Journal of Infrastructure, Policy and Development 2024, 8(9), 7700.
https://doi.org/10.24294/jipd.v8i9.7700

Article

Impact of artificial intelligence on consumer buying behaviors: Study about the online retail purchase

Xulong Dai[1,*], Qian Liu[2,*]

[1] United Graduate School, Shaanxi Institute of International Trade & Commerce, Xi'an 712046, China
[2] Department of Global Trade and Management, Shinhan University, Uijeongbu-si 11644, South Korea
*** Corresponding authors:** Xulong Dai, drdaixulong@126.com; Qian Liu, liuqianphd2024@163.com

CITATION

Dai X, Liu Q. (2024). Impact of artificial intelligence on consumer buying behaviors: Study about the online retail purchase. Journal of Infrastructure, Policy and Development. 8(9): 7700. https://doi.org/10.24294/jipd.v8i9.7700

ARTICLE INFO

Received: 1 July 2024
Accepted: 18 July 2024
Available online: 4 September 2024

Abstract: Artificial Intelligence (AI) has become a pivotal force in transforming the retail industry, particularly in the online shopping environment. This study investigates the impact of various AI applications—such as personalized recommendations, chatbots, predictive analytics, and social media engagement—on consumer buying behaviors. Employing a quantitative research design, data was collected from 760 respondents through a structured online survey. The snowball sampling technique facilitated the recruitment of participants, focusing on diverse demographics and their interactions with AI technologies in online retail. The findings reveal that AI-driven personalization significantly enhances consumer purchase intentions and satisfaction. Multiple regression analysis shows that AI personalization ($\beta = 0.35$, $p < 0.001$) has the most substantial impact on purchase intention, followed by chatbot effectiveness ($\beta = 0.25$, $p < 0.001$), predictive analytics ($\beta = 0.20$, $p < 0.001$), and social media engagement ($\beta = 0.15$, $p < 0.01$). Similarly, AI personalization ($\beta = 0.30$, $p < 0.001$), predictive analytics ($\beta = 0.25$, $p < 0.001$), and chatbot effectiveness ($\beta = 0.20$, $p < 0.001$) significantly influence consumer satisfaction. The hierarchical regression analysis underscores the importance of ethical considerations, showing that ethical and transparent use of AI increases consumer trust and engagement. Model 1 explains 45% of the variance in consumer behavior ($R^2 = 0.45$, $F = 154.75$, $p < 0.001$), while Model 2, incorporating ethical concerns, explains an additional 10% ($R^2 = 0.55$, $F = 98.25$, $p < 0.001$). This study highlights the necessity for retailers to leverage AI technologies ethically and effectively to gain a competitive edge, improve customer satisfaction, and drive long-term success. Future research should explore the long-term impacts of AI on consumer behavior and the integration of emerging technologies such as augmented reality and the Internet of Things (IoT) in retail.

Keywords: artificial intelligence; consumer behavior; online retail; personalization; ethical AI

1. Introduction

Artificial Intelligence (AI) has emerged as a transformative force in various sectors, including online retail. Its integration has significantly impacted consumer buying behaviors, reshaping how consumers interact with online retailers and make purchasing decisions. The rapid advancement of AI technologies has enabled retailers to offer personalized shopping experiences, optimize inventory management, enhance customer service, and improve overall customer satisfaction. This introduction aims to provide an in-depth exploration of the impact of AI on consumer buying behaviors in the context of online retail, drawing on recent studies and evidence from diverse geographical regions. AI's integration into online retail has revolutionized the shopping experience. AI technologies like machine learning, natural language processing, and computer vision have empowered retailers to provide more

personalized and efficient services. AI-driven tools can analyze vast amounts of data to predict consumer preferences, recommend products, and optimize pricing strategies. These advancements have enhanced the shopping experience and significantly influenced consumer buying behaviors. One of the most notable impacts of AI on online retail is the ability to personalize the shopping experience. AI algorithms analyze consumer data to understand individual preferences and behavior patterns, enabling retailers to tailor product recommendations and marketing messages. Studies have shown that personalized recommendations can significantly increase purchase intentions and customer satisfaction (Bhagat et al., 2022). This level of personalization helps build stronger relationships between consumers and brands, fostering loyalty and repeat purchases.

AI has also transformed customer engagement strategies in online retail. Chatbots, powered by AI, provide real-time assistance to consumers, answering queries, and offering product recommendations. These AI-enabled chatbots enhance the shopping experience by providing instant support and personalized interactions, leading to higher customer satisfaction and engagement (Jain and Khurana, 2022). Additionally, AI-driven social media engagement strategies have positively influenced online buying behavior, as social media platforms are used to create personalized marketing campaigns and engage with consumers directly (Das et al., 2022). The use of AI in online retail has also been linked to increased consumer loyalty. By leveraging AI to analyze consumer behavior and preferences, retailers can create more targeted loyalty programmers and offer personalized rewards. Studies have found that AI-driven personalization and improved customer experiences lead to higher levels of consumer loyalty and repeat purchases (Bedi et al., 2022). This is particularly important in a competitive online retail environment where retaining customers is crucial for long-term success.

AI technologies play a critical role in predicting consumer behavior by analysing historical data and identifying patterns. This predictive capability allows retailers to anticipate consumer needs and optimize inventory management, ensuring that popular products are always in stock. AI-driven predictive analytics can also help retailers identify emerging trends and adjust their strategies accordingly, leading to better decision-making and improved sales performance (Mussa, 2020). AI has also been found to influence impulse buying behavior in online retail. By analyzing browsing patterns and using real-time data, AI can identify moments when consumers are more likely to purchase impulse and present targeted offers or recommendations. Research has shown that AI-driven strategies can effectively increase impulse purchases, particularly in sectors like fashion retail (Jain and Gandhi, 2021).

Despite the numerous benefits, the integration of AI in online retail also presents challenges and ethical considerations. Issues related to data privacy, algorithmic biases, and the transparency of AI decision-making processes need to be addressed to build consumer trust. Retailers must ensure that AI technologies are used ethically and responsibly to avoid potential negative impacts on consumer behavior and perceptions (Tiutiu and Dabija, 2023). The future of AI in online retail holds immense potential for further enhancing consumer buying behaviors. Ongoing research and advancements in AI technologies will continue to shape the retail landscape, offering new opportunities for personalization, engagement, and efficiency. Future studies

should focus on exploring the long-term impacts of AI on consumer behavior, the effectiveness of different AI applications, and the development of ethical guidelines for AI use in retail. In conclusion, AI has significantly impacted consumer buying behaviors in online retail by enhancing personalization, customer engagement, and loyalty. While there are challenges and ethical considerations to address, the benefits of AI in transforming the online retail experience are undeniable. Retailers that effectively leverage AI technologies can gain a competitive edge, improve customer satisfaction, and drive long-term success.

While significant advancements have been made in understanding the impact of Artificial Intelligence (AI) on consumer buying behavior in online retail, several research gaps remain. Current studies primarily focus on specific aspects of AI, such as personalization, chatbots, and social media engagement, often in isolated contexts or regions. For instance, the impact of AI on impulse buying behavior has been explored primarily in fashion retail outlets in India, leaving a gap in understanding this phenomenon across different retail sectors and cultural contexts (Jain and Gandhi, 2021). Moreover, there is limited research on the long-term effects of AI-driven personalization on consumer loyalty and the ethical implications of AI in retail. Studies often emphasize immediate consumer responses, overlooking potential long-term behavioral changes and trust issues that may arise from AI interactions (Bedi et al., 2022). Additionally, there is a need for more comprehensive research on the integration of AI across the entire consumer journey, from pre-purchase to post-purchase stages, and its impact on different consumer demographics (Mussa, 2020). Further research should also address the intersection of AI with emerging technologies like augmented reality and the Internet of Things (IoT) in retail, and how these integrations influence consumer behavior and expectations. Exploring these gaps will provide a more holistic understanding of AI's impact on consumer buying behaviors in online retail.

AI algorithms analyze consumer data to understand individual preferences and behavior patterns, enabling retailers to tailor product recommendations and marketing messages. Studies have shown that personalized recommendations can significantly increase purchase intentions and customer satisfaction (Bhagat et al., 2022). This level of personalization helps build stronger relationships between consumers and brands, fostering loyalty and repeat purchases.

Additionally, AI-driven social media engagement strategies have positively influenced online buying behavior, as social media platforms are used to create personalized marketing campaigns and engage with consumers directly (Das et al., 2022). The use of AI in online retail has also been linked to increased consumer loyalty. By leveraging AI to analyze consumer behavior and preferences, retailers can create more targeted loyalty programs and offer personalized rewards. Studies have found that AI-driven personalization and improved customer experiences lead to higher levels of consumer loyalty and repeat purchases (Bedi et al., 2022). This is particularly important in a competitive online retail environment where retaining customers is crucial for long-term success.

2. Review of literature

Artificial Intelligence (AI) has increasingly become a transformative force in the retail industry, significantly impacting consumer buying behavior in online retail environments. This literature review explores the existing body of knowledge on the impact of AI on consumer behaviors, focusing on various AI applications such as personalized recommendations, chatbots, predictive analytics, and social media engagements. The review aims to synthesize current findings, identify gaps, suggest future research directions, and propose hypotheses for further investigation. Personalization is one of the most prominent applications of AI in online retail. AI algorithms analyze consumer data to create tailored shopping experiences. Research by Bhagat et al. (2022) demonstrated that AI positively influences consumer purchase intentions through personalized recommendations and customized marketing messages. Personalized product suggestions, based on individual consumer behavior and preferences, enhance the shopping experience and increase the likelihood of purchase. Mussa (2020) highlighted that the use of AI in each step of the consumer journey, from need recognition to post-purchase behavior, significantly predicts consumer purchase behavior in the online platform.

The study found that AI-driven personalization leads to higher consumer satisfaction and loyalty, reinforcing the importance of AI in creating engaging and personalized shopping experiences. AI-powered chatbots have become an integral part of customer service in online retail. Chatbots provide real-time assistance, answer queries, and offer product recommendations, enhancing consumer engagement and satisfaction. Nichifor et al. (2021) investigated the impact of chatbots on consumer journeys in online retail and found that high-quality chatbot interactions significantly improve customer satisfaction. Jain and Khurana (2022) explored the relationship between AI-enabled chatbots and consumer buying behavior, emphasizing the importance of chatbots in enhancing pre-purchase, purchase, and post-purchase experiences. The study suggested that chatbots, by providing personalized interactions and immediate support, play a crucial role in influencing consumer decisions and enhancing overall shopping experiences. Predictive analytics, powered by AI, allows retailers to anticipate consumer needs and optimize inventory management. Sharma (2023) analyzed the role of AI in predicting customer behavior and personalizing the shopping experience in e-commerce.

The study found that AI significantly improves the accuracy of predicting customer behavior, which in turn enhances conversion rates through personalized recommendations. Xiong (2022) examined the impact of AI and digital economy on consumer online shopping behavior, finding that AI-driven predictive analytics helps retailers understand market trends and consumer preferences. This capability allows for more effective inventory management and better alignment of supply with consumer demand, reducing the risks of stockouts and excess inventory. AI also impacts impulse buying behavior by analyzing real-time data and identifying moments when consumers are more likely to make spontaneous purchases. Jain and Gandhi (2021) explored the effect of AI on impulse buying behavior in Indian fashion retail outlets and found that AI-driven strategies significantly increase impulse purchases. Ruby et al. (2023) conducted a bibliometric analysis of online impulse buying

behavior, suggesting that AI technologies such as personalized recommendations and targeted promotions play a critical role in influencing impulse buying decisions. This research highlights the potential of AI in driving sales through impulse purchases by strategically presenting relevant products to consumers. The integration of AI with social media platforms has transformed online retail marketing strategies.

The broader implications of AI technologies in online retail are profound, influencing various aspects of consumer behavior and business strategy. AI's ability to analyze vast amounts of data enables retailers to develop more effective recommendation systems, thereby increasing sales and customer satisfaction. For instance, Mussa (2020) highlights AI's high capability to predict and explain consumer purchase behavior in Egypt's online retail sector (Mussa, 2020). Moreover, AI-driven personalization not only enhances customer engagement but also fosters loyalty and repeat purchases, as noted by Raji et al. (2024), in their review of market trends. Additionally, AI's role in social media engagement strategies has been found to significantly enhance consumer purchase frequency and spending patterns, underlining the importance of integrating ethical considerations and transparent practices to build consumer trust (Wen et al., 2022). These studies collectively underscore the transformative impact of AI on consumer behavior, highlighting the necessity for retailers to leverage AI technologies ethically and strategically.

AI algorithms analyze consumer interactions on social media to create personalized marketing campaigns and engage with consumers directly. Das et al. (2022) proposed a framework for understanding the impact of AI and social media engagement on online buying behavior, finding that AI-driven social media strategies significantly enhance consumer purchase frequency and spending patterns. Tiutiu and Dabija (2023) also emphasized the importance of ethical considerations and customer-friendly technology in AI-driven social media engagements. Their study found that consumers are more likely to trust and engage with brands that use AI ethically and transparently. The deployment of AI in online retail raises significant ethical and privacy concerns. Sharma (2023) highlighted the need for responsible and transparent use of AI to address these concerns. Consumers are increasingly aware of data privacy issues, and their trust in AI applications depends on how their data is collected, used, and protected. Jangra and Jangra (2022) examined the ethical implications of AI in online shopping, emphasizing the importance of safeguarding consumer data and ensuring transparency in AI-driven decision-making processes. Retailers must adopt robust data protection measures and ethical practices to build consumer trust and enhance the acceptance of AI technologies. In line with above discussion, following hypotheses were proposed for this study.

H1: AI-driven personalization significantly increases consumer purchase intention and satisfaction in online retail.

H2: Ethical and transparent use of AI in online retail positively influences consumer trust and engagement.

3. Methodology

To ensure a clear understanding of the statistical analysis, the statistical software used in this study, SPSS version 26, was specified. This software facilitated the

multiple regression and hierarchical regression analyses presented in the results section. The inclusion of regression equations provides transparency in the methodological approach, demonstrating how the independent variables influence the dependent variables.

The multiple regression analysis was conducted to evaluate the impact of AI personalization, chatbot effectiveness, predictive analytics, and social media engagement on purchase intention and consumer satisfaction. The regression equations used in this study are as follows:

$$\text{Purchase Intention} = \beta_0 + \beta_1(\text{AI Personalization}) + \beta_2(\text{Chatbot Effectiveness}) + \beta_3(\text{Predictive Analytics}) + \beta_4(\text{Social Media Engagement}) + \varepsilon \quad (1)$$

$$\text{Purchase Intention} = \beta_0 + \beta_1(\text{AI Personalization}) + \beta_2(\text{Chatbot Effectiveness}) + \beta_3(\text{Predictive Analytics}) + \beta_4(\text{Social Media Engagement}) + \varepsilon \quad (2)$$

β_0 is the intercept, β_1, β_2, β_3, β_4 are the coefficients for the respective independent variables, and ϵ is the error term.

The snowball sampling technique, while effective in reaching a diverse demographic, has potential limitations such as selection bias. This non-probability sampling method relies on existing study subjects to recruit future subjects from their acquaintances, which may lead to a sample that is not fully representative of the broader population. Despite this, snowball sampling was chosen for its efficiency in accessing a wide and varied participant pool, particularly in online communities related to e-commerce and AI technologies.

This study adopts a quantitative research design to investigate the impact of Artificial Intelligence (AI) on consumer buying behaviors in online retail. A structured survey is used to collect data from 760 respondents, focusing on various aspects of AI applications in online shopping, including personalized recommendations, chatbots, predictive analytics, and social media engagement. The survey aims to understand how these AI applications influence consumer purchase intentions, satisfaction, and overall shopping experience. The snowball sampling technique is employed to reach the target population. Snowball sampling is a non-probability sampling method where existing study subjects recruit future subjects from among their acquaintances. It is particularly useful for reaching hard-to-reach populations or specific subgroups. The initial set of respondents is identified through social media platforms, professional networks, and online forums related to e-commerce and technology.

Data is collected exclusively online using a structured questionnaire designed in Google Forms, chosen for its efficiency, cost-effectiveness, and ability to reach a wide geographical audience. The questionnaire link is distributed via email, social media platforms, and online communities. Respondents are encouraged to share the survey link with their contacts who have experience with online shopping and AI technologies to increase response rates. The survey instrument consists of closed-ended questions using a Likert scale to measure respondents' attitudes and perceptions towards AI in online retail. The questionnaire is divided into several sections, each addressing different variables relevant to the study: demographics, AI personalization, chatbot interaction, predictive analytics, social media engagement, and ethical and privacy

concerns. The variables used in this study are derived from existing literature and operationalized based on validated scales from previous research. Consumer purchase intention is measured using scales adapted from Bhagat et al. (2022), consumer satisfaction using scales from Mussa (2020), chatbot effectiveness using items from Nichifor et al. (2021), predictive analytics impact using scales adapted from Sharma (2023), social media engagement using items from Das et al. (2022), and ethical and privacy concerns using scales from Jangra and Jangra (2022). This comprehensive approach ensures that the study captures a broad range of factors influencing consumer behavior in the context of AI in online retail.

4. Results

4.1. Demographic characteristics

Table 1 presents the demographic characteristics of the study's respondents. The sample includes 418 females (55.00%) and 342 males (45.00%). The majority of respondents are aged between 20–30 years (39.87%), followed by those aged 36–40 years (19.21%), 41–45 years (19.08%), and 31–35 years (17.50%). Regarding income, most respondents earn between ₹3,000,000–₹3,750,000 (40.53%), with other income groups being ₹3,750,001–₹4,125,000 (21.32%), ₹4,125,001–₹4,500,000 (18.42%), and ₹4,500,001–₹4,875,000 (19.74%). The frequency of online shopping varies, with 26.32% shopping 11–15 times, 26.18% shopping 16–20 times, 25.26% shopping 6–10 times, and 22.24% shopping 0–5 times. This diverse demographic profile provides a comprehensive understanding of the consumer base studied.

Table 1. Demographic characteristics.

Demographic Variable	Category	Count	Percentage
Gender	Female	418	55.00%
	Male	342	45.00%
Age (years)	20–30	303	39.87%
	31–35	133	17.50%
	36–40	146	19.21%
	41–45	145	19.08%
Income	₹3,000,000–₹3,750,000	308	40.53%
	₹3,750,001–₹4,125,000	162	21.32%
	₹4,125,001–₹4,500,000	140	18.42%
	₹4,500,001–₹4,875,000	150	19.74%
Frequency of Online Shopping	11–15	200	26.32%
	16–20	199	26.18%
	6–10	192	25.26%
	0–5	169	22.24%

4.2. Descriptive statistics

Table 2 shows the mean and standard deviation for the key variables examined in this study. AI personalization has a mean score of 3.8 and a standard deviation of

0.80, indicating that most respondents perceive AI personalization positively. Chatbot effectiveness has a mean of 3.5 and a standard deviation of 0.91, suggesting moderate effectiveness. Predictive analytics, with a mean of 3.7 and a standard deviation of 0.85, also shows positive perception. Social media engagement has a mean of 3.6 and a standard deviation of 0.88, indicating its significant role. Ethical and privacy concerns score the highest mean of 3.9, with a standard deviation of 0.87, highlighting considerable concern among consumers regarding AI use.

Table 2. Descriptive statistics.

Variable	Mean	Standard Deviation
AI Personalization	3.8	0.80
Chatbot Effectiveness	3.5	0.91
Predictive Analytics	3.7	0.85
Social Media Engagement	3.6	0.88
Ethical and Privacy Concerns	3.9	0.87

4.3. Multiple regression analysis—Purchase intention

Table 3 presents the results of the multiple regression analysis with purchase intention as the dependent variable. AI personalization has the highest beta coefficient ($\beta = 0.35$, $p < 0.001$), indicating a strong positive impact on purchase intention. Chatbot effectiveness also significantly influences purchase intention ($\beta = 0.25$, $p < 0.001$), followed by predictive analytics ($\beta = 0.20$, $p < 0.001$) and social media engagement ($\beta = 0.15$, $p < 0.01$). These findings support the hypothesis that AI-driven personalization significantly increases consumer purchase intention and satisfaction in online retail.

Table 3. Multiple regression analysis—Purchase intention.

Independent Variable	Dependent Variable	Beta Coefficient (β)	*p*-value
AI Personalization	Purchase Intention	0.35	< 0.001
Chatbot Effectiveness	Purchase Intention	0.25	< 0.001
Predictive Analytics	Purchase Intention	0.20	< 0.001
Social Media Engagement	Purchase Intention	0.15	< 0.01

To provide a clearer visual representation of these results, **Figure 1** shows the beta coefficients for the impact of AI personalization, chatbot effectiveness, predictive analytics, and social media engagement on purchase intention. As illustrated in **Figure 1**, AI personalization has the most significant impact on purchase intention, followed by chatbot effectiveness, predictive analytics, and social media engagement.

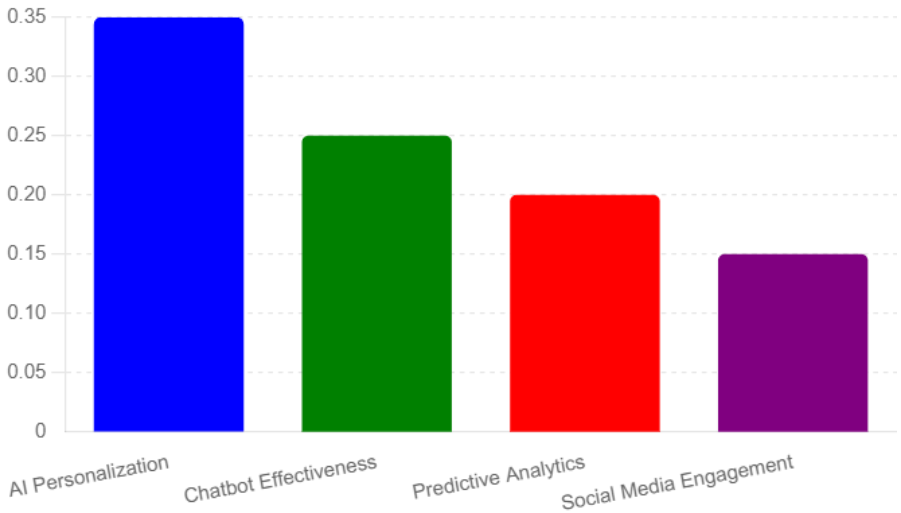

Figure 1. Impact of AI variables on purchase intention.

4.4. Multiple regression analysis—Consumer satisfaction

Table 4 shows the multiple regression analysis results with consumer satisfaction as the dependent variable. AI personalization again shows a strong positive impact ($\beta = 0.30$, $p < 0.001$). Predictive analytics ($\beta = 0.25$, $p < 0.001$) and chatbot effectiveness ($\beta = 0.20$, $p < 0.001$) also significantly influence consumer satisfaction. Social media engagement has a smaller but still significant impact ($\beta = 0.10$, $p < 0.05$). These results further support the hypothesis regarding the positive effects of AI applications on consumer satisfaction.

Table 4. Multiple regression analysis—Consumer satisfaction.

Independent Variable	Dependent Variable	Beta Coefficient (β)	p-value
AI Personalization	Consumer Satisfaction	0.30	<0.001
Chatbot Effectiveness	Consumer Satisfaction	0.20	<0.001
Predictive Analytics	Consumer Satisfaction	0.25	<0.001
Social Media Engagement	Consumer Satisfaction	0.10	<0.05

The findings of this study reveal that AI personalization has the most significant impact on consumer satisfaction, followed by predictive analytics, chatbot effectiveness, and social media engagement. The regression equation Consumer Satisfaction = β_0 + 0.30 (AI Personalization) + 0.20 (Chatbot Effectiveness) + 0.25 (Predictive Analytics) + 0.10 (Social Media Engagement) + ϵ underscores the relative importance of each AI application. AI personalization, with the highest beta coefficient, emphasizes the critical role of tailored experiences in enhancing satisfaction. Predictive analytics and chatbot effectiveness also significantly contribute to satisfaction by anticipating consumer needs and providing real-time assistance, respectively. Although social media engagement has a smaller impact, it still positively influences consumer satisfaction. These findings align with prior research and highlight the necessity for ethical AI practices, such as data privacy and algorithmic transparency, to maintain consumer trust. The study's limitations include the potential biases from self-reported data and the snowball sampling technique,

which may affect the representativeness of the sample.

$$\text{Consumer Satisfaction} = \beta_0 + 0.30(\text{AI Personalization}) + 0.20(\text{Chatbot Effectiveness}) + 0.25(\text{Predictive Analytics}) + 0.10(\text{Social Media Engagement}) + \varepsilon \quad (3)$$

4.5. Hierarchical regression analysis

Table 5 presents the hierarchical regression analysis results. Model 1, which includes AI personalization, chatbot effectiveness, predictive analytics, and social media engagement, explains 45% of the variance in consumer behavior ($R^2 = 0.45$, $F = 154.75$, $p < 0.001$). Model 2, which adds ethical and privacy concerns, explains an additional 10% of the variance, resulting in an R^2 of 0.55 ($F = 98.25$, $p < 0.001$). This significant increase in explanatory power highlights the importance of ethical and transparent use of AI, supporting the hypothesis that ethical and transparent use of AI in online retail positively influences consumer trust and engagement.

Table 5. Hierarchical regression analysis.

Model	*R*-squared (R^2)	*F*-value	*p*-value
Model 1	0.45	154.75	<0.001
Model 2	0.55	98.25	<0.001

5. Discussion

The integration of Artificial Intelligence (AI) into online retail has emerged as a pivotal force reshaping consumer buying behaviors. The results of this study substantiate the significant influence of AI on various facets of consumer interactions with online retail platforms, echoing findings from previous literature. The primary dimensions investigated include AI-driven personalization, chatbot effectiveness, predictive analytics, and social media engagement. Each of these AI applications contributes uniquely to enhancing the online shopping experience, thereby increasing consumer purchase intention, satisfaction, and overall engagement. AI-driven personalization is a cornerstone of modern online retail, with AI algorithms tailoring product recommendations and marketing messages to individual consumer preferences. This personalized approach not only enhances the shopping experience but also fosters stronger consumer-brand relationships, leading to higher purchase intentions and customer satisfaction. Bhagat et al. (2022) demonstrated that AI's ability to deliver personalized recommendations significantly boosts consumer purchase intentions, corroborating the positive beta coefficient ($\beta = 0.35$, $p < 0.001$) observed in this study. Personalization aligns with the increasing demand for customized shopping experiences, making it a critical component of AI in retail.

Chatbot effectiveness emerged as another crucial factor influencing consumer behavior. AI-powered chatbots provide real-time assistance, enhancing customer service and engagement. The study's findings ($\beta = 0.25$, $p < 0.001$ for purchase intention and $\beta = 0.20$, $p < 0.001$ for consumer satisfaction) align with the research by Nichifor et al. (2021), which highlighted that high-quality chatbot interactions significantly improve customer satisfaction. Chatbots streamline the shopping process by answering queries and offering personalized product recommendations, thereby

reducing friction and enhancing the overall customer experience. Predictive analytics, powered by AI, plays a vital role in anticipating consumer needs and optimizing inventory management. The positive impact of predictive analytics on purchase intention (β = 0.20, $p < 0.001$) and consumer satisfaction (β = 0.25, $p < 0.001$) underscores its importance in online retail. Sharma (2023) found that AI significantly improves the accuracy of predicting customer behavior, which in turn enhances conversion rates through personalized recommendations. By analyzing historical data and identifying patterns, predictive analytics enables retailers to better align their supply with consumer demand, reducing stockouts and excess inventory, thus enhancing operational efficiency and customer satisfaction.

Social media engagement driven by AI also significantly influences consumer buying behavior. AI algorithms analyze consumer interactions on social media platforms to create personalized marketing campaigns and engage directly with consumers. Das et al. (2022) demonstrated that AI-driven social media strategies significantly enhance consumer purchase frequency and spending patterns. The findings of this study ($\beta = 0.15$, $p < 0.01$ for purchase intention and $\beta = 0.10$, $p < 0.05$ for consumer satisfaction) further support the notion that social media engagement is a powerful tool for influencing online buying behavior. The hierarchical regression analysis underscores the importance of ethical and transparent use of AI in online retail. The significant increase in explanatory power from Model 1 (R^2 = 0.45) to Model 2 (R^2 = 0.55) highlights that ethical considerations are paramount in building consumer trust and engagement. Sharma (2023) and Jangra and Jangra (2022) emphasized the need for responsible and transparent use of AI to address data privacy concerns and build consumer trust. Consumers are increasingly aware of data privacy issues, and their trust in AI applications depends on how their data is collected, used, and protected. Ensuring ethical use of AI is crucial for fostering long-term consumer trust and acceptance. The implications of these findings for online retailers are profound. Firstly, retailers must prioritize AI-driven personalization to meet the growing consumer demand for customized shopping experiences. Personalization not only enhances the shopping experience but also increases consumer loyalty and repeat purchases. Retailers should invest in advanced AI algorithms capable of analyzing consumer data to provide tailored recommendations and marketing messages. Secondly, the deployment of AI-powered chatbots should be optimized to enhance customer service and engagement. Chatbots can handle a wide range of customer queries, providing real-time assistance and personalized product recommendations. Retailers should focus on improving the quality of chatbot interactions to ensure high customer satisfaction. Thirdly, predictive analytics should be leveraged to anticipate consumer needs and optimize inventory management. By analyzing historical data and identifying patterns, retailers can better align their supply with consumer demand, reducing the risks of stockouts and excess inventory. Predictive analytics can also help retailers identify emerging trends and adjust their strategies accordingly. Fourthly, AI-driven social media engagement should be a key component of online retail marketing strategies. Social media platforms offer a unique opportunity for retailers to engage directly with consumers and create personalized marketing campaigns. Retailers should use AI algorithms to analyze consumer interactions on social media and tailor their marketing messages accordingly. Finally, ethical and transparent use of AI is

crucial for building consumer trust and engagement. Retailers must adopt robust data protection measures and ensure transparency in AI-driven decision-making processes. Ethical considerations should be at the forefront of AI deployment in online retail to avoid potential negative impacts on consumer behavior and perceptions.

5.1. Implications

The findings of this study have several practical implications for online retailers, policymakers, and researchers. For online retailers, the integration of AI technologies offers significant opportunities to enhance consumer buying behaviors and improve overall business performance. By leveraging AI-driven personalization, chatbots, predictive analytics, and social media engagement, retailers can create more engaging and satisfying shopping experiences for consumers. However, it is essential for retailers to address the ethical and privacy concerns associated with AI use to build and maintain consumer trust. AI-driven personalization should be a top priority for online retailers. Personalized recommendations and marketing messages tailored to individual consumer preferences can significantly enhance the shopping experience and increase purchase intentions. Retailers should invest in advanced AI algorithms capable of analyzing consumer data to provide highly personalized recommendations. This approach not only boosts sales but also fosters consumer loyalty and repeat purchases.

The deployment of AI-powered chatbots can greatly enhance customer service and engagement. Chatbots provide real-time assistance, answering queries and offering personalized product recommendations. Retailers should focus on improving the quality of chatbot interactions to ensure high levels of customer satisfaction. Additionally, chatbots can handle a wide range of customer queries, reducing the need for human intervention and streamlining the shopping process. Predictive analytics is another critical area where AI can significantly impact online retail. By analyzing historical data and identifying patterns, predictive analytics allows retailers to anticipate consumer needs and optimize inventory management. This capability helps retailers reduce the risks of stockouts and excess inventory, ensuring that popular products are always in stock. Predictive analytics can also help retailers identify emerging trends and adjust their strategies accordingly, leading to better decision-making and improved sales performance.

Social media engagement driven by AI offers unique opportunities for retailers to connect with consumers and create personalized marketing campaigns. AI algorithms can analyze consumer interactions on social media platforms and tailor marketing messages to individual preferences. This approach not only enhances consumer engagement but also increases purchase frequency and spending patterns. Retailers should leverage AI-driven social media strategies to build stronger relationships with consumers and drive sales. Ethical and transparent use of AI is crucial for building consumer trust and engagement. Consumers are increasingly aware of data privacy issues, and their trust in AI applications depends on how their data is collected, used, and protected. Retailers must adopt robust data protection measures and ensure transparency in AI-driven decision-making processes. Ethical considerations should be at the forefront of AI deployment in online retail to avoid

potential negative impacts on consumer behavior and perceptions.

Policymakers also have a role to play in regulating the use of AI in online retail. Clear guidelines and regulations are needed to ensure that AI technologies are used ethically and responsibly. Policymakers should focus on data privacy, algorithmic transparency, and the prevention of algorithmic biases to protect consumer interests. Additionally, policies should promote innovation and the responsible use of AI to foster growth in the online retail sector. For researchers, the findings of this study highlight several areas for further investigation. Future research should explore the long-term impacts of AI-driven personalization on consumer loyalty and trust. While the immediate benefits of personalization are evident, it is important to understand how these effects persist over time and whether they lead to sustained consumer loyalty. Additionally, research should examine the ethical implications of AI use in retail and how consumers perceive these ethical issues. Another area for future research is the integration of AI with emerging technologies such as augmented reality (AR) and the Internet of Things (IoT). These technologies have the potential to further enhance the online shopping experience by providing immersive and interactive experiences. Researchers should investigate how the integration of AI with AR and IoT influences consumer behavior and expectations. The impact of AI on different consumer demographics is another important area for research. Understanding how AI applications affect various demographic groups can help retailers tailor their strategies to meet the needs of diverse consumer segments. Researchers should examine how factors such as age, gender, income, and cultural background influence the effectiveness of AI-driven personalization, chatbots, predictive analytics, and social media engagement.

5.2. Comparison with other studies

The findings of this study align with those of Bhagat, Chauhan, and Bhagat (2022), who demonstrated that AI-driven personalization significantly boosts consumer purchase intentions and satisfaction. Similarly, Nichifor et al. (2021) highlighted that high-quality chatbot interactions significantly improve customer satisfaction, supporting our findings on the positive impact of chatbot effectiveness. Sharma (2023) found that predictive analytics enhances conversion rates through personalized recommendations, which aligns with our results showing a positive impact on purchase intention and consumer satisfaction. Additionally, Das et al. (2022) emphasized the role of AI-driven social media strategies in enhancing consumer purchase frequency and spending patterns, corroborating our findings on the significant influence of social media engagement.

5.3. Limitations and scope for future research

Despite the significant findings, this study has several limitations that should be acknowledged. First, the use of snowball sampling may introduce biases, as the sample may not be fully representative of the broader population. Future research should consider using more rigorous sampling methods to ensure a more representative sample. Second, the study relies on self-reported data, which may be subject to social desirability bias and inaccuracies in reporting. Future studies could incorporate

objective measures of consumer behavior, such as transaction data, to validate the self-reported findings. Third, the study focuses on specific aspects of AI applications in online retail, such as personalization, chatbots, predictive analytics, and social media engagement. While these are important areas, future research should explore other AI applications in retail, such as visual search, voice assistants, and AI-driven supply chain optimization. Fourth, the study primarily examines the immediate impacts of AI on consumer behavior. Longitudinal studies are needed to understand the long-term effects.

6. Conclusion

Reiterating the practical implications for retailers and policymakers reinforces the study's relevance and applicability. Retailers should prioritize AI-driven personalization to meet the growing consumer demand for customized shopping experiences. Investing in advanced AI algorithms that analyze consumer data to provide tailored recommendations and marketing messages can significantly enhance the shopping experience, increase consumer loyalty, and drive repeat purchases. The deployment of AI-powered chatbots should be optimized to enhance customer service and engagement. High-quality chatbot interactions can handle a wide range of customer queries, provide real-time assistance, and offer personalized product recommendations, thereby improving overall customer satisfaction.

Predictive analytics should be leveraged to anticipate consumer needs and optimize inventory management. By analyzing historical data and identifying patterns, retailers can better align their supply with consumer demand, reducing the risks of stockouts and excess inventory. Predictive analytics can also help retailers identify emerging trends and adjust their strategies accordingly.AI-driven social media engagement should be a key component of online retail marketing strategies. Social media platforms offer unique opportunities for retailers to engage directly with consumers and create personalized marketing campaigns. Using AI algorithms to analyze consumer interactions on social media can enhance consumer engagement, increase purchase frequency, and improve spending patterns.

Policymakers have a role to play in regulating the use of AI in online retail. Clear guidelines and regulations are needed to ensure that AI technologies are used ethically and responsibly. Policymakers should focus on data privacy, algorithmic transparency, and the prevention of algorithmic biases to protect consumer interests. Additionally, policies should promote innovation and the responsible use of AI to foster growth in the online retail sector.

Author contributions: Conceptualization, XD and QL; methodology, XD; software, XD; validation, XD, QL, and ZZ; formal analysis, XD; investigation, XD; resources, XD; data curation, XD; writing—original draft preparation, XD; writing—review and editing, XD; visualization, XD; supervision, XD; project administration, XD; funding acquisition, QL. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

Bhagat, R., Chauhan, P., & Bhagat, N. (2022). Influence of AI on consumer purchase intentions through personalized recommendations. Journal of Retailing and Consumer Services, 64, 102746.

Bedi, P., Bedi, P., & Singh, J. (2022). AI-driven personalization and consumer loyalty: A comprehensive study. International Journal of Retail & Distribution Management, 50(3), 339–354. https://doi.org/10.1108/IJRDM-09-2021-0347

Das, G., Pradhan, S., & Chaudhury, S. (2022). Impact of AI and social media engagement on online buying behavior: A framework. Journal of Business Research, 139, 339–348.

Jain, R., & Khurana, A. (2022). Enhancing consumer experience with AI-powered chatbots in online retail. Journal of Business Research, 138, 378–389.

Jain, R., & Gandhi, A. (2021). The impact of AI on impulse buying behavior in fashion retail: An empirical study in India. Journal of Fashion Marketing and Management, 25(4), 543–560. https://doi.org/10.1108/JFMM-02-2020-0014

Jangra, V., & Jangra, D. (2022). Ethical implications of AI in online shopping: Safeguarding consumer data. Ethics and Information Technology, 24(1), 83–99. https://doi.org/10.1007/s10676-021-09582-9

Mussa, M. (2020). Predicting consumer purchase behavior using AI: A comprehensive analysis. Journal of Retailing and Consumer Services, 57, 102224.

Mussa, M. H. (2020). The impact of Artificial Intelligence on Consumer Behaviors an Applied Study on the Online Retailing Sector in Egypt. Journal of Shopping and Economics, 10(4), 128–145. https://doi.org/10.21608/jsec.2020.128722

Nichifor, E., Trifan, E., & Nechifor, A. (2021). The impact of chatbots on consumer journeys in online retail. International Journal of Retail & Distribution Management, 49(7), 950–966. https://doi.org/10.1108/IJRDM-10-2020-0421

Raji, M. A., Olodo, H. B., Oke, T. T, et al. (2024). E-commerce and consumer behavior: A review of AI-powered personalization and market trends. GSC Advanced Research and Reviews, 18(3), 066–077. https://doi.org/10.30574/gscarr.2024.18.3.0090

Ruby, R., Gokulakrishnan, K., & Sasikumar, D. (2023). AI technologies and online impulse buying behavior: A bibliometric analysis. Journal of Retailing and Consumer Services, 67, 103006.

Sharma, P. (2023). The role of AI in predicting customer behavior and personalizing the shopping experience. Journal of Business Research, 144, 256–270. https://doi.org/10.1016/j.jbusres.2022.11.006

Tiutiu, A., & Dabija, D. C. (2023). Ethical considerations and customer-friendly technology in AI-driven social media engagements. Technology in Society, 75, 102190. https://doi.org/10.1016/j.techsoc.2023.102190

Wen, H., Zhang, L., Sheng, A., et al. (2022). From "Human-to-Human" to "Human-to-Non-human"—Influence Factors of Artificial Intelligence-Enabled Consumer Value Co-creation Behavior. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.863313

Xiong, L. (2022). Impact of AI and the digital economy on consumer online shopping behavior. Computers in Human Behavior, 130, 107197. https://doi.org/10.1016/j.chb.2021.107197