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A STUDY ON THE EFFECT OF AI-POWERED CHATBOTS ON CUSTOMER SERVICE RESPONSE TIMES AND SATISFACTION WITH REFERENCE TO E-COMMERCE

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Abstract:

Witnessing the changes brought by Artificial Intelligence in performing business operations, AI-powered chatbots are now effectively transforming customer service and represent a significant shift in how businesses interact with their customers. Chatbots can assist customers and potential clients in quickly finding or entering information by replying to inquiries via audio input, text input, or a combination of the two, eliminating the need for human interaction or manual investigation. (IBM, 2024) This study investigates the effects of AI chatbots on customer service efficiency and satisfaction, driven by the growing demand for businesses to deliver rapid, accurate, and cost-effective customer help in an increasingly digital marketplace. The rising use of AI chatbots by companies worldwide and changing customer expectations for an immediate response make this research very pertinent and important. No doubt choosing this research topic is influenced by three key reasons associated with the current business environment: the urgent need for study based on the massive surge of AI chatbots, ever-increasing customer demands for 24/7 support, and greater potential for reducing process costs using AI than through other innovations in service quality. This study aimed to investigate the effect of using AI chatbots on customer service response times compared to traditional human-only support systems. Further, to measure customer satisfaction during interaction with AI chatbots compared to human agents and to identify the main determinants of successful AI chatbots for customer service operations. The present study was based on primary data; researchers used a structured questionnaire to collect information. The sample size for the present study was 231 respondents using a combination of convenience and simple random sampling methods.

Keywords: *Artificial Intelligence, Customer Service, Chatbots, Response Times, Customer Satisfaction.*

Introduction:

The electronic buying and selling of items online has transformed how businesses do their work and service customers. Online commerce covers everything that happens through digital shopping, including marketplaces, mobile shopping, social media platforms and direct websites of every business. (BigCommerce, n.d.) Businesses must now handle more customer interactions quickly and effectively because digital adoption has grown customer interaction speed dramatically. (Jindalx, n.d.) E-commerce needs to grow faster than traditional

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Original Research Article

customer service practices built around phone and email support. The rising customer needs require businesses to investigate new ways of processing their growing interactions.

With the development of AI-powered chatbots. The majority of organisations, regardless of size, use sophisticated software systems that use artificial intelligence and natural language to interact with clients in the same way that actual people would. They use their artificial intelligence to answer customer queries about products while processing orders and solving easy problems completely automatically. (Gladly, n.d.) Companies today widely use AI chatbots for e-commerce functions because they show the industry's transformation potential. (Investopedia, n.d.)

Conceptually, chatbots are defined as 'machine conversation systems that interact with human users via natural conversational language'. (Bayan Abu Shawar, 2007) The 'bot' in the term *chatbot* refers to 'robot' and reflects the fact that chatbots are a smart system that robotically connects and interacts with customers like human beings. (Shoda, 2018)

This study focused on the impact of AI-powered chatbots on two crucial aspects of e-commerce customer service: This study investigates how these systems affect customer wait times and satisfaction levels. Faster interactions help businesses build stronger relationships with customers through better customer service in our connected digital world. Good customer satisfaction drives successful businesses because it keeps customers coming back and making more money.

The study aimed to address the following key research questions:

- How quickly do e-commerce companies handle customer questions through AI chatbots compared to normal human staff responses?
- What results in better customer happiness during interactions with AI chatbots compared to human representatives in digital stores?

The research needs to explore AI chatbots to help companies make better decisions about integrating machines into their customer service operations. The research results help e-commerce businesses understand how best to use AI tools when providing customer service.

The urgent need to investigate this topic is driven by three key factors: AI chatbots are growing quickly while customers want 24/7 support and businesses see major savings through AI compared to other ways to improve service quality.

This research employed a quantitative approach using primary data collected through a structured questionnaire administered to 195 respondents. A combination of convenience and simple random sampling methods was employed to ensure a representative sample. This survey measured how customers respond to both human agents and AI chatbot interactions based on how quickly they answer and how it makes them happy. The present study focused on key variables to be measured, including Response Time: Researchers measured the total time needed to get an initial response and for the inquiry to be fully resolved during both robot and person-to-person interactions. Customer Satisfaction: This research aimed to identify the key factors that influence customer satisfaction.

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OPEN ACCESS

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JAN – FEB 2025

Original Research Article

The data collected will be analysed using statistical methods such as the chi-square test to identify significant associations in response times and satisfaction levels between the two customer service methods. Further analysis explored the relationship between identified success factors and the overall effectiveness of the AI-powered chatbots. The study's findings contributed significantly to the existing literature on AI in customer service, providing valuable insights for both researchers and practitioners in the e-commerce domain. The findings could help e-commerce organisations create more successful and customer-centric AI-powered chatbots, ultimately boosting the consumer experience and increasing business success in the ever-changing e-commerce industry.

Statement of the problem:

Online shopping demand growth has created tough customer support requirements for businesses to deliver instant service 24/7 and keep a check on operational expenses. Traditional human-based customer service faces major issues when trying to grow at scale and deliver consistent outcomes quickly. Available research remains narrow on proving that AI chatbots consistently boost how quickly e-commerce companies assist customers and keep customers satisfied. Firms struggle to measure their AI chatbot investments because they do not have established methods to evaluate outcome impact. This study is essential because it analyses how well AI chatbots work to help companies serve customers better and make customers satisfied, which helps businesses select effective customer support platforms.

Review of literature:

For the present study, the researchers reviewed various published journals & research articles that were related to AI-powered chatbots, customer service and satisfaction.

In the research article "When Chatbots Struggle with Customer Queries: Can Humans Help Them?" Through their research project, **Harinder Hari and Arun Sharma (2024)** showed why AI chatbots fail at understanding specific customer questions and show when human help becomes essential. This research finds specific situations where chatbots face difficulties, especially when answering detailed or challenging customer requests. The article recommends using a mix of human support and machine capability since chatbots handle universal questions, but real associates take over tough cases. The combination of robotic chatbots and human support offers better service quality and process optimisation to companies working within the present automated framework. (Hari, 2024)

The research article "Impact of AI on Customer Experience in Video Streaming Services: Through their joint research, **Saif Ahmed and Norzalita Abd Aziz (2024)** analysed how artificial intelligence makes video streaming platforms more user-friendly. The study revealed how AI boosts personalised content recommendations to make users more engaged and pleased with the service. As the study shows, trust and effective personalisation help users develop stronger connections with streaming services. The research showed how AI can work better with users by revealing what streaming service customers think about personalisation automation in their field. (Ahmed, 2024)

The study examines if service robots provide equal benefits to employee presence when customer service goes wrong. According to research by **Jing (Jasper) Yu, Xiaoming (Rose) Liu, and Jun (Justin) Li (2024)**, service

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Educreator Research Journal

OPEN ACCESS

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JAN – FEB 2025

Original Research Article

robots' physical presence affects how well customers are satisfied after receiving bad service. Customer satisfaction rises higher when robots are physically there instead of virtual agents because real-robot contact builds stronger customer-to-robot bonds. This research showed that real robots help customers recover faster after poor experiences, which helps companies use robots confidently in their customer contact efforts. (Jing (Jasper) Yu, 2024)

Nkululeko PraiseGod Zungu, Hayford Amegbe, Charles Hanu and Emmanuel Selase Asamoah (2025) examined how artificial intelligence helps banking self-service gain better results for customers. This research showed that AI tools help customers see better results from personalisation and faster support on their own without needing staff. The study showed how AI technology helps banks offer better customer service while lowering operating expenses. The study examined banking AI tools to show that proper self-service systems produce stronger customer connections and engagement while businesses compete for customers. (Zungu, 2025)

Limitations of the study:

This study has some limitations, which means the findings need to be carefully analysed. First, the research results based on 231 respondents would probably fail to represent all e-commerce customers around the world. Using convenience sampling and random sampling increases the risk of selecting biased participants, which limits the research outcomes' universal application. Current AI technology evolves so quickly that findings can become outdated by the time new chatbot features appear. The findings specifically apply to e-commerce only and cannot be used across other sectors that employ AI chatbots. The study mostly studied text-based platforms but excluded voice-based AI assistants and combo chatbot setups, which provide key customer service options today.

Objective of the study:

1. To investigate the impact of AI chatbots on customer service response times in e-commerce.
2. To measure customer satisfaction during interaction with AI chatbots compared to human agents
3. To identify the main determinants of successful AI chatbots for customer service operations.
4. To explore customer preferences for different customer service channels (chatbots vs. human agents).

Hypotheses of the study:

1. **$H0_1$**: There is no difference in customer satisfaction levels (measured by response time, query resolution, and overall experience) between interactions with AI chatbots and human agents in e-commerce.
2. **$H0_2$:** There is no association between age group distribution and preferences for AI chatbots versus human agents in customer service.
3. **$H0_3$:** There is no significant difference in response times provided by AI chatbots compared to human agents in e-commerce customer service.

Research Methodology:

The research methodology must be strong to minimise errors in data collection and analysis. Therefore, researchers have selected a survey or structured questionnaire method for data collection.

It is described in the following table no. 1

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Educreator Research Journal

OPEN ACCESS

VOLUME–XII, ISSUE–I

JAN – FEB 2025

Original Research Article

Table 1:

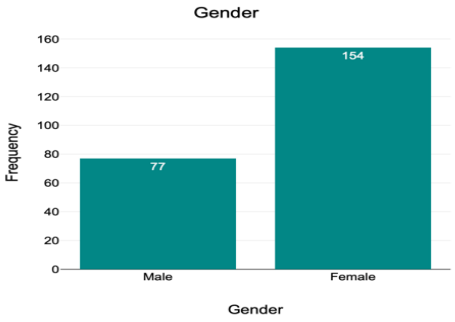
Type of Data	Primary & Secondary
Sampling Method	Simple Random & Convenience Sampling
Sample size	231 Respondents
Research tool	Structured Questionnaire
Research Method	Descriptive
Data Collection method	Survey
Survey Area	Mumbai Metropolitan Region
Tools to analyse data	Chi-square Test for hypothesis testing & DATA Tab for demographic analysis.

Analysis, Interpretation of Data & Findings:

Tables and graphical representations were used to analyse the collected data and reach appropriate conclusions and interpretations.

Demographic profile of the respondents:

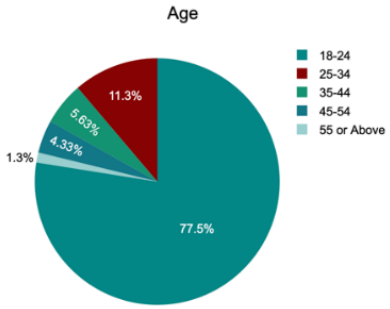
Chart 1: Gender of respondents



Interpretation: The data indicates that 66.7% of the respondents are female, while 33.3% are male, reflecting a higher representation of females in the sample.

Source: By Re

Chart 2: Age of the respondents



Interpretation: The pie chart reveals a skewed age distribution, with 77.5% of respondents in the 18-24 age group, indicating a significant bias towards younger participants in the survey.

Source:ByResearcher

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E- 2394-8450

Educreator Research Journal

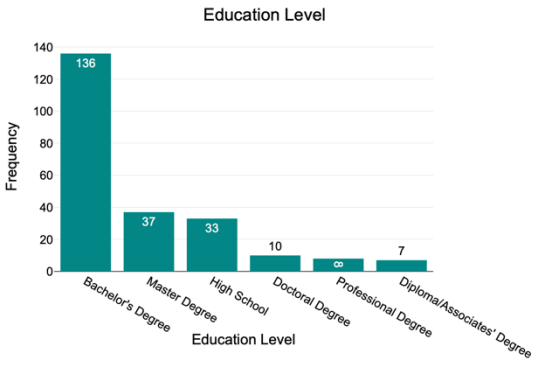
OPEN ACCESS

VOLUME–XII, ISSUE–I

JAN – FEB 2025

Original Research Article

Chart 3: Education level



The bar chart indicates that the majority of respondents (136) hold a Bachelor's degree, followed by Master's degrees (37), High School diplomas (33), Doctorates (10), Professional degrees (6), and Diplomas/Associates (7). This suggests a high level of educational attainment among - participants, which may not represent populations with lower educational levels.

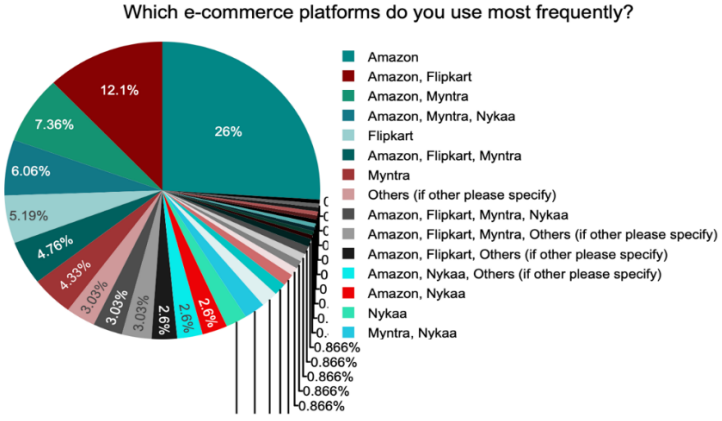
Source: By Researcher

Chart 4: How often do you shop online

This bar chart demonstrates that "Occasionally" is the most frequent response (90 respondents) to the question of how often respondents shop online. "Monthly" shopping is the second most common (76 respondents). "Weekly" (32), "Rarely" (29), and "Daily" (4) show decreasing frequencies. The majority of respondents shop online occasionally or monthly, suggesting a moderate to infrequent pattern of online shopping behaviour within this sample.

Source: By Researcher

Chart 5: E-commerce platforms used by the respondents



Source: By Researcher

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Educreator Research Journal

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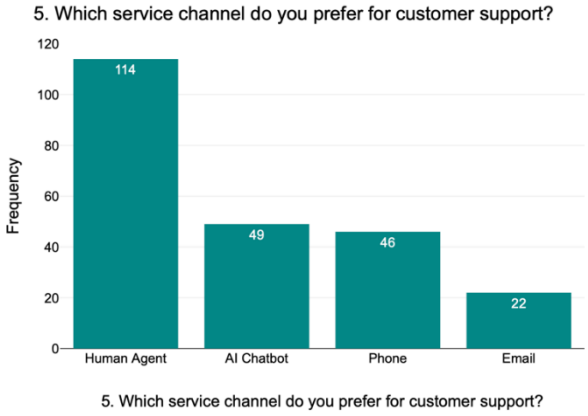
JAN – FEB 2025

Original Research Article

Interpretation: The pie chart reveals a highly concentrated pattern of e-commerce platform usage. Amazon stands out as the dominant platform, with 26% of respondents indicating its most frequent use. This suggests a strong market share for Amazon among the surveyed population. The next most significant segments involve combinations of major players: Amazon and Flipkart (12.1%), Amazon and Myntra (7.36%), and Amazon, Flipkart, and Myntra (6.06%). This indicates that a considerable portion of the population utilises multiple major platforms, suggesting a strategy of diversification among consumers for online shopping.

Chart 6: Service channel preference



Interpretation: The data indicates a strong preference for human interaction in customer support, with 114 out of 231 customers choosing human agents over AI chatbots (49 customers), email (22), or phone support (46). This suggests that while AI can be useful, most customers value personal engagement for their inquiries. Businesses should prioritise enhancing human support capabilities while using AI as a complementary tool.

Statistical Analysis and Hypothesis Testing Results:

Table 2

Sr. No.	Relationship Tested	Degrees of Freedom (df)	Calculated χ^2 Value	Critical Value ($\alpha = 0.05$)	Decision ($\alpha = 0.05$)
1	Customer Satisfaction - Response Time	4	27.62	9.488	Reject H_0
2	Customer Satisfaction - Query Resolution	4	22.62	9.488	Reject H_0
3	Customer Satisfaction - Overall Experience	4	7.84	9.488	Accept H_0
4	Response Time vs Interaction Type	6	70.56	12.592	Reject H_0
5	Age Group vs Interaction Preference	4	10.58	9.488	Reject H_0

Interpretation of Chi-Square Test Results:

1. **Response Time Satisfaction**: The chi-square test revealed a calculated value of 27.62, surpassing the critical value of 9.488 ($df = 4$, $\alpha = 0.05$). This allows the researchers to reject the null hypothesis, indicating a statistical difference in customer satisfaction regarding response times between AI Chatbots and Human Agents.

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Original Research Article

2. **Query Resolution Satisfaction**: The calculated chi-square value for query resolution satisfaction was 22.62, also exceeding the critical threshold of 9.488 (df = 4, α = 0.05). Consequently, researchers reject the null hypothesis, suggesting that customers perceive significant differences in satisfaction levels related to how AI Chatbots and Human Agents resolve queries.
3. **Overall Experience Satisfaction**: In contrast, the chi-square test for overall experience satisfaction yielded a value of 7.84, which is below the critical value of 9.488 (df = 4, α = 0.05). Thus, researchers fail to reject the null hypothesis, indicating no difference in overall customer satisfaction between AI Chatbots and Human Agents.
4. **Response Time Distribution**: The analysis of response time distribution produced a calculated chi-square value of 70.56, significantly higher than the critical value of 12.592 (df = 6, α = 0.05). This result leads to rejecting the null hypothesis, demonstrating a highly significant difference in response times between AI Chatbots and Human Agents.
5. **Age Group Preferences**: Finally, for age group preferences, the chi-square value was 10.58, exceeding the critical value of 9.488 (df = 4, α = 0.05). Therefore, researchers reject the null hypothesis, indicating a significant relationship between age groups and their preferences for AI Chatbots versus Human Agents in customer service interactions.

Recommendation and Suggestions:

Based on the study's findings, below are some recommendations for e-commerce businesses:

- According to the study's conclusions, e-commerce companies should explore incorporating human and AI help into their customer service strategy. Rather than depending only on AI chatbots, it is critical to have a robust human support team, as a sizable percentage of consumers (148 out of 231) still prefer human connection for their concerns.
- To provide consistent service, firms should define explicit transition rules for moving consumers from chatbots to human agents. This is critical since there are significant disparities in satisfaction with response times and issue resolution between AI and human help.
- Additionally, optimising response times is critical. As per the findings, response times vary significantly between channels, requiring a careful balance between speedy automated responses and high-quality human assistance for complex issues.
- Regularly collecting client feedback through both AI and human service channels is also important. While the study found no significant differences in overall satisfaction, regular input can assist in maintaining service quality and suggest areas for improvement.
- Finally, training employees on how to operate effectively with AI tools is crucial. Employees should focus on resolving complex queries that require human judgment, as the study found substantial differences in customer satisfaction with query response between the two types of help.

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JAN – FEB 2025

Original Research Article

Significance of the study:

The significance of this study lies in its potential to provide valuable insights into the impact of AI-powered chatbots on customer service response times and satisfaction in the e-commerce sector. The increasing use of AI in customer support necessitates understanding its impact on efficiency and customer experience. By comparing AI chatbots to human agents, this research fills a knowledge gap, offering e-commerce businesses actionable insights for integrating AI effectively. The goal is to improve customer satisfaction, operational efficiency, and overall customer support strategies in the digital marketplace.

Conclusion: The study on the effect of AI-powered chatbots on customer service response times and satisfaction in e-commerce reveals significant insights into customer interactions.

Customers experience significant disparities in satisfaction levels when it comes to response times and query resolutions, but they report similar overall satisfaction when comparing human agents versus AI chatbots. Out of 231 surveyed customers, 148 selected Human Agents as their preferred option over 83 who preferred AI chatbots. The survey's outcome generates surprise given the current artificial intelligence surge because it shows that most customers prioritise human-agent interactions for service support. The research data demonstrates that age acts as a significant variable in determining which interaction types different populations choose. Research findings reveal how AI technology improves efficiency in customer service while showing that direct human involvement is essential for handling intricate consumer concerns to help e-commerce companies develop improved interaction ways.

Area for further research: The study's sample size was constrained. The majority of the data came from young, well-educated individuals. It should expand in further studies. It is also vital to investigate linguistic barriers as a significant factor in the refusal to accept the AI chatbot. Further, to investigate AI chatbot effectiveness across multiple industries beyond e-commerce (e.g., healthcare, banking, retail) to develop cross-industry implementation frameworks and study the impact of voice-enabled and multimodal AI chatbots on customer experience, comparing effectiveness with text-only interactions. This will give a clear picture of India's future with AI chatbots.

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