in the fields of clean energy, technology management, and digital marketing, who were selected through purposive sampling and the snowball technique. The criteria for expert selection included relevant postgraduate education, at least ten years of professional or research experience, executive or research experience in key companies and institutions, scientific publication records, and familiarity with big data, artificial intelligence, and personalized marketing concepts. This group comprised senior managers, academic researchers, policymakers, and consultants, chosen with the aim of ensuring diversity of perspectives and covering both theoretical and operational dimensions of the model. The qualitative sample included 14 experts and specialists aged between 39 and 55 years, with an average of about 17 years of professional experience. The gender distribution of participants was relatively balanced, and the diverse combination of executive, research, and technological roles enriched the data and enhanced the validity of the analysis. Data were collected through semi-structured interviews and analyzed using three-stage coding (open, axial, and selective) in MAXQDA software. To strengthen validity, peer review by a second researcher and inter-coder agreement were conducted, and theoretical saturation was achieved after the 14th interview.

The instrument for collecting qualitative data was the semi-structured interview, which included demographic and specialized questions. The specialized questions were designed around the six main components of the grounded theory paradigm model, including causal factors, contextual conditions, the central category, intervening conditions, operational strategies, and outcomes. Complementary questioning techniques such as “Why?”, “How?”, and “Give an example” were used to increase the depth of the data. The interview protocol included researcher introduction, explanation of purpose and ethical considerations, posing of questions, and summarizing key points, with each interview lasting approximately 45 minutes. Data were stored in coded form, and participants provided informed consent.

In the quantitative phase, the statistical population included current and potential customers of companies active in the clean fuels sector. Considering time constraints and geographical dispersion, convenience sampling was employed, and the sample size was determined to be 434 individuals. The data collection instrument was a researcher-made questionnaire based on concepts extracted from the qualitative stage and credible scientific literature. Content validity was confirmed by expert judgment, and reliability was assessed using Cronbach’s alpha and composite reliability (CR), with results exceeding 0.7. Convergent validity was evaluated with AVE, while discriminant validity was assessed using the Fornell-Larcker criterion and HTMT.

Data analysis followed the mixed-method approach. In the qualitative section, data were analyzed using open, axial, and selective coding, and the initial conceptual model was extracted. To enhance accuracy, the structured Delphi technique was employed to validate constructs and components with expert input. In the quantitative section, exploratory and confirmatory factor analyses were conducted to examine the structure of the model, followed by structural equation modeling (SEM) using the PLS approach in SmartPLS software. Model fit indices, coefficient of determination (R^2), Q^2 index, and the Fornell-Larcker criterion were used to evaluate the validity and stability of the final model.

This study, by integrating qualitative and quantitative methods and employing a grounded theory approach, succeeded in presenting a comprehensive hyper-personalized marketing model for clean fuel campaigns,

characterized by scientific validity, high explanatory power, and practical applicability. The use of experienced experts, standard data collection tools, advanced statistical analyses, and adherence to ethical considerations all contributed to ensuring the quality, validity, and reliability of the findings. This chapter demonstrates that combining qualitative and quantitative methods with rigorous data analysis enables the extraction of practical and context-specific models in the field of grounded theory marketing, and the present study is an example of such an approach in the area of clean fuel campaigns.

Given the precise methodological steps, data analysis, and scientific validation, the proposed final model is applicable in both practical and research environments and can contribute to the development of clean fuel marketing campaigns with an advanced, grounded theory personalization approach. This chapter, by presenting the step-by-step research process—from sample and instrument selection to data analysis and model validation—provides a solid and transparent foundation for the study's results and the final model.

3. Findings and Results

Based on the stages of grounded coding, open coding was first conducted. Subsequently, axial coding was carried out, which is presented in Table (1). In axial coding, the type of questions posed indicates the nature of relationships. For instance, to compare one category with another, the researcher may ask whether Category A is a consequence of the strategies related to Category B. The researcher performs this process while searching for event-based evidence to confirm or refute the question. When the data confirm the question, the relationship between the two categories is established and may be converted into a proposition.

Table 1

Axial Coding (Subcategories and Codes)

Codes	Core Category
Analysis of clean fuel consumption data of customers	Customer Data and Consumption Behavior Analysis
Analysis of transactional data of energy customers	
Analysis of repeated purchase behavior of clean fuels	
Analysis of behavioral preferences of clean energy customers	
Real-time analysis of customer behavior in energy systems	
Development of digital infrastructures in clean energy	Digital Infrastructure and Technology Development
Development of data APIs for clean fuels	
Development of data dashboards for clean fuel campaigns	
Design of mobile applications for clean fuel campaigns	
Use of IoT data in energy marketing	
Senior management support for hyper-personalized marketing innovation	Managerial Support and Policy-Making
Examination of the impact of data-driven incentive policies	
Evaluation of the effectiveness of personalized marketing	
Examination of the impact of cultural factors on clean energy adoption	Socio-Cultural Influences
Evaluation of cultural campaigns in clean fuel consumption	
Modeling the effect of social awareness on energy behavior	
Data security and authentication of clean energy customers	Data Security and Digital Authentication
Evaluation of security in digital energy marketing systems	
Evaluation of the role of information security in energy customer satisfaction	
Analysis of online payment data for clean fuels	
Personalization of energy services based on behavioral data	Service Personalization and Customer Experience
Personalization of marketing messages based on data	
Personalization of clean energy promotional offers	
Personalization of payment processes in clean fuel purchases	
Customization of marketing messages based on geographical location	
Geographical analysis of clean fuel customer behavior	Geographical and Spatial Analysis
Analysis of customer location data for targeted marketing	
Analysis of customer interaction with clean energy applications	Application and Platform Development and Analysis

Analysis of the level of use of clean energy applications	
Development of energy recommender systems on platforms	
Analysis of the growth rate of clean fuel application installations	
Development of customer clustering algorithms for energy	Market Segmentation and Clustering Analysis
Market segmentation of energy customers using AI	
Analysis of customer knowledge gaps about clean fuels	Attitude, Knowledge, and Awareness Gap Analysis
Measuring customer attitudes toward smart energy services	
Identification of information needs of clean energy customers	
Personalized marketing in clean energy campaigns	Personalized Marketing
Customization of energy-saving recommendations	
Personalization of clean energy event notifications	
Interactive and immersive customer experience in clean fuel campaigns	Interactive and Immersive Customer Experience
Simulation of clean energy service experiences for customers	
Design of interactive campaigns using energy-based virtual reality	
Brand storytelling of clean energy in digital media	Branding and Brand Storytelling
Development of digital brand identity for clean fuels	
Analysis of brand strength data in the digital energy space	
Analysis of key performance indicators (KPIs) of clean energy campaigns	
Integration of AI into energy marketing campaigns	Artificial Intelligence and Machine Learning
Prediction of fuel consumption behavior using machine learning algorithms	
Use of recommender algorithms for clean energy	
Development of real-time customer support systems in energy	Customer Support and After-Sales Services
Intelligent chatbot support on clean energy websites	
Design of digital processes for handling energy complaints	
Analysis of complaints from clean energy customers	Customer Complaints and Feedback Analysis
Analysis of complaint reduction rates after data-driven campaigns	
Examination of clean energy market share in geographic segmentation	Market and Competition Analysis
Analysis of the impact of news on clean fuel consumption behavior	
Analysis of barriers to adoption of new clean fuel technologies	
Design of hyper-personalized marketing campaigns for clean energy	Campaign Design and Evaluation
Design of purchase incentive campaigns for clean fuels	
Design of collaborative campaigns with environmental organizations	
Development of digital loyalty programs for clean energy	Customer Clubs and Loyalty Development
Creation of digital customer clubs for clean energy	
Design of loyalty point systems for energy customers	
Integration of AI into energy marketing campaigns	Use of Emerging Technologies
Development of energy recommender systems on platforms	
Development of data APIs for clean fuels	
Use of blockchain for clean fuel traceability	
Use of IoT data in energy marketing	
Real-time data analysis for marketing decision-making	Real-Time Analytics Systems
Real-time analysis of customer behavior in energy systems	
Simulation of clean energy service experiences for customers	Simulation and Interactive Experience
Interactive and immersive customer experience in clean fuel campaigns	
Design of interactive campaigns with energy-based virtual reality	
Personalization of energy services based on behavioral data	Personalized Communication and Services
Personalization of marketing messages based on data	
Customization of marketing messages based on geographical location	
Personalization of clean energy promotional offers	
Personalization of clean energy event notifications	
Energy-saving education using augmented reality	Customer Education and Empowerment
Educating customers on clean fuel technologies	
Analysis of the role of webinars in improving energy consumption	
Design of gamification-based educational processes for clean energy	

Optimization of user interface in energy marketing platforms	User Experience Improvement and Optimization
Improvement of customer engagement rates in energy applications	
Optimization of response rates to energy marketing emails	
Optimization of clean energy marketing messages	
Analysis of environmental data and campaign effectiveness	Market Analysis Tool Development
Development of data dashboards for clean fuel campaigns	
Geographical analysis of clean fuel customer behavior	
Analysis of multichannel purchase paths for clean fuels	
Use of influencers in clean energy campaigns	Networking and Social Engagement
Integration of energy marketing with social media	
Analysis of user comments on clean fuel in social networks	
Monitoring of online feedback from clean energy customers	
Monitoring customer experience quality in clean energy campaigns	Quality Monitoring and Continuous Improvement
Continuous feedback collection from clean fuel campaigns	
Analysis of positive feedback rates in clean energy campaigns	
Evaluation of content effectiveness in attracting energy customers	
Analysis of customer satisfaction with clean energy services	
Customer loyalty development in clean energy digital space	Customer Loyalty Enhancement
Development of digital loyalty programs for clean energy	
Evaluation of customer loyalty outcomes in clean energy	
Identification of digital loyalty indicators for energy customers	
Measuring customer trust in clean energy brands	Brand Trust Enhancement
Analysis of customer trust in data-driven energy advertising	
Evaluation of the impact of online feedback on customer trust	
Analysis of customer satisfaction with clean energy services	Customer Satisfaction and Experience Enhancement
Monitoring customer experience quality in clean energy campaigns	
Monitoring special customer experiences in clean energy	
Improvement of customer engagement rates in energy applications	Engagement and Campaign Response Improvement
Optimization of response rates to energy marketing emails	
Optimization of clean energy marketing messages	
Analysis of customer satisfaction with clean energy services	
Optimization of clean fuel advertising costs	Efficiency and Return on Investment Enhancement
Optimization of return on investment in clean energy campaigns	
Analysis of key performance indicators of clean energy campaigns	Campaign Evaluation Improvement
Development of data dashboards for clean fuel campaigns	
Analysis of brand strength data in the digital energy space	

Table 2

Selective Coding and Theme Selection

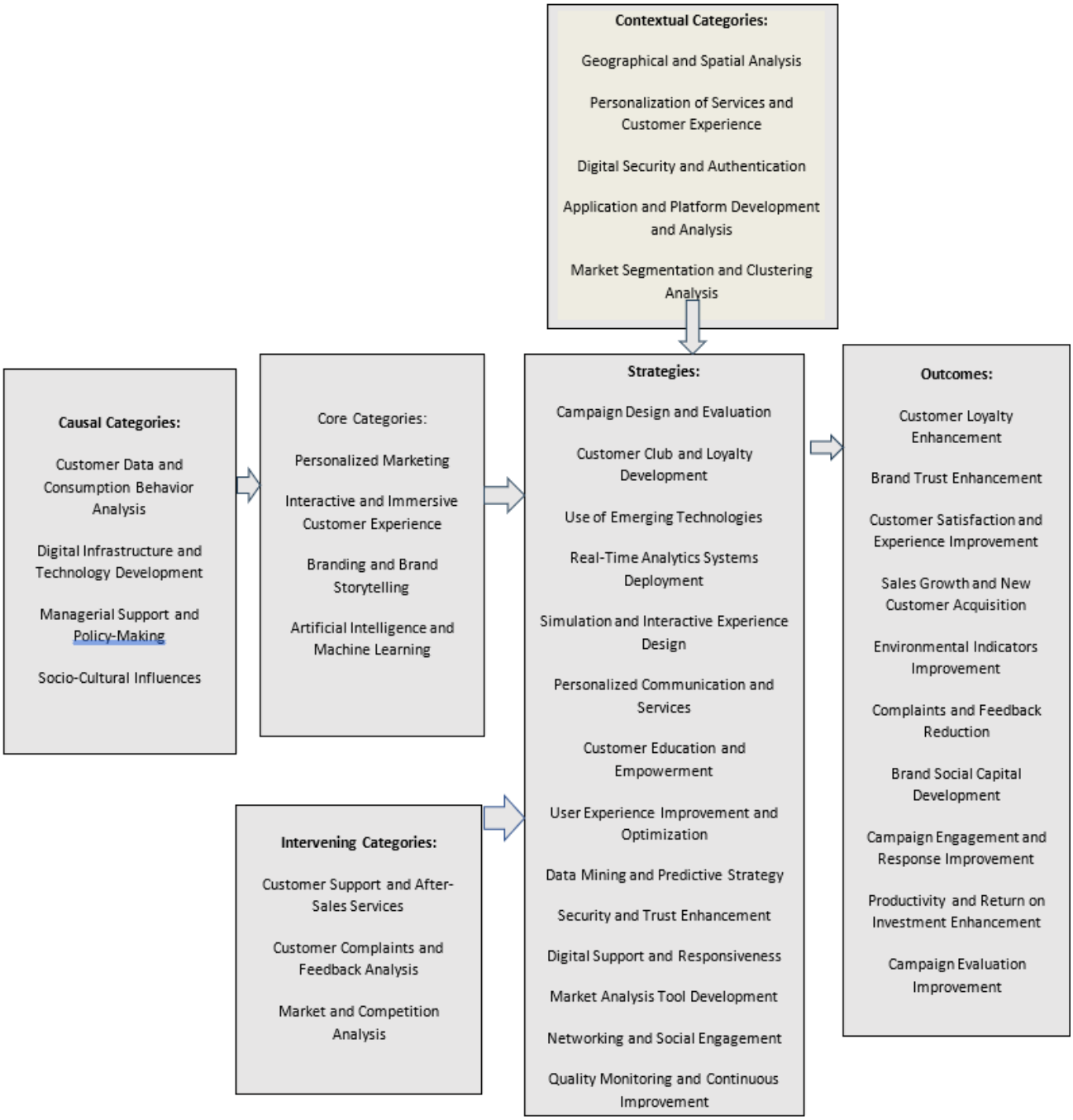
Codes	Axial/Selective Category	Selective Theme
Analysis of clean fuel consumption data of customers	Customer Data and Consumption Behavior Analysis	Causal Factors
Analysis of transactional data of energy customers		
Analysis of repeated purchase behavior of clean fuels		
Analysis of behavioral preferences of clean energy customers		
Real-time analysis of customer behavior in energy systems		
Development of digital infrastructures in clean energy	Digital Infrastructure and Technology Development	
Development of data APIs for clean fuels		
Development of data dashboards for clean fuel campaigns		
Design of mobile applications for clean fuel campaigns		
Use of IoT data in energy marketing		
Senior management support for hyper-personalized marketing innovation	Managerial Support and Policy-Making	
Examination of the impact of data-driven incentive policies		
Evaluation of the effectiveness of personalized marketing		

Examination of the impact of cultural factors on clean energy adoption	Socio-Cultural Influences	
Evaluation of cultural campaigns in clean fuel consumption		
Modeling the effect of social awareness on energy behavior		
Data security and authentication of clean energy customers	Data Security and Digital Authentication	Contextual Factors
Evaluation of security in digital energy marketing systems		
Evaluation of the role of information security in energy customer satisfaction		
Analysis of online payment data for clean fuels		
Personalization of energy services based on behavioral data	Personalization of Services and Customer Experience	
Personalization of marketing messages based on data		
Personalization of clean energy promotional offers		
Personalization of payment processes in clean fuel purchases		
Customization of marketing messages based on geographical location		
Geographical analysis of clean fuel customer behavior	Geographical and Spatial Analysis	
Analysis of customer location data for targeted marketing		
Analysis of customer interaction with clean energy applications	Application and Platform Development and Analysis	
Analysis of the level of use of clean energy applications		
Development of energy recommender systems on platforms		
Analysis of the growth rate of clean fuel application installations		
Development of customer clustering algorithms for energy	Market Segmentation and Clustering Analysis	
Market segmentation of energy customers using AI		
Analysis of customer knowledge gaps about clean fuels	Attitude, Knowledge, and Awareness Gap Analysis	
Measuring customer attitudes toward smart energy services		
Identification of information needs of clean energy customers		
Personalized marketing in clean energy campaigns	Personalized Marketing	Core Category
Customization of energy-saving recommendations		
Personalization of clean energy event notifications		
Interactive and immersive customer experience in clean fuel campaigns	Interactive and Immersive Customer Experience	
Simulation of clean energy service experiences for customers		
Design of interactive campaigns using energy-based virtual reality		
Brand storytelling of clean energy in digital media	Branding and Brand Storytelling	
Development of digital brand identity for clean fuels		
Analysis of brand strength data in the digital energy space		
Analysis of key performance indicators (KPIs) of clean energy campaigns		
Development of real-time customer support systems in energy	Customer Support and After-Sales Services	Intervening Factors
Intelligent chatbot support on clean energy websites		
Design of digital processes for handling energy complaints		
Analysis of complaints from clean energy customers	Customer Complaints and Feedback Analysis	
Analysis of complaint reduction rates after data-driven campaigns		
Examination of clean energy market share in geographic segmentation	Market and Competition Analysis	
Analysis of the impact of news on clean fuel consumption behavior		
Analysis of barriers to adoption of new clean fuel technologies		
Design of hyper-personalized marketing campaigns for clean energy	Campaign Design and Evaluation	Strategies
Design of purchase incentive campaigns for clean fuels		
Design of collaborative campaigns with environmental organizations		
Development of digital loyalty programs for clean energy	Customer Clubs and Loyalty Development	
Creation of digital customer clubs for clean energy		
Design of loyalty point systems for energy customers		
Integration of AI into energy marketing campaigns	Use of Emerging Technologies	
Development of energy recommender systems on platforms		
Development of data APIs for clean fuels		
Use of blockchain for clean fuel traceability		

Use of IoT data in energy marketing		
Real-time data analysis for marketing decision-making	Real-Time Analytics Systems	
Real-time analysis of customer behavior in energy systems		
Simulation of clean energy service experiences for customers	Simulation and Interactive Experience	
Interactive and immersive customer experience in clean fuel campaigns		
Design of interactive campaigns with energy-based virtual reality		
Analysis of clean fuel consumption data of customers	Data Mining and Predictive Strategy	
Prediction of fuel consumption behavior using machine learning algorithms		
Development of customer clustering algorithms for energy		
Data mining of clean energy customer purchasing behavior		
Enhancing data security and authentication of clean energy customers	Security and Trust Enhancement	
Implementation of customer privacy protection policies		
Enhancement of the role of information security in digital marketing systems		
Development of real-time customer support systems in energy	Digital Support and Responsiveness	
Intelligent chatbot support on clean energy websites		
Design of digital processes for handling energy complaints		
Analysis of environmental data and campaign effectiveness	Market Analysis Tool Development	
Development of data dashboards for clean fuel campaigns		
Geographical analysis of clean fuel customer behavior		
Analysis of multichannel purchase paths for clean fuels		
Use of influencers in clean energy campaigns	Networking and Social Engagement	
Integration of energy marketing with social media		
Analysis of user comments on clean fuel in social networks		
Monitoring of online feedback from clean energy customers		
Monitoring customer experience quality in clean energy campaigns	Quality Monitoring and Continuous Improvement	
Continuous feedback collection from clean fuel campaigns		
Analysis of positive feedback rates in clean energy campaigns		
Evaluation of content effectiveness in attracting energy customers		
Analysis of customer satisfaction with clean energy services		
Customer loyalty development in clean energy digital space	Customer Loyalty Enhancement	Outcomes
Development of digital loyalty programs for clean energy		
Evaluation of customer loyalty outcomes in clean energy		
Identification of digital loyalty indicators for energy customers		
Measuring customer trust in clean energy brands	Brand Trust Enhancement	
Analysis of customer trust in data-driven energy advertising		
Evaluation of the impact of online feedback on customer trust		
Analysis of customer satisfaction with clean energy services	Customer Satisfaction and Experience Enhancement	
Monitoring customer experience quality in clean energy campaigns		
Monitoring special customer experiences in clean energy		
Evaluation of sales growth rates in clean fuel campaigns	Sales Growth and Customer Acquisition	
Analysis of the rate of new customer acquisition for clean fuels		
Analysis of return rates of clean energy campaigns		
Promotion of sustainable clean energy consumption behavior	Environmental Indicators Improvement	
Increasing public awareness of clean fuels		
Modeling the effect of social awareness on energy behavior		
Analysis of complaint reduction rates after data-driven campaigns	Complaints and Feedback Reduction	
Analysis of complaints from clean energy customers		
Brand storytelling of clean energy in digital media	Brand Social Capital Development	
Development of digital brand identity for clean fuels		
Creation of digital customer clubs for clean energy		

Figure 1

Final Research Model Based on the Grounded Theory Paradigm



The results of the grounded theory coding revealed several contextual categories that provide the structural and environmental conditions shaping hyper-personalized marketing in clean fuel campaigns. These categories include geographical and spatial analysis, personalization of services and customer experience, digital security and authentication, application and platform development and analysis, market segmentation and clustering analysis, and the analysis of attitudes, knowledge, and awareness gaps. Together, these contextual factors highlight the technological, behavioral, and spatial foundations upon which advanced marketing strategies can be designed.

The study further identified a series of strategies that organizations can implement to operationalize hyper-personalized marketing in the clean energy sector. These strategies include campaign design and evaluation, customer club and loyalty development, the use of emerging technologies, real-time analytics systems deployment,

simulation and interactive experience design, personalized communication and services, customer education and empowerment, user experience improvement and optimization, data mining and predictive strategies, security and trust enhancement, digital support and responsiveness, market analysis tool development, networking and social engagement, and quality monitoring with continuous improvement. These strategic components illustrate the actionable pathways by which companies can translate contextual insights into effective marketing practices.

The outcomes derived from the integration of these strategies are wide-ranging and address both customer-centric and organizational objectives. The findings point to enhanced customer loyalty, strengthened brand trust, improved customer satisfaction and experiential quality, growth in sales and new customer acquisition, as well as the advancement of environmental performance indicators. Additionally, the outcomes include a reduction in complaints and negative feedback, development of brand social capital, improved campaign engagement and responsiveness, higher productivity and return on investment, and stronger campaign evaluation indicators. These results underscore the multifaceted impact of hyper-personalized marketing on both consumer behavior and organizational performance.

In terms of core categories, the research identified four central dimensions that drive the model: personalized marketing, interactive and immersive customer experience, branding and brand storytelling, and the integration of artificial intelligence and machine learning. These categories represent the focal elements around which all other components revolve, serving as the primary mechanisms through which personalization and value creation are achieved in clean fuel campaigns.

The findings also highlight a set of causal categories that initiate and influence the marketing process. These include customer data and consumption behavior analysis, digital infrastructure and technology development, managerial support and policy-making, and socio-cultural influences. These categories serve as the driving forces that enable the development of hyper-personalized marketing practices by providing the necessary data, institutional backing, and socio-cultural alignment.

Finally, the analysis identified intervening categories that shape the way strategies are implemented and outcomes are achieved. These categories consist of customer support and after-sales services, customer complaints and feedback analysis, and market and competition analysis. They function as mediating factors that can either strengthen or weaken the effectiveness of hyper-personalized marketing strategies depending on how effectively they are managed.

4. Discussion and Conclusion

The findings of this study confirm the significant role of hyper-personalized marketing in shaping consumer behavior, enhancing engagement, and increasing campaign effectiveness in the context of clean fuel initiatives. By integrating behavioral, psychological, and contextual data into a unified marketing model, this research demonstrates that hyper-personalization, supported by artificial intelligence (AI) and data-driven strategies, not only improves customer experience but also fosters loyalty and trust in sustainable energy products. The results indicate that when firms utilize AI-powered clustering, predictive analytics, and real-time data, customers are more likely to adopt clean energy consumption behaviors and participate in sustainability-oriented campaigns. These outcomes underscore the importance of merging personalization with broader societal objectives, offering both economic and environmental benefits.

One of the central contributions of this study is the validation of hyper-personalized marketing as a transformative approach for clean energy campaigns. The results revealed that data-driven personalization strategies are strongly associated with higher levels of customer satisfaction, engagement, and perceived relevance of marketing messages. These findings align with earlier research emphasizing the critical role of personalization in creating superior consumer experiences (Chandra et al., 2022; Tong et al., 2021). Specifically, personalization strategies that integrate real-time behavioral data enhance customers' perceptions of value and relevance, thereby improving brand loyalty and long-term engagement. Similarly, the incorporation of interactive and immersive features, such as gamification and augmented reality, reflects the evolution of marketing strategies toward experience-driven engagement (Prahalad & Ramaswamy, 2004). This convergence of personalization and immersive experiences validates the conceptual foundations of hyper-personalization identified in previous studies.

The results further highlight the role of AI in operationalizing hyper-personalized campaigns. By utilizing predictive algorithms and machine learning models, firms can anticipate customer behaviors, segment markets with greater precision, and deliver tailored recommendations that

resonate with individual preferences. This finding is consistent with previous work demonstrating that AI enhances scalability and efficiency in personalization (Katikar, 2024; Kumar et al., 2019). Moreover, AI's ability to dynamically adapt campaigns in response to contextual and behavioral data is central to ensuring relevance across diverse customer segments (Gupta et al., 2025; Parsakia & Jafari, 2023). For example, AI-driven personalization in retail marketing has already been shown to transform customer experiences through IoT integration and real-time interaction (Gupta et al., 2025). This study confirms that such innovations can be extended to sustainability campaigns, where consumer decisions are more complex and value-driven.

Another important dimension of the findings relates to customer trust and security. Results indicated that concerns over data privacy and digital security remain significant barriers to the adoption of hyper-personalized marketing in clean fuel campaigns. However, the study also found that transparent policies, secure authentication mechanisms, and blockchain-supported traceability enhanced consumer trust, thereby increasing campaign participation. These findings echo prior research emphasizing the importance of security and privacy in ensuring consumer acceptance of personalized marketing (Mandeep et al., 2024; Rejeb et al., 2020). Notably, the integration of blockchain for secure transactions and IoT-enabled authentication provides new avenues for addressing consumer skepticism in data-intensive environments. Thus, the alignment between security enhancements and personalization outcomes demonstrates that technological trust is an indispensable component of hyper-personalized strategies.

The results also reveal that socio-cultural factors play a moderating role in the effectiveness of personalization strategies. Customer attitudes toward clean energy and their willingness to share personal data were influenced by cultural norms, awareness levels, and contextual perceptions. This observation is consistent with findings from comparative studies, which highlight differences in consumer perceptions of personalized marketing across regions (Kasimu et al., 2023; Patel, 2023). For instance, in certain contexts, personalized marketing efforts were perceived as intrusive, whereas in others they were welcomed as valuable services. This suggests that firms must localize their hyper-personalized campaigns, taking into account cultural sensitivity and consumer expectations. By doing so, organizations can avoid resistance and build long-term acceptance of personalization initiatives in the energy sector.

The study further contributes to the growing body of research on the intersection of sustainability and marketing. Findings indicated that personalization in clean fuel campaigns not only increases consumer adoption of green products but also strengthens their commitment to sustainable behaviors. This aligns with prior work demonstrating that personalization can be an effective tool for shaping pro-environmental attitudes and practices (Masoudi, 2024; Rahmani et al., 2024). Specifically, when campaigns used hyper-personalized recommendations, real-time reminders, and socially embedded narratives, customers reported higher satisfaction and willingness to engage in environmentally responsible consumption. These results suggest that personalization may serve as a bridge between individual consumer preferences and collective sustainability goals.

Another key insight from the study is the role of immersive and interactive features in fostering engagement. Results showed that when campaigns incorporated gamified learning, augmented reality, and interactive storytelling, customer engagement significantly increased. These findings are consistent with earlier work on co-creation experiences, which emphasized that consumers prefer being active participants in value creation (Prahalad & Ramaswamy, 2004). The extension of this principle into clean energy campaigns demonstrates that immersive experiences, when combined with personalization, create a powerful synergy for enhancing both consumer engagement and brand loyalty.

From a managerial perspective, the study highlights the importance of organizational support and leadership commitment to implementing hyper-personalized strategies. Findings indicated that campaigns with strong backing from senior management and clear policies achieved higher adoption rates and better customer satisfaction. This result aligns with prior studies emphasizing that managerial support is essential for overcoming organizational inertia and embedding personalization into business processes (Masoudi, 2024; Mathew, 2025). Moreover, firms that invested in digital infrastructure, staff training, and cultural adaptation were better positioned to implement scalable hyper-personalized strategies.

Finally, the study's findings reinforce the importance of measuring performance and outcomes in hyper-personalized marketing. The use of advanced analytics, key performance indicators (KPIs), and continuous monitoring enabled firms

to refine their strategies and achieve higher returns on investment. This resonates with previous studies emphasizing the role of analytics and real-time monitoring in optimizing campaign effectiveness (Chandra et al., 2022; Parsakia & Jafari, 2023). By employing real-time dashboards and predictive models, firms in this study were able to track engagement, customer satisfaction, and campaign outcomes with greater accuracy. The integration of AI and big data into performance measurement thus ensures not only immediate effectiveness but also long-term strategic sustainability.

Despite its contributions, the study has several limitations. First, the sample was limited to clean fuel campaigns and may not fully capture the dynamics of hyper-personalized marketing in other industries such as retail, healthcare, or hospitality. Second, the reliance on self-reported measures introduces the possibility of response bias, particularly regarding consumer perceptions of privacy and trust. Third, although the study employed a mixed-method approach, the quantitative sample size may still limit generalizability across broader populations. Additionally, the rapid pace of technological development means that the findings may become outdated as new tools, platforms, and regulatory frameworks emerge. Finally, the study focused primarily on consumer perspectives and managerial insights, leaving out other stakeholders such as policymakers, NGOs, and technology providers who may also shape the effectiveness of hyper-personalized strategies.

Future studies should expand the scope beyond clean fuel campaigns to include cross-industry comparisons, enabling a deeper understanding of how personalization functions in diverse contexts. Researchers could also employ longitudinal designs to assess how consumer attitudes and behaviors evolve over time with repeated exposure to hyper-personalized campaigns. Another avenue for exploration is the role of emerging technologies such as generative AI, edge computing, and the metaverse in advancing personalization strategies. Additionally, future work could investigate the ethical dimensions of hyper-personalization in greater depth, focusing on regulatory frameworks, consumer consent mechanisms, and the balance between personalization and autonomy. Finally, studies could examine personalization from a multi-stakeholder perspective, incorporating insights from policymakers, environmental organizations, and technology developers to develop more holistic and sustainable personalization models.

Managers seeking to adopt hyper-personalized marketing strategies should prioritize investments in digital infrastructure and AI-driven analytics to ensure scalability and precision. They should also establish clear privacy and security policies that build consumer trust while maintaining transparency in data collection and usage. Localizing campaigns to reflect cultural sensitivities and consumer expectations will be essential for gaining widespread acceptance. Moreover, firms should integrate immersive and interactive features such as gamification, augmented reality, and storytelling to foster deeper engagement. Regular performance measurement using advanced dashboards and predictive analytics will allow for continuous refinement and optimization of strategies. Finally, aligning hyper-personalized marketing efforts with sustainability objectives can help organizations not only achieve business goals but also contribute to broader societal and environmental outcomes.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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