IMPACT OF SYSTEM-LEVEL INDICATORS OF CHATBOTS ON PERCEIVED USEFULNESS AND INTENTION TO USE FOR BANKING SERVICES

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ABSTRACT. Technology is rapidly mounting, and AI has transformed the financial industry rapidly. The primary objective of the research is to identify factors (like Design, Information Quality, Security, and Facilitating Conditions) that influence a customer to employ chatbot technology in the banking industry. A survey of 250 respondents was carried out utilizing an online questionnaire. The study's target respondents are customers who use banking services and chatbots through a random sampling method. The structured questionnaire employed in this study comprised two modules: one detailing the attributes of respondents and enterprises and the other containing questions on research constructs. The Stimulus Theoretical Framework and Technology Acceptance Model were tested throughout the study. The model helps to analyze the factors responsible for customer propensity that influence the use of chatbots. The research first conducted an exploratory factor analysis (EFA) to determine the measured data's structure. The internal consistency of data was tested using Cronbach's alpha values. Finally, the research hypothesis was assessed using Structural Equation Modeling (SEM). The research findings can help banks to meet the needs of their diverse customer base. The study would help the providers of chatbot services to reduce the complexity of communication and services for the users and make the customers adopt the technology services without any intervention. This develops trust among the consumers, thus making it a valuable contribution.

1. INTRODUCTION

Chatbot application is an artificial intelligence (AI) based computer program that can simulate human conversation into textual or verbal formats. This communication is so close to nature that it creates the impression of conversing with a real person (Bala et al., 2017). The accessibility and functionality of banking applications have an impact on consumer satisfaction, which is why banks are putting more emphasis on adopting customer-centric technology (Napitupulu, 2023). Highly tailored banking experiences have been made possible by this bank's use of AI-driven algorithms (Sharma, 2023). The banking industry was an early adopter of chatbots. Bots that mimic human conversation are called chatbots, and they are highly advanced computer systems. According to Adam et al. (2021), chatbot employs AI to understand the natural language of humans and analyze the audio and visual data to communicate effectively and naturally with the users. Everyone relies on the convenience and reliability of banking services in their day-to-day lives. Clients typically complain of issues in service access and completion of related processes. The banks have achieved a competitive advantage due to many factors (Vieira & Sehgal, 2017). There is an increased reliance on technology and more

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dependency on customer services, which are direct and have larger accountability. There is greater use of customer services in banks, larger geographic reach, shorter response time to customers, and use of efficient technology, which has improved the banking sector commendably. Chatbots have become increasingly common in the recent decade; with developments in areas such as expert systems, technology, and natural language processing, businesses no longer have customers send their inquiries or complaints straight to the top brass at the call center (Mordor Intelligence, 2019). Chatbots have driven as a layer of mediation between the users and customer service representatives, screening and re-directing queries. A chatbot, popularly referred to as a conversational agent, when used in a website or application, may act as if it were a real person, answering questions and providing information in a conversational style. These programs appear highly individualized, clever, useful, and responsive because they constantly learn, evolve, and adapt to user requirements (Mantra Labs, 2019).

Companies and customers alike can gain from implementing chatbots. Chatbots provide customers with a convenient way to get in touch with businesses anytime, from the comfort of their couches, with just a click away, and receive personalized responses to their queries (Mantra Labs, 2019). As a second benefit, businesses can reduce the number of customer care representatives they employ thanks to these applications' use. As useful as chatbots can be, some potential downsides exist, such as privacy and financial concerns (Richad et al., 2019).

Research has been carried out on using chatbots in various sectors, like travel (Bonsón Ponte et al., 2015, Melián-González et al., 2021), education, and healthcare (Almahri et al., 2020). However, little research has examined how chatbots are received in the insurance or banking industry (Cardona et al., 2019, Sarbabidya & Saha, 2020). Many studies have investigated the aspects affecting people's willingness to interact with a chatbot. Still, the results cannot be universally applied to industries like banking or insurance without in-depth analysis. For banking, a specialized investigation is essential.

2. Research Question

The limited research to analyze the impact of chatbots on customer management in the banking sector previously stated that customers appreciate security, reliability, convenience, quality of response, and short response time. Therefore, the study aimed to identify the factors like Design, Information Quality, Security, and Facilitating Conditions that impact the usage of chatbots.

3. Literature Review

Consumer Intention to use AI in the banking sector is a well-researched topic. The continuing advancement in technology globally is positively influencing the banking business too (Shaikh & Karjaluoto, 2015). Consequently, valuable insight can be gained by reviewing the available literature on the Intention to use other types of technologies in banking, like mobile banking or Internet banking (Schierz et al., 2010, Shankar & Kumari, 2016, Yang et al., 2012).

The Technological Acceptance Model (TAM) is popular in understanding how and why people use new technologies (Venkatesh & Davis, 2000). The ability of the model to describe user attitude, intention, and behavior can be traced back to two central constructs: perceived usefulness (PU) and perceived ease of use (PEOU), as shown in Figure 1. PU is when a prospective customer trusts that using the said product will enhance the person's overall performance (Davis et al., 1989). PEOU is said to be a belief by the prospective consumer that a certain product or service will free them from unnecessary hard work and make it an effortless process.

Chatbots have a significant role in the financial sector. It can help review accounts, manage refunds, process payments, report lost cards, and renew insurance (Tarbal, 2020, Yang et al., 2015). Numerous recent articles have addressed the topic of integrating chatbots into the banking sector.
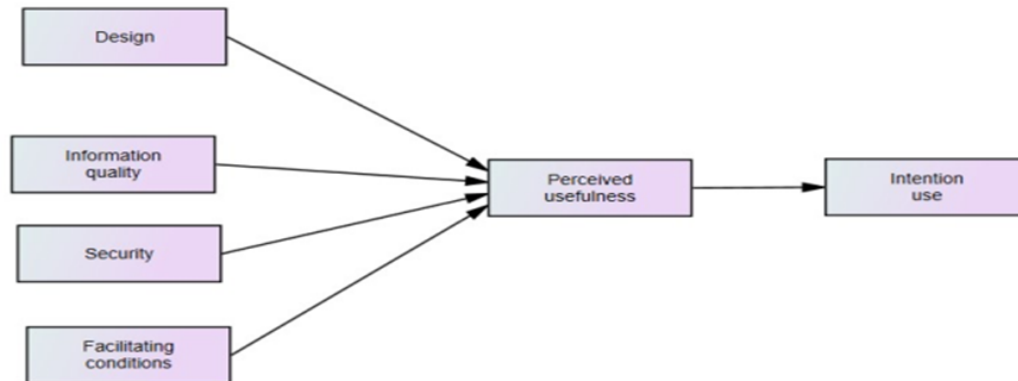
FIGURE 1. Theoretical Framework

Cardona et al. (2019) examined how widely chatbots are used and found that most people were aware of the technology and were comfortable engaging with it only initially. About a third of people didn't want to use chatbots at all. Customers' attitudes about chatbots were shown to be correlated with their assumed effectiveness, functionality, convenience, and safety, as mentioned in a study conducted by Gupta & Sharma (2019). To find out if the functioning of chatbots will match customer expectations, Quah & Chua (2019) looked into their implementation in Singapore's banking sector, revealing that the technology was beneficial. The customers valued the real-time responses of the chatbots, the detailed information they provided, the sense of data protection and privacy offered, along with perceived effective functioning offered by the banking chatbot system. However, some consumers were disquieted by the slow response of the chatbot. Richad et al. (2019), in their research, justified that the ingenuity assumed usefulness, convenience, and positive outlook towards using chatbots in banking played a determinant role in Millennials' behavioral intention in Indonesia based on TAM. Trivedi (2019) looked into how customers felt after interacting with a banking chatbot and how that affected their loyalty to the bank, using the Information Systems (IS) success model. The research outcomes demonstrated that the system's overall standard, the grade of the information, and the extent of fair services significantly impacted the customer experience, in which the quality of the system had the highest influence level. On similar accounts, Sarbabidya & Saha (2020) pre-programmed informative knowledge of the chatbots, convenient usage, cost-effectiveness and efficiency, user-oriented services, customization, relationship banking services, responsiveness, trustworthiness, value for money, security, and privacy for customers, and maintaining customers' security and privacy were all found to positively affect the perception of chatbots in the role of customer services in banking.

One of the most crucial factors in the widespread implementation of novel technological developments is disseminating information about those developments (Sathye, 1999). It was shown that customer knowledge is prominent in determining online banking rate of intention to use (Gangwar et al., 2014, Liao et al., 2009, Pikkarainen et al., 2004). Yet, consumers are only gradually adopting Internet banking due to a lack of familiarity with technology (Sathye, 1999). Research by Al-somali et al. (2009) indicated that people's opinions of the utility and convenience of online banking were significantly influenced by their familiarity with the service and its advantages. Also, the general level of perceived risk was reduced due to i-banking awareness (Hanafizadeh & Khedmatgozar, 2012, Yousafzai, 2012).

Sarbabidya & Saha (2020) argue that chatbots are innovative, transpiring, intelligent, and user-friendly technology that can be accessed year-round at any given time. They are highly beneficial in rendering good customer service and real-time solutions through one-to-one chat. Nguyen (2019) assessed chatbots' potential impact on the customer services of a company

through experiments. The impact of chatbots on consumer engagement is discussed by another author, Ojapuska (2018), who clarifies the difference between the technology of chatbots and other communication channels employed to increase customer engagement. Gupta & Sharma (2019) use the TAM model to understand consumers' feelings regarding chatbots in the Indian banking sector. Janssen et al. (2020) provide some useful insights into developing and deploying an SMS Chatbot-based virtual assistant to hotel customers, focusing on their entertainment, social, and relational issues-related motivations. Brandtzaeg & Følstad (2017) describes how chatbots have successfully connected users with prompt and efficient service, which sheds more light on the popularity of the technology. According to earlier studies, the properties of system quality and the trust concept may also be related, allowing system quality to predict trust. Users' satisfaction is substantially impacted by their ability to access accurate, exact, sufficient, and up-to-date information (Kalankesh et al., 2020). Information quality was also shown in some recent research to be important in fostering users' trust (Gao & Waechter, 2017). Consumers invest considerable time using chatbot services to receive the data they need to make decisions. As a result, the data provided by chatbot systems must be correct, clear, tailored, and attractive (Thompson et al., 2008). The information banks offer must be reliable because it directly affects the monetary decisions and transactions of the customers. Users may stop trusting chatbot services and turn to alternative information sources if chatbots give them irrelevant, out-of-date, or erroneous information. Users lose plenty of time and effort due to this predicament (Gao et al., 2015). Users occasionally have to enter confidential information into chatbot interactions for the chatbot to meet their demands. So, people may have more faith in service providers if they guarantee the dependability and security of chatbot systems (Candela, 2018). Several academics have also claimed that customers may lose faith in service providers if information systems have a bad interface design that makes them difficult to utilize (Lee & Chung, 2009). While using chatbots, users may anticipate gaining advantages, including time savings, precise information, and immediate support.

The availability of 24/7 customer service via chatbots and the significant reduction in transaction processing times are impressive (Aguegboh et al., 2022). Users see chatbots as practical solutions consistent with their needs when chatbot services perform at par or exceed their initial expectations (Kasilingam, 2020). Also, users' satisfaction with using the chatbot technology will motivate them to use it in the future. Although several organizations have widely deployed chatbots over the years, customer satisfaction is still quite low. This could be due to several chatbot usage issues, like doubts regarding the chatbot's performance, discomfort, or privacy concerns (Luo et al., 2019). Although user satisfaction to continue using chatbots is still quite low, few studies have yet to examine why users hesitate. Therefore, empirical research on using chatbot services in banking and user satisfaction with the technology is a topical and important subject. Eren (2021) made the most current effort to look into consumers' happiness with chatbot services in banking. The following hypotheses were formulated keeping in mind the above literature.

4. Research Hypothesis

H1: Chatbots' design significantly influences perceived usefulness by banking customers.

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

H3: Chatbots' security significantly influences perceived usefulness by banking customers.

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

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

5. Reasearch Methodology

The empirical analysis was conducted on a sample of the banking Sector. The study's target respondents are customers who use banking services and chatbots through a random sampling method. The structured questionnaire employed in this study comprised two modules: one detailing the attributes of respondents and enterprises and the other containing questions on research constructs. The customers were required to mark their judgment on a 5-point Likert scale (with 1 indicating strong disagreement and 5 referring to strong agreement). During the data screening procedure, missing values were eliminated from the 275 questionnaires submitted by respondents, and 250 samples were selected for further study.

Statistical Package for the Social Sciences (SPSS) and AMOS version 26 were adopted to test the data using vivid and inferential statistics (Tabachnick & Fidell, 2007). Tables 1 and 2 show descriptive statistics that highlight the data structure. The research first conducted an exploratory factor analysis (EFA) to determine the measured data's structure. The internal consistency of data was tested using Cronbach's alpha values. Finally, the research hypothesis was assessed using Structural Equation Modeling (SEM).

TABLE 1. Details of respondents from selected SMEs (N=250)

Measures	Items	Frequency	Percentage
Gender	Male	162	64.8
	Female	88	35.2
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 (64.8%) compared to female 38.2%. Most respondents are well-educated, and it is evident from the study that almost 94% of the respondents availing of chatbot services are young, aged 24 to 40 years.

5.1. Factor Analysis.

Appropriate loading of selected scale items was examined through precursory factor analysis, and the findings of Table 3 revealed all the factor loading scores were above 0.5, with no discernible cross-loading. The Kaiser-Meyer-Olkin (KMO) value evaluates whether a sample is large enough for investigation. The suitability of factor analysis for this study's data is evident from the high KMO value (0.924) and the low significance (< 0.05) of Bartlett's Test of Sphericity. The research constructs were analyzed with Principal Component Analysis (PCA) with the Promax Rotation method. The final factor extraction was chosen based on Eigenvalues equal to or greater than 1, providing 6 factors for the current study. These factors can explain 72.483% of the total variance.

The statistics table indicates the satisfaction level of customers for system-level variables of chatbots: design, information quality, security, and facilitating conditions, along with their decision for assumed functionality and intent to use chatbots. The results show that the average scores for all the variables are above 3 (neutral), confirming respondents agree on system-level factors responsible for the Intention to use chatbots. The correlations of the independent

TABLE 2. Cronbach's alpha, mean, standard deviation and correlation of the variables

	Design	Information quality	Security	Facilitating conditions	Perceived usefulness	Intention to use
Reliability (α 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	.67538	.79533	.77554	.81197	.72713	.76730
Design	1	.728**	.717**	.619**	.739**	.363**
Information quality	.728**	1	.854**	.714**	.779**	.442**
Security	.717**	.854**	1	.662**	.744**	.426**
Facilitating conditions	.619**	.714**	.662**	1	.653**	.346**
Perceived usefulness	.739**	.779**	.744**	.653**	1	.533**
Intention to use	.363**	.442**	.426**	.346**	.533**	1

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

variables among themselves and with the dependent variables have also been illustrated in the table. The correlation coefficients are positive and significant for all relationships with usage intention, showing that a rise in system-level indicators results in improved assumed productivity and usage intention of chatbots in banking by customers.

Finally, the research variables' trustworthiness and dependency were investigated using Cronbach's alpha value, as shown in Table 2. All six components have an alpha value higher than 0.7, per the threshold requirements, thus verifying the reliability of the data.

6. TESTING OF THE HYPOTHESIS USING STRUCTURAL EQUATION MODELING

The causal relationships between the research constructs in this study were examined using SEM analysis with the maximum likelihood method. The impact of four system-level indicators, design, information quality, security, and facilitating conditions, was assessed in this study by considering exogenous variables (independent variables) on the perceived usefulness and usage intention of chatbots as an endogenous dependent variable of the study. A critical ratio value of 1.96 and a p-value < 0.05 at the 5% level of significance are the requisite criteria to determine whether a study hypothesis should be accepted or rejected.

Table 4 demonstrates the hypothesis testing and path analysis results. It also shows standardized path coefficients, their statistical significance for each relationship, and the p-value. Figure 2 shows the standardized path coefficient (β) is positive and significant for all four system constructs. The impact of chatbot design on usage perception 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 results show a positive effect of the information quality on the assumed usefulness, having $\beta = 0.286$, CR$=2.801$, and p$=0.005$ ($p < 0.05$), providing ample substantiation to accept hypothesis H2. Similarly, the perceived usefulness of chatbots in banking is positively influenced by security with $\beta = 0.193$, p$=0.039$. The relationship can be understood as significant since the p-value is less than 0.05. Therefore, this finding supported hypothesis H3.

TABLE 3. Factor loadings of variables

Factor	Items	Item loadings
Design	D1: Chatbots design is user-friendly	.806
	D2: Chatbots are designed to handle multiple queries	.836
	D3: Chatbots has a nice appearance	.796
	D4: Chatbots has a catchy name	.856
	D5: Chatbots tone is interesting	.834
Information quality	IQ1: Information given by bank's chatbots is reliable	.886
	IQ2: Information given by Chatbots is accurate	.901
	IQ3: Information given by Chatbots is up-to-date	.787
	IQ4: Chatbots gives us required information timely when I need it	.916
Facilitating conditions	FC1: I have the necessary resources for using Chatbots	.817
	FC2: I am knowledgeable enough to use the chatbots	.721
	FC3: Chatbots are in sync with other technologies I use	.765
Security	S1: Chatbot advisory services are reliable	.811
	S2: I believe my privacy would not be divulged	.747
	S3: I am concerned that the information shared in chatbots could be misused	.847
	S4: Chatbots comply with the regulatory standards	.760
Perceived usefulness	PU1: Chatbots helps me to accomplish tasks more quickly	.780
	PU2: Chatbots make accomplishing tasks faster	.888
	PU3: Chatbots improves the quality of getting information	.796
Intention to use	I1: I intend to use the chatbot in the future	.722
	I2: I prefer to use chatbot service frequently	.827
	I3: I would strongly recommend this bank's chatbot to other persons	.775

In addition, chatbots' perceived usefulness is positively influenced by the ease of conditions. The β-value for this path is 0.136 with p-value $=0.048$ ($p < 0.05$), confirming the acceptance of hypothesis H4.

Finally, the assumed effectiveness of the chatbots significantly influences the customer's intention to employ the technology in the banking sector. Also, the path coefficient value is 0.489 with p=0.000, as the p-value is less than 0.05. This supports the acceptance of hypothesis H5.

Since standardized regression shows the power of independent variables, the results demonstrate that the chatbot is most impacted by data quality. The result concludes the research that

TABLE 4. Path coefficients of the Structural model

Hypotheses	Outcome variables		Causal Variables	SE	CR	P	Path coeff	Result
H1	Perceived usefulness	←	Design	.085	3.729	***	0.281	Accepted
H2	Perceived usefulness	←	Information quality	.098	2.801	.005	0.286	Accepted
H3	Perceived usefulness	←	Security	.092	2.064	.039	0.193	Accepted
H4	Perceived usefulness	←	Facilitating conditions	.067	1.980	.048	0.136	Accepted
H5	Intention to use		Perceived usefulness	.068	7.234	***	0.489	Accepted

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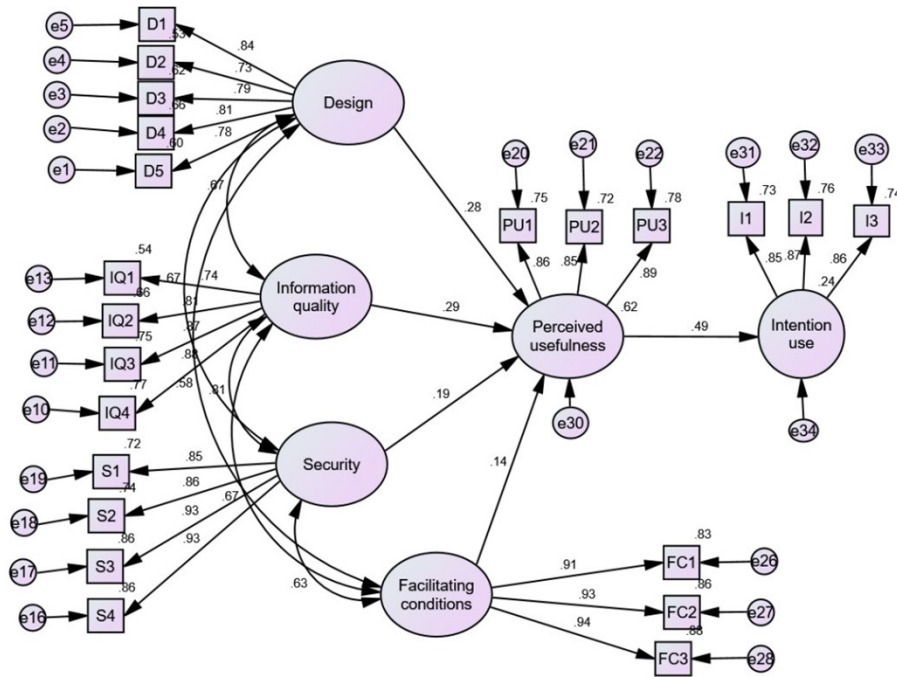

FIGURE 2. Effect Model

the impact of the grade of information on the perceived usefulness of chatbots is the highest. This is followed by design, security, and ease of use. The coefficient of determination (R2) value is 0.62, indicating that 62% of variations in the 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 explains 24% of the variation in customer intention to use chatbots in the banking industry.

The measurement model's fit indices are CMIN/df=1.762, RMSEA=0.055, CFI=0.967, TFI=0.962, and AGFI=0.866, as given in Table 5. The results indicate that the structure model fits prediction and interpretation.

TABLE 5. Overall Model Fit

Indices	Recommended criteria	Model values
Normed chi square (χ^2/DF)	$1<\chi^2/\mathrm{df}<3$	1.762
Goodness-of-fit index (GFI)	>0.90	0.916
Adjusted GFI (AGFI)	>0.80	0.866
Comparative fit index (CFI)	>0.95	0.967
Root mean square error of approximation (RM-SEA)	<0.05 good fit <0.08 acceptable fit	0.055
Tucker-Lewis index (TLI)	0<TLI<1	0.962

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

7. Discussion

Financial institutions and banking sectors are turning to AI-powered chatbots to provide more streamlined and up-to-date customer service (Business Insider, 2021). A structural equation modeling approach was employed in this study to investigate the connection between the four system-level characteristics of chatbots-design, information quality, security, and facilitating conditions-and customer Intention to use in the banking industry. The study's results demonstrated that all system-level elements influence chatbots' acceptance by users. In light of this, banking firms and the programmers responsible for building banking chatbot applications should put considerable energy and time into each aspect to make them better suited for consumers (Nguyen et al., 2021). Information plays a central role in the functioning of a chatbot and the user's positive experience. Further security is always a concern for the users of any tool, which is the case with chatbots (Mordor Intelligence, 2019).

7.1. Implications.

Clients' decision to adopt a banking chatbot is heavily influenced by the quality of the information provided by the chatbot, according to the study's findings. Hence, it is recommended that banks give their customers accurate and current information (Chung et al., 2020). Customers view chatbot security as crucial; thus, the banking industry should establish standards. The design of chatbots plays a significant role in their use. Chatbots should be created with the user in mind to be intuitive, aesthetically pleasing, and simple to use (Mogaji et al., 2021). The study findings also demonstrated that facilitating conditions aid the chatbot's Intention to use. Managers are urged to focus on customer service to help people learn how to use chatbots (Arya, 2017).

As a chatbot uses AI to mimic human communication, it is reasonable to assume that users will receive helpful responses to their questions and comments. Although unsatisfactory first encounters can sow seeds of doubt and lead to a loss of confidence, chatbot providers must ensure the high quality of their services and the data they give (Nadarzynski et al., 2019). Trust can be fostered through professional contacts, the caliber of questions and advice, personal information protection, etc. The findings about the perceived risk and trust associated with chatbots have managerial implications for chatbot suppliers. Awareness should be spread to educate consumers about the information gathered by the tool to ensure that users have the privacy and confidentiality they expect while conducting transactions (Hasal et al., 2021). Customers prefer to deal with a consumer acquisition system rather than an actual person (Venkatesh et al., 2003, Venkatesh et al., 2012).

Therefore, it is reasonable to assume that customers in the banking industry are willing to adopt chatbots because of curiosity, convenience, and technological advancement. So, it can be calculated that banks need to start experimenting and using the skills to design chatbots with important features to attract customers and fulfill their needs (Juniper Research, 2017). In addition, chatbots hold great promise for keeping customer records accurate and up to date

(Laumer et al., 2019). They can also improve the standard of customer service provided. Thus, it is in the best interest of banking institutions to be ready for this change. The platform's security could be verified by its users and promoted to new users through coupons and cashback (Hasal et al., 2021). This study's management ramifications suggest that to boost chatbot users' contentment, intention, and Intention to use, service providers should pay close attention to factors such as users' perceptions of chatbots' utility and risk.

7.2. Limitations.

The study has certain limitations which point to potential future exploration areas. The limited sample size is the first and most obvious problem. Although the study's sample size is large enough to meet the basic criterion, future research can benefit from a greater sample size due to the size and significance of the millennial generation. The current body of information on chatbots could benefit from a comparison of the millennial user's perspective with that of the next generation, Generation Z. Further, through research, the limitations of chatbots, such as their inability to show empathy and lack of human touch can be further studied.

8. Conclusion

There is an increased interest among scholars in AI tools and their implications in the contemporary world. One of the most popular technologies is chatbots which are being used directly with the consumers and are developed to make their experience hassle-free, timely, and convenient. Therefore, constant research in the financial and banking domain can help make the chatbots' functionality more effective and the user experience swifter and more enriching. Thus, the research on using chatbots in the banking sector for providing customer service is a timely and topical issue. A structural equation model was used to examine the connections between design, information quality, security, and facilitating conditions of the chatbots. The results showed that all the system-level variables influence chatbots' acceptance. Thus, the results showed that chatbots in the banking sector are becoming increasingly popular due to their value, security, and ease of use. They can handle various tasks and inquiries, offering customers a convenient and accessible way to interact with their bank. They, however, also have a phenomenal space for improvement which is possible with continuous robust research in all connected domains of the subject. The design, the quality of the information imparted by the tool, the security system, and the ease of use can be improvised with the help of user feedback.

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