



Enhancing Customer Experience in Electronic Commerce: Role of Artificial Intelligence in Personalization and its Ethical Implications

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Abstract: *The rise of artificial intelligence (AI) has transformed electronic commerce (e-commerce), with AI-powered personalization becoming essential for enhancing customer experiences. This paper explores the impact of AI-driven personalization on e-commerce, enhancing customer experience and the ethical implications. Using a mixed-methods approach, data from 78 participants show that personalized recommendations significantly boost shopping efficiency and brand loyalty, with 97.4% of respondents noticing personalization and 56.4% finding it highly useful. However, 51% expressed concerns about data privacy. The findings highlight the need for transparency and strong data protection to maintain consumer trust. In conclusion, the study emphasizes the need for a balanced approach to AI personalization, where e-commerce platforms can leverage AI's benefits while addressing ethical concerns and privacy issues. The research offers valuable insights for both academic and industry professionals seeking to improve customer experience through responsible AI use.*

1. INTRODUCTION

The integration of artificial intelligence (AI) into e-commerce platforms has transformed the shopping experience for consumers. AI-powered systems allow businesses to analyze large amounts of customer data and provide highly personalized recommendations, making the shopping experience more efficient and enjoyable. Recent studies confirm that AI contributes significantly to enhancing customer experience across various stages of the e-commerce journey (Anderson & Johnson, 2024).

Personalization in e-commerce has been shown to improve user engagement and loyalty by offering tailored shopping experiences that align with individual preferences. However, as personalization relies heavily on data collection and analysis, significant ethical concerns regarding privacy and data security have emerged. Consumers are becoming more aware of how their personal data is used, raising concerns about transparency and control over their information. This paper investigates the impact of AI-driven personalization on electronic commerce, focusing on how these advanced systems enhance customer experience and their ethical implications.

2. LITERATURE REVIEW

Artificial intelligence (AI) is significantly reshaping e-commerce by enhancing operational efficiency and digitizing traditional business processes (Bughin et al., 2017). As digitalization accelerates,

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AI plays a crucial role in addressing the varied preferences of online consumers (Gupta et al., 2019). Through data analysis and trend identification, AI facilitates personalized marketing and improves customer satisfaction by anticipating purchasing behavior.

Artificial intelligence (AI) personalization in e-commerce involves tailoring the shopping experience to individual customers based on their preferences, behaviors, and past interactions. By analyzing vast amounts of customer data, AI systems can deliver personalized content, product recommendations, and marketing messages (Nimbalkar & Berad, 2022). This not only increases sales and customer loyalty but also improves the consumer experience. Gupta et al. (2024) emphasize that AI significantly transforms e-commerce by enhancing customer service, enabling advanced personalization techniques, and supporting data-driven marketing strategies.

AI technologies such as machine learning and natural language processing are being used in recommendation engines that predict customer behavior. According to Song et al. (2019), intelligent recommendation systems take personalization a step further by using AI algorithms to suggest products that align with the customer's tastes and preferences. These systems analyze user behavior, purchase history, and browsing patterns to suggest products that customers are likely to buy. Such intelligent recommendation systems, widely adopted by platforms like Amazon and Netflix, use collaborative and content-based filtering to improve accuracy and increase engagement (Kumar et al., 2022; Pallathadka et al., 2023; Song et al., 2019). When e-commerce platforms use data-driven insights to recommend products and services that align with a customer's past behaviors and interests, it creates a more engaging and relevant shopping experience (Khyat & Kumre, 2023).

Collaborative filtering, content-based filtering, and hybrid models are among the main approaches used to deliver personalized content (Ramesh & Vijayalakshmi, 2022). Recommendation systems employ a technique called collaborative filtering to forecast consumer preferences and interests based on data and patterns from numerous users (Kouayep et al., 2024). The fundamental premise is that individuals with similar preferences for one product are likely to share preferences for others. There are two primary types: memory-based collaborative filtering, which uses neighborhood computation, and model-based collaborative filtering, which relies on data mining methods such as clustering, semantic analysis, and Bayesian networks (Kouayep et al., 2024). Content-based recommenders can be extensively customized to the user's preferences, including recommendations for specific items. When a company needs to generate suggestions based on a range of features and has a large product library, content-based filtering is particularly effective. Deep learning algorithms are used in e-commerce to forecast client preferences and behavior by analyzing customer data such as browsing history, previous purchases, and product interactions (Wang et al., 2020). This makes it possible for companies to provide extremely personalized recommendations, enhancing the buying experience and raising conversion rates.

To boost operational efficiency and improve service quality, e-commerce platforms and companies are continuously seeking innovative ways to meet consumer demands (Sinha & Rakhra, 2023). AI has emerged as a powerful tool in this context, simplifying the shopping experience and making it more accessible, even for less experienced or less privileged customers (Bughin et al., 2017). AI also supports inventory management by predicting demand and automating reordering processes, helping businesses minimize stockouts and reduce costs (Kumar et al., 2022). AI adoption also plays a critical role in the broader development of e-commerce infrastructure, contributing to innovation, competitiveness, and scalability (Areiqat et al., 2021).

AI-powered chatbots also play a crucial role in improving customer service by providing real-time support using natural language processing, which reduces the need for human intervention (Kumar et al., 2022; Pallathadka et al., 2023; Song et al., 2019). Adomavicius and Tuzhilin (2006) explain that personalization helps streamline the decision-making process by presenting customers with options that are tailored to their individual needs and preferences. When a customer receives personalized recommendations for products similar to those they've previously expressed interest in, they are more likely to make confident purchase decisions. Supporting this, McKinsey & Company (2021) found that 76% of consumers become irritated when their personalization expectations aren't met, and Mohamed (2024) found that 60.9% of participants in a Finnish study had made purchases based on AI-generated recommendations. These findings reinforce the positive psychological and behavioral impact of personalization in e-commerce environments. In addition, AI enables voice and visual search functionalities, helping users locate products through spoken queries or images, further streamlining the shopping experience (Pallathadka et al., 2023).

Netflix's recommendation engine employs collaborative filtering and content-based filtering to create a tailored viewing experience. By understanding individual user preferences and predicting their future behaviors, Netflix can suggest content that users are likely to enjoy, thereby reducing the time spent searching for something to watch and increasing overall satisfaction. According to Gomez-Uribe and Hunt (2016), Netflix meticulously tracks user activity—such as watch history, session duration, and ratings—to refine its suggestions and enhance user experience. Retailers like Sephora have successfully implemented AI to create highly personalized digital experiences, using data to adapt offers, communication, and product displays to each customer's profile (Alburger, 2020).

Psychological theories further explain the power of personalization. The Elaboration Likelihood Model (ELM) offers insights into how personalization influences consumer decision-making in e-commerce. When consumers are highly involved, they process information through the central route, and personalization can enhance this by delivering detailed information that meets the consumer's specific interests (Babatunde et al., 2024). Conversely, for low-involvement consumers, personalized emotional content can be influenced through the peripheral route (Shao et al., 2023). Moreover, AI plays a preventive role in fraud detection by monitoring transactions in real time and identifying anomalies using machine learning algorithms (Pallathadka et al., 2023). Despite its benefits, AI personalization faces ethical challenges. According to Riegger et al. (2022), personalization has a dual effect on customers—while it may lead to positive reactions such as gratitude and satisfaction, it can also increase privacy concerns and risk perceptions. These concerns highlight the ongoing privacy-personalization paradox, where users appreciate personalization but remain wary of data collection.

As Raji et al. (2024) note, the collection and use of personal data by AI systems raise serious concerns about privacy and transparency. Consumers are increasingly aware of how their data is being used, and when companies fail to communicate this clearly or obtain informed consent, it undermines trust in AI systems. Raji et al. (2024) further explain that when AI systems are trained on biased data, they may unintentionally reinforce those biases, resulting in unfair or discriminatory outcomes. E-commerce platforms must proactively detect and mitigate algorithmic bias to ensure fair personalization.

In conclusion, while AI personalization offers substantial benefits to e-commerce, including enhanced customer experiences and increased loyalty, it also presents ethical and practical challenges that must be addressed. Emerging trends in AI, such as augmented reality (AR) and virtual reality (VR), promise to further personalize the e-commerce experience, but they must be implemented with care to address ongoing concerns about privacy and trust.

3. METHODOLOGY

This research employs a mixed-methods approach to explore the role of AI-powered personalization in enhancing customer experiences in e-commerce, while also addressing ethical implications. The study combines quantitative data collected through structured questionnaires with qualitative insights from open-ended responses to provide a comprehensive understanding of consumer attitudes toward AI-driven personalization. The survey was distributed to 78 participants, who are regular users of e-commerce platforms, to gather feedback on their experiences with AI-powered personalization.

3.1. Research Design

Primary data was collected through a structured online questionnaire. The survey was designed to assess consumer attitudes toward AI-powered personalization, particularly regarding customer satisfaction, trust, and privacy concerns. The questions were formulated using a Likert scale, allowing participants to express the extent to which they agreed or disagreed with statements about their experiences. The qualitative data was gathered from open-ended questions, providing additional insights into individual consumer experiences and concerns.

3.2. Data Analysis

The quantitative data was analyzed using descriptive statistics, correlation analysis, and reliability tests, while the qualitative responses were reviewed to identify common themes and patterns. Descriptive statistics provided an overview of participants' experiences with AI-powered personalization, while correlation analysis was used to examine the relationships between key variables, such as customer satisfaction, privacy concerns, and trust in AI systems.

3.3. Sample

This section presents the findings from the quantitative research conducted on the impact of AI-powered personalization on customer satisfaction in e-commerce, along with concerns regarding privacy, transparency, and trust in AI systems. The results are based on survey responses from 78 participants and have been analyzed using descriptive statistics and correlation analysis. The primary data collection was conducted in North Macedonia in the period from June 27th until July 11th, 2024, using a structured online questionnaire.

3.3.1. Quantitative Research Sample

Table 1. Demographic Characteristics of the Research Sample

Characteristic	Categories	Percentage (%)
Age	18-24	50%
	25-34	34.6%
	35-44	9%
	45+	6.4%
Gender	Male	43.6%
	Female	56.4%
Level of Education	High School	12.8%
	Some College/Further Education	28.2%
	Bachelors	41%
	Masters	17.9%

Source: Own research

The research sample consisted of 78 participants who regularly engage in e-commerce activities. The demographic analysis showed that the majority of respondents were between the ages of 18 and 24 (50%), followed by participants aged 25-34 (34.6%), 35-44 (9%), and those over 45 (6.4%). In terms of gender distribution, 56.4% of the respondents were female, and 43.6% were male. 41% of respondents have a Bachelor's degree, making it the most common level of education. 17.9% of respondents have a Master's degree, 28.2% have completed some college or further education, without earning a bachelor's degree and 12.8% of respondents have only a high school education.

3.3.2. Qualitative Research Sample

A more comprehensive qualitative approach, such as in-depth interviews or focus groups, was conducted to provide richer data on the nuances of customer experiences and the specific factors influencing their perceptions of AI personalization. 27 participants contributed to the qualitative research study, providing valuable insights and perspectives.

4. RESEARCH RESULTS

4.1. Quantitative Research Results

The survey results revealed key insights into how participants interact with and perceive AI-powered personalization in e-commerce. A vast majority (97.4%) of respondents acknowledged noticing personalized product recommendations based on their previous browsing or purchase history. When asked if they found these recommendations useful, 56.4% responded positively, while 37.2% said "sometimes.". In terms of relevance, 20.5% reported they were always relevant, 34.6% of participants reported that the recommendations they received were often relevant, and 37.2% noted that the recommendations were sometimes relevant. Only 6.4% found them rarely or never relevant. When it comes to purchasing decisions, 16.7% of respondents indicated that they were very likely to purchase a product recommended by an online store, 19.2% were likely, 42.3% remained neutral, and 17.9% were very unlikely to do so. Additionally, 35.9% stated that personalized recommendations somewhat influenced their purchasing decisions, while 24.4% said the recommendations had a very strong influence. A significant 97.4% of respondents noticed that after browsing or purchasing products, they were targeted with ads related to those items or the store. In terms of whether AI can improve the e-commerce experience through personalization, 48.7% agreed, while 24.4% strongly agreed. Regarding shopping efficiency, over half (52.6%) of participants believed that personalization somewhat improves the process, helping them find products faster and reducing irrelevant results and 32.1% said it greatly improves efficiency. Furthermore, 19.2% of respondents were very satisfied with the level of personalization provided by e-commerce platforms, while 41% were satisfied. Finally, when asked if personalized recommendations make them feel more valued as a customer, opinions were distributed across the scale, with 28.2% strongly agreeing and 34.6% agreeing.

The survey explored participants' concerns regarding data privacy and transparency in e-commerce personalization. When asked about their level of concern regarding the privacy of their data used for personalized recommendations, 32.1% of respondents reported being concerned, while 19.2% were very concerned. On the other hand, 26.9% were slightly concerned, and 10.3% were not concerned at all. Over half of the participants (52.6%) admitted to having opted out of personalized recommendations due to privacy concerns, while 47.4% indicated they had not. In terms of transparency, 50% of respondents disagreed that e-commerce websites are transparent about how they use personal data for personalization. An additional 23.1% strongly disagreed with the statement. Only 12.8% of respondents agreed, and a mere 2.6% strongly agreed that companies are transparent in their data practices.

Table 2. AI Personalization and Customer Satisfaction in E-commerce

Question	Response Options	Percentage (%)
Have you ever noticed that an online retailer suggests items for you to purchase based on what you've previously looked at or purchased?	Yes / No	97.4 / 2.6
Do you find it useful to receive product recommendations when shopping online based on items you've previously looked at or purchased?	Yes / No / Sometimes	56.4 / 37.2 / 6.4
Were the product recommendations you received relevant to you when shopping online?	Always / Often / Sometimes / Rarely / Never	20.5 / 34.6 / 37.2 / 6.4 / 1.3
If an online store suggests a product for you to buy, how likely are you to buy it?	Very Likely / Likely / Neutral / Unlikely / Very Unlikely	16.7 / 19.2 / 42.3 / 17.9 / 3.8
To what extent do personalized recommendations influence your purchasing decisions?	Very Much / Somewhat / Neutral / Little / Not at All	24.4 / 35.9 / 19.2 / 14.1 / 6.4
Have you ever noticed that after you buy or browse products on an online store, you are then targeted with ads related to those products or that e-store?	Yes / No	97.4 / 2.6
Do you think AI can help improve e-commerce by providing more personalized experiences and improved user experience?	Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree	24.4 / 48.6 / 17.9 / 6.4 / 2.6
To what extent do you believe that personalization improves your shopping efficiency (e.g., finding products faster, fewer irrelevant results)?	Greatly / Somewhat / Neutral / Little / Not at All	52.6 / 32.1 / 7.7 / 2.6 / 5.1
Overall, how satisfied are you with the level of personalization provided by e-commerce websites?	Very Satisfied / Satisfied / Neutral / Dissatisfied / Very Dissatisfied	19.2 / 41 / 33.3 / 6.4 / 0
Do personalized recommendations make you feel more valued as a customer?	(strongly disagree) 1/2/3/4/5 (strongly agree)	7.7/12.8/34.6/16.7/28.2

Source: Own research

Table 3. Privacy Concerns, Transparency, and Opt-Out Behaviour

Question	Response Options	Percentage (%)
How concerned are you about the privacy of your data used for personalized recommendations?	Very Concerned/Concerned/ Neutral/Slightly Concerned/ Not Concerned	19.2 / 32.1/11.5/26.9/10.3
Have you ever opted out of personalized recommendations due to privacy concerns?	Yes / No	52.6 / 47.4
Do you believe e-commerce websites are transparent about how they use your data for personalization?	Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree	2.6/ 12.8/ 11.5/ 50/ 23.1

Source: Own research

Table 4. Trust in Future AI Accuracy and Perceived Benefits in E-Commerce

Question	Response Options	Percentage (%)
How likely are you to trust AI recommendations if they become more advanced and accurate in the future?	(Very Unlikely) 1/2/3/4/5 (Very Likely)	6.4/14.1/33.3/19.2/26.9
What potential improvements do you think AI could bring to the personalization experience in ecommerce?	Better product matches/ Faster discovery of relevant products/ Improved customer service interactions/ More personalized marketing and promotions/Other	60.3/67.9/41/38.5/6.4

Source: Own research

The survey asked participants about their trust in AI recommendations becoming more advanced and accurate in the future. A total of 26.9% of respondents indicated that they would be very likely to trust future AI recommendations, while 19.2% said they would likely trust them. On the other end of the spectrum, 6.4% of respondents were very unlikely to trust AI in the future, with another 14.1% leaning toward distrust. Participants were also asked what potential improvements AI could bring to the personalization experience in e-commerce. The most frequently cited improvements included faster discovery of relevant products (67.9%) and better product matches (60.3%). Other notable potential benefits included more personalized marketing and promotions (38.5%) and improved customer service interactions (41%). A small percentage (6.4%) mentioned other improvements outside these categories.

4.2. Qualitative Research Results

Among the 27 respondents, many shared positive experiences with AI-driven personalization, highlighting how it improved decision-making and helped them find products more efficiently. Respondents appreciated the ease of locating specific items, such as niche products, and praised personalized recommendations for streamlining their shopping experience, much like having a personal shopping assistant. Platforms like Shein were noted for effectively using previous orders to inform current recommendations, saving time and enhancing convenience. However, privacy concerns were a common issue. Many respondents felt uncomfortable with the level of data collection and the invasive nature of targeted ads, which some described as “creepy” and intrusive. There were also frustrations with irrelevant recommendations that sometimes led to unnecessary purchases or failed to align with users’ current needs. Looking ahead, respondents expressed a desire for more control over their personal data, including the ability to opt in or out of specific recommendations. They suggested features such as feedback mechanisms (e.g., thumbs up/down) to refine recommendations and called for a balance between familiar and new content to keep the experience engaging. Additionally, several participants mentioned the importance of AI supporting more mindful decision-making, helping users avoid overconsumption.

5. STATISTICAL ANALYSIS

The statistical analysis of the data collected from 78 participants provides key insights into how AI-powered personalization influences customer satisfaction and behavior. The analysis was conducted using descriptive statistics and correlation analysis to explore the relationships between key variables, such as customer satisfaction, privacy concerns, and trust in AI systems.

5.1. Descriptive Statistics

The descriptive statistics provide an overview of key variables related to AI-powered personalization in e-commerce. The analysis highlights the frequency and mean responses for each question, offering insights into customer behavior and attitudes toward personalization. Nearly all respondents (mean of 1.03) had noticed personalized recommendations while shopping online. In terms of usefulness, the mean response for finding product recommendations helpful was 1.81, and the relevance of these recommendations was rated at 2.33. On the likelihood of purchasing items based on personalized suggestions, the mean was 2.73, demonstrating a relatively positive impact of AI on consumer decision-making. Participants also indicated a moderate influence of personalized recommendations on their purchasing decisions, with a mean of 2.41. Additionally, the perceived usefulness of chatbots or virtual assistants received a mean score of 2.63. Privacy concerns were evident, with a mean of 2.77, reflecting moderate to high levels of concern regarding the use of

personal data for AI-driven recommendations. Transparency, however, was rated poorly, with a mean of 4.05, indicating that participants largely disagreed that e-commerce platforms are transparent about data usage. Trust in future AI accuracy was moderately high, with a mean of 3.46.

5.2. Correlation Analysis

The correlation analysis revealed several important relationships between the variables studied. Notably, there is a strong positive correlation ($r=0.851$) between the perceived usefulness of personalized recommendations and overall satisfaction with personalization. This suggests that when customers find recommendations useful, their satisfaction with the e-commerce experience increases. The influence of recommendations on purchasing decisions ($r=0.941$) shows that effective personalization, which drives purchasing behavior, is crucial for customer satisfaction. There is a strong positive correlation ($r=0.848$) between customers' concerns about the privacy of their data and their belief that e-commerce websites are not transparent about how they use data for personalization. This suggests that a lack of transparency is strongly associated with increased privacy concerns among customers. Between the two variables: the likelihood of trusting AI recommendations if they become more advanced and accurate in the future, and the belief that AI can help improve e-commerce by providing more personalized experiences and improved user experience there was a strong positive correlation ($r=0.858$). This suggests that customers who are likely to trust AI recommendations if they become more advanced and accurate also strongly believe that AI can improve e-commerce by providing more personalized experiences and enhancing user experience. This implies that advancements in AI accuracy and capabilities are expected to increase trust in AI-driven personalization and its perceived benefits in e-commerce.

5.3. Reliability Testing/ Cronbach's Alpha

Cronbach's alpha was used to assess the internal consistency of the survey questions related to customer satisfaction and privacy concerns. The Cronbach's alpha for the customer satisfaction items was 0.968, indicating excellent internal consistency. Privacy concerns items gave a Cronbach's alpha of 0.875, and the trust in AI items had a Cronbach's alpha of 0.923. These results suggest that the survey instruments reliably measure the intended constructs.

6. DISCUSSION

The findings from both the quantitative and qualitative research suggest that AI-powered personalization in e-commerce offers significant benefits to consumers, while also presenting challenges related to privacy and data transparency. The survey revealed that the majority of respondents appreciate the convenience and relevance of personalized recommendations, which enhance their shopping experience by helping them discover products more efficiently. This aligns with existing literature, which highlights the role of AI in improving customer satisfaction and driving engagement through tailored experiences. However, privacy remains a critical concern for many users. More than half of the respondents expressed discomfort with the level of data collection involved in AI-driven personalization, with some opting out of personalized recommendations altogether. This reflects the ongoing tension between the benefits of personalization and the privacy-personalization paradox, where consumers desire personalization but are wary of how their personal data is being used. The qualitative data further underscored this concern, with participants describing personalized ads as intrusive and expressing frustration with irrelevant or excessive recommendations. The trust issue also emerged in the discussion on AI's future role in e-commerce. While most respondents are optimistic about AI's potential to improve accuracy and enhance the shopping experience, there is a clear need

for companies to improve transparency and give users more control over their data. Respondents expressed interest in features that allow them to manage their data preferences, emphasizing the importance of fostering trust in AI systems. Additionally, respondents suggested that AI could be further enhanced by incorporating user feedback and supporting personal goals, which would make the system more responsive to individual needs.

7. CONCLUSION

This study highlights both the opportunities and challenges associated with AI-powered personalization in e-commerce. On one hand, personalization is widely recognized for improving customer experience by making shopping more efficient and tailored to individual preferences. On the other hand, concerns about privacy, data transparency, and trust in AI systems persist. The research suggests that for AI to continue enhancing the e-commerce experience, companies must address these concerns by improving transparency and offering users more control over their personal data. However, one limitation of this study is the relatively small sample size, which may not fully capture the diversity of experiences and attitudes toward AI-powered personalization across broader populations. Future research could focus on larger, more varied samples to generalize findings more effectively. Future developments in AI should focus on creating a balance between delivering personalized experiences and maintaining user trust. Incorporating feedback mechanisms, increasing transparency in data collection, and allowing users to customize their personalization settings are critical steps toward achieving this balance. As AI continues to evolve, it has the potential to create even more engaging and efficient shopping experiences, provided that ethical considerations remain a priority.

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