Analyzing the Drivers of Customer Chatbot Adoption in the Banking Industry

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ABSTRACT

Background: The integration of Artificial Intelligence (AI) chatbots into various industries has become a significant trend, with the banking sector being one of the key adopters. AI chatbots are designed to simulate human conversation, offering automated responses to customer queries. Their use in the banking industry aims to streamline customer service and improve efficiency. However, understanding the factors that influence customers' willingness to use chatbot services remains crucial for banks in optimizing these technologies. Factors such as perceived usefulness, ease of use, trust, privacy concerns, and customer satisfaction play vital roles in determining the acceptance of chatbot services in banking.

Purpose: The purpose of this research is to identify and analyze the factors that influence customer intention to use chatbots in banks. By investigating these factors, the study seeks to provide banks with actionable insights to improve their chatbot services, enhance customer engagement, and increase customer satisfaction. The research also aims to assess the role of various technological aspects such as the chatbot interface, content, safety, and convenience in shaping customer decisions to adopt this technology.

Methods: This study employs a quantitative research approach, utilizing a structured questionnaire to gather data from a sample of 250 bank customers. The questionnaire assesses several key factors, including perceived usefulness, perceived ease of use, trust, privacy concerns, and customer satisfaction. The collected data is then analyzed using statistical techniques, including regression analysis and structural equation modeling (SEM), to test the Technology Acceptance Model (TAM) and examine the relationships between the identified factors.

Results: The analysis reveals significant relationships between customer intention to use chatbot services and factors such as perceived usefulness, trust, and ease of use. Customers' satisfaction with the interface, content, and security of the chatbot also plays a critical role in their willingness to adopt this technology. The study confirms that perceived convenience and safety strongly influence customers' decision to engage with AI-driven chatbots in banks.

Conclusions: The findings of this research provide valuable insights into the factors affecting customer acceptance and intention to use chatbots in the banking sector. Financial institutions can use these insights to tailor their chatbot services, ensuring they address customer concerns related to trust, security, and ease of use. The results also highlight the importance of designing user-friendly interfaces and ensuring the safety of customer data. By understanding these factors, banks can improve customer satisfaction, foster trust, and promote the adoption of AI-driven services, benefiting both customers and service providers in the long term.

1. Introduction

Everyone needs financial services because they are convenient and trustworthy. Customers frequently voice concerns regarding difficulties gaining entry to services or finishing associated processes. The banks have gained a competitive edge as a result of several factors, including their increased reliance on technology, their increased use and reliance on direct accountable customer service environments, their increased volume of banking services, their expanded geographic reach, and the increased demand from their clientele for faster response times, as well as their improved control and increased use and reliance on technology to further hone their operational efficiency.

Artificial intelligence and natural language processing advancements over the past decade have led to the widespread adoption of chatbots. Call centers are no longer the first

point of contact for clients with questions or concerns. AI-powered chatbots are now available to filter and reroute user inquiries before they reach human customer support reps. When integrated into a website or mobile app, a chatbot (also called a conversational agent) can mimic human speech by responding to user queries and presenting information in a natural, conversational tone. Because they are continually learning, adjusting, and responding to user needs, these systems give the impression of being highly personalized, clever, valuable, and responsive.

Chatbots have benefits for businesses and their customers. To begin, chatbots allow customers to contact businesses at any time, from anywhere, right on their own mobile devices, and to receive instant, individualized solutions to their questions and concerns. Another perk is that with these programs in place, companies may use fewer customer service reps. There are numerous possible drawbacks of utilizing chatbots, despite their usefulness, including privacy and financial problems (Richad *et al.*, 2019). Despite their utility, chatbots face challenges such as privacy concerns and financial risks, which can impact user acceptance (Richad *et al.*, 2019).

There have been new publications on the topic of chatbots in the fields of travel (Melián-González *et al.*, 2021) and healthcare and education (Almahri *et al.*, 2020). Neither the insurance nor the banking sectors have been studied extensively in terms of chatbot reception (Rodríguez Cardona *et al.*, 2019; Sarbabidya & Saha, 2020). It's been the subject of numerous studies to determine what factors influence users' willingness to engage with a chatbot, but such findings may not translate to the financial services sector.

Based on previous studies on the effects of chatbots on banking sector customer service, we know that service quality, security, convenience, sustainability, and problem handling are important to banking sector customers. This study set out to determine whether elements, such as chatbot design, information, security, and facilities, influence customers' intentions to use chatbots.

2. Literature Review and Hypothesis Development

The emergence of artificial intelligence (AI) has significantly contributed to the development of chatbots, enabling banks to provide personalized and efficient services. Business Insider (2021) highlights the role of AI in transforming the banking sector by improving operational efficiency and customer experience. Juniper Research (2020) emphasizes that chatbots have become a game-changer for banking by reducing costs and enhancing service availability. Moreover, Mantra Labs (2019) discusses the influence of chatbots in

reshaping digital interactions in India, underscoring their potential to address the needs of a tech-savvy population.

Customer perception and attitude play a pivotal role in the adoption of chatbots. Eren (2021) identifies key determinants of customer satisfaction in chatbot usage, such as perceived ease of use and reliability, using evidence from a Turkish banking application. Kasilingam (2020) further explores the factors influencing customer attitudes toward chatbots for shopping, emphasizing the importance of user experience and convenience.

Behavioral theories provide insights into the factors driving chatbot adoption. Venkatesh and Davis (2000) extend the Technology Acceptance Model (TAM) to include variables such as perceived usefulness and ease of use, which are critical for understanding user acceptance of new technologies. Similarly, Venkatesh *et al.* (2003) propose the Unified Theory of Acceptance and Use of Technology (UTAUT), which integrates constructs like performance expectancy, effort expectancy, and social influence. These frameworks have been applied to various contexts, including mobile payment services (Schierz *et al.*, 2010) and mobile banking (Shaikh & Karjaluoto, 2015).

The banking industry's adoption of chatbots is influenced by sector-specific requirements and customer expectations. Nguyen *et al.* (2021) analyze the determinants of continuance intention toward banks' chatbot services in Vietnam, identifying usability and perceived value as significant factors. Chung *et al.* (2020) focus on luxury brands, illustrating how chatbot e-services can enhance customer satisfaction through personalized interactions. Similarly, Vieira and Sehgal (2017) discuss how banks can leverage AI techniques to better serve their customers, emphasizing the importance of aligning technological capabilities with customer needs. Despite the benefits, challenges remain in ensuring widespread adoption of chatbots. Gangwar *et al.* (2014) highlight the importance of addressing technological and organizational barriers to foster adoption. Liao *et al.* (2009) introduce the Technology Continuance Theory (TCT), which explains how initial adoption is influenced by factors like satisfaction and perceived usefulness. Mordor Intelligence (2019) provides market insights, noting that while the chatbot market is growing, its success depends on overcoming technical limitations and enhancing user trust.

Regional variations in chatbot adoption are evident in the literature. Govindaraj *et al.* (2023) provide a quantitative investigation of media experts' opinions on AI across platforms, highlighting cultural differences in AI acceptance.

One of the most well-known models for exploring why and how individuals adopt new technology is the Technological Acceptance Model (TAM). Melián-González *et al.* (2021) Chatbots have been successfully implemented

in industries like travel, where they assist with customer inquiries and streamline processes (Melián-González *et al.*, 2021).The model's descriptive power can be traced back to its two primary constructs, PEOU and PU, which together account for the user's impression of the product's usefulness and the ease with which it can be used. When defining PEOU, we say that it is "the degree to which a prospective user believes that using a particular system would be free from effort," while when defining PU, we say that it is "the degree to which a prospective user believes that using a particular system would enhance his or her job performance" (Davis *et al.*, 1989).

Chatbots in the banking industry can assist customers with tasks like reviewing their accounts, reporting a stolen card, making a payment, renewing their insurance, and requesting a refund (Tarbal, 2020).

Most individuals were familiar with the technology and preferred to use it at the beginning of the guidance process, according to research by Rodríguez Cardona *et al.* (2019), but around a third of participants said they didn't want to use chatbots at all. Gupta and Sharma (2019) found that positive customer attitude towards chatbots is related to the bots' perceived utility, simplicity of usage, and security risks. Quah and Chua (2019) studied the use of chatbots in the banking sector in Singapore to determine if their performance would meet customers' expectations and concluded that the technology was helpful. The banking chatbot's detailed information was the most highly regarded feature by customers, followed by its speed of response, functionality, interactivity, user friendliness, and security of personal information. Trivedi (2019) applied the information systems success model to the question of how consumers' impressions of a banking chatbot can influence their loyalty to the bank as a whole. Customers' favorable impressions of the software's creator stemmed from their positive chatbot encounters, while their worries about the program's potential for harm were allayed simply by the fact that they were using it. According to research by Sarbabidya and Saha (2020), advising services, ease of use, and convenience all contribute to chatbots' successful performance in the banking industry's customer service sector, cost effectiveness and efficiency, customization, relationship banking services, responsiveness, trustworthiness, useful service, security and privacy for customers, and maintaining customers' security and privacy. The adoption of chatbots in the education sector has been studied, revealing key factors influencing user acceptance (Almahri *et al.*, 2020)."

Sathye (1999) cites the broadcast of information about unique technological advancements as a key component in the widespread deployment of such developments. Research by Pikkarainen *et al.* (2004) shows that consumer awareness plays a major influence in predicting the frequency of online banking adoption. But consumers are hesitant to switch to online banking because of concerns about security and privacy (Sathye, 1999). E-banking education also led to a decrease in generalized risk perception, according to the research of Hanafizadeh and Khedmatgozar (2012).

Chatbots were first widely used in the financial sector. Chatbots, short for "chat robots," are sophisticated AI programs designed to have conversations with humans. Chatbots, as defined by Adam *et al.* (2020), are computer programs that mimic human conversation using AI and natural language processing. Chatbots, according to Sarbabidya and Saha (2020), are an innovative, forward-thinking, and easily adoptable technology that has proven itself to be very effective in providing a wide range of client services. Gupta and Sharma (2019) apply the TAM model to learn how Indian banking clients feel about chatbots. L.N. Michael (2018) sheds light on the creation and rollout of an SMS chatbot-based virtual assistant for hotel guests, with particular attention paid to their motives in the areas of entertainment, socializing, and interpersonal concerns. To better understand the appeal of chatbots, see Asbjorn Folstad's (2017) account of how they've been used to successfully link users with quick and effective service. Access to complete, correct, sufficient, and timely information has a significant impact on user happiness. Recent studies have also demonstrated that information quality is crucial to gaining consumers' trust (Gao, & Waechter, 2017). Consumers spend considerable effort and time using chatbot services to get information prior to making choices. Therefore, it is imperative that chatbot systems provide accurate, understandable, relevant, and engaging information (Teo, 2008). Since a bank is a financial institution, the information it provides to its customers is especially important to ensure its accuracy because it can have a direct impact on their transactions and financial decisions. "In banking, chatbots streamline processes like account reviews and payments, making them indispensable for efficiency (Tarbal, 2020)."

If chatbots consistently mislead users with inaccurate or outdated information, people may quit using them altogether. This situation causes significant wasted time and effort for users (Gao, 2015). In order for a chatbot to fulfill a user's requests, the user may need to reveal sensitive information on occasion. Therefore, if service providers can ensure the dependability and safety of chatbot systems, they may gain the trust of their customers. Several researchers have found that customers' trust in service providers declines when using information systems with poor interface design (Lee & Chung 2009). Advantages such as saving time, accurate information, and instant support are what users might hope to receive from interacting with chatbots. If the quality of the chatbot services matches or surpasses user expectations,

they will be well received by users. Client satisfaction with chatbots is still fairly low, despite widespread use of chatbots by various companies in recent years. This may be due to issues associated with chatbots, such as skepticism about their efficacy, negative feelings, or privacy concerns. Luo *et al.* (2019). Few studies have investigated why consumers are afraid to use chatbots, despite the fact that user happiness and the intention to continue using chatbots are still fairly low. The following hypothesis has been established on the basis of the aforementioned literature.

2.1. Research Hypothesis

H1: Chatbot design significantly influences perceived usefulness by banking customers.

H2: Chatbot information quality significantly influences perceived usefulness by banking customers.

H3: Chatbot security significantly influences perceived usefulness by banking customers.

H4: Chatbot facilitating conditions significantly influence perceived usefulness by banking customers.

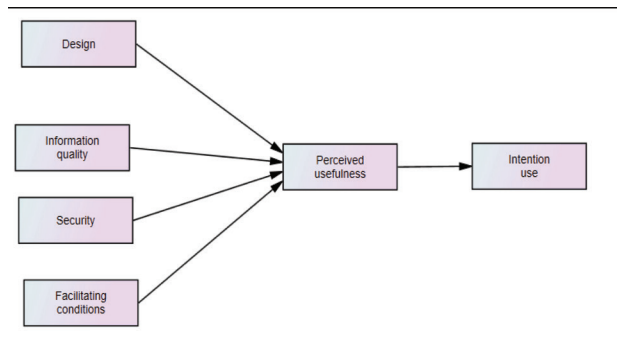H5: Perceived usefulness of chatbots significantly influences their intention to be used by banking customers.

Figure 1: Conceptual Framework of the Study

3. Methodology

Davis first proposed TAM in 1989 to illuminate the realities of computer use. One's "perceived usefulness" of a system (like a single platform e-payment system) is the extent to which one anticipates that using that system will improve one's action, while one's "perceived ease of use" of that system is the degree to which one anticipates that using that system will be effortless (Davis, 1989). "The TAM framework was employed to assess user acceptance of chatbot technologies in this study (Davis *et al.*, 1989)."Davis *et al.*, (1989). The banking sector in Tamil Nadu served as the empirical study's sample. Customers who routinely make use of financial services and chatbots will be randomly sampled as the study's respondents. A semi-structured questionnaire was developed,

with one half containing questions about respondents and business information and the other containing questions regarding study variables. Digital transformation has significantly shaped customer expectations in banking (Mantra Labs, 2019). On a scale from five (strongly agree) to one (strongly disagree), participants were asked to rate their level of agreement with the statement. From the initial pool of 275 completed questionnaires, missing values were removed, and 250 samples were chosen for further analysis as part of the data screening process.

Statistical Package for the Social Sciences and AMOS version 26 were used to test the data using descriptive and inferential statistics. As seen in Table 1 and 3, descriptive statistics provide an overview of the data. The first exploratory factor analysis (EFA) has been conducted to determine the structure of the measured data. Cronbach's alpha values were used to examine the data's internal consistency. SEM (Structural Equation Modeling) was then used to assess the research hypothesis.

Table 1: Details of Respondents from Selected SMEs (N=250)

Measures	Items	Frequency	Percentage
Gender	Male	162	64.7
	Female	88	35.3
Age	Below 24	41	16.4
	25-30	98	39.2
	30-35	88	35.2
	35-40	49	19.6
	40 & above	15	6
Education	Secondary	27	10.8
	Undergraduate	108	43.2
	Postgraduate	67	26.8
	Others	48	19.2

From the above table it can be interpreted that most of the respondents are male (64.7%) in comparison to female 38.3%. It is evident from the study that most of the respondents are young who is availing chatbot services

between the age of 24 to 40 years are 94%.Most of the respondents are well educated .

4. Factor Analysis

All the factor loading scores are over 0.5, and no cross-loading was seen in the preliminary factor analysis that was undertaken to ensure that selected scale items were suitably loaded, as shown in Table 2. Kaiser-Meyer-Olkin values determine if a sample size warrants more study. Bartlett's Test of Sphericity indicates that factor analysis is appropriate for our data due to its high KMO (0.924) and low significance (less than 0.05). The elements in the study were analyzed using principal component analysis with the maximum rotation technique. Eigen values greater than or equal to one were used to select the final factor extraction, yielding six factors. 72.483% of the total variance can be accounted for by these variables.

Table 2: Factor Loadings of Variables

Factor	Items	Item loadings
Design	D1: Chatbots design is user-friendly	0.806
	D2: Chatbots are designed to handle multiple queries	0.836
	D3: Chatbots has a nice appearance	0.796
	D4: Chatbots has a catchy name	0.856
	D5: Chatbots tone is interesting	0.834
Information quality	IQ1: Information provided by bank's chatbots is reliable	0.886
	IQ2: I think Chatbots' information is reliable.	0.901
	IQ3: Information provided by Chatbots is uo-to-date	0.787
	IQ4: I can get the data I need right when I need it thanks to chatbots.	0.916
Facilitating conditions	FC1: I have necessary resources for using Chatbots	0.817
	FC2: The ability to interact with chatbots is a skill I possess.	0.721
	FC3: I can utilise chatbots with the devices I already own.	0.765
Security	S1: Chatbots services keep my information confidential	0.811
	S2; I believe my transactions using chatbots are secured	0.747
	S3: Chatbots are secured enough to enhance the utilization of the service	0.847
	S4: Chatbots complies with the regulatory standards	0.760
Perceived usefulness	PU1: I am able to perform transactions efficiently with the help of chatbots	0.780
	PU2: I've found that using chatbots allows me to get more done in less time.	0.888
	PU3: Chatbots Advisory Services are very useful to me	0.796
Intention to use	I1: Eventually, I hope to make use of the chatbot.	0.722
	I2: Whenever possible, I use a chatbot service.	0.827
	I3: I think the bank's chatbot is fantastic and would recommend it to everyone.	0.775

Customers' levels of satisfaction with chatbot system-level characteristics such as design, information quality, security, and facilitating conditions, as well as their decisions regarding the perceived utility and intention to use chatbots, are detailed in the descriptive statistics table. The mean values for all variables are more than 3 (the neutral value), indicating that respondents agree on the system-level causes responsible for the adoption of chatbots in financial services. Independent variables' correlation with one another and with the dependent variables are also shown in the table. All associations with intention to use have positive and significant correlation coefficients, demonstrating that as indicators at the system level improve, so do consumers' perceptions of the utility of and desire to use chatbots in banking.

Cronbach's alpha, a measure of internal consistency, is displayed in Table 3 to conclude our analysis of the research variables. All six components have an alpha value higher than 0.7, meeting the minimum criteria for reliability.

Table 3: Cronbach's Alpha and Correlation of the Variables

	Design	Information quality	Security	Facilitating conditions	Perceived usefulness	Intention to use
Reliability (Alpha value)	0.886	0.890	0.940	0.949	0.916	0.894
Mean	4.3213	4.6622	4.7296	4.2453	4.5669	4.4333
Standard deviation	0.67538	0.79533	0.77554	0.81197	0.72713	0.76730
Design	1	0.728**	0.717**	0.619**	0.739**	0.363**
Information quality	0.728**	1	0.854**	0.714**	0.779**	0.442**
Security	0.717**	0.854**	1	0.662**	0.744**	0.426**
Facilitating conditions	0.619**	0.714**	0.662**	1	0.653**	0.346**
Perceived usefulness	0.739**	0.779**	0.744**	0.653**	1	0.533**
Intention to use	0.363**	0.442**	0.426**	0.346**	0.533**	1

Note: ** indicates Correlation is significant at the 0.01 level (2-tailed)

4.1. Hypothesis Testing using Structural Equation Modelling

The study runs SEM analysis using the maximum likelihood method to test the causal relationship between research constructs. The study assessed the impact of four system-level indicators (design, information quality, security, and facilitating conditions) by considering them as exogenous variables (independent variables) on perceived usefulness and intention to use chatbots as endogenous dependent variables of the study. The criteria for accepting or rejecting a study hypothesis are based on a critical ratio value of 1.96 and a p value less than 0.05 at the 5% level of significance.

Path analysis and hypothesis testing findings are shown in Table 4. Each relationship's standardized path coefficient and associated p-value are displayed. The standardized path coefficient (beta) for all four system components is positive and statistically significant (p value 0.05), as shown in Table 4. The impact of chatbot design on perceived usefulness is positive and significant, as $\beta = 0.281$ with p = 0.000. Since p value <0.05 and CR (3.729) > 1.96, thus hypothesis H1 is accepted.

The influence of chatbots information quality on perceived usefulness is positive and significant, having $\beta = 0.286$, CR = 2.801, and p = 0.005 (p< 0.05), providing sufficient evidence to accept hypothesis H2. Similarly, perceived usefulness of chatbots in banking is positively influenced by security, with $\beta = 0.193$, p = 0.039. This

relation is significant as p value less than 0.05; therefore, hypothesis H3 was supported by this finding.

In addition, facilitating conditions also result in a positive and significant impact on the perceived usefulness of chatbots. The β value for this path is 0.136 with a p value of 0.048 (p<0.05), confirming the acceptance of hypothesis H4.

Finally, perceived usefulness of chatbots is significantly influencing customer intention to use chatbots in the banking industry. The path coefficient value is 0.489 with p = 0.000; as the p value is less than 0.05, this supports acceptance of hypothesis H5.

As standardized regression weights indicate strength of impact of independent variable on dependent variable, the findings revealed that the influence of information quality on perceived usefulness of chatbots is highest, followed by design, security, and facilitating conditions.

The coefficient of determination (R^2) value is 0.62, indicating that 62% of variations in perceived usefulness of chatbots by customers in banking are explained by four indicators of system-level variables, i.e., information quality, design, security, and facilitating conditions. In addition, perceived usefulness is explaining 24% of the variation in customer intention to use chatbots in the banking industry.

CMIN/df = 1.762, RMSEA = 0.055, CFI = 0.967, TFI = 0.962, and AGFI = 0.866 are the fit indices for the measurement model. Prediction and interpretation are consistent with the structure model, as shown by the results.

Table 4: Path Coefficients of the Structural Model

Hypo-theses	Outcome Variables		Causal Variables	SE.	CR.	P	Path Coefficient	Result
H1	Perceived usefulness	←	Design	0.085	3.729	***	0.281	Accepted
H2	Perceived usefulness	←	Information quality	0.098	2.801	0.005	0.286	Accepted
H3	Perceived usefulness	←	Security	0.092	2.064	0.039	0.193	Accepted
H4	Perceived usefulness	←	Facilitating conditions	0.067	1.980	0.048	0.136	Accepted
H5	Intention to use		Perceived usefulness	0.068	7.234	***	0.489	Accepted

Note: SE; Standard error, CR; Critical ratio, Path coefficient, p: probability of significance. *** indicates $p<0.000$.

Table 5: Overall Model Fit

Indices	Recommended Criteria	Model Values
Normed chi square	$1<X^2/df<3$	1.762
Goodness-of-fit index	>0.90	0.916
Adjusted GFI	>0.80	0.866
Comparative fit index	>0.95	0.967
Root mean square error of approximation	<0.05 good fit <0.08 acceptable fit	0.055
Tucker-Lewis index	$0<TLI<1$	0.962

Note: Threshold criteria suggested by Hair *et al.* (2010) study.

5. Discussion and Implications

Financial institutions and banking sectors are adopting AI-powered chatbots to better serve their consumers. "The quality and reliability of information are crucial for building trust in chatbot services, as demonstrated by Teo (2008)." Customer awareness and concerns about security have historically influenced technology adoption in the banking sector (Sathye, 1999)." The purpose of this research was to apply a structural equation modeling approach to analyze the connections between four system-level properties of chatbots (chatbot design, information quality, security, and enabling conditions) and customers' intention to use them in the financial sector. The study showed that all of the system-level factors that affect chatbot acceptability are crucial. As a result, financial institutions and the developers of banking chatbot software should devote considerable resources to perfecting each of these features. The study concludes that the quality of the information offered by a banking chatbot has a significant impact on customers'

decisions to embrace the chatbot. This is why it is essential for customers to receive up-to-date information from their institutions. Customers place a high priority on chatbot safety; thus, financial institutions need to develop guidelines in this area. The way chatbots are programmed is crucial to their success. Designing a chatbot with the end user in mind ensures that it will be easy to learn and utilize. The results of the study also showed that favorable settings encourage chatbot adoption. When it comes to teaching individuals how to use chatbots, managers are recommended to put an emphasis on customer service.

6. Conclusion

In conclusion, this study emphasizes the significance of perceived utility, perceived usability, trust, privacy concerns, and customer satisfaction in influencing customer desire to use chatbots in banks. Banking institutions can use the knowledge from this research to help them create efficient

strategies for implementing chatbots and enhancing customer service. By taking care of these issues, banks may increase customer acceptance of and engagement with chatbot technology, thus increasing the overall customer experience in the banking industry. Overall, this study adds to the body of knowledge on chatbot adoption in the banking industry and offers useful recommendations for banks looking to efficiently use chatbot technology. Banks should use the potential of chatbots to create improved customer experiences and streamline their financial services by comprehending and addressing the factors impacting client intention.

7. Limitations and Future Scope

Like any other study, this one includes caveats that suggest new avenues for research. The small size of the sample is the first and most glaring issue. The study's sample size is high enough to pass the minimum threshold, but more participants would improve the quality of the results. This is especially true given the size and relevance of the millennial generation. Information on chatbots would be strengthened by contrasting the experiences of millennial and Generation Z users.

Authorship Contribution

All the authors contributed equally to all the aspects of the manuscript.

Ethical Approval

This research was conducted in accordance with ethical guidelines and standards. No human or animal subjects were harmed during the course of this study. Ethical approval was not necessary as the study focused on anonymized data collected from publicly available sources and did not involve the use of personal or sensitive information.

Conflict of Interest

Author declares that there are no conflicts of interest related to this study.

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