The Mechanism of Artificial Intelligence Personalized Recommendations and Customer Service Systems on Consumer Satisfaction in E-commerce Shopping

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Abstract. With the rapid development of artificial intelligence (AI) technology, more and more fields are beginning to use AI technology. Based on this, this paper studies the role of AI personalized recommendations and AI customer service systems in improving consumer satisfaction in e-commerce shopping, and adopts a questionnaire survey method to conduct empirical research on sample data. The results indicate that AI personalized recommendations and AI customer service systems have a significant positive impact on consumer trust, which in turn further influences consumer satisfaction. Consumer trust plays a significant mediating role between AI personalized recommendations and AI customer service systems, and consumer satisfaction. Furthermore, consumer trust has a significant positive impact on consumer satisfaction. Therefore, e-commerce platforms and merchants should pay more attention to consumers' needs and feedback regarding AI personalized recommendations and AI customer service systems in the future. By improving the user experience for consumers, it can further enhance their trust and satisfaction.

Keywords: Artificial Intelligence, Personalized Recommendations, AI Customer Service System, Customer Satisfaction

1. Introduction

In the current era of rapid development of big data modeling technology and digital technology, artificial intelligence (AI) technology is also gradually being applied to various fields, and continues to play an important role. In the field of e-commerce and online shopping, AI technology has deeply penetrated every link in the consumer value chain. It is particularly noteworthy in the areas of personalized recommendations and AI customer service. On the one hand, e-commerce platforms leverage technologies such as machine learning and deep learning to mine data on user browsing, clicks, and purchases in real time, shortening the consumer information search path with accurate recommendations. This effectively reduces costs, increases flexibility, and simplifies customer interactions [1]. On the other hand, emerging AI customer service utilizing big data models is gradually replacing traditional human customer service. AI customer service provides consumers with instant, efficient, and low-cost service support by utilizing emotional computing and multi-round dialogue capabilities. The application of AI technology in customer service not only

accelerates consumers' purchasing decision-making process, but also provides businesses with more precise and effective marketing strategies, greatly reducing the cognitive burden on users and significantly improving overall customer satisfaction [2].

In today's rapidly changing and fast-paced market environment, the traditional consumer mindset focused on product quality is no longer sufficient to enable businesses to secure a large market share and strong market competitiveness. Consumer trust and satisfaction have increasingly become key factors for businesses and merchants to maintain long-term market competitiveness and sustainable development. Therefore, companies and businesses are constantly exploring new ways to enhance consumer trust and satisfaction with their brands. AI personalized recommendations and AI customer service leverage enhanced perceptual relevance and human-like interaction to enhance consumers' emotional connection to the platform and brand, and reinforce consumers' experience of being understood and respected when making purchases, further enhancing customer loyalty to brands and merchants, thereby creating services with high customer satisfaction.

This paper examines the impact of AI personalized recommendations and AI customer service systems on consumer satisfaction to provide merchants with more effective marketing strategies. Avoid causing consumer resentment and anxiety due to excessive recommendations and rigid customer service, while ensuring a simultaneous improvement in consumer satisfaction.

2. Research model and hypothesis

AI personalized recommendations refer to the provision of information that meets users' personalized needs through computer information systems. Personalized recommendation systems can effectively filter and screen information, helping users retrieve information resources that meet their needs in a personalized way [3]. With the rapid development of online shopping and internet shopping, businesses hope to quickly identify potential target customers through more efficient and convenient algorithms. Consumers, on the other hand, hope that AI's personalized recommendations will reduce the time spent searching for desired products, allowing them to browse and purchase their favorite items more quickly. The availability of recommended choices can significantly influence consumer trust [4]. As AI personalized recommendations continue to improve the accuracy of recommendations in the consumer purchasing process, consumers will increasingly trust the results generated by AI systems through big data model calculations. Therefore, AI's personalized recommendation system helps consumers purchase products more quickly while also enhancing consumer trust in the system. Therefore, the first hypothesis of this paper is proposed.

H1: AI personalized recommendations have a positive impact on consumer trust.

Currently, in the field of corporate customer service, AI customer service systems are also widely used. AI customer service systems are a new generation of intelligent online customer service. It adds AI algorithm logic to traditional customer service functions to provide consumers with interactive services. This system uses natural language processing technology, speech recognition technology, machine learning technology, and other technologies to understand consumer needs, answer consumer questions, and provide solutions. AI customer service systems now use big data analysis to design customer-specific profiles, and thus are integrated into the marketing and retail sectors [5]. Past research has clearly shown that AI interaction is an important factor in determining consumer trust [6]. Furthermore, artificial intelligence systems have advantages over traditional human customer service representatives in terms of efficiency and cost. Therefore, through the AI customer service system's ability to automatically process consumer demands and services, it can bring higher operational efficiency and more operating profits to enterprises [7]. Although some AI customer service systems still have some weaknesses, such as a monotonous form, limited ability,

etc. However, as the degree of automation in the system continues to improve, these shortcomings are also being continuously refined. As AI customer service systems continue to improve and their problem-solving capabilities further enhance, consumers' acceptance and trust in AI customer service systems will also gradually increase. Based on the above, the second assumption of this paper was made.

H2: AI customer service systems have a positive impact on consumer trust.

Consumer trust is a subjective belief formed by consumers based on their understanding. It manifests itself as dependence on others other than oneself, or a person's expectations that the relevant entity will fulfill its obligations about the transaction [8]. In the context of AI, trust is key to ensuring that this technology is accepted, continues to progress, and develops [9]. The consumer trust discussed in this paper is mainly reflected in consumers' reliance on and expectations for AI personalized recommendations and AI customer service systems, hoping that they can provide consumers with reliable and effective assistance during the purchasing process and decision-making. After consumers develop a high level of trust in AI personalized recommendations and AI customer service systems, consumer satisfaction will also be greatly improved. In mainstream marketing literature, satisfaction is a one-dimensional concept. It is a cognitive comparison between expectations and actual product or service performance [10]. Based on the above discussion, Hypothesis 3 is proposed in this paper.

H3: Consumer trust has a positive impact on consumer satisfaction.

Based on the above hypothesis, the article should conduct an in-depth study of the influencing mechanisms between AI personalized recommendations, AI customer service systems, consumer trust, and consumer satisfaction. Based on this, the model shown in Figure 1 was constructed.
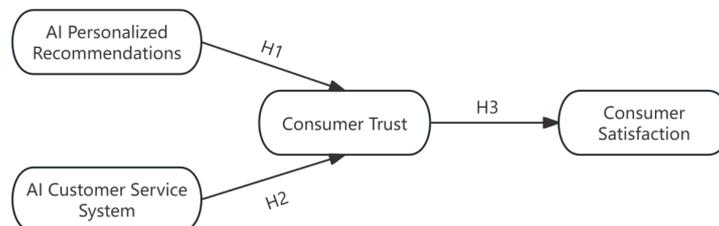

Figure 1. Research model

3. Scales and data collection

3.1. Scale

This paper uses a questionnaire survey to collect data to validate the hypotheses and models presented in this paper. Since this paper aims to measure the impact of AI personalized recommendations and AI customer service systems on consumer satisfaction in e-commerce shopping, the questionnaire used in this paper was modified based on existing questionnaires and actual circumstances. This helps to improve the accuracy of questionnaire research variables. The scale for AI personalized recommendations in the independent variable refers to the research of Kar Yan Tam and Shuk Ying Ho, using four questions for measurement. The scales and measurement items for the AI customer service system were taken from the research of David Gefen and Detmar W. Straub. It also uses four measurement items. The mediator variable consumer trust scale was adapted from relevant literature by Robert M. Morgan and Shelby D. Hunt. The scale for the

dependent variable of consumer satisfaction was designed based on the relevant research by Fornell, C. et al.. Four questions were designed for measurement.

3.2. Data collection

This questionnaire survey is primarily targeted at consumers who frequently use online shopping software and platforms, as well as those interested in AI customer service systems. Respondents participating in the questionnaire survey must have relevant experience using AI personalized recommendations and AI customer service systems when shopping online. They must also be able to make objective evaluations and scores based on actual usage and experience. In order to ensure that the sample size of this survey questionnaire is sufficient and that the results are representative and universal, this questionnaire was conducted using the online questionnaire software Wenjuan Xing. In the end, 100 questionnaires were effectively completed.

4. Hypothesis testing and data analysis

4.1. Reliability and validity testing

In reliability analysis, AI customer service systems ($\alpha > 0.8$) and AI personalized recommendations ($\alpha > 0.77$) demonstrated excellent reliability. Consumer trust and consumer satisfaction were 0.744 and 0.719, respectively, which are close but still within an acceptable range. The data indicate that the design of the items on each scale is reasonable, and the internal consistency meets psychological measurement standards. Furthermore, KMO is greater than 0.7, with a value of 0.930. Indicating that the assumption meets the prerequisites for factor analysis. $p < 0.001$ meets the $p < 0.05$ standard, so the data passes Bartlett's test. The results of these two tests indicate that the research data is valid.

4.2. Correlation analysis

According to Table 1, the results of the correlation analysis, the Pearson correlation coefficient of the independent variable AI personalized recommendation is 0.788, and $p < 0.001$. The data shows that the independent variable has a significant positive correlation with consumer satisfaction. Similarly, the Pearson correlation coefficient between the independent variable, the AI customer service system, and the dependent variable is 0.795, with $p < 0.001$. Therefore, based on the data, it can be concluded that AI customer service systems are also significantly and positively correlated with consumer satisfaction.

Table 1. Correlation analysis between AI personalized recommendations and AI customer service on consumer satisfaction

		AI Personalized Recommendations	AI Customer Service System
Consumer Satisfaction	Pearson Correlation Coefficient	0.788**	0.795**
	Significance (two-tailed)	<0.001	<0.001
**At the 0.001 level (two-tailed), the correlation is significant.			

4.3. Mediation effect test

According to the analysis results of the model, the hypothesis that personalized recommendations and AI customer service systems have a positive impact on consumer trust is fully supported. Specifically, assume that H1, "AI personalized recommendation systems have a positive impact on consumer trust," passes the test. Through the regression analysis in Table 2, the standardized coefficient β of the AI personalized recommendation system on consumer trust is 0.436, with a significance level of $p<0.001$. It shows that for every 1 standard deviation increase in personalized recommendations, consumer trust increases significantly by 0.436 standard deviations. The results show that AI personalized recommendations can increase consumer trust. In particular, when AI personalized recommendations suggest products or services that meet consumer needs, consumer trust can be significantly strengthened. In summary, H1 is completely valid.

Similarly, the standard coefficient β for consumer trust in AI customer service systems is 0.390, $p<0.001$. This proves that H2 is valid. The instant response and problem-solving capabilities of AI customer service systems also help to enhance consumer trust.

Table 2. Regression linear analysis of consumer trust in AI personalized recommendations and AI customer service

		Coefficient$^\alpha$				
		Unstandardized Coefficient		Standardization Coefficient		
	Model	B	Standard Error	Beta	t	Significance
	(Constant)	0.779	0.234		3.324	0.001
1	AI Personalized Recommendations	0.413	0.109	0.436	3.799	< 0.001
	AI Customer Service System	0.369	0.109	0.390	3.395	< 0.001
	Dependent variable: Consumer trust					

According to the data in Table 3, it can be seen that the AI personalized recommendation system has a significant positive impact on consumer satisfaction (β = 0.408, t = 3.825). The AI customer service system has a beta value of 0.452 and a t-value of 4.237, indicating that it also has a significant positive effect on consumer satisfaction. In addition, the model's overall explanatory power R^2 reaches 68.1%, and the ANOVA test results are highly significant.

In the model, the correlation coefficient between consumer trust and consumer satisfaction is 0.253, and the significance level is $p<0.008$. Therefore, it has a significant positive impact on consumer satisfaction.

Furthermore, when consumer trust is introduced, the standardized coefficients of both independent variables decrease significantly. The AI personalized recommendation coefficient decreased from 0.408 to 0.300. Meanwhile, the AI customer service system coefficient decreased from 0.452 to 0.356. This also indicates that consumer trust plays a significant mediating role between AI systems and satisfaction. AI personalized recommendations and customer service systems not only directly improve satisfaction, but also indirectly improve satisfaction by enhancing consumer trust. Among them, the trust mechanism contributes nearly 40% of the effect. The model's statistical indicators are robust, and its conclusions are reliable.

In the hierarchical regression model shown in Table 3, the direct effect of consumer trust on satisfaction is β=0.247, and the ANOVA test further supports the overall validity of the model. This led to the establishment of H3, confirming that consumer trust is the key psychological bridge connecting AI technology and user satisfaction.

Table 3. Regression linear analysis of AI personalized recommendations, AI customer service, and consumer trust on consumer satisfaction

	Coefficient^a					
		Unstandardized Coefficient		Standardization Coefficient		
	Model	B	Standard Error	Beta	t	Significance
1	(Constant)	0.612	0.223		2.743	0.007
	AI Personalized Recommendations	0.396	0.104	0.408	3.825	< 0.001
	AI Customer Service System	0.439	0.103	0.452	4.237	< 0.001
2	(Constant)	0.415	0.228		1.819	0.072
	AI Personalized Recommendations	0.291	0.108	0.300	2.710	0.008
	AI Customer Service System	0.345	0.106	0.356	3.254	0.002
	Consumer Trust	0.253	0.094	0.247	2.700	0.008
	Dependent variable: Consumer satisfaction					

5. Recommendation

5.1. Establish a 'transparent recommendation' system

In terms of algorithmic explainability and controllability, the platform should establish a 'transparent recommendation' system. Specifically, a 'recommendation reason' tag can be embedded in the product details page or recommendation card. Enhance consumer trust through colloquial, scenario-based language explanations, such as 'Guess what you like'. It also provides a correction feedback function, allowing users to make corrections in real time when they find that recommendations are inaccurate. The system instantly corrects weights through reinforcement learning. This move not only satisfies consumers' information needs but also enhances their sense of control through an empowerment mechanism, thereby strengthening consumer trust. In addition, the platform should actively accept joint supervision by the public and regulatory authorities to further consolidate its brand credibility.

5.2. Enhancing AI's rapid response and processing capabilities

In response to the increasingly rapid pace of promotions in the industry, platforms need to enhance the response speed and quality of AI. On the one hand, platforms and merchants should continuously optimise algorithms to ensure that AI customer service can maintain a response time of seconds during traffic peaks. On the other hand, when the system detects a surge in negative user sentiment due to objective reasons such as delayed shipments or stock shortages, it automatically triggers an 'emotional circuit breaker' script. Avoid dissatisfaction spreading on social media by proactively sending compensation coupons, expedited shipping options, or manual customer service callbacks to affected users. After the event, emotional analysis and attribution reports were used to identify shortcomings in the promotional experience, providing a data-driven list of improvements for the next promotion.

5.3. Improving the emotionality of AI customer service systems

The iteration of AI customer service should not stop at 'fast responses', but should strive for 'accurate and warm responses'. In daily service, AI customer service should use affective computing technology to identify emotional tendencies in user text or voice. Use appropriate soothing language for users who are highly angry or anxious. When necessary, transfer to a human customer service representative to form a hybrid model of 'AI prediction--human backup'. At the same time, for high-value or high-complaint-risk users, e-commerce platforms can set up a 'dedicated AI customer service' system. AI customer service and dedicated human customer service work together to provide full lifecycle services, reducing churn rates. The platform can also record the triggers and intervention effects of each user's emotional fluctuations, which can be fed back into model training to gradually improve emotional comfort capabilities.

6. Conclusion

This article focuses on AI personalised recommendations and AI customer service systems, which are becoming increasingly popular in China's e-commerce landscape. By constructing a model, it conducted an in-depth investigation into the pathways through which these two factors influence consumer trust and satisfaction, and successfully obtained results and insights. AI personalised recommendation systems and AI customer service systems can significantly enhance consumer trust. Furthermore, consumer trust has a significant positive impact on consumer satisfaction. This indicates that e-commerce merchants and platforms should strengthen the promotion and updating of AI algorithms to provide consumers with a better sensory experience and purchasing services. This will lead to a more positive belief in the reliability and benevolence of the platform's algorithms, and strengthen consumers' confidence in the platform's service capabilities and ability to fulfil its transaction obligations.

In addition, consumer trust plays a significant mediating role between AI personalised recommendations, AI customer service systems, and consumer satisfaction. The mediating effect accounts for approximately 40% of the total effect. The results reveal that AI technology does not directly improve user experience solely through functional 'efficiency improvements'. More importantly, through the path of 'trust', which emphasises both emotion and cognition, the satisfaction effect is indirectly amplified. It reflects the synergistic evolution of technological attributes and psychological mechanisms.

In addition, although this paper has made some progress in terms of theory and empirical evidence, there are still certain limitations. Future research could further expand the sample size. For example, covering diverse scenarios such as cross-border e-commerce, fresh food e-commerce, and social e-commerce, or conducting stratified sampling of consumers from different regions, cultural backgrounds, and income levels. By increasing the sample size, the external validity of the research conclusions can be improved.

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