Journal of Theoretical and Applied Information Technology
15th March 2025. Vol.103. No.5

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

CHATBOT ADOPTION IN BANKING: ENHANCING CUSTOMER EXPERIENCE AND SATISFACTION IN INDONESIA – JAKARTA URBAN AREA

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ABSTRACT

The widespread adoption of chatbots in the banking industry has transformed customer service delivery. The widespread adoption of chatbots in the banking industry has transformed customer service delivery. However, there is limited research on the impact of chatbots on customer experience and satisfaction, particularly in emerging markets. This study aims to fill this gap by investigating how the adoption of chatbots in the Indonesian banking sector influences online customer experience and satisfaction, with a focus on usability and security features. The research employed a quantitative design, using a structured questionnaire to collect data from 360 banking customers in the Jakarta area who have experience using chatbot services. Structural Equation Modeling (SEM) was used to analyze the relationships between chatbot adoption, online customer experience, and customer satisfaction. The findings revealed that the adoption of chatbots significantly influences online customer experience, which plays a crucial mediating role between chatbot adoption and customer satisfaction. This highlights the importance of enhancing online customer experience to improve customer satisfaction through chatbot implementation. Correspondingly, the study contributes to the existing literature by addressing a notable gap in understanding the security aspects of chatbot adoption. It provides a comprehensive framework that integrates security considerations with usability features. This offers valuable insights for banks implementing chatbot technologies while ensuring customer trust and data protection.

Keywords: *Chatbot Adoption, Banking Industry, Customer Experience, Customer Satisfaction, Security*

1. INTRODUCTION

Industry 4.0, driven by the integration of digital technologies such as IoT, AI, and cyber-physical systems, has fundamentally reshaped business operations across industries. Financial institutions, in particular, have been at the forefront of embracing these advancements to not only automate routine tasks but to revolutionize their banking services and redefine customer engagement. In line with this evolution, the shift toward digital banking has become essential as customer expectations evolve toward more convenient, responsive, and personalized services. In this context, the ability of financial institutions to leverage new technologies to stay competitive while managing operational costs is increasingly critical. Understanding the effective implementation of chatbots in banking is crucial not only for improving customer service delivery but also for ensuring data security and building long-term customer trust in an era where digital banking is becoming the norm [1], [2], [3].

Existing research has established that chatbots serve as essential tools for enhancing customer interactions and providing real-time support in banking services [4], [5]. As customers demand 24/7 accessibility and faster, more intuitive services, chatbots are positioned to meet these needs by automating a range of banking functions, such as balance inquiries and fund transfers [6]. Studies have also highlighted the dual benefits of chatbots in both facilitating customer service and gathering valuable feedback for service improvement [7], [8].

Chatbots have gained widespread adoption in the banking industry due to their ability to provide swift and effective customer support [9], [10]. As customers increasingly demand efficient,

personalized, and accessible services, banks have accelerated their implementation of digital solutions, including chatbots. The growing prevalence of digital banking channels positions chatbots as a strategic solution for enhancing customer experience while optimizing operational costs [11], [12]. These digital assistants provide 24/7 accessibility, enabling customers to perform essential tasks such as balance inquiries, fund transfers, and bill payments at their convenience, thereby reducing wait times and improving service efficiency [13].

However, why are chatbots so crucial in banking, and how do they integrate into the complex landscape of financial services? The answer lies in the dual role chatbots play: on the one hand, they address the growing demand for personalized, on-demand service; on the other, they must operate within the rigid constraints of data security and privacy. While much of the research on chatbots has focused on industries such as e-retail, where customer engagement is the primary concern, banking faces a unique challenge. Here, security is paramount, as the sensitive nature of financial transactions makes banking systems a prime target for cybercriminals [14]. The challenge is balancing efficiency with security. Successful chatbot implementation requires a delicate balance between automated and human interaction while maintaining robust security frameworks that integrate trust, privacy, and ethical considerations [15], [16]. The effectiveness of these systems depends on their ability to provide both extrinsic benefits (security, efficiency) and intrinsic value (trust, engagement) to customers [17], [18].

In recent years, chatbots have transformed customer service across various industries, such as e-commerce and healthcare, improving new levels of convenience and efficiency [14]. Research by [17] confirms that chatbots positively impact customer satisfaction, strengthening both external and internal aspects of online shopping in e-retailing contexts. However, while extensive studies have explored chatbot use in retail, there is a notable research gap in the banking industry, which faces unique challenges due to strict regulatory requirements and critical security needs. Chatbot research has predominantly focused on customer-centric industries like e-retailing, with limited attention to industries like banking, where security and privacy are paramount [14]. Unlike retail industries, which prioritize user engagement and operational efficiency, the banking industry requires a more nuanced approach that balances ease of use with stringent security to uphold customer trust [16], [19].

This study aims to address this gap by investigating how the integration of both usability and security in chatbot adoption can enhance online customer experience and customer satisfaction in the banking industry. Research indicates that while chatbots can streamline processes and enhance customer satisfaction in retail, they also introduce significant vulnerabilities in high-risk environments like banking. Therefore, the implementation of these technologies must go beyond just improving service delivery. Unlike retail industries, where customer engagement often takes precedence over security, the sensitive nature of banking transactions necessitates a comprehensive security framework. While chatbots can boost operational efficiency, they also create vulnerabilities that demand particular attention in industries like banking, where data privacy and security are essential [14]. To build customer trust and protect against data breaches, the study underscores the need for robust security protocols, including end-to-end encryption, biometric verification, and continuous monitoring.

Building on current chatbot research, which has primarily emphasized usability in e-retailing settings, this study integrates security as a central factor in the banking industry's adoption of chatbots. Although usability remains crucial for positive customer interactions, it does not fully address the rigorous security requirements of banking, where customer trust relies on both user-friendliness and the protection of sensitive financial information [19]. By focusing on the balance between user-friendly interfaces and advanced security protocols, this study proposes a framework for chatbot adoption that not only enhances service efficiency but also aligns with the stringent security needs of the banking industry. Through this focus, this study aims to explore how the combined integration of usability and security can enhance customer experience and satisfaction in banking chatbot systems (**Figure 1**). In particular, we address the following research question: To what extent can the combined focus on usability and security in chatbot adoption improve online customer experience and satisfaction in the banking industry?

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ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

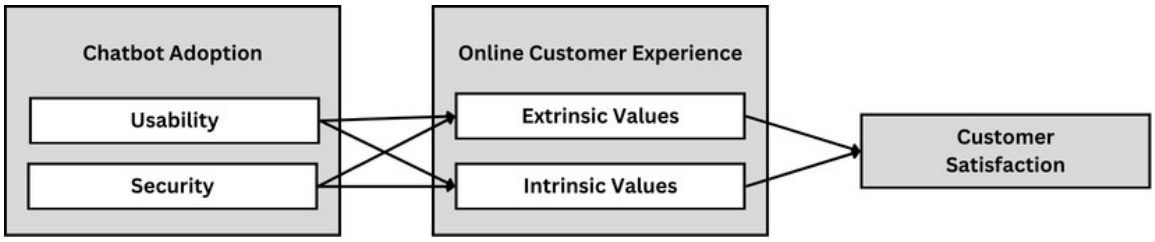

Figure 1: Proposed Model

2. LITERATURE REVIEW

2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), a seminal theoretical framework proposed by Davis in 1989, continues to be pivotal for understanding technology adoption processes in digital environments [20]. Central to the model are two fundamental cognitive constructs: perceived usefulness and perceived ease of use. Perceived usefulness describes the degree to which an individual anticipates that a specific technology will improve their work performance. It reflects users' assessment of the technology's potential to fulfil their goals effectively. In contrast, perceived ease of use relates to an individual's expectation that engaging with a technological system will require minimal effort. This construct evaluates the cognitive and physical simplicity associated with utilizing the technology [20].

Since its inception, the TAM has undergone extensive empirical validation and has been extended to accommodate various technological advancements, demonstrating its adaptability and relevance across contexts. Recent scholarly attention has emphasized its applicability in emerging fields, particularly in conversational artificial intelligence (AI), where human-computer interaction plays a central role. For example, researchers have found that users' perceptions of a conversational AI's utility and the simplicity of its interface are critical factors influencing its adoption [20], [21].

Empirical investigations have consistently highlighted the critical role of user perceptions in technology acceptance, with researchers identifying perceived utility and interaction complexity as primary determinants of user engagement [21]. The TAM continues to provide a robust theoretical framework for exploring the cognitive mechanisms that drive technological adoption and behavioral intention, offering insights into how users evaluate, accept, and engage with digital systems.

2.2 Chatbot Adoption

Chatbots are automated systems that combine "chatting" with "robot" technology, enabling communication through text or audio interfaces [22]. These conversational agents are designed to mimic human interactions, with their primary use found in customer service sectors. In order to facilitate more complex and organic interactions with consumers, contemporary chatbots incorporate artificial intelligence driven by Natural Language Processing (NLP) algorithms [14], [23].

Chatbots' basic design stores responses on servers and uses machine learning (ML) and deep learning technologies to continuously improve their accuracy and personalization through data analysis and user interactions [22]. Chatbots can be categorized based on their functional roles: customer service assistants, personal digital aids like Alexa, content curation systems for news and weather updates, and specialized coaching bots designed for educational or therapeutic purposes [24].

In customer service, AI chatbots powered by machine learning have become highly popular as effective tools for automating and improving service delivery processes [25]. Fred D. Davis created the Technology Acceptance Model (TAM) in 1989, which provides a theoretical framework for comprehending chatbot adoption. This approach highlights two important components: perceived ease of use (PEOU), which is the expectation of seamless engagement, and perceived usefulness (PU), which is the conviction that the technology improves work performance [20]. These factors have a substantial impact on users' behavioral intentions and actual usage patterns, thereby contributing to the overall usability of chatbot systems [26], [27].

In the implementation of chatbot systems, data privacy and transaction security stand as paramount concerns, especially when handling sensitive user information. In [25], the authors emphasize the necessity of implementing robust security measures and maintaining compliance with regulatory frameworks such as GDPR. Similarly, the authors in

[22] underscore the importance of secure data management practices, particularly in the context of delivering personalized services.

2.3 Online Customer Experience

The concept of online customer experience (CX) encompasses the lasting impressions formed when customers engage with a company's offerings, including its products, services, and brand identity, with these impressions being fundamentally shaped by sensory inputs [28]. As a "multifaceted construct", CX incorporates both direct and indirect interactions, weaving together rational, emotional, and psychological elements of the customer journey [29], [30]. Moving beyond mere transactional exchanges, CX aims to craft distinctive, enjoyable, and memorable interactions, placing particular emphasis on customers' subjective responses when products and services align harmoniously [31], [32], [33]. The effective management of CX is crucial for maintaining customer satisfaction and fostering loyalty, requiring consistent brand perception across all customer touchpoints throughout the relationship lifecycle [31].

A deeper understanding of customer experience emerges through [34] framework of extrinsic and intrinsic values. Extrinsic values, which focus on tangible economic outcomes such as efficiency and perceived financial benefits, play a significant role in determining customer satisfaction and service quality within online environments [35], [36], [37]. These values are closely tied to platform functionality and service delivery speed. Conversely, intrinsic values emphasize experiential and hedonistic aspects, prioritizing elements of enjoyment and playfulness over economic considerations [37], [38]. Within digital contexts, these intrinsic values manifest through engaging features such as gamification elements, user-friendly interface design, and immersive multimedia experiences, all of which contribute to enhancing enjoyment and strengthening emotional connections between customers and brands.

2.4 Customer Satisfaction

Customer satisfaction represents a complex emotional response that emerges from the evaluation comparing a product or service's actual performance against the customer's preexisting expectations [39]. This subjective emotional reaction to the purchasing experience serves as a fundamental metric for evaluating customer experience, enabling consumers to assess how well a product's actual performance aligns with their desired attributes [40].

The concept of satisfaction fundamentally measures the degree to which customer expectations are fulfilled through their service interactions [41]. The authors in [42] elaborate on this definition, describing customer satisfaction as the consumer's assessment that a product or service has either met or exceeded their anticipated expectations. This can be further understood as a comprehensive evaluation process where customers compare their expected service performance against their actual experience [31]. The relationship between expectations and perceived performance creates a clear dichotomy: when performance matches or surpasses expectations, customer satisfaction results; however when performance falls below expectations, dissatisfaction emerges [31].

In the banking industry specifically, customer satisfaction plays a pivotal role in determining institutional success by directly influencing customer loyalty [19]. This relationship manifests in tangible benefits: satisfied customers demonstrate a higher likelihood of returning, maintaining ongoing business relationships, and providing positive recommendations to others. These behaviors collectively contribute to establishing and maintaining a sustainable competitive advantage within the banking industry.

3. HYPOTHESIS DEVELOPMENT

3.1 Chatbot Adoption and Online Customer Experience

The user experience with chatbots is defined as "concerning how users perceive and respond to chatbots and how chatbot layout, interaction mechanisms, and conversational content influence perceptions and responses" [21]. The effectiveness of AI-based customer assistants (CA), especially in customer service, is largely determined by the customer experiences when interacting with these automated services [25]. Chatbots consist of various elements that contribute to this experience, such as usability and security.

Usability refers to the extent to which a chatbot is user-friendly and easy to navigate. In the context of the Technology Acceptance Model (TAM), perceived usefulness and perceived ease of use are critical factors influencing user acceptance [43]. For chatbots, these elements translate into how easily users can interact with the system to achieve their desired outcomes.

From the perspective of extrinsic value, usability is closely linked to the economic efficiency and practicality users perceive when interacting with the chatbot. A well-designed and user-friendly chatbot allows for smooth interactions, thereby enhancing the functional aspects of the online customer experience [26]. In the banking industry, this might include quick access to account information or seamless transaction processes.

To address the challenges related to the extrinsic value of online customer experience, this study proposes the following hypothesis:

H1: The usability of a chatbot positively affects the extrinsic values of online customer experience in the banking industry.

From the perspective of intrinsic value, usability also plays a role in providing an engaging and enjoyable experience. When a chatbot is designed with intuitive navigation and interactive features, users are more likely to find the experience satisfying and enjoyable [34]. This enjoyment contributes to the intrinsic value of the customer experience by promoting a sense of ease and satisfaction.

To address the challenges related to the intrinsic value of online customer experience, this study proposes the following hypothesis:

H2: The usability of a chatbot positively affects the intrinsic values of online customer experience in the banking industry.

With the increasing use of chatbots, concerns about security and privacy have become paramount. Chatbots, particularly in the finance industry, are vulnerable to security threats that may compromise sensitive user data, such as credit card numbers and transaction histories [14]. Maintaining a secure environment is essential not only for protecting user information but also for building and sustaining trust [14].

From an extrinsic value perspective, security influences how customers perceive the economic and practical benefits of using chatbots. In the banking industry, a secure chatbot instils confidence that transactions and personal information are handled safely, thereby enhancing the perceived utility of the service.

To address the challenges related to security and its impact on the extrinsic value of online customer experience, this study proposes the following hypothesis:

H3: The security of a chatbot positively affects the extrinsic values of online customer experience in the banking industry.

From an intrinsic value perspective, users' perception of security also impacts their emotional comfort and confidence when using chatbots. Knowing that their data is protected allows users to interact with the system more freely, promoting a positive and emotionally satisfying experience [44].

To address the challenges related to security and its impact on the intrinsic value of online customer experience, this study proposes the following hypothesis:

H4: The security of a chatbot positively affects the intrinsic values of online customer experience in the banking industry.

3.2 Online Customer Experience and Customer Satisfaction

Customer experience (CX) encompasses various dimensions, including satisfaction, value, quality, image, purchase intentions, patronage, loyalty, and recommendations [32]. Researchers have traditionally assumed that positive CX emotions correlate with favorable outcomes, such as satisfaction and repurchase behavior, while negative emotions lead to dissatisfaction and avoidance behavior [45]. Emerging technologies, particularly artificial intelligence (AI) and chatbots enhance service providers' capacity to meet customer needs by delivering immersive, tailored experiences [23]. However, technology can also induce stress, diminishing customers' emotional responses and overall satisfaction [41].

Exceptional customer satisfaction is critical for establishing expectations, nurturing trust, retaining loyalty, and building effective relationships [46]. In the online shopping context, positive customer experiences can help retailers achieve satisfaction [17]. Customer experience is integral to the value creation process in retail; guiding customers and creating positive emotional experiences significantly enhances satisfaction [40]. When customers perceive the value of their shopping experience as exceeding expectations, satisfaction is more likely [41]. Overall, the interplay between customer

experience and satisfaction is crucial for setting benchmarks for expectations, fostering trust, ensuring loyalty, and cultivating emotional connections with customers [46].

The connection between extrinsic value and customer satisfaction is evident in the tangible benefits customers derive from chatbot interactions in the banking industry. Extrinsic value encompasses factors such as efficiency, convenience, and cost-effectiveness. When chatbots deliver efficient service that meets or exceeds customer expectations, they foster positive evaluations, enhancing overall satisfaction [31], [32]. Furthermore, when the perceived performance aligns with customer expectations, they feel valued, which contributes to their satisfaction [40].

To address the challenges related to the impact of extrinsic value on customer satisfaction, this study proposes the following hypothesis:

H5: The extrinsic values of online customer experience positively affect customer satisfaction with the chatbot in the banking industry.

In contrast, the correlation between intrinsic value and customer satisfaction relates to the emotional and subjective benefits experienced during interactions with chatbots. This includes engagement, enjoyment, and personal fulfilment. Positive emotional experiences during these interactions lead to higher satisfaction, as customers feel understood and appreciated [46]. Moreover, personalized interactions foster connections that enhance satisfaction [29], [41]. Finally, enjoyable interactions contribute to positive assessments of the overall experience, further reinforcing satisfaction [45].

To address the challenges related to the impact of intrinsic value on customer satisfaction, this study proposes the following hypothesis:

H6: The intrinsic values of online customer experience positively affect customer satisfaction with the chatbot in the banking industry.

4. METHODS

4.1 Research Design and Sample

This study adopted a cross-sectional survey design, a widely used approach in technology adoption research across banking [9], healthcare [22], and e-retailing [17]. The cross-sectional method enabled a snapshot assessment of customer perceptions of chatbot usability and security in banking services at a specific point in time. A structured questionnaire was designed based on the literature on the use of chatbots in the banking industry. The population of this study consisted of all individuals who used the chatbot service provided by various banks in Indonesia.

This research was conducted in the Jakarta, Bogor, Depok, Tangerang, and Bekasi (Jabodetabek) areas due to its status as a heavily populated urban region and a key financial hub with significant digital banking adoption. Prior studies in South Korea [11] have examined chatbot implementation in well-developed financial centers. This study extends such insights to emerging markets, specifically Indonesia's banking industry, where chatbots play a growing role in digital banking interactions. Jabodetabek's advanced infrastructure and high banking penetration make it an ideal case study for evaluating chatbot-driven customer experiences.

Due to the unknown size of the exact population, non-probability sampling with a convenience sampling approach was employed. To determine the sample size, we refer to the statement by the authors in [47], which indicated that the minimum sample size for Structural Equation Modeling (SEM) should range between 100 and 500, with larger sizes yielding more stable results, particularly in cases of data or measurement issues, resulting in a sample size of 350.

Structural equation modelling (SEM) was employed to analyze data and validate theoretical hypotheses. According to [47], structural equation modelling (SEM) serves as a powerful tool for researchers to gain a deeper understanding of intricate data relationships by simultaneously analyzing multiple relationships, accounting for measurement errors, handling complex models with latent variables, providing model fit assessments, and facilitating theoretical testing. In this context, a key objective of SEM was to evaluate the validity of a specific causal model while simultaneously capturing the intricate direct and indirect relationships among latent variables and study constructs, thereby enhancing the understanding of these intricate data relationships.

The survey garnered 360 responses, with data cleaning reducing the sample to 334 usable responses. Demographic details are documented in **Table 1**. The demographic composition revealed a

gender distribution of 58.89% women and 43.11% men. Age-wise, the respondents were segmented as 41.01% aged 18-27, 52.40% aged 28-43, and 6.59% aged 44 or older. Furthermore, 21.56% of the respondents had a high school degree, 11.07% had a diploma degree, 57.19% had a bachelor's degree, 9.88% had a master's degree, and 0.30% had a doctor's degree. Regarding vocation, 22.45% were students, 51.80% were employees, 24.85% were entrepreneurs, and 0.90% had other vocations.

Table 1: Sample Demographic Profiles

Variable	Category	n	Percentage (%)
Gender	Men	144	43.11%
	Women	190	58.89%
Age	18-27	137	41.01%
	28-43	175	52.40%
	44 or older	22	6.59%
Education	High school	72	21.56%
	Diploma	37	11.07%
	Bachelor's degree	191	57.19%
	Master's degree	33	9.88%
	Doctorate	1	0.30%
Vocation	Student	75	22.45%
	Employee	173	51.80%
	Entrepreneur	83	24.85%
	Other	3	0.90%

4.2 Measures

The research employed a survey questionnaire divided into two sections: the first capturing respondent demographics and the second addressing items for each latent variable in this study. The first part of the questionnaire included gender, age, education, and vocation, whereas the second part covered usability, security, extrinsic value, intrinsic value, and customer satisfaction.

The study adapted, modified, and extended existing measurement scales to suit its context. Usability was assessed using 4 items adapted from [17], with the sample item as "The chatbot is aware of context during a conversation". Security was measured through 4 items adapted from [48] and [3], with sample items as "Although my personal information could be misused by the chatbot, I trust the service provider to handle it responsibly and keep it secure". The extrinsic values scale consisted of 5 items based on [37] and [17], with sample item as "The chatbot makes me feel personally engaged and valued as a customer". In comparison, the intrinsic values scale comprised 5 items adapted from [37] and [17], with sample item as "I enjoy using the chatbot to complete my service requests with little effort and receive its benefits". Customer satisfaction was measured using 4 items adapted from [18], [17], and [49], with a sample item as "I think using the chatbot service on this banking application is a good idea".

The constructs were measured using a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), with intermediate levels including: 2 = disagree, 3 = tend to disagree, 4 = tend to agree, and 5 = agree. The selection of a 6-point Likert scale was intended to discourage respondents from providing neutral responses. The authors in [50] observed that East Asian respondents frequently favored the mid-point on 5- or 7-point scales due to cultural influences, including the 'doctrine of the mean.' He suggested that employing an even-numbered scale could mitigate this tendency by eliminating the central option. Similarly, the authors in [51] utilized a 6-point Likert scale to deter respondents from choosing the midpoint.

5. RESULTS OF ANALYSIS AND HYPOTHESIS TESTING

5.1 Measurement Model (Validity and Reliability)

In this study, we used covariance-based structural equation modelling (SEM) instead of component-based or partial least squares (PLS) modelling, as SEM better suits analyzing relationships between latent constructs and observed variables. We performed confirmatory factor analysis (CFA) using SmartPLS to validate hypotheses and assess the measurement model's reliability and validity, systematically evaluating construct measurement before proceeding to structural model testing.

We initially tested a first-order CFA model with 27 items. The results showed that 25 of the items were kept because the factor loadings were above 0.708, which indicated that they contributed sufficiently to their respective constructs (**Table 2**). According to [52], standardized factor loadings should be at least 0.708, as this value squared (0.708^2) equals 0.50, meaning the indicator explains 50% of the variance in its construct.

Table 2: Validity and Reliability of The Scales

Construct	Item	Factor loading	Cronbach's alpha	Composite reliability	AVE
Usability	U2	0.731	0.721	0.734	0.545
	U3	0.767			
	U4	0.802			
Security	S1	0.916	0.776	0.777	0.599
	S2	0.857			
	S3	0.849			
	S4	0.886			
Extrinsic value	E1	0.804	0.810	0.815	0.569
	E2	0.783			
	E3	0.739			
	E5	0.744			
Intrinsic value	I1	0.835	0.832	0.835	0.598
	I2	0.786			
	I3	0.751			
	I4	0.737			
	I5	0.755			
Customer satisfaction	C1	0.826	0.827	0.827	0.659
	C2	0.783			
	C3	0.798			
	C4	0.839			

5.2 Structural Model and Hypothesis Testing

We used a combined SEM structural model and CFA (**Figure 2**) to assess the relationship between observed variables (indicators) and their corresponding latent variables (constructs). Additionally, path coefficient analysis was performed to determine the significance of the hypothesized relationships. This approach represents a specialized SEM analysis aimed at evaluating the covariance among latent variables.

The findings presented in **Table 3** provide robust insights into the influences of various chatbot features on both extrinsic and intrinsic values of the online customer experience, ultimately affecting overall customer satisfaction.

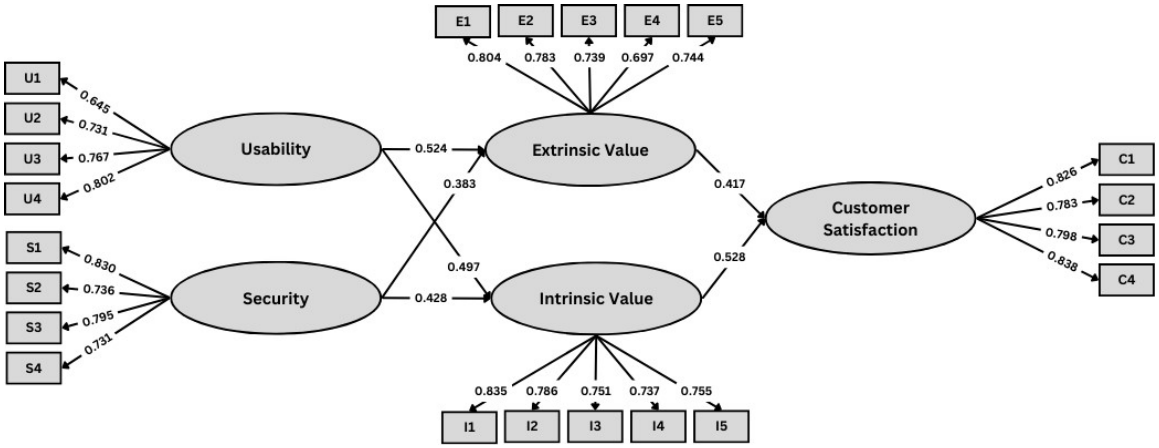

Figure 2: Result of SEM Structural Model Analysis

Chatbot usability had highly significant positive effects on both the extrinsic ($\beta = 0.524$, $t = 5.386$, $p < 0.001$) and intrinsic ($\beta = 0.497$, $t = 5.447$, $p < 0.001$) values of the online customer experience, thereby supporting Hypotheses 1 and 2.

Chatbot security also had highly significant positive effects on both the extrinsic (β = 0.383, t = 3.682, p < 0.001) and intrinsic (β = 0.428, t = 4.495, p < 0.001) values of the online customer experience, thereby supporting Hypotheses 3 and 4.

Finally, both extrinsic and intrinsic values of the online customer experience had highly significant positive effects on customer satisfaction (β = 0.417, t = 4.474, p < 0.001 and β = 0.528, t = 5.643, p < 0.001, respectively), thereby supporting Hypotheses 7 and 8.

Table 3: Direct Effects

Hypothesized path		Path coefficient	*t*	ρ	Result
H1	Usability → Extrinsic value	0.524	5.386	0.000	Supported
H2	Usability → Intrinsic value	0.497	5.447	0.000	Supported
H3	Security → Extrinsic value	0.383	3.682	0.000	Supported
H4	Security → Intrinsic value	0.428	4.495	0.000	Supported
H5	Extrinsic value → Customer satisfaction	0.417	4.474	0.000	Supported
H6	Intrinsic value → Customer satisfaction	0.528	5.643	0.000	Supported

6. DISCUSSION AND CONCLUSION

This study aimed to investigate how chatbot adoption influences online customer experience and satisfaction in the banking industry. The results confirm that chatbot usability and security significantly enhance both the extrinsic and intrinsic values of online customer experience, which in turn directly impact customer satisfaction. This perspective aligns with the Technology Acceptance Model (TAM), which underscores the importance of perceived usefulness and ease of use in influencing technology adoption [20]. These findings directly align with the research objective, which sought to explore how these two factors—usability and security—can improve both the functional and emotional aspects of online customer interactions.

Usability was identified as a key contributor to enhancing the online customer experience, particularly in terms of extrinsic value. Usability, defined as the chatbot's intuitive interface and simplicity of navigation, is critical in ensuring a smoother interaction for users and lowering cognitive strain. This makes it easier for clients to accomplish their desired objectives swiftly and conveniently, boosting their perception of the chatbot as a valuable tool [25], [26]. The importance of usability aligns with state-of-the-art solutions in chatbot development, which prioritize user-friendly interfaces to meet customer expectations for efficiency and convenience. However, unlike studies focusing more on usability and responsiveness [17], our research uniquely integrates security as a key component that works in tandem with usability to improve customer satisfaction.

Security is another crucial component of chatbot adoption that is vital for increasing intrinsic value by protecting data and establishing trust. A safe chatbot increases emotional involvement by preserving personal and financial information while reducing fears of data breaches and fraud [14], [15]. In the banking context, where privacy concerns are paramount, security not only protects the customer but also fosters a deeper emotional connection. This approach is consistent with prior research that emphasizes the role of AI-driven systems in optimizing customer interactions. By integrating security with usability, this study offers a more holistic approach to chatbot design, addressing both functional needs (efficiency) and emotional needs (trust and comfort). This dual focus stands apart from previous research, which has either predominantly emphasized usability or security without fully considering their combined impact on customer experience.

The results also show that the online customer experience, which includes both extrinsic and intrinsic values, has a direct and beneficial impact on consumer satisfaction. This result is consistent with the concept that customer experience (CX) includes emotional fulfilment in addition to functional interactions [41]. Extrinsic value in chatbots is generated from functional aspects such as efficiency, reliability, and ease of usage. Chatbots in the banking industry, for example, can respond rapidly to consumer inquiries, streamline transactional processes, and enable seamless account management, increasing the perception of efficiency and practicality [31], [32]. These functional benefits match customers' expectations for a convenient and

dependable service, which directly influences their satisfaction.

In contrast, intrinsic value is derived from the emotional connection that customers feel while interacting with chatbots. This encompasses the engagement, happiness, and personal satisfaction that come from using a chatbot. When chatbots have intuitive interfaces, individualized communication, and engaging features, customers are more likely to find their encounters delightful and satisfying. This connection is critical for establishing trust and long-term engagement, particularly in the banking industry, where customers require more than just speed and efficiency—they also want assurance that their data is secure and that they are understood [31], [41]. Unlike previous studies that focus on emotional satisfaction in e-retailing settings, this study uniquely applies these findings to the banking industry, where customers place significant weight on the emotional aspect of trust in financial interactions.

Furthermore, the research found that the online customer experience mediates the relationship between chatbot adoption and customer satisfaction, underlining the relevance of both functional and emotional aspects in reaching optimal results. This mediation effect underscores that the benefits of chatbot adoption are not solely direct; rather, they are significantly enhanced through the perceived quality of customer engagement [33], [34]. This aspect of the study adds to the existing literature by showing that usability and security combined have a greater impact on customer satisfaction than any individual factor alone. In banking, customers demand more than just transaction speed; they want a trustworthy and engaging encounter that fits their emotional needs [23]. By addressing both functional efficiency (through usability) and emotional satisfaction (through security), chatbots create a deeper connection with users, driving higher levels of customer satisfaction.

In conclusion, this study makes a significant contribution by advancing our understanding of how chatbot adoption in the banking industry enhances customer experience and satisfaction, particularly in the context of Indonesia's urban customers. By integrating usability and security into the framework of the Technology Acceptance Model (TAM), this research highlights the critical role these factors play in shaping both extrinsic and intrinsic values of the online customer experience. The findings show that usability enhances efficiency and convenience, while security fosters trust and emotional satisfaction, both of which are crucial for increasing customer satisfaction.

This study not only reinforces the importance of functional and emotional aspects in shaping user perceptions but also introduces a novel perspective by explicitly addressing the balance between these dimensions within the specific setting of banking chatbots. The dual focus on usability and security—traditionally treated separately—provides a comprehensive framework for designing chatbot systems that meet the high expectations of tech-savvy urban customers in Indonesia. This dual focus is especially important in the banking industry, where customer expectations for secure, efficient, and engaging digital services are exceptionally high [14], [16]. Additionally, the research contributes to the academic literature by demonstrating that the online customer experience acts as a key mediator between chatbot adoption and customer satisfaction, thus offering valuable insights for banks aiming to improve their digital customer service offerings.

7. LIMITATIONS AND FUTURE RESEARCH

The current study presents several notable limitations that warrant consideration. First, the research did not incorporate moderating variables such as personality traits, which could significantly influence how users interact with chatbots. Moreover, this study was restricted to urban areas and only looked at those who lived in cities and metropolitan regions. Additionally, this study lacked comprehensive demographic information about the sample population, including age distribution and socio-economic status, which are fundamental for understanding patterns in user engagement and satisfaction levels across different user segments.

While the focus on the banking industry provided valuable insights, it also limited the study's generalizability, suggesting that expanding research into other industries, such as education or healthcare, could reveal industry-specific challenges and opportunities in chatbot implementation. Furthermore, the study's emphasis on technical aspects did not fully address the emotional and psychological dimensions of user interaction, indicating that the integration of emotional intelligence features in chatbots and their impact on user satisfaction and trust represents a critical area for future investigation. Finally, the research did not thoroughly examine potential barriers to chatbot

adoption, such as user resistance or technological limitations.

Future research should address these limitations by including personality traits and other psychological factors as moderating variables, collecting comprehensive demographic data, expanding the scope to multiple industries, investigating the role of emotional elements in chatbot interactions, and identifying and analyzing barriers to adoption and potential solutions. Future studies may further be conducted in Indonesia's rural and isolated regions to investigate regional variances, contextual factors, and particular difficulties that might affect the findings. These improvements would contribute to a more comprehensive understanding of chatbot implementation and user interaction across various contexts.

REFERENCES:

[1] S. Bhattacharya and B. Singla, "Exploring the Secrets Behind Chatbot Success in Modern Banking:A Systematic Literature Review," 2024. [Online]. Available: https://orcid.org/0000-0002-2729-1835

[2] G. Gunawardane, "Enhancing customer satisfaction and experience in financial services: a survey of recent research in financial services journals," *Journal of Financial Services Marketing*, vol. 28, no. 2, pp. 255–269, Jun. 2023, doi: 10.1057/s41264-022-00148-x.

[3] P. Yadav, P. Gupta, P. Rai, N. Naik, and K. Kasipandian, "Exploring the Factors Influencing the Adoption and Continuous Engagement in Unlocking the Potential of Technology Driven Chatbots in Banking and Financial Institutions," *Engineered Science*, vol. 28, Apr. 2024, doi: 10.30919/es1054.

[4] B. A. Eren, "Determinants of customer satisfaction in chatbot use: evidence from a banking application in Turkey," *International Journal of Bank Marketing*, vol. 39, no. 2, pp. 294–311, Mar. 2021, doi: 10.1108/IJBM-02-2020-0056.

[5] C. L. Hsu and J. C. C. Lin, "Understanding the user satisfaction and loyalty of customer service chatbots," *Journal of Retailing and Consumer Services*, vol. 71, Mar. 2023, doi: 10.1016/j.jretconser.2022.103211.

[6] R. Rani, J. Kanda, Chanchal, and T. S. Vij, "A study on chatbots in the Indian banking sector," in *Contemporary Studies of Risks in Emerging Technology, Part A*, Emerald Group Publishing Ltd., 2023, pp. 35–47. doi: 10.1108/978-1-80455-562-020231003.

[7] E. W. T. Ngai, M. C. M. Lee, M. Luo, P. S. L. Chan, and T. Liang, "An intelligent knowledge-based chatbot for customer service," *Electron Commer Res Appl*, vol. 50, Nov. 2021, doi: 10.1016/j.elerap.2021.101098.

[8] M. K. Satheesh, N. Samala, and R. V. Rodriguez, "ROLE OF AI-INDUCED CHATBOT IN ENHANCING CUSTOMER RELATIONSHIP MANAGEMENT IN THE BANKING INDUSTRY," 2020, doi: 10.21917/ijms.2020.0185.

[9] B. A. Eren, "Determinants of customer satisfaction in chatbot use: evidence from a banking application in Turkey," *International Journal of Bank Marketing*, vol. 39, no. 2, pp. 294–311, Mar. 2021, doi: 10.1108/IJBM-02-2020-0056.

[10] C. L. Hsu and J. C. C. Lin, "Understanding the user satisfaction and loyalty of customer service chatbots," *Journal of Retailing and Consumer Services*, vol. 71, Mar. 2023, doi: 10.1016/j.jretconser.2022.103211.

[11] M. Jang, Y. Jung, and S. Kim, "Investigating managers' understanding of chatbots in the Korean financial industry," *Comput Human Behav*, vol. 120, Jul. 2021, doi: 10.1016/j.chb.2021.106747.

[12] S. Sarbabidya and T. Saha, "Role of Chatbot in Customer Service: A Study from the Perspectives of the Banking Industry of Bangladesh," 2020.

[13] R. Rani, J. Kanda, Chanchal, and T. S. Vij, "A study on chatbots in the Indian banking sector," in *Contemporary Studies of Risks in Emerging Technology, Part A*, Emerald Group Publishing Ltd., 2023, pp. 35–47. doi: 10.1108/978-1-80455-562-020231003.

[14] J. Yang, Y. L. Chen, L. Y. Por, and C. S. Ku, "A Systematic Literature Review of Information Security in Chatbots," Jun. 01, 2023, *MDPI*. doi: 10.3390/app13116355.

[15] K. Gondaliya, S. Butakov, and P. Zavarsky, "SLA as a mechanism to manage risks related to chatbot services.," in *Proceedings - 2020 IEEE 6th Intl Conference on Big Data Security on Cloud, BigDataSecurity 2020, 2020 IEEE Intl Conference on High Performance and Smart Computing, HPSC 2020 and 2020 IEEE Intl Conference on Intelligent Data and Security, IDS 2020*, Institute of Electrical and Electronics Engineers Inc., May 2020, pp.

235–240. doi: 10.1109/BigDataSecurity-HPSC-IDS49724.2020.00050.

[16] S. Thorpe and H. Scarlett, "Towards a Cyber Aware Chatbot Service," in *Proceedings - 2021 IEEE International Conference on Big Data, Big Data 2021*, Institute of Electrical and Electronics Engineers Inc., 2021, pp. 6040–6042. doi: 10.1109/BigData52589.2021.9671775.

[17] J. S. Chen, T. T. Y. Le, and D. Florence, "Usability and responsiveness of artificial intelligence chatbot on online customer experience in e-retailing," *International Journal of Retail and Distribution Management*, vol. 49, no. 11, pp. 1512–1531, Oct. 2021, doi: 10.1108/IJRDM-08-2020-0312.

[18] M. Chung, E. Ko, H. Joung, and S. J. Kim, "Chatbot e-service and customer satisfaction regarding luxury brands," *J Bus Res*, vol. 117, pp. 587–595, Sep. 2020, doi: 10.1016/j.jbusres.2018.10.004.

[19] D. K. Gautam and G. K. Sah, "Online Banking Service Practices and Its Impact on E-Customer Satisfaction and E-Customer Loyalty in Developing Country of South Asia-Nepal," *Sage Open*, vol. 13, no. 3, Jul. 2023, doi: 10.1177/21582440231185580.

[20] F. D. Davis and A. Granić, "The Technology Acceptance Model 30 Years of TAM," 2024. doi: https://doi.org/10.1007/978-3-030-45274-2.

[21] A. Følstad *et al.*, "Future directions for chatbot research: an interdisciplinary research agenda," *Computing*, vol. 103, no. 12, pp. 2915–2942, Dec. 2021, doi: 10.1007/s00607-021-01016-7.

[22] S. Hwang and J. Kim, "Toward a chatbot for financial sustainability," *Sustainability (Switzerland)*, vol. 13, no. 6, Mar. 2021, doi: 10.3390/su13063173.

[23] W. D. Hoyer, M. Kroschke, B. Schmitt, K. Kraume, and V. Shankar, "Transforming the Customer Experience Through New Technologies," *Journal of Interactive Marketing*, vol. 51, pp. 57–71, Aug. 2020, doi: 10.1016/j.intmar.2020.04.001.

[24] E. Adamopoulou and L. Moussiades, "Chatbots: History, technology, and applications," *Machine Learning with Applications*, vol. 2, p. 100006, Dec. 2020, doi: 10.1016/j.mlwa.2020.100006.

[25] L. Nicolescu and M. T. Tudorache, "Human-Computer Interaction in Customer Service: The Experience with AI Chatbots—A Systematic Literature Review," May 01, 2022, *MDPI*. doi: 10.3390/electronics11101579.

[26] C. Flavián, M. Guinalíu, and R. Gurrea, "The role played by perceived usability, satisfaction and consumer trust on website loyalty," *Information and Management*, vol. 43, no. 1, pp. 1–14, Jan. 2006, doi: 10.1016/j.im.2005.01.002.

[27] H. Stewart and J. Jürjens, "Data security and consumer trust in FinTech innovation in Germany," *Information and Computer Security*, vol. 26, no. 1, pp. 109–128, 2018, doi: 10.1108/ICS-06-2017-0039.

[28] K. Anshu, L. Gaur, and G. Singh, "Impact of customer experience on attitude and repurchase intention in online grocery retailing: A moderation mechanism of value Co-creation," *Journal of Retailing and Consumer Services*, vol. 64, Jan. 2022, doi: 10.1016/j.jretconser.2021.102798.

[29] G. T. M. Hult, P. N. Sharma, F. V. Morgeson, and Y. Zhang, "Antecedents and Consequences of Customer Satisfaction: Do They Differ Across Online and Offline Purchases?," *Journal of Retailing*, vol. 95, no. 1, pp. 10–23, Mar. 2019, doi: 10.1016/j.jretai.2018.10.003.

[30] A. K. Sebald and F. Jacob, "What help do you need for your fashion shopping? A typology of curated fashion shoppers based on shopping motivations," *European Management Journal*, vol. 38, no. 2, pp. 319–334, Apr. 2020, doi: 10.1016/j.emj.2019.08.006.

[31] A. V. Ertemel, M. E. Civelek, G. Ö. Eroğlu Pektaş, and M. Çemberci, "The role of customer experience in the effect of online flow state on customer loyalty," *PLoS One*, vol. 16, no. 7 July 2021, Jul. 2021, doi: 10.1371/journal.pone.0254685.

[32] R. Jain, J. Aagja, and S. Bagdare, "Customer experience – a review and research agenda," 2017, *Emerald Group Publishing Ltd.* doi: 10.1108/JSTP-03-2015-0064.

[33] B. Schmitt, J. Joško Brakus, and L. Zarantonello, "From experiential psychology to consumer experience," *Journal of Consumer Psychology*, vol. 25, no. 1, pp. 166–171, Jan. 2015, doi: 10.1016/j.jcps.2014.09.001.

[34] C. Mathwick, N. Malhotra, and E. Rigdon, "Experiential value: conceptualization, measurement and application in the catalog and Internet shopping environment," 2001.

[35] S. M. Fazel-e-Hasan, G. Mortimer, I. Lings, and J. Drennan, "Examining customer-

oriented positive deviance intentions of retail employees," *International Journal of Retail and Distribution Management*, vol. 47, no. 8, pp. 836–854, Aug. 2019, doi: 10.1108/IJRDM-10-2018-0235.

[36] M. B. Holbrook and E. C. Hirschman, "The Experiential Aspects of Consumption: Consumer Fantasies, Feelings, and Fun," 1982. [Online]. Available: https://www.jstor.org/stable/2489122

[37] W. Wei, E. Torres, and N. Hua, "Improving consumer commitment through the integration of self-service technologies: A transcendent consumer experience perspective," *Int J Hosp Manag*, vol. 59, pp. 105–115, Oct. 2016, doi: 10.1016/j.ijhm.2016.09.004.

[38] B. Lofman, "Elements of Experiential Consumption: An Exploratory Study," 1991.

[39] Philip. Kotler, K. Lane. Keller, and Alexander. Chernev, *Marketing management*. Pearson Education Limited, 2022.

[40] X. L. Pei, J. N. Guo, T. J. Wu, W. X. Zhou, and S. P. Yeh, "Does the effect of customer experience on customer satisfaction create a sustainable competitive advantage? A comparative study of different shopping situations," *Sustainability (Switzerland)*, vol. 12, no. 18, Sep. 2020, doi: 10.3390/SU12187436.

[41] L. Lucia-Palacios, R. Pérez-López, and Y. Polo-Redondo, "Does stress matter in mall experience and customer satisfaction?," *Journal of Services Marketing*, vol. 34, no. 2, pp. 177–191, Apr. 2020, doi: 10.1108/JSM-03-2019-0134.

[42] Y. Skaf, C. Eid, A. Thrassou, S. El Nemar, and K. S. Rebeiz, "Technology and service quality: achieving insurance industry customer satisfaction and loyalty under crisis conditions," *EuroMed Journal of Business*, 2024, doi: 10.1108/EMJB-01-2024-0027.

[43] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Q*, vol. 13, no. 3, pp. 319–339, 1989, doi: 10.2307/249008.

[44] W. H. DeLone and E. R. McLean, "Measuring e-commerce success: Applying the DeLone and McLean Information Systems Success Model," *International Journal of Electronic Commerce*, vol. 9, no. 1, pp. 31–47, 2004, doi: 10.1080/10864415.2004.11044317.

[45] A. Manthiou, E. Hickman, and P. Klaus, "Beyond good and bad: Challenging the suggested role of emotions in customer experience (CX) research," *Journal of Retailing and Consumer Services*, vol. 57, Nov. 2020, doi: 10.1016/j.jretconser.2020.102218.

[46] N. J. Slack and G. Singh, "The effect of service quality on customer satisfaction and loyalty and the mediating role of customer satisfaction : Supermarkets in Fiji," *TQM Journal*, vol. 32, no. 3, pp. 543–558, May 2020, doi: 10.1108/TQM-07-2019-0187.

[47] J. F. Hair, W. C. Black, B. J. Babin, and R. E. Anderson, *MULTIVARIATE DATA ANALYSIS EIGHTH EDITION*. 2019. [Online]. Available: www.cengage.com/highered

[48] H. Jo, "Impact of Information Security on Continuance Intention of Artificial Intelligence Assistant," in *Procedia Computer Science*, Elsevier B.V., 2022, pp. 768–774. doi: 10.1016/j.procs.2022.08.093.

[49] L. Li, K. Y. Lee, E. Emokpae, and S.-B. Yang, "What makes you continuously use chatbot services? Evidence from chinese online travel agencies," *Electronic Markets*, pp. 575–599, Jan. 2021, doi: 10.1007/s12525-020-00454-z/Published.

[50] L. Cohen, L. Manion, and K. Morrison, *Research Methods in Education*, 8th ed. Routledge, 2018.

[51] Q. Sun, L. J. Zhang, and S. Carter, "Investigating Students' Metacognitive Experiences: Insights From the English as a Foreign Language Learners' Writing Metacognitive Experiences Questionnaire (EFLLWMEQ)," *Front Psychol*, vol. 12, Aug. 2021, doi: 10.3389/fpsyg.2021.744842.

[52] J. F. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Third Edition*, Third. SAGE Publications, Inc., 2022.