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Examining the Impact of Artificial Intelligence on Optimizing Customer Experience in Online Retail Stores

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Abstract

The primary objective of this study was to analyze various dimensions of employing artificial intelligence (AI) to enhance customer experience in online retail stores and to identify the factors influencing its success. This research was conducted using a quantitative, descriptive-survey method, and the relationships among AI, service personalization, and customer experience in online retail were examined through structural equation modeling (PLS-SEM). A purposive sampling method was applied to a group of 400 individuals, and data were collected using a researcher-made questionnaire. The validity and reliability of the instrument were confirmed through statistical analyses, and data analysis was performed using SmartPLS 4 software. The mediating role of personalization was assessed using the bootstrap method, and model fit was evaluated using standard indices The key findings of this study demonstrated that the use of AI has a positive impact on both customer experience and service personalization. The effect of AI usage on customer experience was confirmed with a path coefficient of 0.31 and a significance level of 0.001, while its effect on service personalization was confirmed with a path coefficient of 0.54 and a significance level of 0.002. Furthermore, service personalization showed a positive and significant effect on customer experience. In examining mediation, it was found that service personalization plays a partial mediating role in the relationship between AI usage and customer experience. Model fit indices including SRMR, NFI, and GOF indicated a good fit and the model's capacity to explain the relationships among the variables. The findings of this research revealed that the integration of AI in online retail stores significantly enhances customer experience. This technology, by strengthening service personalization, directly and indirectly influences customer satisfaction. Additionally, the structural equation modeling analysis confirmed that the proposed conceptual model fits well and effectively identifies the complex relationships among the variables.

Keywords: Artificial Intelligence, Online Retail Store, Customer Experience, Optimization

1. Introduction

Over the past decade, there has been a fundamental transformation in how businesses interact with customers in the digital space, largely driven by rapid advancements in artificial intelligence (AI). As consumer expectations evolve quickly and competition among online retailers intensifies, the ability to deeply understand customer behavior and respond intelligently to their needs has become a strategic advantage. AI, through capabilities such as machine learning, predictive analytics, computer vision, and natural language processing, enables brands not only to personalize but also to optimize the customer experience

in real-time (Jannach et al., 2022; Kumar et al., 2023). This technology has increasingly become an essential tool in designing digital interactions.

Customer experience is no longer limited to traditional factors such as price or product quality; rather, it encompasses the customer's overall evaluation of their interactions with a brand throughout the purchasing journey—from initial awareness to post-purchase stages. According to the "Critical Touchpoints" theory, AI can identify key interaction points between the customer and the retailer and intelligently enhance them to improve customer satisfaction and emotional engagement (DeVries, 2003; Dwivedi, 2021). For example, e-commerce platforms using AI-driven systems can significantly reduce customer wait times for support responses, delivering a smoother and more user-friendly experience (Parsakia & Jafari, 2023).

Moreover, one of AI's unique capacities lies in detecting customer sentiment through the analysis of feedback from social media, submitted reviews, and customer support interactions. Tools such as sentiment analysis help online retailers gain a clearer understanding of customer satisfaction or dissatisfaction and devise strategies to address identified shortcomings (Cambria et al., 2022). AI also offers the ability to predict customer behavior. Predictive learning models can combine past purchasing data to estimate the timing of a customer's return visit to a website or the likelihood of shopping cart abandonment, triggering preventive actions such as personalized offers, discount coupons, or targeted messages.

A notable innovation in this area is the application of next-generation algorithms known as large language models (LLMs), such as GPT, which provide deeper comprehension of customer queries and generate highly accurate and relevant responses. These technologies, in addition to their role in customer support, are also employed in creating personalized advertising content, allowing businesses to tailor messages precisely to each user's style and preferences (Dwivedi, 2021). Accordingly, online retailers can integrate behavioral, geographic, and psychographic data to design multi-layered recommender systems that create a fully customized shopping experience.

Overall, AI serves not only as a tool for optimizing customer experience but also as a key driver in transforming business models and designing loyalty strategies. By reducing the gap between data and decision-making, AI helps online retailers create a more human-like, faster, more accurate, and satisfying experience for their customers. Such transformation influences customer retention and sales growth and fosters long-term, value-based relationships between brands and customers. In addition, intelligent chatbots powered by natural language processing (NLP) have revolutionized customer support. According to a study by Rossmann et al. (2020), 65% of users prefer using chatbots for resolving simple issues rather than waiting for human operators. This technology delivers immediate and precise responses while simultaneously reducing operational costs and enhancing the customer experience (Rossmann et al., 2020).

In the realm of sentiment analysis, AI—leveraging advanced deep learning algorithms—has been able to process customer feedback beyond superficial interpretations, capturing emotional subtleties and hidden intentions embedded in user comments. These analyses not only categorize feedback into positive, negative, and neutral but also assess emotional context and intensity, enabling online retailers to craft targeted and personalized responses to customer criticisms and suggestions (Zhang et al., 2018). For instance, a customer expressing dissatisfaction over delayed delivery in polite terms may be incorrectly categorized as satisfied by traditional algorithms, whereas AI-powered systems can more accurately detect such nuanced dissatisfaction and initiate appropriate responses.

Furthermore, the use of AI in website experience personalization represents a significant advancement in customer satisfaction. Intelligent algorithms analyze behavioral data, purchase history, visit timing, geographic location, and even device type to dynamically tailor webpage content, offers, and advertisements in real-time (Huang & Rust, 2021, 2023). This dynamic personalization reduces bounce rates, increases user engagement, and ultimately boosts conversion rates. Additionally, AI-driven advertisement timing can analyze customer behavior patterns to display ads at moments of peak impact.

In the areas of dynamic pricing and inventory management, AI has transformed the decision-making process. Demand forecasting models that utilize historical purchase data, seasonal trends, social events, and even weather conditions help retailers optimize their inventory—avoiding both surplus and shortages—and improve working capital efficiency (Li et al., 2023). Moreover, dynamic pricing algorithms can adjust prices in real-time based on market competition, customer preferences, and price sensitivity, thereby ensuring maximum profitability.

Despite these numerous advantages, effective use of AI in online retail requires proficiency in designing technical infrastructures, ensuring transparency in algorithmic decision-making processes, and building customer trust. Understanding user behavior towards new technologies, digital literacy levels, and concerns regarding data collection and usage are among the key behavioral challenges in implementing AI. In addition, legal requirements related to data privacy and ethics must be rigorously addressed, especially in countries with stringent regulations such as the GDPR in the European Union (Maglio & Lim, 2019; Michael et al., 2023).

Another critical point is that successful AI implementation demands alignment between an organization's technical, marketing, and human resources strategies. Only when organizational structure, innovation acceptance culture, and high-level data analytics capabilities are in place can AI function as a sustainable competitive advantage in customer experience optimization. Therefore, research into the impact of AI in this domain is not only crucial for advancing theoretical frameworks and scientific models in customer experience management but also for developing practical frameworks in digital policymaking and strategic decision-making for online enterprises.

2. Methods and Materials

This study was conducted within the framework of a quantitative approach and is classified as a descriptive-survey with an applied orientation. The primary objective was to examine the relationships among the use of artificial intelligence technologies, service personalization, and customer experience in online retail stores. Given the nature of the research variables and the intended causal structure, the variance-based structural equation modeling method with a combined approach incorporating both reflective and formative measurement models (PLS-SEM) was employed. This method is considered suitable and contemporary due to its ability to model complex constructs, handle medium sample sizes, and accommodate non-normal data distributions.

The statistical population included all individuals who had made a purchase from Iranian online retailers—such as Digikala, Okala, and SnappMarket—within the past year. Due to the unavailability of a complete list of customers, convenience and purposive sampling methods were applied. The sample size was determined based on the guidelines suggested by Hair et al. (2023) for PLS modeling, using the rule of having at least ten times the number of the maximum incoming paths to a latent variable. Ultimately, 400 completed questionnaires were included in the analysis.

The data collection instrument was a researcher-designed questionnaire developed through a systematic review of the relevant literature. The questions were structured into three main sections: items related to the extent of artificial intelligence usage, including recommender systems, chatbots, and learning systems; items concerning service personalization based on need recognition, content tailoring, and human-machine interaction; and items measuring customer experience across cognitive, emotional, and behavioral dimensions. A five-point Likert scale (ranging from "strongly disagree" to "strongly agree") was used for measurement (Table 1).

Table 1. Operationalization of Variables and Questionnaire Items

Variable	Dimension	Questionnaire Item	Scale
Use of AI	Recommender Algorithms	The online store regularly recommends products that match my preferences.	5-point Likert
	Chatbots and Smart Responders	The chatbot provides accurate and effective responses to my questions.	
	Machine Learning	The online shopping system enhances my experience based on past purchases.	
Service Personalization	Personalized Content	The store's homepage displays unique content tailored to me.	
	Personal Interaction	The store interacts with me on a personal level (e.g., using my name).	
	Suggestion Adjustment	The store updates its suggestions based on my current needs.	
Customer Experience	Cognitive	I gained useful information from shopping at this online store.	
	Emotional	Shopping at this store makes me feel good.	
	Behavioral	I am highly likely to shop at this store again.	

To assess the validity of the data collection instrument, content validity was established through feedback from five faculty members specializing in digital marketing and information technology engineering. Construct validity was evaluated through confirmatory factor analysis based on the PLS approach, and convergent and discriminant validity were assessed using AVE,

Fornell-Larcker, and HTMT criteria. The reliability of the questionnaire was assessed using Cronbach's alpha and composite reliability, with all constructs showing values greater than 0.70.

For data analysis and hypothesis testing, SmartPLS 4 software was used. The conceptual model included three primary constructs and six causal paths. First, the measurement model, encompassing both reflective and formative constructs, was assessed using iterative algorithms. Then, the structural model was analyzed using the t-statistic and path coefficient (β) at a 95% confidence level. To evaluate the mediating role of service personalization, a multi-stage bootstrapping method and the VAF index were used to determine the type and strength of the mediation effect.

Model fit indices such as SRMR, NFI, and GOF were examined to assess the overall goodness of fit and ensure that the model was adequate for interpreting the results. This methodology represents a combination of classical and modern approaches to analyzing causal relationships in digital behavioral research.

3. Findings and Results

Based on the data in the table, Cronbach's alpha for all three constructs exceeded 0.85, indicating very strong internal consistency of the items for each variable. The composite reliability (CR) values were all above 0.89, which further confirmed the internal stability of the constructs with even greater rigor than Cronbach's alpha. The Average Variance Extracted (AVE) for all constructs was above 0.50; specifically, AVE was reported as 0.64 for AI usage, 0.61 for service personalization, and 0.68 for customer experience. These values demonstrate that each construct explains more than half of the variance of its indicators and thus satisfies the condition for convergent validity.

Regarding discriminant validity, the HTMT criterion showed that the values between constructs were all below 0.85. For example, the HTMT between AI usage and service personalization was 0.62, between AI usage and customer experience was 0.58, and between service personalization and customer experience was 0.66. These values clearly indicate sufficient distinction among the constructs. Overall, it can be concluded that the measurement model had acceptable reliability and validity and was ready to proceed to path analysis and hypothesis testing (Table 2).

Table 2. Reliability and Validity of Constructs (Reflective Constructs)

Construct	Cronbach's Alpha	Composite Reliability (CR)	AVE	HTMT with Other Constructs
AI Usage	0.87	0.91	0.64	Personalization: 0.62, Customer Experience: 0.58
Service Personalization	0.85	0.89	0.61	AI Usage: 0.62, Customer Experience: 0.66
Customer Experience	0.91	0.93	0.68	AI Usage: 0.58, Personalization: 0.66

Results from the path analysis showed that the effect of AI usage on customer experience was positive and statistically significant. The path coefficient for this relationship was 0.31, with a t-value of 4.62 and a p-value of 0.001, confirming the first hypothesis (AI usage → customer experience) with high confidence. Likewise, AI usage had a positive and significant effect on service personalization; the path coefficient was 0.54, the t-value was 7.80, and the p-value was 0.002, thus confirming the second hypothesis (AI usage → service personalization). The effect of service personalization on customer experience was also examined and found to be positive and significant, with a path coefficient of 0.48, a t-value of 6.23, and a p-value of 0.002. Consequently, the third hypothesis (service personalization → customer experience) was also confirmed. All three hypotheses were supported, and the results of the structural model validated the proposed causal relationships among the research variables (Table 3).

Table 3. Path Coefficients and Hypothesis Testing (Structural Model Analysis)

Hypothesized Path	Path Coefficient (β)	t-value	p-value	Hypothesis Result
AI Usage → Customer Experience	0.31	4.62	0.001	Confirmed
AI Usage → Service Personalization	0.54	7.80	0.002	Confirmed
Service Personalization → Customer Experience	0.48	6.23	0.002	Confirmed

The mediating effect of service personalization was analyzed using the bootstrapping method and the Variance Accounted For (VAF) index. The indirect effect of AI usage on customer experience through service personalization yielded a coefficient of 0.26. The total effect coefficient for this path, including both direct and indirect effects, was reported as 0.57. The VAF index, which indicates the ratio of the indirect effect to the total effect, was calculated to be 45.6%. According to the methodological criteria used in this study, a VAF between 20% and 80% denotes partial mediation. Therefore, it was concluded

that service personalization played a partial mediating role in the relationship between AI usage and customer experience. This result was aligned with the theoretical logic of the study's conceptual model and the confirmed direct paths (Table 4).

Table 4. Mediating Effect Analysis of Service Personalization (Bootstrapping and VAF Method)

Indirect Path	Indirect Effect Coefficient	Total Effect (Direct + Indirect)	VAF (%)	Mediation Type
AI Usage → Personalization → Customer Experience	0.26	0.57	45.6%	Partial Mediation

The results related to the structural model fit indices showed that the SRMR value was 0.058, which is below the desired threshold of 0.08, indicating that the difference between the observed and predicted covariance matrices was minimal and that the model fit was appropriate. The NFI was reported at 0.89, which exceeds the minimum desired value of 0.80, confirming that the proposed model significantly improves fit compared to an independent model. The GOF index was 0.52, which surpasses the reference threshold of 0.36, indicating a strong and excellent structural model fit. Collectively, all fit indices confirmed that the structural model proposed in this study exhibited a satisfactory fit and was capable of accurately explaining the relationships among the variables (Table 5).

Table 5. Structural Model Fit Indices

Fit Index	Value	Desired Threshold	Evaluation
SRMR (Standardized Root Mean Square Residual)	0.058	< 0.08	Appropriate
NFI (Normed Fit Index)	0.89	> 0.80	Appropriate
GOF (Goodness of Fit)	0.52	> 0.36 (Strong)	Excellent

4. Discussion and Conclusion

The findings of this study consistently demonstrated that the use of artificial intelligence (AI) plays a significant role in optimizing customer experience in online retail environments. This effect is not only direct but is also amplified through the enhancement of service personalization processes. The direct effect coefficient of AI usage on customer experience (0.31) and its effect on service personalization (0.54) were both significant and strong, clearly indicating that AI-based algorithms and systems perform effectively in understanding customer preferences and needs. These figures reflect not only the predictive power of AI algorithms but also highlight how this technology can serve as a strategic lever in enhancing customer interactions. This enables online retailers to create a unique shopping experience for each customer, thereby increasing customer loyalty and satisfaction. Recent studies clearly indicate that AI is transforming the way online stores interact with customers, enabling them to use consumption data and purchase behavior to generate more personalized and engaging interactions (Elsafty & Hesham, 2025). These results align with recent research by Huang et al. (2023) and Yang et al. (2024), which demonstrated that employing AI in digital retail leads to a distinctive, satisfying, and personalized customer experience (Huang & Rust, 2023; Yang et al., 2024). These findings suggest that the application of AI, especially in online purchasing processes, can have long-term positive effects on customer experience and, in turn, on the performance of online retailers.

Studies have also shown that intelligent recommender systems can increase conversion rates by up to 35% (Jannach et al., 2022). These systems analyze user behavior data to provide highly accurate product recommendations. This capability significantly enhances the customer shopping experience and delivers personalized suggestions tailored to their precise preferences and needs. Moreover, research conducted by IBM (2021) revealed that 65% of customers prefer to use intelligent chatbots for resolving simple issues because these systems offer 24/7, personalized support. This underscores the growing demand for fast, effective, and intelligent interactions that can substantially enhance customer satisfaction. As a result, online retailers should invest in deploying AI technologies in customer interactions—particularly through chatbots and intelligent support systems—to best capture customer satisfaction.

At a deeper level, research by DeVries (2003) has shown that AI, by analyzing purchase patterns and browsing behavior, provides valuable insights for retailers. This is particularly effective in dynamic pricing and inventory management, where AI-equipped stores have experienced profit increases of up to 10%. This is highly relevant for online stores where inventory control and dynamic pricing directly influence customer acquisition and market competitiveness (DeVries, 2003). For instance, AI systems can more accurately analyze customer behavior to adjust prices in real time, thereby preventing resource loss. Such decision-making enables stores to optimize resources and perform more competitively by increasing sales and profitability.

However, successful implementation of this technology requires attention to several key factors. A indicates that 43% of consumers are concerned about the misuse of their personal data. These findings emphasize that combining AI with human-centered approaches can lead to better outcomes (Lemon & Verhoef, 2016). This implies that to fully exploit AI's potential, retailers must address customer concerns about privacy and implement solutions to protect data security. Furthermore, combining AI technologies with human-centric approaches can facilitate more optimized interactions, leading to higher customer satisfaction and loyalty. In this regard, using AI as a supplementary tool to create personalized experiences alongside human interaction may enhance the success of online stores.

Moreover, the positive and significant effect of service personalization on customer experience (0.48) indicated that tailoring services to the unique characteristics, behaviors, and needs of each customer can greatly enhance the shopping experience. This finding underscores the importance of acknowledging individual customer differences in the online shopping process and emphasizes the necessity of providing each customer with a personalized and distinctive experience. This aligns with theoretical frameworks based on digital customer experience and personalization models, which assert that customer experiences should be continuously and intelligently designed and updated for each individual. Theoretically, these results highlight that optimizing customer experience is not achieved solely through technology, but through the intelligent use of data to customize interactions and recommendations. This means that even in digital environments, human approaches to understanding and responding to individual customer needs remain essential.

The analysis of the mediating effect of service personalization using the bootstrapping method and the VAF index revealed that this variable plays a partial mediating role (VAF = 45.6%). This indicates that AI usage impacts customer experience both directly and indirectly by enhancing personalization. This dual-layered structure effectively illustrates the operational mechanism of AI in the realm of digital experience. In other words, AI influences customer experience not only through direct interactions but also indirectly by strengthening service and recommendation personalization. These findings underscore the dual importance of AI in improving customer experience and show that optimization in digital environments requires a combination of both direct and indirect factors.

Model fit was also assessed using indices such as SRMR (0.058), NFI (0.89), and GOF (0.52), all of which indicated a strong and acceptable fit. Notably, the high GOF value demonstrated the overall performance of the research model in both measurement quality and structural relationships. These indices clearly confirmed that the proposed model was well-fitted for analyzing the impacts of AI and service personalization on customer experience and was effective in modeling the complex relationships among variables. This was especially evident in the relationship between AI, service personalization, and customer experience in digital environments. Thus, the results of this model can serve as both a scientific and practical foundation for similar future studies. The proposed model can facilitate deeper analysis of variable relationships and act as a valuable tool in future research across digital marketing and AI technology domains.

Collectively, these findings suggest that companies operating in the online retail sector should adopt more strategic approaches when implementing AI solutions. Simply utilizing the technology is not sufficient; the most effective results are achieved when AI is employed for continuous, precise, and interactive personalization. This requires that stores design their systems with the understanding that AI should be used to offer personalized recommendations and services that align with each customer's specific needs and preferences. Consequently, these systems must be capable of adapting to diverse customer behaviors and effectively identifying their unique needs. Given the growing competition in digital markets, leveraging AI to enhance customer experience has become a necessity that can provide a substantial competitive advantage for brands. These results not only contribute new empirical evidence but also offer a robust theoretical basis for future research on customer experience, intelligent system design, and digital marketing. Considering the increasing importance of AI in optimizing customer experience, this study can serve as a practical guide for companies and online retailers aiming to utilize this technology more effectively in purchasing processes and experience enhancement. Furthermore, this research may inspire future studies in various areas of AI applications within business and digital interactions.

The limitations of this research included constraints related to sampling. Since the data were collected using a researcher-designed questionnaire, the findings may be limited to a specific group of online customers and may not fully reflect the customer experience across all types of online stores. Additionally, the study focused exclusively on one specific type of customer interaction with online systems and did not account for various interactions in other online industries such as services, gaming, and other digital platforms. Moreover, the use of structural equation modeling (SEM), despite its strength in analyzing

complex relationships, restricts the results to measurable dimensions and model assumptions, potentially overlooking the influence of other unmeasurable variables on customer experience.

Research recommendations for future studies include evaluating different models of AI and service personalization across various online industries and platforms. In particular, research on cultural and behavioral differences in the use of AI could provide a deeper understanding of its impact on customer experience across regions. Additionally, studies exploring the combined effect of AI techniques and human analytics on customer experience could lead to the identification of more innovative methods for enhancing digital interactions and building trust in online stores. Future research may also focus on real-world interactions between users and AI systems, especially regarding the integration of emerging technologies with traditional human interaction methods. Since this study analyzed an existing conceptual model, future investigations are encouraged to be conducted empirically using data collected from various online retailers to identify more precise impacts of AI on customer experience.

The results of this study clearly showed that the use of AI in online retail has a substantial and multi-dimensional impact on optimizing customer experience. On the one hand, AI technologies were found to directly improve the quality of interaction between customers and brands. On the other hand, by enhancing service personalization, they indirectly and mediationally influence customer experience. In particular, service personalization, as a bridge between AI and customer experience, plays a key role in translating the effects of technology into customer perception and satisfaction. These findings emphasize that interactive, data-driven, and customized approaches must be designed and executed alongside intelligent technologies to achieve maximum effectiveness and deliver a rich, dynamic, and enjoyable customer experience.

In addition, the conducted structural equation modeling (SEM) analysis confirmed that the proposed conceptual model exhibited high statistical fit and effectively identified and validated the complex relationships among the research variables. This underscores the theoretical credibility of the proposed model and its effectiveness in analyzing the various dimensions of AI's impact on customer experience in digital contexts. In other words, the mere use of AI technologies does not guarantee success in enhancing customer experience. What matters is how AI is implemented, integrated, and adapted to customers' behavioral, psychological, and expectation-based characteristics.

Another important point is that the findings of this study open new horizons for future research in digital marketing, human–machine interaction, and intelligent system design. This study highlights the necessity of integrating AI with deep human analysis, data ethics, and customer behavioral insights, asserting that success in customer experience optimization requires a blend of technological insight and socio-psychological understanding. Therefore, online retailers must go beyond mere technical applications to create a meaningful synergy between data, technology, and human interaction in order to establish a sustainable and superior position in digital competition. Such an approach can lead to long-term, loyalty-based relationships between brands and customers and ultimately ensure sustainable value creation in the online environment.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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