



The role of Artificial Intelligence in enhancing customer experience in E-Commerce

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Abstract

Background: The application of Artificial Intelligence has revolutionized e-commerce. Such applications enable effective customer service with personalized service to customers and enhance the flow of operations in online businesses. Advances in technologies like machine learning, natural language processing, and predictive analytics have increased the involvement of AI in ecommerce platforms in maximizing customer experience in interactions with companies. This paper discusses how companies use AI for the purpose of improving the experiences of their customers in online purchasing.

Aim: The purpose of this research is to explore the influence of AI technologies on customer experience in e-commerce. It identifies the most commonly used AI tools in e-commerce, assesses their effectiveness in enhancing customer satisfaction, and discusses the challenges that businesses face in adopting AI. Specifically, the study focuses on the role of AI-driven personalization, automation, and customer support features in enhancing user engagement and loyalty. The study discusses the issues with data privacy, technological constraints, and cost involved in implementing AI, but points out the opportunity for more inclusion of AI in e-commerce.

Method: A mixed-method approach was used with the combination of quantitative and qualitative data collection. A survey among 200 e-commerce customers was conducted to evaluate their experiences about AI-powered features, such as personalized recommendations, AI-driven chatbots, and automated customer service systems. Further, interviews were conducted with 20 industry professionals to explore challenges, opportunities, and impacts in adopting AI by the e-commerce sector. Data collected from the survey was subjected to statistical methods in order to analyze customer satisfaction. Interview responses were analyzed by using thematic analysis.

Results: The results reveal that AI-based personalization and automation improve customer experience and interest dramatically. With personalized product advice and efficient chatbots, the shopping experience is much smoother and more relevant, thus bringing more customers back. However, the challenges include issues like data privacy, high implementation costs, and technical barriers to successful AI integration.

Conclusion: This study concludes that AI is indispensable for the development of customer experience in e-commerce, giving companies a chance to enhance customer satisfaction and engagement. Despite the setbacks, AI stands as a transformational tool for e-commerce websites seeking to be personalized and efficient.

Specific Contribution: This paper contributes to understanding how AI technologies improve the customer experience of e-commerce, thus providing action-oriented insights into business strategy looking for implementation and incorporation of AI for better engagement.

Keywords: Artificial intelligence (AI), customer experience, E-commerce, personalization, automation

Introduction

E-commerce transformed consumer interaction and created convenience and accessibility for consumers. Due to competition, companies are resorting to advanced technology to provide endless scope for engagement with clients. In this process, AI has become the primary tool integrating the capabilities of machine learning, NLP, and predictive analytics to provide personalized experiences for customers, along with optimization in operations.

AI applications are going beyond the level of only automation. Personalized recommendations, AI-powered chatbots, and intelligent search engines have revolutionized customer interactions in e-commerce. While they may enhance engagement, they raise difficult challenges concerning data privacy concerns, technological complexity, and high implementation costs. This study, therefore, lays out the ways in which AI can dramatically improve the customer experience in an e-commerce context.

1. AI-Powered Personalization in E-commerce

AI-driven recommendation engines analyze consumer behavior to tailor the shopping experience and increase customer engagement and sales. Companies like Amazon and Netflix are able to leverage AI-driven personalization effectively in order to boost customer retention. Moreover, AI-powered chatbots and virtual assistants enhance the service provided by companies through NLP, delivering real-time, personalized responses. In the course of AI evolution, businesses will be able to perfect these techniques and create an even more immersive, customer-oriented shopping experience.

2. The Role of AI in Customer Support and Automation

AI has improved customer service with chatbots and virtual assistants providing quick answers to reduce wait times and ensure faster services. AI-powered ticketing systems will give customer complaints the utmost priority to ensure a

quicker response time. It will automate the management of supply chain, demand forecast, inventory, and fraud detection for smoother transactions and increasing trust in the minds of customers. All these enhance the e-commerce experience.

3. Research Aim and Objectives

The focus of this paper is on customer experience in the e-commerce area, with personalization, automation, and support from AI technology. It elaborates on the impact of AI on satisfaction and engagement while eliminating the challenges regarding data privacy, technical barriers, and costs associated with it. Therefore, this research aims at the following points

- To analyze the role of AI in personalization, automation, and customer support through the lens of customer satisfaction and engagement.
- To discuss the challenges facing AI adoption in terms of data privacy, costs of implementation, and technical capabilities.

By doing this, the research provides information on how AI can be used to enhance customer experience and helps businesses in their integration of AI.

Literature Review

AI technology has transformed e-commerce with an improved experience of the customer, efficiency, and business growth. The following section reviews AI-driven personalization and customer engagement research, while discussing some of the challenges of adoption.

1. AI-Driven Personalization and Customer Engagement

Arshad (2024) ^[2]: considered the integration of AI into e-commerce and how chatbots, recommendation engines, and sentiment analysis may optimize client delight. AI customer service enhanced response time, and predictive algorithms personalized the buying experience. AI-enabled inventory management also improved in stock percentages, which diminished irritation. The only exceptions are that data privacy and ethics issues continue to act as a hindrance to the prevalent use of AI.

Nakata and Smith (2024) ^[11]: examined how AI could enhance customer journeys through the use of anticipatory shipping, dynamic pricing, and machine learning-based product recommendations. According to the report, AI-driven strategies significantly enhance customer satisfaction and loyalty through data-driven decision-making. In spite of the ethical implications, AI innovation is a source of competitive advantage and long-term customer value.

2. AI's Role in Business Optimization and Challenges

Taoirv, Stefanova, and Aleksandrova (2024) ^[11] analyzed that intelligent assistants, automated delivery, and pricing strategy are some applications of AI in e-commerce. The study had mentioned the effects of AI on customer engagement as well as efficiency in operations but had also given a methodology about implementing AI for increasing company expansion. The analysis resulted in an opinion that AI is a big influencer for e-commerce optimization.

Nguyen (2023) ^[10]: investigated the scope and potential for AI to improve consumer satisfaction and corporate productivity. Surveys and secondary sources have determined that AI boosts engagement and delivers new clients. Therefore, the findings of this research verify the hypothesis as such; the findings reveal that AI changes e-commerce. Companies using AI will benefit in regards to consumer satisfaction and operational effectiveness, as they gain a competitive advantage.

3. Research Gap

The literature review points out the role of AI in making customer experience in e-commerce better through personalization, automation, and customer support. Although the studies by Arshad (2024) and Nakata & Smith (2024) ^[11] show that AI-driven tools increase satisfaction and engagement, they overlook the challenges related to adoption such as data privacy, high costs, and technical barriers. Similar to this, Tairov *et al.* (2024) and Nguyen (2023) ^[10, 11] consider business optimization of AI. However, there is a lack of empirical studies on customer perception and real-world challenges. By incorporating surveys and expert interviews in this study, it bridges this gap. In accordance with the defined goals, it delivers strategic value to enable e-commerce companies to incorporate AI effectively.

Research Methodology

The research takes a mixed-method approach. The quantitative part consists of online surveys, which allow for an estimation of customer satisfaction levels using statistics. In turn, qualitative interviews provide insight into the issues encountered in AI adoption from experts.

1. Research Design

For an assessment of AI-driven personalization, automation, and customer support in e-commerce, both a survey and an interview was done. Such research enables one to have statistics and insights of challenges facing industries from customers themselves.

2. Research Hypothesis

H₀: AI-driven personalization, automation, and customer support show no significant impacts toward customer satisfaction.

H₁: AI-based personalization, automation, and customer service improves the satisfaction of customers remarkably.

3. Data Collection

An experimental survey with e-commerce customers was designed with 200 participants to assess AI-driven features including personalized recommendations, chatbots, and automated customer service systems. In order to measure satisfaction and engagement, the survey contains Likert scale questions. Semi-structured interviews with 20 industry experts explore challenges and opportunities in the adoption of AI. Qualitative thematic analysis was used in order to classify relevant insights in categories.

4. Sampling Strategy

A random sampling was used to draw 200 customers from various demographical backgrounds, thus representing them broadly. The qualitative analysis utilized purposive

sampling to draw 20 industry experts, such as e-commerce business owners, AI developers, and marketing experts.

5. Data Analysis

Descriptive statistics, correlation, and regression analysis were used to analyze the survey data to measure the impact of AI on customer satisfaction. SPSS software was used to test the hypothesis to ensure accuracy. Interview responses were analyzed using thematic analysis to determine common themes on AI adoption, benefits, and challenges.

Results and Discussion

This section provides results from the survey and interviews. The section presents findings that help understand how AI-driven personalization, automation, and

customer support affect the customer satisfaction level of e-commerce sites. This section interprets findings in relation to the objectives and hypothesis of this research.

1. Quantitative Analysis

The data obtained from the structured survey were analyzed using descriptive statistics, correlation and regression analysis, to assess the role of AI in customer satisfaction among 200 respondents.

1.1. Descriptive Statistics

Table 1 shows the means and standard deviations of key variables measured on a Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

Table 1: Descriptive Statistics of Customer Perceptions

Variable	Mean	Std. Deviation	Interpretation
AI Personalization	4.32	0.78	High Satisfaction
AI Chatbots	4.15	0.85	Positive Perception
Automated Support	3.98	0.92	Moderate Satisfaction
Overall AI Effectiveness	4.25	0.80	High Effectiveness
Customer Retention	4.10	0.89	Positive Impact

The results showed that AI-driven personalization was highly appreciated by customers with a mean of 4.32 and standard deviation of 0.78. Similarly, the use of chatbots was highly appreciated by customers with a mean of 4.15 and standard deviation of 0.85. On the other hand, automated support services were moderately satisfied with a mean of 3.98 and standard deviation of 0.92.

To help one visually perceive this effect, figure 1 contains a comparison between the mean scores for customer satisfaction regarding AI-driven features for the above services of AI Personalization, AI Chatbots, and Automated Support, highlighting their understanding about how engaging or effective customers feel AI are in serving customers.

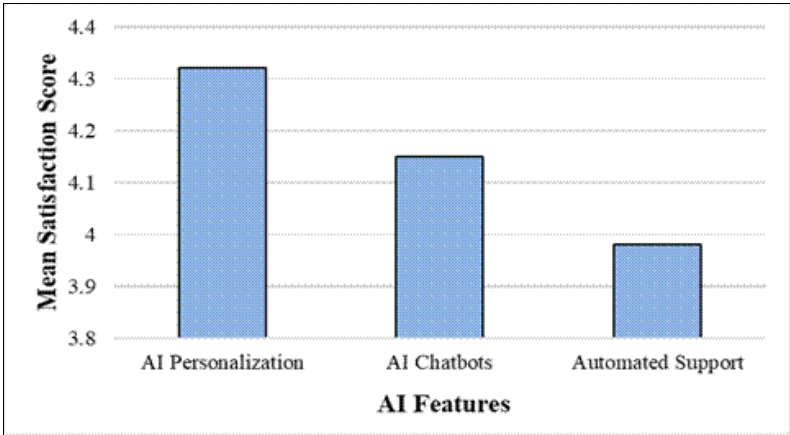


Fig 1: Customer Satisfaction Ratings for AI Features

The analysis of the customer satisfaction levels shows that AI Personalization holds the highest rating, with a mean of M = 4.32, SD = 0.78. This is followed by AI Chatbots (M = 4.15, SD = 0.85) and Automated Support with a mean rating of M = 3.98, SD = 0.92. This means AI-driven personalization is the best-received feature, enhancing engagement and satisfaction with customers. The automated support service, however, received moderate ratings, which

indicate potential areas to be improved within automated customer interaction.

1.2. Correlation Analysis

A Pearson correlation test analyzed the associations of AI-driven personalization with automation, customer service, and global satisfaction from customers.

Table 2: Correlation Analysis

Variable	AI Personalization	AI Chatbots	Automated Support	Customer Satisfaction
AI Personalization	1.00	0.68**	0.61**	0.74**
AI Chatbots	0.68**	1.00	0.57**	0.69**
Automated Support	0.61**	0.57**	1.00	0.64**
Customer Satisfaction	0.74**	0.69**	0.64**	1.00

All features driven by artificial intelligence significantly relate to customer satisfaction, with highest being personalization, $r = 0.74$, with $p < 0.01$. The association analysis between AI-enabled features and

satisfaction was used as a method. Figure 2 depicts the magnitude of correlation from AI Personalization, AI Chatbots, to Automated Support across overall customer satisfaction.

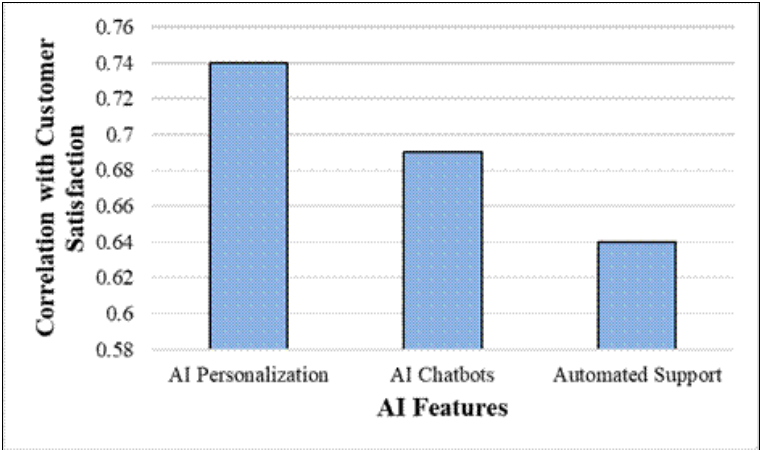


Fig 2: Correlation between AI Features and Customer Satisfaction

The Pearson correlation analysis demonstrates that AI Personalization has the highest correlation with customer satisfaction at $r = 0.74$, $p < 0.01$. In contrast, the second and third most significant features were AI Chatbots at $r = 0.69$, $p < 0.01$ and Automated Support at $r = 0.64$, $p < 0.01$, respectively. It indicates that features of AI are very crucial to increase customer satisfaction, especially in personalization and chatbots. Automated support has a

relatively lower correlation. Improvements in this area can further strengthen the effectiveness of AI in e-commerce.

1.3. Regression Analysis

To test the hypothesis about the influence of AI features on customer satisfaction, a multiple regression analysis was performed.

Table 3: Regression Analysis Summary

Predictor	Beta (β)	t-value	p-value	Significance
AI Personalization	0.45	6.12	<0.001	Significant
AI Chatbots	0.33	5.01	<0.001	Significant
Automated Support	0.28	4.65	<0.001	Significant
R² = 0.68	F (3, 196) = 45.87	p < 0.001		

With $R^2 = 0.68$, the model captures 68% of the explained variance in the customer satisfaction measurement, thus vindicating our hypothesis that the AI-driven feature does enhance customer experience. $p < 0.05$ is obtained for all variables, therefore we reject H_0 and take H_1 - AI-driven feature does enhance the customer

satisfaction levels.

2. Qualitative Analysis

Deeper insights on the challenges and opportunities of adopting AI were further ascertained from interviews conducted with 20 industry professionals.

Table 4: Summary of Themes from Interviews

Theme	Frequency of Mention	Key Insights
Data Privacy Concerns	15/20	Customer not willing to share data; needs stronger privacy policy.
High Implementation Costs	14/20	Expensive to adopt AI; small-scale enterprises can't afford.
Customer Engagement Benefits	18/20	AI enhances customer engagement through experience-based personalization and 24/7 support.
Technological Barriers	12/20	Lack of skilled workforce and integration issues is a hindrance to efficiency of AI.

3. Summary of Key Findings

The results validate that AI-driven personalization, automation, and customer support have an impressive effect on customer satisfaction in e-commerce. Descriptive statistics show very high satisfaction with AI personalization ($M = 4.32$) and with chatbots ($M = 4.15$), but still show moderate levels for automated support ($M = 3.98$). Correlation analysis validates strong positive relationships between features of AI and customer satisfaction, especially personalization ($r = 0.74$). Regression analysis ($R^2 = 0.68$, $p < 0.001$) supports the fact

that AI is indeed having a positive effect; therefore, H_0 is rejected.

4. Impact of AI on Customer Satisfaction

Based on key findings, specific areas of AI integration significantly add value to enhancing customer satisfaction:

- AI Personalization: Customers feel a great affinity towards AI-based recommendations, where there has been a marked upsurge in engagement and intention to buy.

- **AI Chatbots:** The technology enhances response speed, which positively contributes to customer experience in an unobtrusive manner.
- **Automated Support:** Although the customers appreciate it, the automated support system shows some areas to be improved, thereby meeting customers' expectations in a better manner.

5. Challenges in AI Adoption

Despite these successful outcomes, various issues with AI technology adoption have been realized during interviews with professionals in the sector. The challenges are therefore highlighted and should be overcome to maximize the incorporation:

- **Data Privacy:** The clients will not readily disclose personal data; therefore, the privacy needs to be much more enhanced.
- **Expensive Implementation:** The small businesses have many economic constraints on how to effectively implement AI-based solutions.
- **Technological Barriers:** The difficulty to implement AI uniformly throughout sectors hindered by the absence of an adequate skilled workforce and integration issues.

6. Implications for Businesses

The study brings to the forefront the urgent necessity for businesses to refine AI automation while keeping personalization at the centre of customer experience. Dealing with the issues of data privacy and affordable AI solutions would allow businesses to leverage the most out of AI technologies, even in resource-scarce settings.

Conclusion and Recommendations

This study emphasizes how AI impacts customer experience in e-commerce. There is evidence from AI-driven personalization, automation, and support technologies that indeed improve customer satisfaction and engagement considerably. Personalization and chatbots have been reported to be of great importance to customers in building retention and ease of shopping experience. However, there are significant challenges such as data privacy issues, high cost of implementation, and technological difficulties. Overcoming these hurdles is crucial for businesses to make the most of AI. Generally, AI is a critical business tool for any e-commerce firm looking to increase customer experience and stay ahead of the curve in this dynamic digital marketplace. In this regard, this research met its objectives since it discussed a number of AI applications in e-commerce and measured their impact on customer experience. Such inputs also helped narrow the gap towards understanding how exactly AI can focus on specific client expectations in this e-commerce stream, providing really useful insights into both practice and research. There are several potential strategies that one could use further to optimize usage of AI on e-commerce activities

- **Data Privacy:** Develop comprehensive data protection policies that ensure transparency, gain the trust of customers, and ensure a safe environment for shopping.
- **Affordable AI:** SMEs must adopt affordable AI options and deploy them gradually without burdening their finances, especially by using cloud-based tools and subscription models.

- **Improving Automated Support Systems:** The AI-driven chatbots and automated support must be improved to ensure efficient service, meet customer expectations, and deal with complex questions.

This way, with these recommendations, e-commerce businesses can strike the optimal benefits of AI, creating a great user experience and thereby maintain sustainability in the digital marketplace

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