© MAR 2026 | IRE Journals | Volume 9 Issue 9 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I9-1714783

Exploring the Impact of AI-Powered Personalisation on Customer Loyalty at a Large Nigerian E-Commerce Organisation

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Abstract- ***The rapid evolution of e-commerce, driven by technological advancements, has fundamentally transformed how consumers interact with online platforms. Central to this transformation is the integration of Artificial Intelligence (AI) in personalising user experiences. This study investigates the challenges faced by a large e-commerce organisation in Nigeria in implementing AI-powered personalisation strategies on its website and examines the impact of these strategies on customer loyalty. An empirical and quantitative research methodology was adopted, underpinned by the Commitment-Trust Theory, with data collected via structured questionnaires distributed to 80 employees, of which 53 responded. The findings reveal that AI-based personalisation systems are more effective than traditional e-commerce recommender systems, as they provide highly accurate and relevant recommendations by leveraging complex algorithms and real-time data analysis, significantly enhancing customer experience and satisfaction. The study identifies key challenges to implementing AI-driven personalisation, including data privacy concerns (77% of respondents), algorithmic biases (70%), and technical infrastructure limitations (66%). Regression analysis confirms a statistically significant positive relationship between AI-based personalisation and customer loyalty (P-value = 0.000869). Recommendations include enhancing data privacy measures, mitigating algorithmic biases, and investing in robust technical infrastructure. The study concludes that effectively leveraging AI-driven personalisation is crucial for maintaining a competitive edge and achieving long-term success in the dynamic e-commerce landscape.***

Index Terms- ***Artificial Intelligence, Customer Loyalty, E-Commerce, Machine Learning, Personalisation***

I. INTRODUCTION

In recent years, e-commerce operations in the retail industry have undergone a profound transformation, largely driven by advancements in technology, with applications ranging from automated checkout processes to personalised product recommendations [1], [2]. Technology has revolutionised the way consumers interact with online platforms [3]. At the forefront of this digital revolution is the integration of artificial intelligence (AI) into e-commerce systems, particularly in the area of personalisation [1].

AI-based personalisation systems have become very significant in the e-commerce space [4]. These systems leverage algorithms to tailor shopping experiences to customer preferences and behaviours [5]. Common AI-based personalisation systems include collaborative filtering, content-based filtering, and hybrid approaches, each offering unique advantages over traditional e-commerce recommender systems [3]. Singh and Adhikari [6] aver that there are many advantages of AI-based personalisation systems over their traditional counterparts, including more accurate and relevant recommendations for customers, which increase customer engagement, higher conversion rates, and ultimately, greater revenue for retailers [4].

Despite the significant strides made in AI-driven personalisation in e-commerce, challenges and limitations persist [7]. While much attention has been paid to the benefits of AI-powered personalisation, the potential pitfalls and drawbacks have not been fully explored [1], [7]. Understanding the impact of AI-based personalisation on customer loyalty is of paramount importance, as customer loyalty is a key determinant of long-term success in the highly competitive e-commerce market, and personalised experiences play a crucial role in fostering customer engagement and retention [8].

This study sets out to investigate the challenges faced by a large-scale e-commerce organisation in Nigeria in implementing and leveraging AI-powered personalisation strategies on its website, and to examine the impact of these strategies on customer loyalty. The specific objectives include: (1) critically reviewing the concept of AI-based personalisation systems and their components; (2) evaluating the advantages of AI-based personalisation over traditional e-commerce recommender systems; (3) identifying the technical, operational, and customer-related challenges and limitations; (4) assessing the impact of AI-based personalisation on customer loyalty; and (5) synthesising findings to provide actionable recommendations.

II. LITERATURE REVIEW

A. Definition and Scope of AI-Powered Personalisation

AI-powered personalisation refers to the usage of artificial intelligence technologies to tailor experiences, products, and services to individual users, based on their preferences, behaviours, and interactions [9]. Personalisation involves collecting and analysing vast amounts of data from various touchpoints, such as browsing history, purchase patterns, and social media activity [10]. This data is processed using sophisticated algorithms to create unique profiles for each user. The essence of AI-powered personalisation lies in its ability to predict and anticipate users' needs with a high degree of accuracy, making each interaction more meaningful and engaging [11], [10].

Key components include machine learning algorithms, data analytics, and natural language processing (NLP) [12]. Machine learning algorithms are at the heart of personalisation, enabling systems to learn from user data and improve recommendations over time. Data analytics plays a crucial role in processing and interpreting the vast amounts of information generated by user interactions, transforming raw data into actionable insights [11], [10]. NLP enhances personalisation by allowing systems to understand and respond to user queries in natural language [9].

B. Traditional vs. AI-Based Personalisation Systems

Traditional e-commerce personalisation methods typically involve rule-based systems that rely on predefined criteria to suggest products and services to customers, using basic demographic data such as age and gender, or historical purchase information [13]. In contrast, AI-based personalisation systems utilise advanced algorithms and machine learning to analyse vast amounts of real-time data [14]. The key difference lies in the sophistication and adaptability of AI-based systems, which can continuously learn and evolve, offering a level of personalisation that traditional methods cannot match [13], [14].

Traditional methods offer simplicity and ease of implementation, making them accessible for businesses with limited technological resources, but their main disadvantage is the lack of depth and adaptability [15], [16]. AI-based personalisation systems provide highly accurate and relevant recommendations by leveraging complex algorithms and real-time data analysis, significantly enhancing customer experience and leading to increased loyalty and higher conversion rates [17]. However, AI systems also present challenges, including high implementation costs, extensive data management requirements, and potential privacy concerns, though privacy concerns are increasingly mitigated with GDPR regulations [18].

C. Challenges and Limitations of AI-Driven Personalisation

One of the primary technical challenges is algorithmic bias, which occurs when the data used to train AI models reflect existing biases, leading to unfair or discriminatory outcomes [11], [19]. Data privacy issues also pose a significant concern, as AI systems require vast amounts of personal data to function effectively [11], [19]. While user consent can address this [19], others highlight the difficulty of ensuring truly informed consent in the digital age [15]. Measures are now being taken by ensuring compliance with privacy regulations such as GDPR [18].

D. AI-Powered Personalisation and Customer Loyalty

Empirical research consistently indicates a positive impact on customer loyalty. Studies show that AI-driven personalisation enhances customer loyalty by providing tailored experiences that meet individual preferences, resulting in higher customer satisfaction and repeat purchases [20]. Companies using AI personalisation see a 20% increase in customer engagement and a 10–15% improvement in conversion rates [21]. Research indicates that 80% of consumers are more likely to make a purchase when brands offer personalised interactions [22].

Studies indicate that younger consumers, particularly millennials and Gen Z, respond more positively to AI personalisation compared to older demographics [23], [24]. However, the effectiveness of AI personalisation can be influenced by cultural factors, suggesting that a one-size-fits-all approach may not be optimal [24]. While short-term benefits are well-documented, the long-term effectiveness depends on sustained relevance and novelty [17], [25].

E. Theoretical Framework: Commitment-Trust Theory

This study builds on the Commitment-Trust Theory, formulated by Morgan and Hunt in 1994 [26]. The theory posits that two fundamental factors—commitment and trust—are essential for fostering successful relationships [27]. In the context of customer loyalty, commitment implies a customer's enduring desire to maintain a valued relationship with a brand, while trust refers to the confidence that the brand will act in the customer's best interests [26], [27], [28]. By leveraging commitment and trust, e-commerce businesses can enhance customer retention, increase repeat purchases, and build long-term loyalty.

While the theory provides a strong foundation, critics argue that other factors, such as emotional attachment, convenience, and situational factors, also play significant roles in shaping customer loyalty [29]. Proponents counter that trust and commitment are foundational elements that underpin other relational dynamics [26], [30].

III. METHODOLOGY

The study employed an empirical and quantitative research methodology, as this approach allowed for the systematic collection and analysis of numerical data to make objective conclusions about the impact of AI-powered personalisation on customer loyalty [31]. A deductive approach was employed, wherein existing theories, specifically the Commitment-Trust Theory, guided the formulation of hypotheses that were subsequently tested using collected data [32].

Primary data was collected using structured questionnaires designed on Qualtrics, employing a combination of closed-ended questions and a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" to measure customer loyalty towards AI-powered personalisation features. The Trust-Commitment-Loyalty Scale was utilised to measure customer loyalty across three critical dimensions: Trust, Commitment, and Loyalty [33], [34].

The purposive sampling method was adopted, specifically targeting employees of a large Nigerian e-commerce organisation (pseudonym: JD). A sample of 80 employees was targeted, with 53 respondents completing the questionnaires. The survey was distributed electronically through Qualtrics between July 14 and July 30, with each session lasting approximately 10–15 minutes. A pilot study was conducted with three respondents to test the questionnaire's clarity.

The collected data was analysed using statistical methods, including descriptive statistics, correlation analysis, and regression analysis. Microsoft Excel was used for data analysis to complement the descriptive analysis capabilities of Qualtrics. Ethics was rigorously maintained through institutional procedures, including informed consent and participant information sheets.

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DOI: https://doi.org/10.64388/IREV9I9-1714783

The null hypothesis tested was: H_0: AI-personalisation does not significantly increase customer loyalty.

III. RESULTS AND FINDINGS

A. Participant Profile

Table I presents the demographic profile of the 53 respondents who completed the questionnaire. The workforce is predominantly young (70% aged 21–30), male (68%), and well-educated (78% holding a Bachelor's degree). The majority occupy mid-level positions (54%), have 1–3 years of employment (52%), and work in the E-Commerce department (56%). This demographic profile is reflective of the e-commerce industry, which tends to attract a younger workforce adept at using digital technologies [20], [23].

TABLE I: Distribution of Participants' Profile

Characteristic	Category	Frequency	Percentage
Age	21–30	37	70%
	31–40	13	25%
	41–50	3	5%
Gender	Male	36	68%
	Female	17	32%
Education Level	Bachelor's Degree	41	78%
	Diploma	7	14%
	Master's Degree	4	8%
Position Level	Mid-Level	29	54%
	Junior-Level	21	40%
	Management	3	6%
Duration of Employment	1–3 years	28	52%
	4–6 years	15	29%
	Less than 1 year	9	17%
	7–10 years	1	2%
Department	E-Commerce	30	56%
	Operations	7	14%
	Supply Chain	5	10%
	Human Resources	4	8%
	Finance	3	5%

B. Evaluation of AI-Based Personalisation System

Survey results indicate that 100% of participants confirmed the implementation of an AI-based personalisation system on the e-commerce website. Table II presents the frequency of system updates as perceived by respondents, showing that 85% perceive updates as frequent or very frequent, suggesting a proactive approach by the company in maintaining their AI systems [35].

TABLE II: Frequency of AI System Updates

Update Frequency	Percentage of Respondents	Cumulative Perception
Very Frequently	22%	
Frequently	63%	85% (Frequent/Very Frequent)
Occasionally	14%	

C. Advantages of AI-Based Personalisation

Table III summarises respondent perceptions of AI system effectiveness, accuracy, and impact on shopping experience. The results demonstrate overwhelmingly positive reception: 87% agree on effectiveness, 88% on accuracy, and 79% on improvement of shopping experience. These findings are consistent with research highlighting the superiority of AI-driven personalisation strategies [16], [13].

TABLE III: Survey Responses on AI-Based Personalisation Effectiveness

Survey Item	Strongly Agree	Agree	Neutral	Disagree/ Strongly Disagree
AI-based system is effective	41%	46%	13%	0%
More accurate than traditional systems	37%	51%	11%	2%
Improved	27%	52%	19%	2%

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overall shopping experience				

Additionally, 83% of respondents consider AI personalisation important for achieving business objectives, with 59% rating it as very important and 24% as extremely important (Table IV). This high level of importance indicates recognition of AI personalisation's strategic value in driving organisational success [37].

TABLE IV: Importance of AI Personalisation in Business Objectives

Importance Rating	Extremely Important	Very Important	Moderately Important
AI personalisation in achieving business objectives	24%	59%	17%

D. Challenges and Limitations

Table V presents the perceived impact of three key challenges on AI-driven personalisation. Data privacy concerns emerged as the most significant barrier, with 77% of respondents indicating moderate to high impact. Algorithmic biases were recognised by 70% as having moderate to very high impact. Technical infrastructure limitations were acknowledged by 66% of respondents as having moderate to high impact [19], [35].

TABLE V: Perceived Impact of Challenges on AI-Driven Personalisation

Challenge	Very High	High	Moderate	Low	Very Low
Data Privacy Concerns	–	29%	48%	21%	3%
Algorithmic Biases	5%	17%	48%	29%	2%
Technical Infrastructure Limitations	2%	22%	44%	21%	11%

E. Impact of AI-Based Personalisation on Customer Loyalty

Table VI presents the correlation analysis between AI personalisation and customer loyalty, showing a positive correlation coefficient of 0.409, which indicates a moderate positive relationship. The regression analysis results in Table VII provide further evidence, with a coefficient of 1.931 for AI personalisation, indicating a significant positive impact on customer loyalty (t-stat = 3.503, P-value = 0.000869). Since the P-value is well below the 0.05 threshold, the null hypothesis is rejected.

TABLE VI: Correlation Analysis – AI Personalisation vs. Customer Loyalty

	AI Personalisation	Customer Loyalty
AI Personalisation	1.000	0.409
Customer Loyalty	0.409	1.000

TABLE VII: Regression Analysis – AI Personalisation and Customer Loyalty

Variable	Coefficient	Standard Error	t-Statistic	P-value
Intercept	–	–	–	–
AI Personalisation	1.931	0.551	3.503	0.000869

The positive coefficient suggests that for each unit increase in AI personalisation, customer loyalty increases by approximately 1.93 units. These findings are consistent with the Commitment-Trust Theory, which posits that building trust through personalised interactions enhances customer loyalty [26]. The significant relationship identified underscores the strategic importance of investing in AI technologies to enhance customer experiences and loyalty.

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V. DISCUSSION

The findings of this study provide substantial evidence supporting the effectiveness of AI-based personalisation in enhancing customer loyalty within the Nigerian e-commerce context. The unanimous confirmation of AI system implementation, coupled with high perceived effectiveness (87%) and accuracy (88%), demonstrates that AI personalisation has become a critical component of modern e-commerce strategy. These findings align with the broader literature suggesting that AI-driven personalisation significantly outperforms traditional recommender systems [13], [14], [16].

The study's identification of data privacy (77%), algorithmic biases (70%), and technical infrastructure limitations (66%) as significant challenges contributes to the growing body of literature on responsible AI deployment. Notably, these challenges are particularly pronounced in the Nigerian context, where regulatory frameworks and technological infrastructure may differ from those in developed markets. This contextual insight addresses a significant gap in existing literature, which has predominantly focused on Western markets [24].

The statistically significant positive relationship between AI personalisation and customer loyalty ($r = 0.409$, $P < 0.001$) validates the application of the Commitment-Trust Theory in the AI-driven e-commerce context. The moderate positive correlation suggests that while AI personalisation is an important driver of customer loyalty, other factors also contribute to customer retention, consistent with critiques of the Commitment-Trust Theory that highlight the roles of emotional attachment, convenience, and situational factors [29], [30].

These findings have important implications for e-commerce organisations operating in emerging markets. The evidence suggests that investing in AI personalisation yields measurable returns in customer loyalty, but this investment must be accompanied by robust strategies for addressing privacy concerns, mitigating biases, and building adequate technical infrastructure.

VI. CONCLUSION

This study has explored the impact of AI-powered personalisation on customer loyalty at a large Nigerian e-commerce organisation. The findings demonstrate that AI-based personalisation systems are more effective than traditional e-commerce recommender systems, providing highly accurate and relevant recommendations that significantly enhance customer experience and satisfaction. However, several challenges, including data privacy concerns, algorithmic biases, and technical infrastructure limitations, hinder the full effectiveness of these systems.

The study confirms a statistically significant positive relationship between AI-based personalisation and customer loyalty, underscoring the strategic importance of AI technologies for e-commerce organisations. Based on these findings, the following recommendations are proposed: (1) e-commerce platforms should prioritise the integration of robust data privacy measures, including advanced encryption methods and transparent data usage policies; (2) continuous monitoring and mitigation of algorithmic biases through diversified training data and regular system audits; (3) investment in robust technical infrastructure to support real-time data processing; and (4) customer education initiatives to build trust and acceptance of AI-driven personalisation.

The study contributes to the literature by providing empirical evidence from the Nigerian e-commerce context, addressing a gap in existing research that has predominantly focused on developed markets. Future research should employ longitudinal studies to examine the long-term effects of AI personalisation on customer behaviour and explore cross-demographic analyses across diverse markets.

ACKNOWLEDGMENT

The author expresses sincere gratitude to supervisor Tom Mitchell for his invaluable mentorship and guidance throughout this research.

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