AN SEM-BASED ANALYSIS OF CUSTOMER TRUST AND ACCEPTANCE OF BANKING CHATBOTS FOR SENSITIVE TRANSACTIONS IN CHENNAI CITY

Ms. Shilpa S

Research Scholar, Patrician College of Arts and Science, Adyar, Chennai.

DR. N. Purusothaman

Assistant Professor and Research Supervisor, Patrician College of Arts and Science, Adyar, chennai.

Abstract

The rapid adoption of artificial intelligence in the banking sector has led to the increased use of chatbots for customer service delivery. While banking chatbots offer convenience and efficiency, customer trust and acceptance remain critical concerns, particularly when chatbots are used for sensitive financial transactions. This study examines the factors influencing customer trust and acceptance of banking chatbots for sensitive transactions in Chennai City. A descriptive research design was adopted, and primary data were collected from 180 banking customers using a structured questionnaire. Structural Equation Modelling (SEM) using AMOS was employed to test the proposed conceptual framework. The results reveal that perceived security, privacy concerns, perceived usefulness, and ease of use significantly influence customer trust, which in turn has a strong positive effect on customer acceptance of banking chatbots. The findings confirm the mediating role of customer trust in the relationship between technology-related factors and chatbot acceptance. The study offers valuable theoretical and managerial implications for banks aiming to enhance trust and encourage customer adoption of AI-enabled chatbot services for sensitive transactions.

Keywords: Banking Chatbots, Customer Trust, Acceptance, Sensitive Transactions, Artificial Intelligence, SEM, AMOS

1. Introduction

The banking industry has undergone significant digital transformation with the integration of artificial intelligence (AI) technologies into service delivery systems. Among these innovations, banking chatbots have emerged as a prominent tool for providing round-the-clock customer support, facilitating transactions, and reducing operational costs. Chatbots are increasingly used for tasks such as balance enquiries, fund transfers, bill payments, and account-related queries, many of which involve sensitive financial information.

Despite their functional advantages, customer acceptance of banking chatbots remains uneven, particularly in the context of sensitive transactions. Concerns related to data security, privacy, trust, and reliability often influence customers' willingness to rely on chatbots for financial decision-making. Trust, therefore, plays a central role in determining whether customers accept and continue to use chatbot-based banking services.

Chennai City, as a major metropolitan and financial hub, has witnessed rapid adoption of digital banking services. Studying customer trust and acceptance of banking chatbots in this context provides valuable insights into consumer behaviour in emerging digital economies. This study

seeks to examine the structural relationships among technology-related factors, customer trust, and acceptance of banking chatbots for sensitive transactions using Structural Equation Modelling.

2. Review of Literature

2.1 Technology acceptance and chatbot adoption

Technology acceptance research has long established perceived usefulness and perceived ease of use as central determinants of individuals' intention to adopt new technologies. In the context of conversational agents, these constructs remain highly relevant, as users evaluate chatbots based on their ability to enhance task performance and provide seamless interaction. Recent studies applying TAM and UTAUT frameworks to chatbot adoption indicate that perceived usefulness and ease of use significantly influence both trust formation and behavioural intention, particularly in service-oriented settings such as banking.

2.2 Customer trust in digital and AI-enabled banking services

Trust is a critical factor in digital banking environments where customers are required to disclose sensitive personal and financial information. Prior research conceptualises trust as a multidimensional construct encompassing perceptions of competence, reliability, integrity, and benevolence. In AI-enabled service systems, trust acts as a key psychological mechanism through which technological attributes influence usage behaviour. Empirical studies have consistently demonstrated that higher levels of trust enhance customers' willingness to adopt and continue using digital banking technologies, including chatbots.

2.3 Perceived security and privacy concerns

Perceived security and privacy concerns play a decisive role in shaping customer trust in banking chatbots. Customers tend to evaluate chatbot systems based on their ability to safeguard financial data, prevent unauthorised access, and ensure secure transaction processing. While perceived security positively influences trust, privacy concerns—such as fears related to data misuse and lack of transparency—negatively affect customers' confidence in chatbot systems. Recent studies highlight that privacy assurance mechanisms and clear data governance policies are essential for enhancing trust in AI-based banking services.

2.4 Perceived usefulness and ease of use

Perceived usefulness reflects the extent to which customers believe that banking chatbots improve the efficiency and effectiveness of transaction processing. Ease of use relates to the simplicity and clarity of interaction with chatbot interfaces. Research in conversational AI indicates that systems perceived as useful and easy to operate are more likely to be trusted and accepted by users. In banking contexts, these perceptions are particularly important for sensitive transactions, where usability failures may increase perceived risk and reduce adoption.

2.5 Empirical evidence on banking chatbots

Empirical studies on banking chatbots suggest that trust mediates the relationship between technological characteristics and acceptance outcomes. Research conducted in emerging economies indicates that customers' adoption decisions are influenced not only by system performance but also by cultural and contextual factors such as digital literacy and preference for human interaction. Metropolitan settings, characterised by higher exposure to digital services, provide an appropriate context for examining chatbot acceptance dynamics.

2.6 Research gap and contribution

Although existing studies have examined chatbot adoption and trust, limited research has integrated perceived security, privacy concerns, perceived usefulness, ease of use, and customer trust within a single structural equation model focusing on sensitive banking transactions. Moreover, empirical evidence from Indian metropolitan contexts remains scarce. The present study addresses this gap by proposing and validating an SEM-based framework that explains customer trust and acceptance of banking chatbots for sensitive transactions in Chennai City.

3. Objectives of the Study

1. To analyse customers' perceptions of banking chatbots for sensitive transactions.
2. To examine the influence of perceived security, privacy concerns, perceived usefulness, and ease of use on customer trust.
3. To study the effect of customer trust on acceptance of banking chatbots.
4. To test a structural equation model linking technological factors, customer trust, and chatbot acceptance.

4. Hypotheses of the Study

➢ **H₁:** Perceived security has a significant positive effect on customer trust in banking chatbots.
➢ **H₂:** Privacy concerns have a significant influence on customer trust in banking chatbots.
➢ **H₃:** Perceived usefulness has a significant positive effect on customer trust in banking chatbots.
➢ **H₄:** Perceived ease of use has a significant positive effect on customer trust in banking chatbots.
➢ **H₅:** Customer trust has a significant positive effect on acceptance of banking chatbots for sensitive transactions.
➢ **H₆:** Customer trust mediates the relationship between technological factors and chatbot acceptance.
➢ **H7:** Customer trust mediates the relationship between privacy concerns and customer acceptance of banking chatbots.
➢ **H8:** Customer trust mediates the relationship between perceived usefulness and customer acceptance of banking chatbots.
➢ **H9:** Customer trust mediates the relationship between perceived ease of use and customer acceptance of banking chatbots.

5. Research Methodology

➢ This study employs a quantitative, cross-sectional research design to examine the determinants of customer trust and acceptance of banking chatbots for sensitive transactions. The analytical framework is grounded in technology acceptance and trust-based theories and is empirically tested using covariance-based Structural Equation Modelling (SEM).

➢ The study was conducted in Chennai City, a major metropolitan centre with high digital banking adoption. The target population comprised bank customers with prior experience interacting with banking chatbots through mobile or web-based platforms. Data were collected from 180 respondents using a structured questionnaire administered through both online and offline modes. A convenience sampling technique

was adopted due to accessibility constraints and the exploratory nature of chatbot adoption research. The sample size meets recommended thresholds for SEM analysis and ensures stable parameter estimation.

➢ Measurement items were adapted from established scales in technology acceptance, trust, and digital banking literature, with contextual modifications to reflect chatbot-based sensitive transactions. All constructs were operationalised using multiple indicators and measured on a five-point Likert scale ranging from strongly disagree to strongly agree.

➢ Data analysis was performed using SPSS for preliminary screening and AMOS for confirmatory and structural analyses. Confirmatory Factor Analysis (CFA) was conducted to assess construct reliability and validity, followed by SEM to test hypothesised relationships. Mediation effects were examined using bootstrapping procedures. Reliability and validity were evaluated using Cronbach's alpha, composite reliability, and average variance extracted, in accordance with established methodological guidelines. Ethical considerations were observed throughout the research process. Participation was voluntary, informed consent was obtained, and respondent anonymity was ensured.

6.Conceptual Framework of the Study

The conceptual framework of this study is grounded in the Technology Acceptance Model (TAM) and trust-based theories of digital service adoption, extending them to the context of banking chatbots used for sensitive transactions. The framework proposes that customers' acceptance of banking chatbots is primarily driven by customer trust, which acts as a central mediating mechanism between technology-related perceptions and behavioural outcomes.

In the proposed model, perceived security, privacy concerns, perceived usefulness, and perceived ease of use are specified as exogenous latent variables. These constructs represent customers' evaluations of the technical, functional, and risk-related attributes of banking chatbots. Perceived security reflects customers' beliefs regarding the safety of financial transactions, while privacy concerns capture apprehensions related to misuse or unauthorised access to personal data. Perceived usefulness and perceived ease of use represent core technology acceptance beliefs related to performance enhancement and interaction simplicity. Customer trust is modelled as an endogenous mediating construct, reflecting customers' confidence in the reliability, integrity, and competence of banking chatbots when performing sensitive financial transactions. The framework posits that favourable perceptions of security, usefulness, and ease of use enhance customer trust, whereas heightened privacy concerns weaken trust.

Finally, chatbot acceptance is specified as the ultimate endogenous outcome variable, representing customers' intention and willingness to use banking chatbots for sensitive transactions. The model assumes that acceptance is largely indirect, occurring through the development of trust rather than through direct effects of technological attributes alone.

Thus, the framework conceptualises customer trust as the key explanatory bridge through which technological perceptions are transformed into acceptance behaviour. This mediation-oriented structure enables a comprehensive understanding of how customers evaluate, trust, and ultimately accept AI-enabled banking chatbots in high-risk transactional contexts.
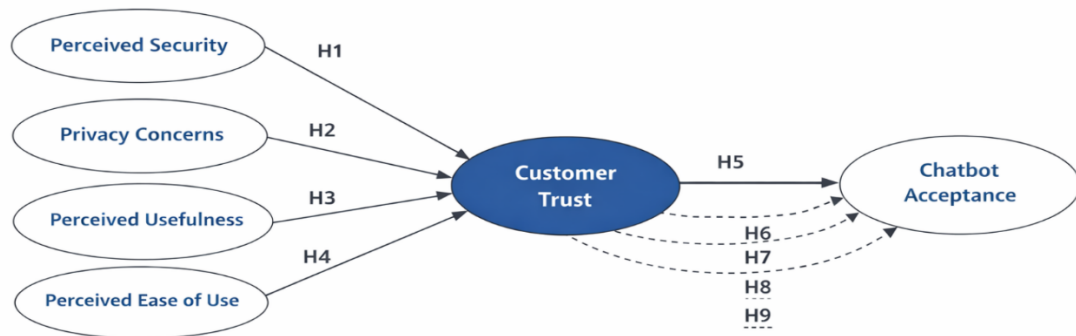
Figure 1: Conceptual Framework for Customer Trust and Acceptance of Banking Chatbots for Sensitive Transactions in Chennai City

7. Measurement Model (Confirmatory Factor Analysis)

Confirmatory Factor Analysis (CFA) was conducted to evaluate the reliability and validity of the measurement model prior to testing the structural relationships. All latent constructs were measured using multiple observed indicators. Reliability was assessed using Cronbach's alpha and Composite Reliability (CR), while convergent validity was examined through Average Variance Extracted (AVE).

Table 1. Reliability and Convergent Validity of Constructs

Construct	Cronbach's α	CR	AVE
Perceived Security	0.86	0.88	0.65
Privacy Concerns	0.83	0.85	0.60
Perceived Usefulness	0.88	0.90	0.72
Perceived Ease of Use	0.85	0.87	0.68
Customer Trust	0.90	0.92	0.75
Chatbot Acceptance	0.89	0.91	0.73

Inference:

All constructs exhibit adequate internal consistency, with Cronbach's alpha and CR values exceeding the recommended threshold of 0.70. The AVE values for all constructs are above 0.50, indicating satisfactory convergent validity. These results confirm that the observed indicators reliably represent their respective latent constructs, justifying progression to structural model testing.

8. Structural Model (SEM using AMOS)

The structural model was estimated using covariance-based SEM in AMOS to examine the hypothesised relationships among technological factors, customer trust, and chatbot acceptance. Model adequacy was evaluated using multiple goodness-of-fit indices.

Table 2. Model Fit Indices

Fit Index	Obtained Value	Recommended Threshold
χ^2/df	2.36	< 3.00
GFI	0.93	≥ 0.90
AGFI	0.91	≥ 0.90
CFI	0.96	≥ 0.90
TLI	0.95	≥ 0.90
RMSEA	0.059	≤ 0.08

Inference:

The goodness-of-fit indices indicate that the proposed structural model demonstrates a good fit with the observed data. All indices fall within acceptable limits, confirming that the hypothesised model adequately explains the relationships among constructs. This provides empirical support for the theoretical framework underpinning the study.

9. Structural Path Results

The structural path coefficients were examined to test the proposed hypotheses. Standardised estimates, critical ratios (CR), and significance levels were used to assess the strength and direction of relationships.

Table 3. Structural Path Coefficients

Hypothesised Path	Standardised β	CR	p-value	Result
Perceived Security → Customer Trust	0.29	4.86	< 0.001	Supported
Privacy Concerns → Customer Trust	−0.22	−3.91	< 0.001	Supported
Perceived Usefulness → Customer Trust	0.31	5.24	< 0.001	Supported
Perceived Ease of Use → Customer Trust	0.27	4.62	< 0.001	Supported
Customer Trust → Chatbot Acceptance	0.74	9.12	< 0.001	Supported

Inference:

The results reveal that perceived security, perceived usefulness, and perceived ease of use have significant positive effects on customer trust, indicating that customers are more likely to trust banking chatbots when they perceive them as secure, efficient, and easy to interact with. In contrast, privacy concerns exert a significant negative influence on customer trust, suggesting that apprehensions regarding data misuse and confidentiality reduce trust in chatbot-based banking services.

Customer trust shows a strong and positive effect on chatbot acceptance ($\beta = 0.74$), highlighting trust as the most influential determinant of customers' willingness to use banking chatbots for sensitive transactions. The significance of all hypothesised paths confirms the mediating role

of customer trust in transforming technological perceptions into acceptance behaviour. Overall, the structural path analysis validates the proposed SEM framework and demonstrates that trust functions as a central mechanism linking technology-related perceptions to acceptance of banking chatbots in high-risk transactional contexts.

10. Findings of the study

- ➢ The results of the Confirmatory Factor Analysis indicate that all measurement constructs demonstrate satisfactory reliability and convergent validity. Cronbach's alpha and composite reliability values exceed the recommended threshold of 0.70, while average variance extracted values are above 0.50 for all constructs. These findings confirm that the measurement model is robust and suitable for structural analysis.

- ➢ The structural equation model exhibits an adequate fit with the observed data, as reflected by acceptable goodness-of-fit indices. The model fit statistics indicate that the hypothesised relationships among perceived security, privacy concerns, perceived usefulness, perceived ease of use, customer trust, and chatbot acceptance are empirically supported within the proposed framework.

- ➢ The structural path analysis reveals that perceived security, perceived usefulness, and perceived ease of use exert significant positive effects on customer trust in banking chatbots. This suggests that customers are more likely to trust chatbot systems when they perceive them as secure, efficient, and easy to interact with during sensitive transactions. In contrast, privacy concerns demonstrate a significant negative effect on customer trust, indicating that apprehensions related to data confidentiality and misuse reduce confidence in chatbot-based banking services.

- ➢ Customer trust emerges as a strong predictor of chatbot acceptance, exhibiting the highest standardised path coefficient among all relationships tested. This finding highlights trust as the most influential determinant of customers' willingness to use banking chatbots for sensitive financial transactions. The results further support the mediating role of customer trust, confirming that technological perceptions influence acceptance primarily through the development of trust rather than through direct effects alone. Overall, the findings validate the proposed SEM framework and demonstrate that customer trust functions as a central mechanism linking technology-related perceptions to acceptance behaviour in high-risk digital banking contexts.

11. Suggestions of the Study

Based on the empirical findings of the study, several practical suggestions are proposed for banks and financial service providers aiming to enhance customer trust and acceptance of chatbot-based services for sensitive transactions.

- ➢ First, banks should prioritise the strengthening of security mechanisms in chatbot systems. Robust authentication processes, encryption protocols, and real-time fraud detection measures should be clearly communicated to customers to enhance perceptions of transaction safety and build trust.

- ➢ Second, privacy concerns must be proactively addressed through transparent data governance policies. Banks should clearly inform customers about how personal and financial data collected through chatbots are stored, used, and protected. Providing

explicit consent mechanisms and privacy assurances can significantly reduce customer apprehension.

➢ Third, the functional usefulness of banking chatbots should be continuously improved. Chatbots must be capable of efficiently handling sensitive transactions with high accuracy and minimal errors to reinforce customers' confidence in their performance.

➢ Fourth, ease of use should remain a key design consideration. Simplified interfaces, clear conversational flows, and intuitive response mechanisms can reduce user effort and enhance trust, particularly among customers with varying levels of digital proficiency.

➢ Fifth, banks may consider adopting a hybrid service approach by integrating chatbot services with human support for complex or high-risk transactions. The availability of human intervention when needed can reassure customers and encourage gradual acceptance of chatbot-based services. Overall, these suggestions emphasise that trust-building strategies encompassing security, privacy, usability, and service support are essential for increasing customer acceptance of banking chatbots in sensitive transaction contexts.

12. Conclusion and Future Research

This study examined the determinants of customer trust and acceptance of banking chatbots for sensitive transactions in Chennai City using a Structural Equation Modelling (SEM) approach. The findings provide empirical evidence that perceived security, privacy concerns, perceived usefulness, and perceived ease of use significantly influence customer trust, which in turn strongly affects customers' acceptance of banking chatbots. The results confirm that customer trust plays a pivotal mediating role in transforming technological perceptions into acceptance behaviour in high-risk financial transaction contexts.

The study contributes to digital banking and technology acceptance literature by validating a trust-mediated SEM framework within an urban Indian setting. From a practical perspective, the findings highlight the importance of strengthening security measures, addressing privacy concerns, and enhancing usability to foster customer trust and encourage the adoption of chatbot-based banking services for sensitive transactions. The results suggest that technological efficiency alone is insufficient to drive acceptance unless accompanied by strong trust-building mechanisms.

Despite its contributions, the study has certain limitations that offer avenues for future research. First, the use of a cross-sectional design limits the ability to capture changes in trust and acceptance over time; future studies may employ longitudinal approaches to examine evolving customer perceptions. Second, the study focuses on a single metropolitan area; extending the research to other regions or conducting comparative urban–rural studies could enhance generalisability. Third, future research may incorporate additional constructs such as perceived risk, service quality, emotional intelligence of chatbots, or regulatory trust to further enrich the explanatory power of the model. Finally, multi-group SEM analysis could be employed to examine differences across demographic segments or levels of digital experience. Overall, the study underscores the central role of customer trust in determining the acceptance of AI-enabled banking chatbots and provides a foundation for future research on conversational technologies in financial services.

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