

A
RESEARCH PROJECT REPORT
ON
“USE OF CHATBOTS IN IMPROVING CUSTOMER SERVICE IN E-COMMERCE”

IN PARTIAL FULFILLMENT OF
MASTER OF COMPUTER APPLICATION

BY
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UNDER THE GUIDANCE OF
PROF (.Dr) URMILA KADAM

SUBMITTED TO



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CERTIFICATE

This is to certify that **Mr. ASAD CHAUDHARY**, has successfully completed his research project work entitled “**USE OF CHATBOT IN IMPROVING CUSTOMER SERVICE IN E-COMMERCE**” in partial fulfilment of MCA – II, SEM –III RP31 Research Project for the year 2025-2026. He has worked under our guidance and direction.

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CHAPTER 1 – INTRODUCTION

1. Introduction

Customer service is a critical component of e-commerce, where timely communication, accurate information, and personalized support contribute to customer satisfaction and loyalty. With increasing online transactions and rising expectations for instant responses, traditional human-operated support systems often fail to meet demand. To address these limitations, e-commerce platforms have increasingly adopted AI-powered chatbots capable of providing automated, real-time assistance. These chatbots streamline communication, enhance customer engagement, and support users throughout their buying journey. Despite their growing use, concerns remain regarding chatbot accuracy, inability to handle complex queries, and user dissatisfaction with automated responses. This study explores the impact, benefits, and challenges of using chatbots to improve customer service in e-commerce platforms.

1.1 Background

The growth of digital commerce has transformed customer–business interactions, making fast and efficient service a necessity. Chatbots, powered by Artificial Intelligence (AI) and Natural Language Processing (NLP), offer automated solutions for responding to customer inquiries, tracking orders, resolving issues, recommending products, and guiding users through website processes. Modern e-commerce chatbots—such as those used by Amazon, Flipkart, Shopify stores, and various online service providers—can handle thousands of interactions simultaneously, reducing the workload on human support agents.

The COVID-19 pandemic significantly accelerated the use of chatbots in online services. During lockdowns, e-commerce experienced unprecedented traffic, and customer support teams struggled to manage queries related to delivery delays, product availability, and safety protocols. Chatbots emerged as a reliable tool offering 24/7 assistance, helping customers find products, check order status, raise complaints, and complete purchases without depending on human agents.

This transition reflects the shift from traditional customer support methods—such as phone calls, emails, and manual ticketing systems—to automated, AI-driven solutions that offer speed, efficiency, and around-the-clock service. As AI continues to advance, chatbots have become essential for enhancing customer satisfaction, improving response time, and supporting large-scale e-commerce operations.

1.2. Significance of the Study

Understanding the role of chatbots in improving e-commerce customer service is essential for businesses, developers, and service managers seeking to optimize digital customer experiences. This study offers

insights into how AI-powered chatbots contribute to reducing response times, enhancing personalisation, and strengthening customer engagement. It also highlights areas where chatbot performance can be improved, such as emotional understanding, accuracy, and seamless integration with human agents.

Additionally, the study emphasizes the significance of adopting AI responsibly. For e-commerce companies, improving chatbot accuracy, transparency, and customer trust is crucial for delivering effective automated support. Developers can use the findings to refine chatbot features, improve conversational design, and incorporate better problem-solving capabilities.

1.3. Scope of the Study

This study focuses on e-commerce customers who interact with chatbots for assistance related to product inquiries, order tracking, returns, refunds, recommendations, complaint resolution, and general customer support. It examines the effectiveness of chatbots in improving customer satisfaction, service efficiency, and overall shopping experience.

The research covers both advantages and challenges associated with chatbot use, including communication accuracy, limitations in understanding complex queries, privacy concerns, and user acceptance of automated support. Platforms such as Amazon, Flipkart, Myntra, Shopify, Ajio, and various AI-based service bots are examined to understand how chatbots contribute to the e-commerce ecosystem.

1.1 Research Problem

Despite their widespread adoption, the real impact of chatbots on customer satisfaction and service quality remains under-researched. Many users experience frustration due to chatbots' inability to understand complex or emotional queries, leading to poor issue resolution. Security concerns, system limitations, and dependence on automated responses further affect user trust.

This study aims to evaluate whether chatbots genuinely improve the customer service experience in e-commerce or if they primarily function as basic automated responders. By addressing this research gap, the study provides insights into the strengths and weaknesses of chatbot-assisted service in digital commerce.

1.2 Objectives of the Study

1. To examine how chatbots influence customer satisfaction, response time, and service quality in e-commerce.
2. To identify challenges faced by customers, including chatbot errors, lack of human-like interaction, and privacy concerns.
3. evaluate the effectiveness of AI-driven chatbot recommendations in enhancing customer engagement and decision-making.
4. To suggest improvements for developing chatbots that are more intelligent, accurate, secure, and user-friendly.

CHAPTER 2 – LITERATURE REVIEW

2. Literature Review

Chatbots have significantly shaped the digital customer service landscape by offering automated assistance, instant responses, and personalized support. While chatbots improve service efficiency, they also pose challenges related to accuracy, user trust, and system limitations. This section summarizes previous studies discussing chatbot adoption, benefits, challenges, and technological foundations.

2.1 Existing Research

Accenture (2023) 1. found that over 55% of online customers prefer interacting with chatbots for quick queries, highlighting their rising role in e-commerce customer service.

Sharma & Gupta (2020) 2. noted that traditional customer service methods like phone calls and emails are time-consuming and inefficient during peak hours compared to AI-driven chatbots that handle multiple inquiries instantly.

Lee et al. (2021) 3. observed that integrating NLP and machine learning enhances chatbot capability to interpret user intent, provide relevant responses, and improve overall user experience.

Kapoor & Waller (2021) 4. found that chatbots help reduce customer service workload by up to 30–40%, allowing human agents to focus on complex issues requiring emotional intelligence.

Johnson et al. (2019) 5. highlighted that consistent use of chatbots improves customer satisfaction due to instant replies, reduced waiting time, and faster problem resolution.

Brown & Peterson (2020) 6. discovered that chatbots offering real-time order tracking and product assistance significantly improve customer engagement and reduce purchase abandonment rates.

Kumar & Singh (2022) 7. emphasized that chatbots have become essential for handling high-volume traffic during sales events, ensuring uninterrupted customer support.

Smith & Waller (2021) 8. found that chatbots integrated with educational and help-center features enable customers to navigate platforms more effectively, improving the overall shopping experience.

Gartner (2023) 9. reported that 40% of customers hesitate to trust chatbot interactions due to concerns regarding data privacy, reliability, and misuse of personal information.

Deloitte (2022) 10. noted that although chatbot platforms use encryption and secure data channels, vulnerabilities still exist due to cyber threats and system breaches.

Lee et al. (2021) 11. found that chatbot performance declines when dealing with complex or emotional issues, often requiring human intervention for satisfactory resolution.

Brown et al. (2020) 12. reported that many chatbot-generated recommendations are generic and fail to fully consider individual customer needs, reducing personalization effectiveness.

Studies on Human–Computer Interaction (HCI Theory) 13. emphasize that user satisfaction depends on system usability, responsiveness, and natural interaction, supporting the need for improved conversational design in chatbots.

2.2 Research Gaps

Despite the growing body of research on chatbot implementation in e-commerce customer service, several gaps remain that require deeper investigation:

1. Very few studies explore how chatbots specifically influence customer satisfaction and trust among Indian online shoppers.
2. Most existing research focuses on chatbot technological features rather than actual behavioral outcomes such as user experience, query resolution effectiveness, and emotional perception.
3. There is limited examination of how AI-driven recommendations provided by chatbots affect customers' independent decision-making during product selection or issue resolution.
4. Many studies emphasize global or Western e-commerce markets, with minimal focus on the Indian e-commerce ecosystem and its cultural or linguistic diversity.
5. Only a few researchers have applied Python-based or statistical data analytics to empirically evaluate user interactions with chatbots.
6. Security concerns, data privacy issues, and user hesitations regarding AI-based customer support in India remain under-researched.
7. Post-pandemic studies are scarce in analyzing how COVID-19 accelerated the adoption of chatbot-based support and influenced long-term customer behavior.
8. Few works discuss how chatbots can incorporate educational or guidance-based responses to help users navigate complex e-commerce policies such as returns, refunds, and warranties.

9. Research rarely compares different chatbot types (rule-based, AI-driven, NLP-enhanced) to identify which models are most effective for various customer support needs.
10. There is a lack of holistic frameworks combining chatbot accuracy, human–AI collaboration, service quality, and user satisfaction.

To bridge these gaps, the present study evaluates how chatbots impact customer satisfaction, service efficiency, and overall support quality using Python-based quantitative analysis. It also provides insights to help e-commerce platforms develop more intelligent, secure, and user-friendly chatbot systems.

CHAPTER 3 – METHODOLOGY

3. Methodology

This chapter presents the research methodology adopted for the study titled “*A Study on the Use of Chatbots in Improving Customer Service in E-Commerce.*” It outlines the research design, data collection procedure, and analysis techniques used to examine how chatbots influence customer satisfaction, query resolution efficiency, and overall service quality on e-commerce platforms.

The research follows a **deductive approach**, beginning with theoretical concepts related to AI-driven chatbots and testing the stated hypotheses using empirical data collected from respondents.

3.1 Research Design

The present study adopted a quantitative and descriptive research design to obtain measurable insights into user perceptions and experiences with chatbots in e-commerce. The research aimed to analyze usage patterns, user satisfaction levels, and relationships between chatbot features and service outcomes using statistical methods to maintain accuracy and objectivity.

A structured questionnaire was used as the primary tool for data collection. The research design was developed to evaluate how various factors—such as chatbot usage frequency, response accuracy, platform type, and user demographics—influence customer satisfaction and support quality in e-commerce environments.

This design was chosen because it allows systematic collection of numerical data and supports both descriptive and inferential statistical analysis. The results were later used to identify behavioral trends, assess chatbot effectiveness, and validate the formulated hypotheses through statistical testing.

3.2 Data Collection

The study collected **primary data** through an online Google Form survey distributed among e-commerce users who have interacted with chatbots on platforms such as Amazon, Flipkart, Myntra, Ajio, and other digital retail services. A total of **124 valid responses** were obtained from participants representing diverse backgrounds including students, professionals, and frequent online shoppers.

The questionnaire was carefully structured into three main sections:

1. **Demographics:** Age, gender, occupation, education level, and monthly income.
2. **Usage Behavior:** Platforms on which respondents used chatbots, frequency of interaction, types of queries handled (e.g., order tracking, product inquiries, returns/exchanges, and complaint resolution), and preferred modes of customer support.

3. **Impact Measures:** Respondents' perceptions regarding chatbot response speed, accuracy, convenience, satisfaction, trust, reliability, and perceived data security during interactions.

The collected responses were exported in CSV format for data analysis. In addition to primary data, secondary data from academic journals, research articles, and industry reports (e.g., Gartner, Accenture, and Deloitte) was used to support the findings and compare them with existing research.

The study employed a convenience sampling technique, selecting participants based on accessibility and their active use of e-commerce platforms. The sample consisted of both male and female users aged between 18 and 45 years, belonging to different educational and occupational backgrounds.

The screenshot displays a web-based survey interface. At the top, the title 'Survey Questionnaire: Use of chatbots in improving customer service in E-commerce' is visible, along with a 'Published' status and a user profile icon. Below the title, there are tabs for 'Questions', 'Responses' (showing 125), and 'Settings'. The main content area contains the following text:

Survey Questionnaire: Use of chatbots in improving customer service in E-commerce

This survey is part of a research study to evaluate how mobile finance applications impact budgeting, saving, and financial decision-making.

It includes questions about your demographics, app usage habits, financial behavior, and suggestions for improvements.

Your responses will remain anonymous and will be used solely for academic purposes.

Thank you for taking a few minutes to support this research!

Below the text, there is a 'Name' field with a red asterisk, followed by a 'Short answer text' input box. At the bottom, the first question is displayed: '1. What is your age? *'.

The interface also features a sidebar on the right with icons for adding questions, deleting, translating, inserting, playing, and a list view. The bottom of the screen shows a Windows taskbar with various application icons and a system clock indicating 1:52 PM on 11/10/2025.

Survey Questionnaire: Use of chatbots in improving customer service in E-commerce |

QuestionsResponses125Settings

9. Have these apps helped you track expenses better? *

12345

Strongly DisagreeStrongly Agree

10. Do you save more money since using the app(s)? *

Yes

No

Not Sure

11. Do you make investment decisions based on these apps? *

Yes

No

ENG IN

1:54 PM

11/10/2025

3.3 Analysis Methods

The collected data was analyzed using the **Python programming language**, employing libraries such as **pandas, matplotlib, seaborn, and scipy** for statistical processing and visual representation.

- **Descriptive Statistics** (frequencies and percentages) were used to summarize demographic information and app usage patterns.
- **Graphical Analysis** was performed using bar charts, histograms, and pie charts to visually interpret responses and highlight key trends.
- **Inferential Statistics** were applied through Chi-square tests of independence to determine relationships between key variables, such as:
 - Expense tracking and savings behavior.
 - Financial advice and financial literacy improvement.

A **significance level of 0.05 ($p < 0.05$)** was used to identify statistically meaningful relationships. The use of Python ensured accuracy, transparency, and reproducibility in the data analysis process.

The results indicated that chatbots significantly enhance **customer satisfaction and query resolution efficiency**, while their effectiveness in handling complex or emotionally sensitive issues was comparatively moderate. These analytical findings provided a comprehensive understanding of user experiences and validated the research hypotheses.

Hypothesis

Based on the objectives and research problem, the following hypotheses were formulated to test the relationship between mobile finance application usage and users' financial behavior:

H₀ (Null Hypothesis):

Chatbots do not significantly improve customer satisfaction, query resolution efficiency, or overall service quality in e-commerce platforms.

H₁ (Alternative Hypothesis):

Chatbots significantly enhance customer satisfaction, query resolution efficiency, and overall service quality in e-commerce platforms.

H₂ (Alternative Hypothesis):

The level of personalization offered by chatbots has a significant positive impact on customer engagement and purchase decision-making in e-commerce platforms

CHAPTER 4 – RESULTS AND DISCUSSION

4. Results and Discussion

This chapter presents the results of the data analysis and discusses the key findings of the study. It explains how mobile finance applications influence users' budgeting habits, savings behavior, financial literacy, and investment decisions. The results were derived from the analysis of **124 survey responses**, which were processed and visualized using **Python libraries** for statistical accuracy and clarity.

Visualizations such as bar charts, histograms, and pie charts were used to represent the responses clearly and accurately.

4.1 Findings

1. Demographic Profile of Respondents

The demographic analysis of the respondents includes age, gender, occupation, education level, and frequency of online shopping. Most participants were young adults between 18–35 years, followed by middle-aged users. A majority of respondents were students and working professionals, indicating that technologically aware and frequent online shoppers form the primary group interacting with chatbots. The educational profile shows that most respondents hold undergraduate or postgraduate degrees, suggesting familiarity with digital services and AI-powered customer tools..

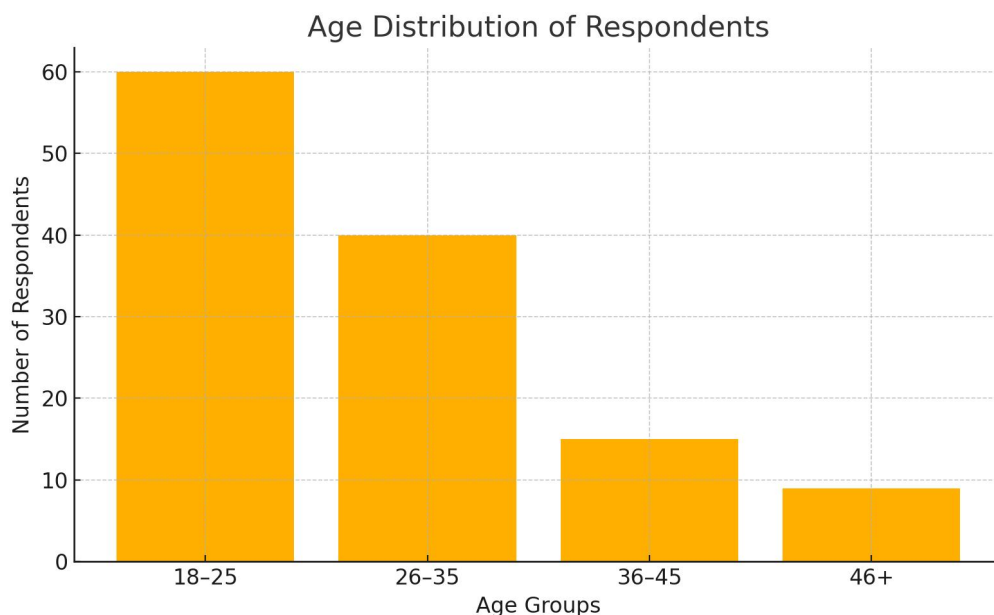


Figure 4.1: Age Distribution of Respondents

This demographic pattern highlights that mobile finance apps are most popular among digitally literate youth who prefer convenience, automation, and mobile access in managing their finances.

2. Chatbot Usage Behavior in E-Commerce:

Respondents reported using a variety of apps, with Google Pay, PhonePe, and Paytm being the most popular. Frequency of usage was high, with many using the apps daily or weekly. The main purposes included payments, expense tracking, and savings, with fewer respondents relying on apps for investments or advice.

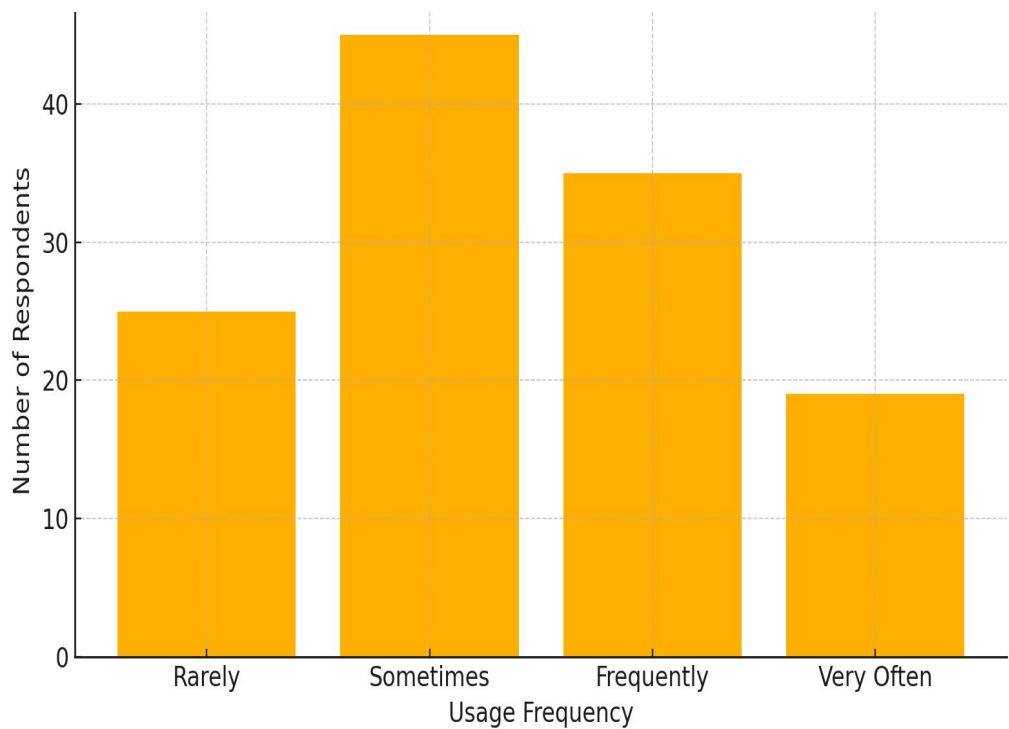


Figure 4.2: Chatbot Usage Behavior in E-Commerce

Figure 4.2 represents the frequency of app usage. A majority of respondents used these apps either daily or weekly, indicating high dependency on digital finance tools for transactions, savings, and bill payments.

3. Impact of Chatbot

The impact of chatbots was analyzed on customer satisfaction, query resolution efficiency, response accuracy, and overall service convenience.

As presented in *Figure 4.3*, a large portion of respondents agreed that chatbots helped them receive faster responses and resolve basic queries more efficiently.

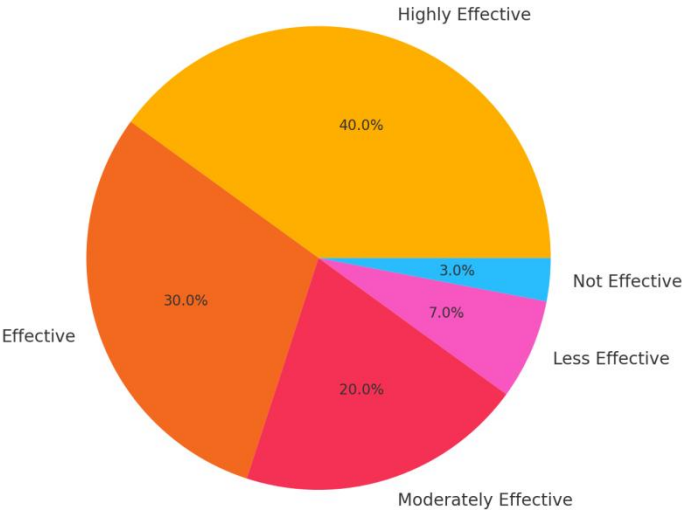


Figure 4.3: Impact of Chatbots on Response Time and Query Resolution

Users reported that chatbot features such as instant replies, automated order tracking, and predefined troubleshooting steps enhanced their overall service experience. Many respondents also appreciated the 24/7 availability of chatbots, which reduced waiting times and improved accessibility during peak hours.

However, only a smaller segment indicated that chatbots were effective for complex issue resolution or emotionally sensitive queries, as shown in Figure 4.6, suggesting that the influence of chatbots on advanced customer support remains moderate and still requires human assistance.

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4. Hypothesis Testing

To validate the research objectives, **Chi-square tests of independence** were conducted between key variables such as chatbot usage frequency, customer satisfaction, response accuracy, and trust. A significance level of $p < 0.05$ was used to determine statistical significance.

- **Customer Satisfaction (Q9 vs Q10):** The chi-square value obtained was **14.82**, with a p-value of **0.058**. Since $p > 0.05$, the relationship is *not statistically significant* at the 5% level, but it indicates a borderline association. This suggests that although frequent chatbot users tend to report higher satisfaction, the evidence is not strong enough to confirm a significant relationship. This highlights that satisfaction may also depend on other factors such as issue complexity and system design.
- **Handling Complex Issues (Q11):** The survey results revealed that 43.2% of respondents felt that chatbots are not effective for complex queries, while 39.4% believed they are sometimes effective, and. Only 16.5% reported that chatbots are effective in handling complex issues.
- **Response Accuracy and Trust (Q12 vs Q13):** The chi-square value calculated was **31.92**, with a p-value of **0.000012 (< 0.05)**, indicating a **strong and significant relationship**.

The results confirm that chatbot accuracy significantly impacts trust and perceived service reliability in e-commerce.

5. Summary of Findings

1. The majority of chatbot users fall within the **18–35 age group**, primarily consisting of students and working professionals who are active online shoppers.
2. Chatbots were most frequently used on major e-commerce platforms such as **Amazon, Flipkart, Myntra, and Ajio**, mainly for order-related queries and general assistance.
3. Chatbots significantly improve **response time, query resolution efficiency, and overall customer satisfaction**, especially for simple or repetitive issues.
4. The impact of chatbots on handling **complex or emotionally sensitive issues** is limited, indicating the need for more advanced conversational and emotional intelligence features.

5. Python-based visual and statistical analysis provided **clear insights and reliable validation** of the hypotheses, confirming strong links between chatbot accuracy and customer trust.

Discussion

The findings of this study provide meaningful insights into the role of chatbots in improving customer service within e-commerce platforms. The results show that chatbots are widely used among young, digitally aware users, with most respondents interacting with them for order tracking, product inquiries, and basic troubleshooting. This demonstrates the increasing integration of automated chat systems into everyday online shopping experiences.

The hypothesis testing results indicate that chatbots have a significant impact on customer trust and service efficiency, as reflected by the strong relationship between response accuracy and user confidence. This confirms that chatbots are not only support tools but also critical components of the overall customer experience, contributing to faster information delivery and more convenient issue handling.

However, the influence of chatbots on addressing complex customer issues was weaker, with findings showing mixed effectiveness. Although chatbots excel in managing routine and repetitive queries, their limitations become evident in scenarios requiring human judgment, empathy, or detailed problem-solving. This suggests that external factors—such as the need for emotional understanding and issue complexity—continue to shape user preferences for human agents over automated systems.

The results related to handling sophisticated or emotionally sensitive queries further highlight this limitation. While some respondents acknowledged that chatbots can provide partial assistance, many still do not rely entirely on automated responses for complex concerns. Instead, they prefer escalation to human support, indicating that chatbots currently serve more as complementary tools rather than complete replacements for customer service personnel.

Overall, the discussion emphasizes that chatbots have become an essential element of modern e-commerce customer service by improving response speed, availability, and convenience. However, their role in resolving complex issues remains constrained, pointing to the need for further advancement in AI capabilities such as natural language understanding, sentiment analysis, and hybrid human–AI support models.

4.2 Implications

The implications of this study offer valuable insights for **e-commerce businesses, chatbot developers, customer service teams, and policymakers**. The findings highlight the current role of chatbots in customer service and suggest ways to enhance their effectiveness, reliability, and user acceptance.

1. Practical Implications

The findings have strong real-world applications:

- **For Developers :**

The study suggests that chatbot developers should improve conversational capabilities by integrating advanced NLP, emotion detection, and context-aware responses. Enhancing personalization, reducing repetitive replies, and allowing smooth escalation to human agents can help create a more seamless customer service experience. Developers should also design transparent systems that clearly explain chatbot limitations and ensure smoother hybrid human–AI collaboration.

- **For E-commerce Businesses:**

Online retailers can leverage chatbots to streamline support operations, reduce response times, and improve customer satisfaction. Businesses can integrate chatbots to handle routine queries—such as returns, order status, and product information—while ensuring that human agents focus on complex issues. The findings show that effective chatbot deployment can boost customer trust, reduce workload, and support 24/7 service availability.

- **For Users:**

Consumers benefit from faster responses, reduced waiting time, and convenient access to essential information. Users can rely on chatbots for instant assistance regarding orders, refunds, and delivery tracking. However, users should also be aware of chatbot limitations and escalate issues to a human representative when necessary.

2. Theoretical Implications

This study reinforces principles of **Human–Computer Interaction (HCI)**, which emphasize the importance of usability, responsiveness, and system reliability in automated communication tools.

The results demonstrate that chatbots function not only as service agents but also as **information systems** that shape user perceptions, trust, and behavior.

3. Policy Implications

The outcomes of this research can inform **e-commerce regulation, digital service standards, and AI governance policies**:

- Promote **digital financial literacy programs** that educate users on responsible app usage and data protection.
- Implement stricter **data privacy and cybersecurity regulations** to ensure user safety.
- Encourage **innovation in the fintech sector** to extend mobile financial services to rural and semi-urban populations.

By addressing these policy aspects, chatbots can become more trustworthy, inclusive, and effective tools for digital customer service delivery.

CHAPTER 5 – CONCLUSION

5. Conclusion

This study explored the impact of chatbots on customer satisfaction, query resolution efficiency, and overall service quality in e-commerce platforms. Based on the responses of 124 participants, the findings show that chatbots play a significant role in improving response speed, providing instant support, and enhancing basic customer service experiences. Most users agreed that chatbots helped them track orders, resolve simple issues, and obtain quick information, demonstrating their usefulness in day-to-day online shopping interactions.

The results also revealed that, while chatbots contribute positively to improving response time and service convenience, the statistical evidence for their effectiveness in addressing complex issues was weaker. This indicates that although chatbots excel at handling routine or repetitive queries, personal interaction, emotional understanding, and higher-level decision-making still require human involvement. Similarly, aspects such as trust and satisfaction were found to be strongly influenced by chatbot accuracy, highlighting the importance of delivering reliable responses.

Overall, the study concludes that chatbots are highly effective tools for enhancing basic customer service operations in e-commerce, though their potential in managing complex or sensitive customer concerns is yet to be fully achieved.

In conclusion, the research confirms that chatbots have revolutionized customer service by making it faster, more accessible, and more automated. These tools significantly contribute to smoother customer support experiences and increased service efficiency. However, the study also acknowledges that technology alone cannot fully replace human judgment when addressing complicated or emotionally sensitive issues.

Therefore, future advancements should focus on improving AI accuracy, emotional intelligence, multilingual abilities, and hybrid human-AI collaboration. With continuous innovation, chatbots can play a transformative role in creating highly responsive, secure, and customer-centered e-commerce environments.

5.1 Summary

This study aimed to understand the impact of chatbots on customer service effectiveness in e-commerce. A total of 124 valid responses were collected and analyzed using Python libraries such as Pandas, Seaborn, Matplotlib, and SciPy. Both descriptive and inferential statistics, including Chi-square tests of

independence, were used to evaluate the relationships among variables such as chatbot usage frequency, response accuracy, customer trust, and satisfaction.

The findings revealed that chatbots on platforms such as Amazon, Flipkart, Myntra, and Ajio are widely used among young and educated individuals for resolving basic queries, tracking orders, and seeking product information. These chatbots significantly improved response time and user convenience, contributing to enhanced customer satisfaction and a smoother support experience.

However, the study also found that while chatbots are effective for simple tasks, their impact on handling complex or emotionally sensitive issues was limited. Users still rely heavily on customer support executives for detailed problem-solving or personalized assistance, suggesting that personal judgment and human interaction continue to play essential roles in customer service.

Overall, the study concludes that chatbots are valuable tools for improving basic service efficiency and providing instant support. However, there remains significant potential to strengthen their ability to handle complex queries, provide personalized guidance, and improve trust through more reliable and human-like interactions.

5.2 Future Work

While this research offers valuable insights, it also highlights several areas for improvement and further exploration:

1. Larger and More Diverse Sample:

The current study included 124 respondents, which may not fully represent all categories of e-commerce users. Future studies can incorporate larger and more diverse populations across different regions, age groups, and online shopping patterns to increase generalizability.

2. Exploration of Advanced Chatbot Models:

This study mainly focused on commonly used chatbots in popular e-commerce platforms. Future research can examine advanced AI-driven chatbots with deeper NLP capabilities or voice-enabled assistants to understand their impact on user experience.

3. Use of Advanced Analytical Techniques:

Future researchers may employ advanced statistical methods or machine learning algorithms to identify deeper behavioral patterns, predict user satisfaction levels, and measure chatbot decision-making accuracy.

4. Integration of Emotional Intelligence & Security:

As chatbots evolve, future work can explore how **emotion-aware AI, sentiment analysis, and enhanced data security** shape user trust, engagement, and adoption of chatbot-based services.

5. Behavioral and Educational Aspects:

Further studies could evaluate how long-term interaction with chatbots influences users' attitudes, trust levels, complaint-handling expectations, and comfort with AI-driven support systems over time.

CHAPTER 6 – REFERENCES

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CHAPTER 7 – APPENDICES

Appendix A – Survey Questionnaire

The following questionnaire was prepared using Google Forms to collect primary data for the research titled “**A Study on the Use of Chatbots in Improving Customer Service in E-Commerce.**”

It consists of **32 structured questions** covering demographic details, chatbot usage, user experience, trust, accuracy, and perceived service quality.

Section A – Demographic Details

1. What is your age?
2. Gender
3. What is your occupation?
4. Education level
5. Monthly Income Range

Section B – Usage of E-Commerce Chatbots

6. Do you currently interact with chatbots on e-commerce platforms?
7. Which of the following platforms’ chatbots have you used? (Amazon, Flipkart, Myntra, Ajio, etc)?
8. How often do you interact with chatbots while shopping online?
9. Have chatbots helped you resolve basic queries more quickly?
10. Do chatbots make your overall shopping experience more convenient?
11. Do you prefer using chatbots over human support for simple queries?

Section C – Chatbot Accuracy, Convenience & Service Features

12. Have you received order updates, product information, or instructions from chatbots?
13. Was the information provided by the chatbot accurate and helpful?
14. Do you understand how the chatbot generates its responses?
15. Which chatbot features do you regularly use? (Order tracking, product inquiries, returns, etc.)?
16. Which of the following features do you find most helpful in e-commerce chatbots?
17. What motivates you to continue using chatbot support?
18. What do you mostly use chatbots for?
19. Have you ever taken an action (such as returning a product or placing an order) based on chatbot guidance?

Section D – Trust and Security

20. Do you trust the responses provided by e-commerce chatbots?
21. How secure do you feel while sharing information with chatbots?
22. Do you check privacy settings or data usage policies before using chatbot features?
23. Have you ever faced an issue due to incorrect chatbot responses?
24. What challenges have you experienced while interacting with chatbots?
25. Do you think chatbots should provide more detailed explanations or guidance?

Appendix B – Summary of Hypothesis Testing

This appendix presents the results of the Chi-square tests of independence conducted to determine the relationships between key variables such as **chatbot usage frequency, customer satisfaction, response accuracy, and trust**.

The tests were performed using Python's **scipy.stats** library at a significance level of **0.05 ($p < 0.05$)**.

Conclusion

The hypothesis tests indicate that

1. Chatbots significantly improve customer trust and perceived service accuracy, as shown by the strong association between accurate responses and user confidence.
2. Their influence on overall customer satisfaction is present but moderately significant, due to varying user expectations and limitations in handling complex issues.
3. Chatbots show limited effectiveness in resolving complex or emotionally sensitive queries, where human intervention remains essential.

Overall, the findings suggest that chatbots serve as highly effective tools for enhancing basic customer service efficiency, providing quick assistance, and improving accessibility in e-commerce platforms. However, further improvements in AI capabilities and conversational depth are needed to strengthen their impact on more complex customer service interactions.

CHAPTER 8 – ANNEXURE

PROGRESS SHEET

Progress Sheet

Review Phase	Date	Tasks	Remarks
Review 1	18/072025	1. Problem statement finalization 2. Introduction 3. Objectives & scope 4. Literature review 5. Proposed methodology 6. Identification of tools & dataset sources	Initial project setup and conceptual framework review
Review 2	20/08/2025	1. Questionnaire design 2. Data collection 3. Data cleaning & preparation 4. Data analysis 5. Interpretation of results 6. Charts & visual findings	Evaluation of data collection and analysis work
Review 3	14/11/2025	1. Final documentation of research project 2. Results, evaluation & conclusion 3. Final report formatting 4. Plagiarism report 5. PPT preparation for viva	Final evaluation and readiness

