

Identification of Indicators for Personalized Marketing with an Artificial Intelligence Approach in the Fourth Industrial Revolution

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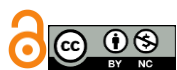
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ABSTRACT

Objective: This study aims to explore the role of artificial intelligence (AI) in personalized marketing within the context of the Fourth Industrial Revolution.

Methodology: A qualitative research design was employed to gather in-depth insights from 11 professionals with expertise in marketing, AI, and the Fourth Industrial Revolution. Semi-structured interviews were conducted to explore participants' perspectives on AI-driven personalized marketing. Thematic analysis was used to identify key patterns and themes related to AI's role in enhancing customer interactions, data management, and marketing effectiveness.

Findings: The study revealed several key themes: (1) the critical importance of data management and real-time analytics in enabling AI-driven personalization, (2) AI's transformative impact on customer experience through personalized content, recommendation systems, and real-time interactions, (3) the role of AI in improving customer engagement and retention through targeted, relevant marketing messages, and (4) ethical concerns regarding data privacy and the transparent use of customer data in AI applications. AI was found to significantly enhance customer experiences, but ethical challenges must be addressed to ensure trust and loyalty.

Conclusion: AI-driven personalized marketing holds substantial promise for improving customer engagement and satisfaction. However, businesses must balance the benefits of personalization with ethical considerations, ensuring transparency in data usage and maintaining consumer trust. Future research should explore the long-term impact of AI on customer loyalty, consumer perceptions, and regulatory frameworks to guide ethical AI implementation in marketing.

Keywords: Artificial Intelligence, Personalized Marketing, Customer Experience, Data Management, Consumer Behavior, Ethical Considerations, Fourth Industrial Revolution, Marketing Strategies, AI in Marketing.

1 Introduction

The Fourth Industrial Revolution (4IR) has heralded profound transformations in the way businesses engage with customers, particularly through the integration of advanced technologies such as artificial intelligence (AI). Among the most significant changes brought by AI is its ability to personalize customer experiences, an area that has gained increasing attention in marketing literature (Behera, 2024). Personalized marketing involves tailoring products, services, and communication strategies to individual customers based on data analytics, predictive models, and AI-driven insights. This practice, facilitated by the wealth of consumer data available in today's digital ecosystem, has become a core competitive strategy for businesses across sectors, ranging from banking to retail, tourism, and hospitality (Bhuiyan, 2024; Ghesh, 2023). AI-powered personalization is no longer a luxury, but rather an expectation from consumers who seek unique, efficient, and relevant interactions with brands (Ghosh, 2024).

AI enables marketers to analyze vast datasets in real time, segmenting customers based on behaviors, preferences, and purchasing histories. This allows for hyper-targeted marketing campaigns that can reach the right audience with the right message at the right time (Kim, 2023). In this context, AI has been applied in various forms, such as chatbots, recommendation systems, predictive analytics, and voice assistants, all of which play a crucial role in shaping customer experiences (Loureiro et al., 2023). For instance, AI-enhanced chatbots are increasingly being used in customer service to provide personalized, real-time assistance (Ghosh, 2024; Lopez, 2024), and in the retail sector, AI systems optimize recommendations by learning from past consumer interactions and behaviors (Blümel, 2023). This shift towards AI-enabled marketing strategies is pivotal for businesses aiming to foster customer loyalty and enhance satisfaction (Sardesai, 2024).

Personalized marketing, however, is not without challenges. One major issue is the complexity of ensuring that AI systems are not only effective but also ethical, transparent, and aligned with customer preferences. Research indicates that while consumers appreciate personalized experiences, they are also wary of privacy violations and data misuse (Almuraqab, 2024; Tula, 2024). This tension between personalization and privacy has sparked debates regarding the ethical implications of AI in marketing, especially as it pertains to the use of personal data without explicit consent (Idian et al., 2023). Furthermore,

there is a need for businesses to balance AI's efficiency with the human touch, as over-reliance on automated systems can sometimes lead to a loss of emotional connection with consumers (Blümel, 2023).

The increasing adoption of AI in marketing is reshaping not only the customer experience but also the broader business landscape. In sectors such as banking, the use of AI-driven solutions has led to more customized financial products and services, helping to strengthen consumer trust and satisfaction (Ho & Chow, 2023). Similarly, in the tourism industry, AI applications such as virtual concierges and personalized itineraries have enhanced service offerings and contributed to customer loyalty (Khana, 2023). In the context of the retail industry, AI systems assist in predictive analytics, customer segmentation, and inventory management, which in turn improve operational efficiencies and customer engagement (Nair, 2024).

The implications of AI-driven personalized marketing extend beyond business performance. AI's role in creating more inclusive and personalized experiences also raises significant questions about its potential to influence consumer behavior and decision-making. Studies have shown that AI-enabled systems can not only predict customer needs but also influence purchase decisions by presenting tailored recommendations and content (Yang, 2023). The impact of these technologies on consumer decision-making is profound, as AI helps brands deliver exactly what customers are looking for, sometimes before they even realize it themselves (James, 2024). This ability to anticipate consumer needs and preferences has made AI a central tool in the evolution of consumer engagement strategies (Liu, 2024).

Despite the advances in AI technologies, there remains a gap in understanding how these innovations can be effectively integrated into personalized marketing strategies to maximize their impact. The existing body of literature highlights several challenges and gaps, particularly in terms of measuring the effectiveness of AI-driven personalization (Ekechi, 2024). Most studies have focused on the technological aspects of AI, with limited attention given to the practical implications of its application in marketing and consumer behavior (Behera, 2024). This study aims to bridge this gap by investigating the key indicators of AI-powered personalized marketing and their impact on customer engagement, satisfaction, and brand loyalty.

The purpose of this research is to identify and validate the key components of personalized marketing strategies

enhanced by AI in the context of the Fourth Industrial Revolution.

2 Methods and Materials

This study employs a qualitative research approach to explore phenomena in natural settings and aims to gain an in-depth understanding of individuals' experiences, perspectives, and emotions. The qualitative approach is particularly suited for investigating how users interact with artificial intelligence-based personalized marketing models and how these models influence consumer behavior. The target population for this study includes professionals and experts in the fields of marketing and artificial intelligence, who possess practical knowledge and experience related to the Fourth Industrial Revolution and personalized marketing. These individuals include senior marketing managers, academic researchers, business consultants, and artificial intelligence experts working in technology companies and advanced industries. Participants are selected through purposive sampling, which ensures that individuals with relevant experience and expertise are chosen to provide valuable insights. Additionally, snowball sampling is employed to identify and interview more key individuals, whereby initial participants are asked to recommend other knowledgeable experts. Data collection continues until theoretical saturation is reached, meaning that no new insights emerge, and data redundancy is achieved.

The primary data collection tool in this study is semi-structured interviews. This interview format allows the researcher to ask open-ended and flexible questions, thereby facilitating a deeper and broader exploration of participants' views and experiences. It also enables the researcher to address emerging topics that may arise during the interview. The interview questions are designed based on the theoretical background and a review of the literature, ensuring that they capture relevant perspectives on personalized marketing using artificial intelligence. The open-ended nature of the questions fosters the collection of

rich qualitative data, offering insights into the participants' understanding of AI-driven personalized marketing models and their impact on consumer behavior.

The qualitative data collected through the interviews are analyzed using thematic analysis. In this method, the data is first subjected to open coding, where key concepts and patterns are identified and categorized. These initial codes are then grouped into themes and sub-themes that provide a coherent representation of the data. Thematic analysis helps the researcher identify key patterns and themes related to the personalized marketing model, ultimately contributing to the development of a conceptual framework for this model based on the findings. This analytical approach enables the researcher to gain a deeper understanding of the underlying factors influencing the effectiveness and challenges of AI-based personalized marketing in the context of the Fourth Industrial Revolution.

3 Findings and Results

The study involved 11 participants, all of whom were professionals with significant expertise in the fields of marketing and artificial intelligence. The participants included senior marketing managers (n=4), academic researchers specializing in AI (n=3), business consultants (n=2), and AI specialists from technology companies (n=2). The majority of participants (n=8) had over five years of experience in their respective fields, ensuring a high level of practical knowledge in AI-driven personalized marketing. Gender distribution was relatively balanced, with 6 male and 5 female participants. The participants were aged between 30 and 55 years, with the average age being 42. In terms of educational background, all participants held at least a bachelor's degree, with the majority having a master's degree or higher (n=9). The varied demographic composition of the participants ensured a broad range of perspectives on the subject of AI in personalized marketing, contributing to the richness of the qualitative data gathered.

Table 1

Identification of Main, Sub-, and Basic Themes (Extracted Concepts) for AI-Based Personalized Marketing

Organizer Themes (Level 1)	Organizer Themes (Level 2)	Basic Themes
Customer Interaction Management	Marketing Strategies and Design	Marketing strategies, designing marketing strategies, personalized marketing, targeted advertising, content optimization, brand awareness increase
	Customer Experience and Communication Management	Customer experience management, personalized interactions, real-time automated interactions, effective customer communication, increased customer satisfaction, enhanced brand communication, stronger brand-customer relationships

Customer Behavior Analysis	Data Management and Analysis	AI-based data management, monitoring and continuous improvement of customer interactions, process complexity
	Organizational Culture and Efficiency	Organizational culture, increased ROI, stronger brand-customer relationships, increased customer satisfaction
	Data Analysis and Prediction	Predicting customer behavior, customer data analysis, big data analytics, predictive analytics, advanced data analytics, simulating user behavior
	Algorithms and Analytical Techniques	Clustering algorithms, decision trees, neural networks, advanced data analytics, predictive analytics
Customer Experience	Customer Behavior Patterns	Identifying customer behavior patterns, analyzing customer behavior, customer journey analysis, sentiment analysis
	Personalized Experience	Personalizing customer experiences, more accurate product recommendations, personalized and relevant advertising content, optimized customer experiences, personalized experiences on websites and apps, personalized services and products, social personalization
	Improvement and Enhancement of Customer Experience	Improving customer experience, elevating service levels, creating unique marketing experiences, customized experiences, positive customer interactions
	Interactions and Communications	Customer experiences and interactions, smart interactions, positive interactions, creating unique marketing experiences
Artificial Intelligence	User Experience and Technology	User experience, personalized experiences on websites and apps, optimizing customer experience
	Models and Algorithms	Advanced algorithms, predictive models, AI models, machine learning algorithms, reinforcement learning, continuous learning, deep neural networks, advertising optimization algorithms, complex algorithms
	Data Processing and Analysis Technologies	Data mining, big data processing, fast and accurate data processing, advanced data analysis, natural language processing, machine vision
	AI and Digital Technologies	Digital technologies, AI technologies, intelligent chatbots, simulating user behavior, Internet of Things (IoT), personalized marketing technologies
	Insights and Advanced Analytics	Deeper insights into customer needs and preferences, machine vision, advanced data analysis

The findings from the interviews revealed several key themes, which were organized into four main categories: Customer Interaction Management, Customer Behavior Analysis, Customer Experience, and Artificial Intelligence. Each of these themes was further divided into subcategories that reflect specific aspects of personalized marketing driven by artificial intelligence.

3.1 Customer Interaction Management

Within the theme of Customer Interaction Management, several subcategories emerged, including marketing strategies and design, customer experience management, and data management. Respondents emphasized the critical role of AI in refining marketing strategies, specifically in targeting and optimizing advertisements. One participant, a senior marketing manager, stated: "AI has transformed the way we design our marketing campaigns. The ability to target customers with precision, based on their preferences and behavior, is invaluable. It's not just about reaching more people, but reaching the right people." The importance of personalized content and messaging was highlighted, with participants agreeing that tailored strategies increase brand awareness and engagement.

Customer experience management also emerged as a major focus, with respondents describing how AI-driven tools enable personalized interactions with customers in

real-time. A business consultant noted: "The ability to automate responses while still maintaining a personal touch has improved our customer satisfaction rates significantly. AI doesn't just respond; it understands, which helps in creating a more loyal customer base." Additionally, AI's role in managing customer data was discussed extensively. Interviewees mentioned the complexities involved in handling large datasets but noted that AI tools greatly streamline data management, facilitating continuous optimization of customer interactions. According to one AI expert: "With AI, we can monitor every touchpoint with a customer and adapt our approach immediately, which is something that was impossible with traditional methods."

3.2 Customer Behavior Analysis

The theme of Customer Behavior Analysis encompassed data analysis and prediction, algorithms and analytic techniques, and consumer behavior patterns. Respondents stressed the importance of predictive analytics in understanding customer behavior. A researcher specializing in AI remarked: "We can now anticipate what customers want before they even know it themselves. AI's ability to predict behavior based on vast amounts of data has revolutionized how we approach personalization." The ability to process and analyze big data was considered essential in this process, enabling companies to gain deeper

insights into consumer preferences and make data-driven decisions that enhance marketing outcomes.

Algorithms and analytic techniques were also a key focus, with many respondents highlighting the importance of machine learning models, such as clustering, decision trees, and neural networks. A participant from a technology company shared: "Algorithms like decision trees and neural networks help us understand customer segmentation in a way that was previously unimaginable. It's not just about demographics anymore; it's about behaviors, needs, and intents." These advanced algorithms were seen as crucial in detecting customer behavior patterns, which can be leveraged for more precise marketing efforts. Another interviewee explained: "We use AI to track the customer journey, from the first interaction to purchase, and this data gives us the power to anticipate what comes next."

3.3 Customer Experience

The subcategory of Personalized Customer Experience was a dominant theme, with respondents emphasizing how AI enhances the customer journey through tailored recommendations and targeted content. A senior marketing director shared: "Personalized experiences are no longer a luxury; they are expected. AI helps us deliver hyper-targeted content and recommendations that resonate with individual customers, making them feel understood and valued." This personalization was not only restricted to product recommendations but also extended to tailored advertising, improving customer engagement and satisfaction.

Respondents also highlighted how AI contributes to improving and elevating the overall customer experience by offering customized services and support. A consultant in customer experience noted: "AI has enabled us to create unique, memorable experiences for each customer, whether it's through personalized service or customized marketing messages. Customers remember these experiences, and that drives loyalty." Many also pointed out that AI's ability to optimize user experience on digital platforms, such as websites and mobile apps, results in smoother and more engaging interactions. As one participant in digital marketing explained: "When a customer lands on a website, AI can personalize their journey in real-time—whether it's showing the right products or providing tailored content—this makes the experience feel more seamless and relevant."

3.4 Artificial Intelligence

Finally, the theme of Artificial Intelligence focused on the advanced models, algorithms, and technologies that underpin AI-driven personalized marketing. Participants emphasized the increasing sophistication of AI tools, such as machine learning, reinforcement learning, and deep neural networks. One AI specialist remarked: "We are using deep learning models to understand complex customer behaviors and preferences. These models are capable of learning continuously, adapting to new data and evolving customer needs." The ability of AI to analyze and process large amounts of data in real-time was considered one of its most powerful features, with interviewees praising the speed and accuracy of these technologies.

Participants also noted how AI technologies are used for data mining, big data processing, and natural language processing (NLP) to extract insights that drive personalized marketing. An AI researcher shared: "Natural language processing is essential for understanding customer feedback, sentiment, and even emotions. It allows us to fine-tune our marketing messages and improve how we engage with customers." Additionally, the role of digital technologies like smart chatbots and the Internet of Things (IoT) in enhancing personalization was highlighted. One participant from a technology firm explained: "AI-powered chatbots provide customers with personalized support 24/7. These bots can not only answer queries but also make personalized recommendations, which enhances the overall service experience."

4 Discussion and Conclusion

The findings of this study highlight several key themes and insights related to AI-powered personalized marketing, particularly within the context of the Fourth Industrial Revolution. The data analysis identified significant patterns that elucidate the role of AI in transforming customer experiences, shaping marketing strategies, and influencing consumer behavior. These findings, derived from interviews with professionals in marketing and AI, provide important implications for both theory and practice in the field of personalized marketing. This section discusses the results in light of previous studies, drawing connections between the findings of this study and existing literature to deepen the understanding of AI's impact on personalized marketing.

One of the primary themes identified in this study was the importance of data management and analysis in AI-powered personalized marketing. Participants emphasized the need

for accurate, real-time data collection and processing to effectively personalize marketing messages and offers. This is in line with the findings of Ghosh (2024) and Bhuiyan (2024), who argue that AI-driven marketing systems rely on sophisticated data analytics to segment consumers and predict their preferences (Bhuiyan, 2024; Ghosh, 2024). Data-driven insights allow companies to tailor their communication strategies, optimize content delivery, and improve customer targeting. This personalized approach, enabled by AI, not only enhances customer satisfaction but also boosts customer loyalty and brand trust, as consumers are more likely to engage with brands that offer relevant and timely interactions (Almuraqab, 2024; Kim, 2023).

In addition to the significance of data management, the study also revealed that AI's role in enhancing customer experience was a central theme. Participants highlighted the transformative effect of AI technologies such as chatbots, recommendation systems, and predictive analytics in creating personalized interactions. AI-enabled customer service tools were seen as critical for improving the efficiency and effectiveness of customer support, providing instant, personalized assistance at any time (Ekechi, 2024). This finding aligns with the work of Blümel (2023), who notes that AI allows businesses to deliver a more personalized touch in digital customer interactions. AI chatbots, in particular, were described as valuable tools for building relationships with customers by offering personalized recommendations based on customer data and past interactions. In this regard, AI plays a pivotal role in creating a seamless, customized experience that meets the unique needs and preferences of each consumer (Ghosh, 2024).

Furthermore, the study uncovered the critical role of AI in improving customer engagement through personalization of content. Participants emphasized the potential of AI in optimizing marketing strategies by delivering personalized advertisements and promotions based on individual customer profiles. This finding is supported by Behera (2024), who asserts that AI-driven personalization is essential for creating targeted marketing campaigns that resonate with consumers (Behera, 2024). AI's ability to predict customer behavior and preferences allows marketers to craft highly relevant offers, resulting in increased engagement, conversions, and customer retention. As consumers increasingly demand more personalized experiences, AI enables businesses to meet these expectations by leveraging machine learning algorithms to

optimize marketing messages and recommendations (Tula, 2024).

The findings also revealed that businesses face challenges in ensuring the ethical use of AI in personalized marketing. While AI offers significant benefits in terms of efficiency and effectiveness, participants raised concerns about the potential for data misuse and privacy violations. Many respondents indicated that customers are becoming more wary of how their personal data is being used, especially in light of increasing awareness of data privacy issues. This concern is consistent with the findings of Ekechi (2024), who highlights the tension between personalization and privacy, suggesting that businesses must find a balance between utilizing customer data for personalized marketing and respecting consumer privacy preferences (Ekechi, 2024). Similarly, the ethical considerations surrounding AI-driven personalization are discussed by Blümel (2023), who calls for greater transparency and consumer consent in the use of AI technologies (Blümel, 2023). The findings of this study underscore the importance of addressing these ethical concerns to maintain consumer trust and avoid potential backlash.

Another key theme that emerged was the significance of AI in facilitating customer journey mapping and enhancing customer relationship management. Participants discussed how AI can map out the entire customer journey by analyzing touchpoints and interactions across multiple channels. This process, known as omnichannel marketing, was seen as a critical component of AI-driven personalized marketing strategies. As noted by Ghosh (2024), AI enables businesses to track and analyze customer behavior across various platforms, creating a comprehensive view of the customer journey (Ghosh, 2024). This allows for the delivery of consistent, personalized experiences that are tailored to the specific needs of each customer at different stages of their journey. This omnichannel approach, supported by AI, helps businesses create a unified, personalized experience that fosters deeper connections with customers and enhances overall satisfaction (Liu-Thompkins et al., 2022; Liu, 2024; Yang, 2023).

The role of AI in shaping consumer preferences and behavior was also a significant finding in this study. AI-powered systems not only respond to customer needs but also influence consumer decisions by providing personalized product recommendations, content, and promotions. This aligns with the work of Kim (2023), who suggests that AI has the potential to shape consumer decision-making by presenting tailored options that resonate

with individual preferences. As AI continues to evolve, its ability to predict and influence consumer behavior will likely become even more pronounced, making it a powerful tool for businesses seeking to drive engagement and conversions. The findings of this study reinforce the idea that AI not only enhances customer experiences but also plays a crucial role in shaping consumer behavior in ways that traditional marketing methods cannot achieve.

While this study provides valuable insights into AI-powered personalized marketing, it is not without limitations. One of the primary limitations of this research is its reliance on qualitative data gathered through semi-structured interviews with a relatively small sample of 11 participants. Although these participants were experts in their fields, the small sample size may limit the generalizability of the findings. A larger and more diverse sample, including practitioners from different industries and geographical regions, could provide a more comprehensive understanding of AI's impact on personalized marketing. Additionally, the focus on experts in marketing and AI may introduce a bias, as their views may differ from those of end consumers or other stakeholders involved in the marketing process.

Another limitation of the study is the potential for interviewer bias in the data collection process. While efforts were made to ensure consistency and neutrality in the interviews, the subjective nature of qualitative research means that the interpretation of responses could be influenced by the researcher's own perspectives and assumptions. Future research could mitigate this limitation by employing multiple researchers for data collection and analysis, ensuring a more balanced and objective interpretation of the findings.

Lastly, this study primarily focused on the positive aspects of AI-powered personalized marketing, such as its potential to improve customer experiences and drive engagement. However, there are also potential drawbacks and challenges associated with the adoption of AI in marketing, including issues related to privacy, data security, and the depersonalization of customer interactions. Future research could explore these challenges in more depth to provide a more balanced perspective on the impact of AI in marketing.

Given the evolving nature of AI technologies and their applications in marketing, there are numerous opportunities for future research in this area. One potential avenue for further investigation is the examination of consumer perceptions of AI-powered personalized marketing. While

this study focused on the perspectives of industry experts, it would be valuable to explore how end consumers perceive and respond to AI-driven personalization. Understanding consumer attitudes towards AI in marketing, including their concerns about privacy and data security, could provide important insights for businesses seeking to adopt AI technologies while maintaining consumer trust.

Additionally, future research could investigate the long-term impact of AI-powered personalized marketing on customer loyalty and brand equity. While this study highlighted the immediate benefits of AI in terms of engagement and satisfaction, it remains unclear whether these effects are sustained over time. Longitudinal studies examining the relationship between AI-driven personalization and customer loyalty would provide a deeper understanding of the long-term benefits and challenges of AI in marketing.

Another promising area for future research is the exploration of the ethical implications of AI in personalized marketing. As AI technologies become more pervasive, businesses will need to navigate complex ethical issues related to data privacy, transparency, and consumer consent. Future research could examine best practices for ensuring the ethical use of AI in marketing, as well as the potential regulatory frameworks that could be implemented to safeguard consumer rights.

For businesses seeking to implement AI-driven personalized marketing strategies, several practical recommendations can be drawn from the findings of this study. First, companies should focus on ensuring that they have access to high-quality, real-time data to support AI-driven personalization. Investing in robust data management systems and analytics tools is essential for businesses to gain actionable insights and deliver personalized experiences that resonate with consumers. Additionally, businesses should prioritize transparency and consumer consent when collecting and using customer data for AI-powered personalization. Ensuring that customers are informed about how their data is being used and providing them with the option to opt-out can help maintain trust and avoid potential privacy concerns.

Second, businesses should aim to strike a balance between AI automation and the human touch in customer interactions. While AI can enhance the efficiency of customer service and provide personalized recommendations, human empathy and understanding are still critical for building strong customer relationships. A hybrid approach that combines the strengths of AI with

personalized human interactions can help businesses create more meaningful and lasting connections with their customers.

Lastly, businesses should continuously monitor and evaluate the effectiveness of their AI-driven personalized marketing strategies. AI technologies are constantly evolving, and businesses must remain agile to adapt to new advancements and changing consumer expectations. Regular assessments of marketing campaigns, customer feedback, and business outcomes will help ensure that AI-powered personalization remains relevant and impactful in the long term.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

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

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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