

The Impact of Chatbots on Customer Service Jobs: A Study on the Replacement of Human Customer Support Agents

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ABSTRACT

The rapid advancement of artificial intelligence (AI) has significantly transformed various industries, including customer service. This study explores the impact of chatbot usage on customer support jobs, specifically examining whether people believe chatbots will replace human agents. Using a sample of 242 respondents, the research applies correlation and regression analysis to assess the relationship between chatbot usage and perceptions of job displacement. The results reveal a **weak positive correlation (R Square = 0.0181)** between chatbot usage and the belief that chatbots may replace human customer service agents. This suggests that as chatbot interactions become more common, people are not likely to perceive AI-driven automation as a potential replacement for human jobs. However, while the correlation is weak, it does not confirm causation, meaning other factors—such as industry trends, job experiences, and evolving AI capabilities—may also influence these beliefs.

The study's findings highlight both the efficiency and limitations of chatbots in customer service. While chatbots can handle repetitive tasks effectively and improve response times, they can't replace human agents, especially in complex or emotionally sensitive interactions. The study suggests that chatbot adoption will likely lead to a hybrid workforce model in the future.

Overall, this research contributes to the ongoing discussion about AI's role in the workforce. It emphasizes the need for businesses and policymakers to carefully consider the balance between technology and human interaction in customer service roles while monitoring the long-term impact of AI on employment trends.

Keywords: Chatbots, Customer Service, Artificial Intelligence (AI), Job Displacement, Automation, Human-Agent Replacement, Workforce Impact.

INTRODUCTION

The use of artificial intelligence technologies has markedly increased over recent years, particularly in the end of the COVID-19 pandemic, where the momentum to decrease labor requirements and conserve resources has escalated. In context with modern world, technological advancements have reached a point where AI systems have the potential to displace human labor, even in roles traditionally reliant on human interaction. This evolution indicates that AI has begun to anthropomorphize, engendering a capacity for self-humanization. The integration of such technology within customer service roles may pose a threat to long-established customer relationships and could jeopardize the initial perceptions of service quality.

Artificial intelligence, commonly referred to as AI, constitutes a compelling and rapidly advancing domain within computer science, fundamentally aimed at the aspirational objective of creating intelligent machines capable of performing tasks that conventionally necessitate cognitive processes akin to human intelligence. These AI frameworks are meticulously constructed to learn and evolve over time, leveraging extensive datasets and extracting insights from their operational experiences, thereby facilitating an increasing level of sophistication, adaptability, and versatility in addressing emerging challenges.

Among the myriad applications of artificial intelligence, one of the most distinguished and widely acknowledged

is the development and implementation of chatbots. These chatbots are advanced computer algorithms expressly designed to simulate human dialogue, whether through text-based communication or auditory interactions. Depending on their configuration, chatbots may function within a rule-based paradigm, strictly adhering to a specific set of predetermined guidelines and scripted dialogues, or they may be driven by sophisticated AI methodologies, incorporating natural language processing (NLP) and machine learning techniques to more adeptly interpret and respond to user inquiries in a manner that appears more natural and contextually relevant.

The emergence of AI-enhanced chatbots has profoundly altered the customer service and support domain, signifying a transformative shift in the manner in which enterprises interact with their customers. These intelligent systems are adept at handling a substantial volume of customer inquiries with exceptional efficiency, providing prompt, precise, and pertinent responses at any time, thereby guaranteeing that users receive assistance as required. Moreover, these chatbots possess the capability to customize interactions based on individual user preferences and behaviors, enabling them to deliver personalized recommendations that enrich the overall customer experience.

Beyond their pivotal function in customer service, AI-driven chatbots are increasingly being employed across a diverse spectrum of industries, including fields such as healthcare, finance, education, and entertainment. Within these sectors, chatbots can facilitate a range of activities, including the organization and scheduling of appointments.

REVIEW OF LITERATURE

Using chatbots and Artificial Intelligence (AI) in colleges and universities is changing the way education works. These technologies bring exciting new possibilities, but they also come with a few challenges that need careful thinking. This section looks at how tools like ChatGPT can help in higher education, what problems might come up, and how we can use them in smart and effective ways.

Opportunities of Chatbots and AI in Higher Education

Enhanced Student Support and Engagement

AI chatbots, such as ChatGPT, offer personalized support to students, providing instant responses to queries, assisting with academic tasks, and offering 24/7 accessibility (Chukwuere, 2024) (Zafar et al., 2024). These tools can enhance student engagement by facilitating interactive learning environments and promoting critical thinking through real time feedback (Wahit & Rossli, 2024). For instance, ChatGPT can assist students with brainstorming ideas, drafting assignments, and improving writing skills, thereby fostering academic productivity ("Adapting to the AI Era: Higher Education's Opportunities and Challenges with ChatGPT", 2024) (Varghese, 2024).

Streamlined Administrative Processes

The integration of AI chatbots can significantly improve administrative efficiency in higher education institutions (HEIs). Chatbots can handle routine tasks such as enrollment, course registration, and fee payments, reducing the workload on administrative staff and enhancing the overall student experience (Chukwuere, 2024) (Segovia-García, 2024). Additionally, AI-powered tools can automate grading and provide personalized feedback, allowing educators to focus more on teaching and research (Bobula, 2024) (Al-Shabandar et al., 2024).

Personalized Learning Experiences

AI technologies like ChatGPT enable personalized learning by tailoring educational content to individual student needs. For example, ChatGPT can generate customized study materials, provide adaptive assessments, and offer one-on-one tutoring, thereby catering to diverse learning styles and preferences (Varghese, 2024) (Zafar et al., 2024). This personalized approach can enhance learning outcomes and student satisfaction.

Challenges of Chatbots and AI in Higher Education

Academic Integrity and Ethical Concerns

One of the most significant challenges associated with AI chatbots is the potential for academic dishonesty. Students may use ChatGPT to complete assignments, write essays, or even cheat on exams, raising concerns about academic integrity (Ferdousi, 2024) (Zafar et al., 2024). Additionally, ethical issues such as plagiarism and the over-reliance on AI tools can undermine the quality of education.

Misinformation and Content Accuracy

AI chatbots like ChatGPT generate responses based on the data they are trained on, which may contain inaccuracies or biases. This can lead to the dissemination of misinformation, particularly in sensitive fields such as science, law, and medicine (Bobula, 2024) (Al Shabandar et al., 2024). Ensuring the accuracy and reliability of AI-generated content is crucial to maintaining the integrity of educational processes.

Privacy and Data Security Concerns

The use of AI chatbots in higher education raises concerns about data privacy and security. ChatGPT requires access to student data, which can be vulnerable to breaches or misuse. Institutions must implement robust data protection measures to safeguard sensitive information (Abhishek et al., 2024) (Segovia-García, 2024).

Implementation Strategies for Chatbots and AI in Higher Education

Developing Ethical Guidelines and Policies

Higher education institutions must establish clear ethical guidelines for the use of AI chatbots. These guidelines should address issues such as academic integrity, data privacy, and the responsible use of AI tools (Abhishek et al., 2024) (Al-Shabandar et al., 2024). Policymakers and educators must collaborate to create frameworks that promote ethical AI practices.

Investing in Faculty Training and Development

Educators need to be equipped with the skills to effectively integrate AI tools into their teaching practices. Institutions should invest in faculty training programs that focus on the responsible use of AI chatbots and the development of AI literacy (Kurtz et al., 2024) (Rozek, 2024). This will enable educators to leverage AI technologies to enhance teaching and learning.

Promoting Digital Literacy Among Students

Students must be educated about the benefits and limitations of AI tools. Institutions should promote digital literacy by incorporating AI education into the curriculum, ensuring that students can use these tools responsibly and effectively (Cui & Alias, 2024) (Asad & Ajaz, 2024).

Future Directions for Chatbots and AI in Higher Education

Continuous Research and Development

Ongoing research is necessary to address the challenges associated with AI chatbots and to explore their full potential in higher education. Future studies should focus on improving the accuracy of AI-generated content, enhancing data security, and developing ethical AI practices (Bobula, 2024) (Al-Shabandar et al., 2024).

Leveraging AI for Lifelong Learning

AI chatbots can play a crucial role in promoting lifelong learning by providing continuous education and upskilling opportunities. Institutions should explore the potential of AI in supporting adult education and professional development (Asad & Ajaz, 2024) (Wangsa et al., 2024).

Fostering Innovation and Creativity

AI tools like ChatGPT can foster innovation and creativity in higher education by enabling students and educators to explore new ideas and approaches. Institutions should encourage the use of AI as a tool for creative problem-solving and innovation (Isiaku et al., 2024) (Varghese, 2024).

Ensuring Equitable Access to AI Tools

Ensuring equitable access to AI tools is essential for promoting inclusivity in higher education. Institutions must address the digital divide by providing resources and support for students who may lack access to AI technologies (Kurtz et al., 2024) (Asad & Ajaz, 2024).

Hypothesis

Null hypothesis (H_0)

- There will be no significant impact of using chatbots as a replacement for customer support jobs.

Objectives

The objectives of this research are:

1. to identify the scenario of chatbots being used as replacement for customer support agents.
2. to identify whether chatbots are able to satisfy the customers for the need of human interaction.

This research aims to gather insights from consumers and general public about the possible replacement of customer support jobs due to the use of chatbots or Anthro morphing of the same. The research collected data by the help of questionnaires that are filled by a sample of 242 which is far more than the expected. The data collected for this research for testing of hypothesis is from primary sources and 100 percent original. The test applied to test up the hypothesis is Correlation and Regression Analysis.

RESEARCH METHODOLOGY

This research aims to gather insights from consumers and the general public about the possible replacement of customer support jobs due to the use of chatbots. A total of 242 participants were surveyed using a convenience sampling technique via online distribution on educational and professional forums. The response rate was approximately 90%, and checks for non-response bias included comparing early and late respondents. The data was collected using a structured questionnaire developed by the researchers. A pilot study with 30 respondents was conducted to assess clarity. The internal consistency reliability (Cronbach's alpha) was found to be 0.78, indicating acceptable reliability. The full instrument is provided in the Appendix. The survey instrument included both closed- and open-ended questions. For multi-response questions such as the identification of chatbot drawbacks, responses were coded as binary variables (1 = selected, 0 = not selected) and aggregated to form a perceived limitation score.

The hypothesis was tested using correlation and regression analysis. While statistical significance was assessed using p-values, practical significance was evaluated based on effect size (R^2). Limitations and implications of the analysis were addressed to contextualize the findings for workforce policy and planning.

Practical Implications

While the regression results showed statistical significance ($p = 0.036$), the explanatory power was very low ($R^2 = 1.81\%$), indicating limited practical influence. This suggests that chatbot usage alone does not shape beliefs about job replacement. Organizations should not interpret these findings as justification for immediate workforce reductions. Instead, chatbots should be integrated to augment human roles. For workforce planning, upskilling employees in chatbot supervision, digital empathy, and complex problem-solving will help build a sustainable

hybrid service model. Policymakers should prioritize digital literacy, ethical AI deployment, and inclusive technology access.

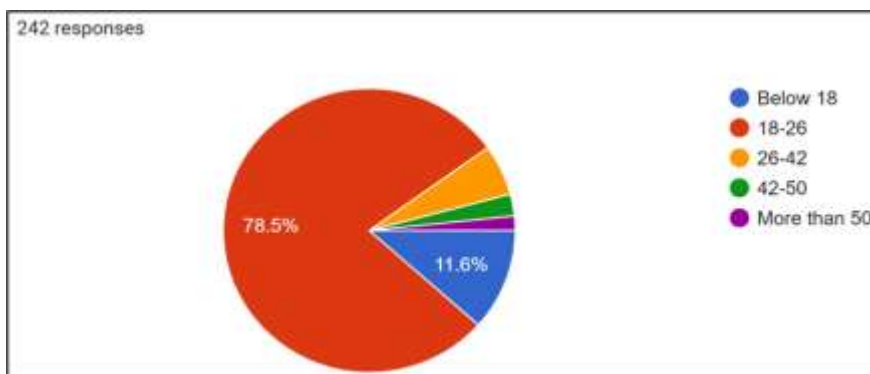
Also, to test whether the various objectives are covered in the hypothesis, the research also contains various statistical data that has been categorized in tabular and graphical form to analyze the various different research questions that are formed in the objectives. At last, the interpretations of the statistical data have been made in the simple words for the final evaluation as well as some limitations, suggestions, and future work requirements were given in the research.

Data Analysis and Interpretation

Demographics

What is your age?

Age groups	Below 18	18-26	26-42	42-50	More than 50	Total
Respondents	28	190	14	6	4	242



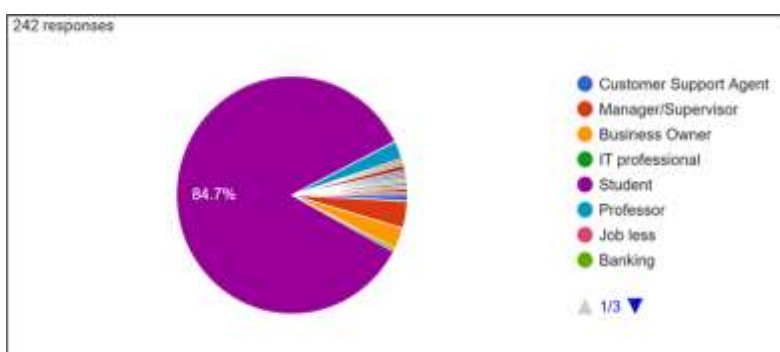
Interpretation

Age is the most important demographic factor to be studied during any research to find out what is different understanding of the topic among different age groups. Thus, my research took 5 age Groups which can judge the topic and able to communicate the findings that are needed as per customer service jobs.

More than half percentage of question are filled by Genz and a little by other age groups.

What is your occupation?

Occupation	Customer Support Agents	Manager /Supervisor	Business owner	IT professional	Student	others	Total
Respondents	2	9	7	1	205	18	242



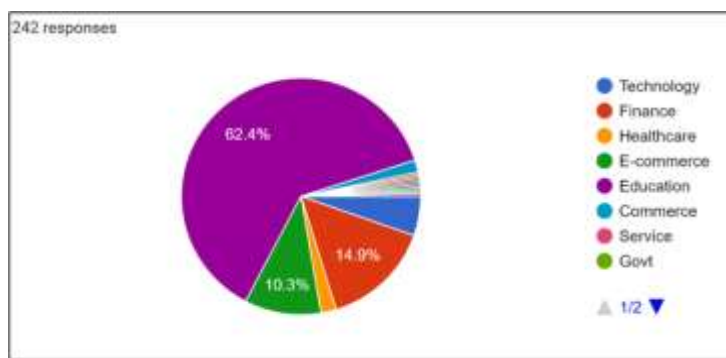
Interpretation

The other most important factor which judges the whole topic is finding out the perspective of the person who is filling the form and how perspective of the person who is filling out the form matters in the research of particular topic.

This form is mostly filled by the consumer base or we can say the person who are not currently doing any type of customer service jobs. Most percentage of this form is filled by students as well as other Scholars and educational stakeholders.

What industry do you belong to?

Industry	Technology	Finance	Healthcare	E-commerce	Education	Others	Total
Respondents	13	36	5	25	151	12	242



Interpretation

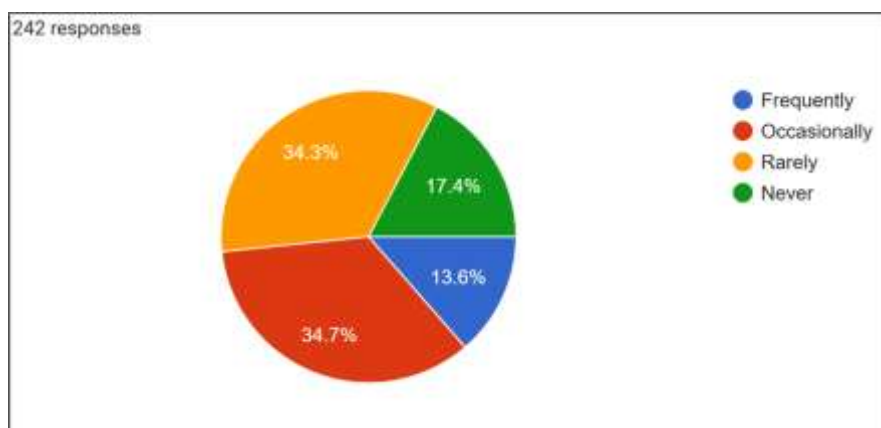
This factor helps to identify the industry in which the person who is filling out the form is performing the occupation. This form contains various options related to different kinds of industries which are prominent and huge population works in these sectors only.

Since, most percentage of occupation consists of students and only few were of working class, the data came out from these criteria consist of the industries in which the student is pursuing his/her degree.

Familiarity With Chatbots

How often do you use chatbots for customer support?

Frequency	Frequently	Never	Occasionally	Rarely	Total
Respondents	33	42	84	83	242



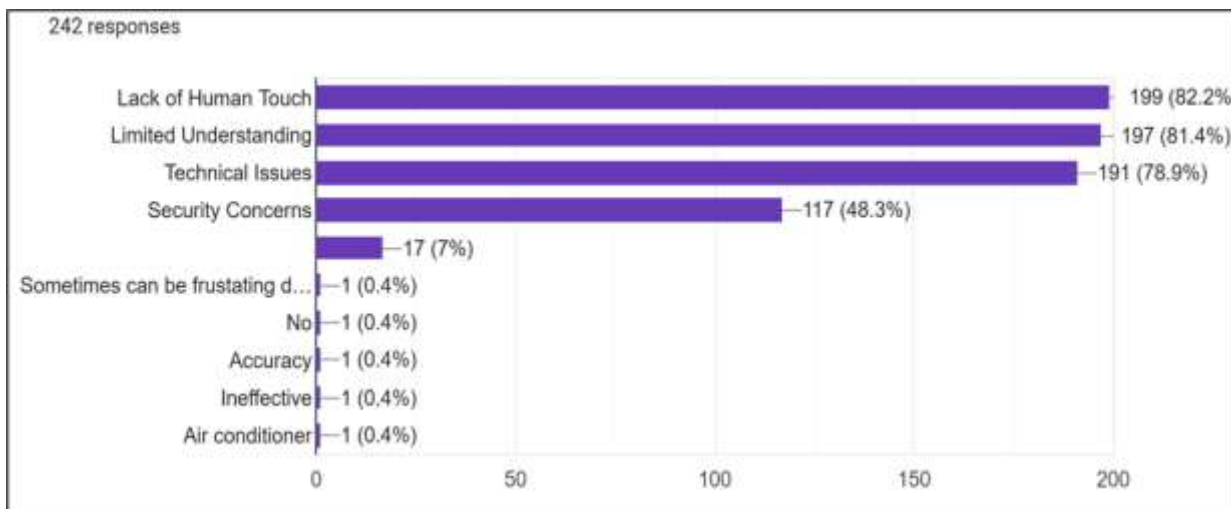
Interpretation

This question asked about the frequency of using the chatbot services for customer service. A large percentage of audience has not been using the chatbot services frequently as 17.4% of persons haven't used the chatbot services as well 34.3% of audience rarely use these services. This way we came to conclusions that the consumer is still prefers the human executives over the technology.

Although the data is not quite similar to its population but still, we believe that the population can also come to conclusions that human executives are better than technology as various mnc's prefer workforce over Techforce. The data of frequently using consumers and occasional using consumers stands at 13.6% and 34.7% which is not so low. As per the findings of this statistical analysis we can conclude that there is higher percentage of population which believes that human customer support agents are far better than chatbot or AI services.

What drawbacks do you associate with chatbots in customer service? (Select up to 3)

Limitations	Limited Understanding	Lack of Human Touch	Technical Issues	Security Concerns	Others	Total
Respondents	197	199	191	117	22	726



Interpretation

This question being exact opposite of the last question Seeks to find out the percentage of people Marking out the possible drawbacks of the chatbots. Matching to my expectations the three most selected options were lack of human touch limited understanding and technical issues. The other option is security concerns but it lacks being chosen by anyone as there is no such personal information involved during the communication with chat bots.

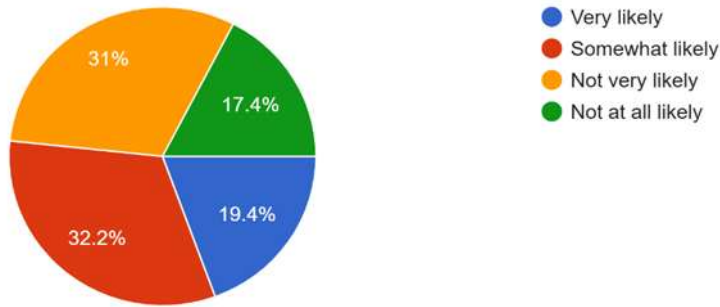
Someone says that “the modern world needs modern solutions” but, in this context, “the modern world needs traditional solutions too”. As checked bots have limited understanding about a matter and it lacks human touch which is most important factor to satisfy a consumer. The human customer support agents will Conquer both drawbacks of chatbots.

Impact And Future of Chatbots

How likely are you to lose your job to a chatbot?

Frequency	Very Likely	Somewhat Likely	Not very Likely	Not at all Likely	Total
Respondents	47	78	75	42	242

242 responses



Interpretation

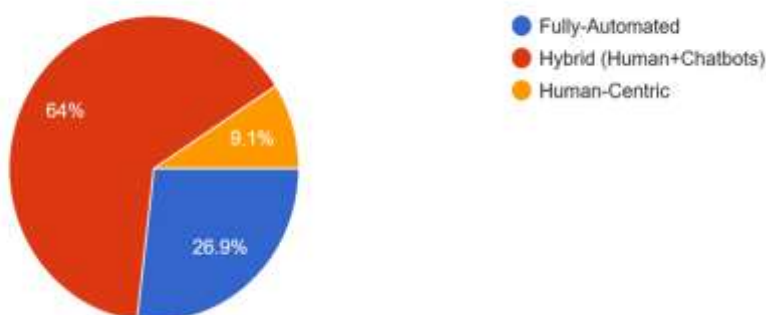
Similar to the last question this question seeks to Gather insights from the audience of what they think whether they will lose their Jobs to chatbots in future. A higher percentage of audience thinks that they will possibly lose their job to a chatbot in future while the ones saying no are not far behind as 48.4% of audience thinks that they will not lose their jobs to chatbots.

Unlikely to the last question where the audience has to judge whether there is a threat to the human customer support agents in future there is less percentage of audience who thinks that there's jobs will be in threat due to chatbots.

How do you envision the future of customer service?

Future	Fully automated	Hybrid (human+ chatbots)	Human-centric	Total
Respondents	65	155	22	242

242 responses



Interpretation

In this question, we can find out what is the possible future of customer service. By the help of this data we can understand that a higher percentage of population thinks that the future of customer service will be hybrid which Means that both human and chatbots will compete to provide customer satisfaction in future. As the chatbots and ai technology is evolving day by day it might get a solution to satisfy the customer needs by adding a possible feature in the future.

Hypothesis Testing Null Hypothesis

“There will be no significant impact of using chatbots as a replacement for customer support jobs.”

The data for the following calculations were taken from two questions and the coding related to the options of the survey are enlisted below:-

Q.8. What drawbacks do you associate with chatbots in customer service?

OPTIONS	CODING GIVEN
Lack of Human Touch	1
Limited Understanding	2
Technical Issues	2
Security Concerns	2

(Select up to 3)

Q.10. How likely are you to lose your job to a chatbot?

OPTIONS	CODING GIVEN
Very Likely	1
Somewhat Likely	1
Not Very Likely	2
Not at all Likely	2

CORRELATION (r)

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

Questions	Q.8.	Q.10.
Q.8. How often do you use chatbots for customer support? (Select one)	1	
Q.10. Do you think chatbots will replace human customer support agents?	-0.02969419	1

Interpretation

We wanted to understand whether people who use chatbots more often are more likely to believe that chatbots will eventually replace human customer support jobs. When we analyzed the data, we found a **correlation of 0.0297**, which is extremely close to zero. This suggests that there's almost no connection between how frequently someone uses chatbots and their belief about chatbots replacing human jobs.

To be sure this result isn't just a coincidence, we would need to check something called the **p-value**, which tells us if the relationship is statistically meaningful. If the **p-value is greater than 0.05**, it means the connection isn't strong enough to be considered significant. But even if we found statistical significance, the effect size (**0.03**) is so small that chatbot usage barely influences people's opinions on this topic.

Since the correlation is so weak, **we can say that chatbot usage doesn't seem to have any meaningful impact on people's beliefs about job replacement**. In other words, just because someone interacts with chatbots often doesn't mean they're any more or less likely to think chatbots will take over human roles.

Regression

$$Y_i = f(X_i, \beta) + e_i$$

SUMMARY OUTPUT

Regression Statistics	Statistics
Multiple R	0.134612928
R Square	0.01812064
Adjusted R Square	0.014029476
Standard Error	0.494629527
Observations	242

ANOVA

Anova Statistics	df	SS	MS	F	Significance F
Regression	1	1.083644	1.083644	4.429214	0.036368988
Residual	240	58.71801	0.244658		
Total	241	59.80165			

Question	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.652448288	0.102992649	16.044	7.43E-40	1.449563	1.8553332	1.449563313	1.855333263
Q.8.	-0.175061353	0.08318154	-2.1046	0.036369	-0.338920	-0.011202	-0.338920472	-0.011202235

Interpretation

This regression analysis explores whether chatbot usage influences people's beliefs about the replacement of human customer service jobs. The **Multiple R value of 0.1346** suggests a very weak relationship between chatbot usage and beliefs about job displacement. The **R Square value of 0.0181** indicates that only **1.81% of the variation** in people's opinions is explained by chatbot usage, meaning other factors play a much larger role in shaping these beliefs. The **Adjusted R Square value of 0.0140** further confirms that chatbot usage alone does not strongly predict opinions on job replacement.

The **ANOVA results** show that the model is statistically significant, with an **F-value of 4.4292** and a **p-value of 0.0363**. Since this p-value is below **0.05**, we can say there is a statistically significant relationship between chatbot usage and job replacement beliefs. However, statistical significance does not imply a strong effect. The **coefficient for chatbot usage (-0.1751)** suggests a weak negative relationship, meaning those who use chatbots more often might actually be **slightly less likely** to believe they will replace human agents. The **confidence interval (-0.3389 to -0.0112)** confirms that while the effect exists, it is small. Overall, the findings suggest that chatbot usage does not strongly influence whether people think customer support jobs will be replaced. Other variables, such as personal experiences, job security, and industry trends, likely have a much greater impact on shaping these beliefs. While automation is advancing, public perception does not overwhelmingly support the idea that chatbots will take over human customer service roles entirely.

CONCLUSION

This study explored whether chatbot usage influences beliefs about the replacement of human customer service jobs by analyzing both correlation and regression results. The **correlation analysis** found a very weak relationship (0.1346), suggesting that the frequency of chatbot usage has little to no direct connection with whether people believe chatbots will replace human jobs. This low correlation indicates that people's perceptions are likely influenced by other factors, such as job security concerns, personal experiences, and exposure to industry trends.

The **regression analysis** further supports this conclusion. With an **R Square value of only 1.81%**, the model shows that chatbot usage explains very little of the variation in people's beliefs. While the **p-value of 0.0363** suggests that the relationship is statistically significant, the effect size is extremely small. The **negative regression coefficient (-0.1751)** indicates that those who use chatbots more frequently may actually be slightly less likely to believe they will replace human agents. This suggests that direct exposure to chatbots may highlight their limitations, reinforcing the idea that human customer support roles remain necessary, particularly for complex interactions.

These results suggest that while chatbots are becoming more common, they are not widely perceived as direct replacements for human agents. Instead, they are likely seen as tools that assist rather than completely replace human workers. The weak relationship between chatbot usage and beliefs about job displacement implies that technological advancements alone do not determine public perception—other factors, such as trust in AI, personal job security, and industry-specific trends, play a much larger role.

Overall, while chatbots are transforming customer service, this study indicates that the belief in full job replacement remains limited. Future research should investigate additional factors shaping these opinions, as well as long-term trends in workforce automation.

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