

IMPACT OF ARTIFICIAL INTELLIGENCE ON CUSTOMER SATISFACTION IN ONLINE SHOPPING

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ABSTRACT

This study empirically examines the impact of Artificial Intelligence (AI) deployment on customer satisfaction within the online shopping sector. Driven by rapid digital transformations, e-commerce firms leverage AI architecture such as personalized recommendations, machine-learning-based fraud prevention, interactive chatbots, and predictive offers—to enhance user experiences. Using a convenience sampling framework, primary data was gathered from 150 online shopping consumers via a structured 5-point Likert scale questionnaire. Instrument stability was verified using a Cronbach's Alpha reliability check, which yielded a strong internal consistency score of 0.864. Inferential analyses, including Pearson Bivariate Correlation and Multiple Linear Regression, were applied to map the directional relationships between variables. The Pearson analysis revealed a strong, positive relationship ($r = 0.782$) between AI service quality and customer satisfaction. Multiple regression testing indicated that automated payment security ($b = 0.345$) and algorithmic product recommendations ($b = 0.312$) exert the highest statistical influence on user satisfaction, while AI chat bots ($b = 0.215$) provide a smaller, though still significant, contribution. Hypothesis testing resulted in the rejection of the null hypothesis (H_0), confirming that AI integrations significantly improve consumer satisfaction. The study concludes with actionable strategies for e-commerce platforms to optimize their front-end interface and back-end security infrastructure.

1. INTRODUCTION & STATEMENT OF THE PROBLEM

1.1 Background of the Study

The global retail sector has undergone a massive paradigm shift, evolving from physical storefronts to algorithmic, digital marketplaces. Modern e-commerce goes beyond merely listing goods online; it focuses on creating dynamic, context-aware, hyper-personalized customer journeys. At the core of this evolution sits Artificial Intelligence (AI). AI systems transform standard retail platforms into interactive environments capable of anticipating customer needs in real-time. By processing large datasets of historical purchases, search patterns,

click-through rates, and session durations, AI algorithms help retailers understand consumer behaviour with high precision. Customer satisfaction in digital storefronts depends on reducing cognitive overload and removing transactional friction. Without physical sales assistants, consumers rely entirely on the digital interface to discover, evaluate, and buy products.

1.2 Statement of the Problem

While AI integration offers clear operational efficiencies, it also introduces challenges regarding consumer alignment and platform trust. E-commerce platforms invest heavily in automated systems, but consumer responses can vary. For instance, algorithmic product recommendations can streamline product discovery, yet they also raise privacy concerns regarding data tracking. Automated AI chat bots offer 24/7 customer support but can frustrate users if they fail to resolve nuanced problems, leading to a disconnected customer service experience. Additionally, online payment systems face growing cyber security threats, making automated fraud detection crucial for building user trust.

2. RESEARCH DESIGN & METHODOLOGY

2.1 Objectives of the Study

The primary objective of this research is to evaluate how AI tools alter consumer sentiment in e-commerce. The specific sub-objectives are:

- ❖ To assess the penetration and adoption rates of specific AI features (e.g., product recommendations, chatbots, personalized offers, voice search, and payment security) among users.
- ❖ To gauge customer perceptions regarding the performance, helpfulness, and safety of AI Applications
- ❖ To quantify the statistical relationship between AI service quality and overall customer satisfaction.
- ❖ To identify which AI components exert the greatest predictive influence on online customer satisfaction.

2.2 Scope and Period of the Study

The scope of this project is focused on the experiential responses of consumers who shop on AI-supported e-commerce sites (such as Amazon, Flipkart, Myntra, and Ajio). Geographically, the study samples active digital consumers across metropolitan and urban areas. Conceptually, the research targets five main AI dimensions: Algorithmic Product Recommendations, Automated Chatbot Assistants, Hyper-Personalized Offers, Voice Search Assistants, and Machine-Learning Fraud Detection/Secure Payment systems. The findings provide insights for e-commerce developers and digital marketing strategists. The empirical research, including questionnaire design, data collection, and statistical analysis, was conducted over a **six-month period**.

Sample Size: 150 Active Respondents

Sampling Methodology: Convenience Sampling

2.3 Statistical Tools Deployed

To maintain statistical accuracy, the raw data was processed through the following quantitative frameworks: Percentage Analysis (demographics and feature adoption), Weighted Mean Score Ranking (Likert scale evaluation), Cronbach's Alpha (reliability testing), Pearson Bivariate Correlation (relationship strength), and Multiple Linear Regression (predictive modeling).

3. REVIEW OF LITERATURE

The intersection of generative algorithms and digital retail has generated significant academic discussion. Reviewing recent foundational studies helps contextualize the empirical findings of this project:

Zhang, L., Kumar, R., & Singh, P. (2025) evaluated broader AI adoption trends across global digital marketplaces. The empirical data showed a clear positive relationship between proactive AI interventions, user engagement metrics, and positive satisfaction outcomes.

Wang, Y., Li, X., & Chen, Z. (2024) the deployment of AI-powered customer service systems and real-time recommendation engines forms a strategic foundation for modern e-commerce.

Ahmad, N., Rahman, M. A., & Ismail, N. (2023) examined the operational dynamics of automated text assistants. The findings indicate that the usability, conversational depth, and responsiveness of AI chatbots are critical factors in the online customer experience.

4. DATA ANALYSIS AND INTERPRETATION (PART I)

4.1 Demographic Profile of Respondents

Demographic Particulars Category Respondents (N=150) Percentage (%)

The demographic data shows a balanced gender split, with female shoppers making up 52% and male shoppers 48%. The age distribution reveals a clear concentration in younger demographics: 43.3% of respondents are between 21–30 years old, and 28% are between 31–40 years old. Educational levels are high, with 40% holding postgraduate degrees and 36.7% holding undergraduate degrees. However, 46.7% spend below 5,000 monthly online, showing that despite high educational levels, purchasing volume remains moderate for nearly half the sample.

4.2 Penetration of Specific AI Features

AI Feature / Capability Count (N=150) Percentage of Usage (%)

Fraud Detection & Secure Payment 130 86.7%, Product Recommendations 128 85.3%,
Personalised Offers & Discounts 118 78.7%, AI Chatbots & Customer Service 105 70.0%
Voice Search Assistance 65 43.3%

The data highlights that background security and automated sorting have the highest user adoption. Fraud Detection & Secure Payment systems lead with an 86.7% interaction rate, closely followed by Product Recommendations at 85.3%. This suggests that consumers consistently rely on AI features that protect their data and filter products. In contrast, Voice Search Assistance shows lower adoption at 43.3%, indicating it is currently a secondary preference for platform navigation.

4.3 Weighted Mean Analysis of Perceptions

Perception / Attitude Statement Mean Score Rank

AI improves trust and security in online shopping. 4.30 I
AI recommendations help me find suitable products. 4.25 II
Overall, I am satisfied with AI-enabled shopping services. 4.22 III
AI improves my online shopping experience. 4.18 IV

AI-based offers influence my purchase decision. 4.12 V

Chatbots provide quick customer support. 4.05 VI

4.4. INFERENCE DATA ANALYSIS

Bivariate Pearson Correlation Analysis

Metric Matrix Variable AI Service Quality Overall Customer Satisfaction

AI Service Quality 1.000 0.782

Overall Customer Satisfaction 0.782 1.000

The analysis shows a strong, positive linear correlation ($r = 0.782$) between AI Service Quality and Customer Satisfaction. This high value indicates that improvements in AI systems correspond directly to higher customer satisfaction. The relationship is statistically stable, proving that AI performance is a reliable indicator of user satisfaction.

4.5 Multiple Linear Regression Analysis

Predictive Variable Elements Standardised Beta (b) t-Value Significance (p)

Payment Security (X4) 0.345 5.821 0.000

AI Recommendations (X1) 0.312 5.104 0.000

Personalisation (X3) 0.286 4.693 0.000

AI Chatbot Service (X2) 0.215 3.118 0.002

The resulting linear regression model is:

Customer Satisfaction = a + 0.345(Payment Security) + 0.312(AI Recommendations) + 0.286(Personalisation) + 0.215(AI Chatbots)

All four predictors are statistically significant, with p-values below the standard $\alpha = 0.05$ threshold. Payment Security has the largest impact ($b = 0.345$, $p = 0.000$), followed by AI Recommendations ($b = 0.312$, $p = 0.000$). AI Chatbot Services have the smallest relative impact ($b = 0.215$, $p = 0.002$), indicating that while automated support is useful, it has less influence on overall satisfaction than transactional security and product discovery.

4.6. HYPOTHESIS TESTING & SUMMARY OF FINDINGS

Hypothesis Testing Architecture

Null Hypothesis (H0): Artificial Intelligence features have no significant impact on customer satisfaction in shopping ecosystems.

Alternative Hypothesis (H1): Artificial Intelligence features have a significant impact on customer satisfaction in online shopping ecosystems.

Statistical Path Analytical Instrument Key Metric Value Decision

H0 -> H1 Multiple Linear Regression $p < 0.05$ across items **Reject H0 / Accept H1**

Summary of Empirical Findings

- **Demographic Concentration:** Online shopping platforms with integrated AI are primarily used by younger consumers. 71.3% of the sample falls between 21 and 40 years old, indicating high tech literacy among current digital shoppers.
- **Security Priorities:** Background safety features are widely adopted, with 86.7% of respondents using automated

fraud prevention tools. This matches the high Likert ranking for platform trust and security (Mean = 4.30).

- **Predictive Values:** Regression models show that backend security and algorithmic curation drive satisfaction more than customer support interfaces. Payment security ($b = 0.345$) and product recommendations ($b = 0.312$) are the strongest predictors of consumer satisfaction.
- **Chatbot Friction:** While 70% of respondents use AI chatbots, this feature scored lowest on the perception scale (Mean = 4.05) and showed the lowest predictive value ($b = 0.215$). This suggests that automated text support still causes occasional consumer friction.
- **Instrument Reliability:** The evaluation tool showed strong structural stability, with a Cronbach's Alpha score of 0.864, confirming internal consistency across the test items.

5. RECOMMENDATIONS & CONCLUSION

5.1 Practical Suggestions

- **Strengthen Advanced Fraud Detection:** Since payment security is the primary driver of customer satisfaction ($b = 0.345$), businesses should invest in machine learning models that detect anomalies and protect transactions without adding friction to the checkout process.
- **Refine Recommendation Accuracy:** To build on the value of product recommendations ($b = 0.312$), platforms should move beyond basic user-history filtering and incorporate real-time intent data, helping reduce search time and lower cognitive fatigue.
- **Improve Chatbot Support Escalation:** To address the lower satisfaction scores for AI chatbots, developers should refine natural language processing capabilities and add clear protocols for transferring complex queries to human agents when automated text falls short.
- **Optimize Interfaces for Younger Demographics:** Since Gen Z and Millennial shoppers make up 71.3% of the active user base, platform interfaces should be designed for high speed, ease of use, and mobile responsiveness.

CONCLUSION

This study confirms that Artificial Intelligence has a significant, positive impact on customer satisfaction in the online shopping sector. The rejection of the null hypothesis highlights that automated systems are no longer just optional operational additions; they are core components of the modern customer experience. The research shows that while front-end tools like personalization and chatbots add value, back-end stability—specifically transactional safety and intelligent product sorting—drives the core of customer satisfaction. By continuously balancing security with personalized usability, digital retailers can build trusted, efficient marketplaces that improve customer retention and long-term satisfaction.

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