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The Influence of AI Chatbots in Fintech Services on Customer Loyalty within the Banking Industry

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ABSTRACT

The convergence of Artificial Intelligence (AI) and FinTech services has brought about a transformative impact on customer engagement in institutions. AI-powered chatbots have emerged as indispensable tools for enhancing customer experiences within the banking sector. In this era of digital transformation, financial institutions have recognized the vital importance of exceptional service quality and the utilization of chatbots in attracting and retaining customers. Consequently, there is a growing interest in comprehending the role of chatbot service quality in shaping customer loyalty. This study adopts an empirical and descriptive approach, employing a quantitative research method. Data were obtained from 729 respondents through an online survey employing judgemental nonprobability sampling. The gathered data were analysed using Smart PLS- Structural Equation Model (SEM). The study delineates the attributes of AI chatbot service quality and identifies their significant influence on customer loyalty, taking into account the mediating role of customer satisfaction. The findings of this study contribute to the understanding of the relationship between chatbots, customer satisfaction, and loyalty. The study validates the significance of customer satisfaction, enhances the understanding of chatbot effectiveness, explores the unique characteristics of chatbot interactions, and demonstrates how technology-driven customer service can be integrated into loyalty models. Moreover, this study offers practical implications that can guide businesses in optimizing their chatbot strategies. By prioritizing the enhancement of chatbot performance, personalizing interactions, integrating across channels, and monitoring customer satisfaction and loyalty metrics, organizations can elevate customer satisfaction, cultivate loyalty, and achieve positive business outcomes.

Keywords: Artificial Intelligence, customer satisfaction, financial technology, service quality

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1. Introduction

In the continuously evolving landscape of financial services, the integration of cutting-edge technology has assumed increasing significance. Fintech, derived from the fusion of "financial technology," has brought about a profound transformation in the operational dynamics and customer engagement strategies of financial institutions (Klausser et al. 2022). Among the most conspicuous manifestations of this technological evolution is the deployment of artificial Intelligence (AI) chatbots, designed to augment customer interactions and streamline banking procedures. As fintech solutions continue to reshape the financial sector, the research community has displayed considerable interest and scrutiny into their impact on customer loyalty (Qadiri et al. 2020; Doherty & Curran, 2019). This research study endeavours to investigate the influence of fintech services, particularly in the form of AI chatbots, on customer loyalty, within the specific context of Egyptian banks. The Egyptian banking sector, like counterparts worldwide, has undergone a notable process of digitization and innovation in

recent years. Fuelled by a burgeoning population and an increasing prevalence of smartphone usage, banks have enthusiastically adopted fintech solutions to address the evolving demands of their clientele (Chinnasamy et al. 2021). The primary objective of this study is to probe how the incorporation of AI chatbots, a prominent fintech application, shapes customer loyalty within the Egyptian banking industry. Customer loyalty, in this context, is defined as the predisposition of customers to sustain their financial relationships with a particular bank over time. It represents a multifaceted concept that extends beyond mere transactional associations, encompassing emotional connections, trust, and a willingness to endorse the institution to others (Hayati et al. 2020). While the direct relationship between AI chatbots and customer loyalty is of primary interest, this study duly recognizes the pivotal role of customer satisfaction as a mediator in this relationship. Customer satisfaction is a well-documented determinant of loyalty in the domains of marketing and customer relationship management. In the sphere of AI chatbots, comprehending how customer satisfaction operates as a mediating factor in the linkage between technology and loyalty assumes paramount importance. While the positive relationship between service quality, customer satisfaction, and loyalty has been previously established across various contexts, this study makes a novel contribution by examining this relationship specifically within the domain of AI chatbots in the Egyptian banking industry. Despite the proliferation of chatbots globally, rigorous academic inquiry into their impact remains lacking, particularly in developing economies like Egypt. This represents an evident gap in existing literature that this study endeavours to address. By providing empirical insight into how chatbots influence the customer experience and loyalty, this research generates valuable practical implications for banks seeking to optimize their AI and digital strategies. It moves beyond generalization to offer actionable intelligence tailored to the distinct technological climate and customer behaviours prevalent across the Egyptian banking sector. In doing so, it equips banks with the evidence-based understanding of chatbots necessary to foster digital adoption and loyalty in this burgeoning market.

2. Literature Review

2.1. AI Chatbot Service Quality

Artificial intelligence (AI) chatbots have become a preferred customer engagement channel across industries, including banking and financial services. However, the service quality capabilities of chatbots continue to lag behind human agents. Defining and evaluating AI chatbot service quality is essential for organizations to maximize the technology's benefits (Hentzen et al. 2020; Suhel et al. 2020).

According to Chen et al. (2022), AI chatbots differ from traditional information systems. Therefore, typical service quality dimensions may not work for AI chatbot evaluation. The study defines nine AI chatbot service quality dimensions: (1) accuracy of response (provides accurate and relevant information) (Johnson et al. 2023; Mayer & Davis, 1999), (2) omnipresence (accessible across different channels and platforms) (Hilbert, 2020; Baek & Yoo, 2018), (3) personalized recommendations (provides personalised answers that are based on customer choices and history) (Ai et al. 2018; Zhang et al. 2011), (4) self-learning (self-improvement and independent learning) (Fan et al. 2021; Rijsdijk et al. 2007), (5) consistency (requires continuous, reliable service) (Adam et al. 2021; Alge, 2001), (6) human-like empathy (implies understanding customers' feelings and needs) (Pelau et al. 2021; Pitt et al. 1995), (7) always available (means uninterrupted service 24/7) (Windl et al. 2022; Venkatesh et al. 2011), (8) ease of use (ease of navigation and user-friendliness) (Park and Kim, 2023; Gefen et al. 2003), and (9) availability of human service alternatives (offer preferred human interaction) (Nocker and Sena, 2019; Furneaux & Wade, 2011). These characteristics cover AI chatbots'

distinctive capabilities, which can help evaluate chatbot performance and identify opportunities for improvement.

2.2. Customer Loyalty

The degree to which customers are dedicated to a specific brand or organisation is referred to as customer loyalty, which is essential for every successful business. Customers who remain loyal to an organisation have a greater propensity to continue doing business with that organisation, to suggest it to others, and to provide favourable feedback. This may result in higher revenue, fewer expenditures associated with marketing, and a strengthened reputation in the market (Khan et al. 2021). Businesses are employing AI chatbots to improve customer service. Chatbots can manage high numbers of basic requests and offer self-service. However, chatbots need to provide excellent service to build customer loyalty. Chatbots that cannot answer inquiries or please customers could negatively affect the brand's image. Over time, unpleasant chatbot interactions may decrease loyalty. Therefore, organisations must design chatbots that understand language nuances, handle complex requests, and respond with empathy (Sidaoui et al. 2020). Chatbots that provide helpful, smooth service can boost customer loyalty. An always available chatbot may make customers feel appreciated by the brand. Successful chatbot conversations familiarise users with digital self-service. This simplicity may increase customer retention, repeat purchases, and brand advocacy. As AI advances, chatbots may be able to personalise interactions based on customers' preferences and historical search behavior. Personalised experience management with chatbots may differentiate brands and increase customer loyalty (Nicolescu & Tudorache, 2022). Accordingly, the following is hypothesized:

H1: AI Chatbots service quality positively affects customer loyalty.

2.3. Customer Satisfaction

Customer satisfaction plays a critical role in determining the success and prosperity of an organization. Customers who are satisfied with the offerings of a particular company are inclined to engage in additional purchases, disseminate favourable word-of-mouth regarding the company, and refrain from transitioning to a competitor. To attain elevated levels of customer satisfaction, prioritising the identification and fulfilment of the needs and demands of the intended recipients is of the utmost importance (Hult et al. 2022). As more businesses adopt chatbots as a customer service channel, their impact on satisfaction levels is an important consideration. Chatbots that provide prompt, relevant, and easy-to-understand responses are likely to lead to higher customer satisfaction. However, chatbots that struggle with natural language interactions or fail to resolve issues could leave customers dissatisfied. Ensuring chatbots achieve a high level of service quality is key to enhancing satisfaction (Lubbe & Ngoma, 2021). Parameters like accuracy of responses, ability to address different query types, speed of interaction, and clarity of communication all influence a customer's experience. Poor quality chatbot interactions may frustrate customers and diminish their perceptions of the brand. On the other hand, chatbots that competently handle common requests can help boost satisfaction. Being able to get quick answers from a chatbot on product information, order status, or account details anytime and anywhere provides value and convenience to customers (Haugeland et al. 2022). Especially for simpler requests, chatbots have the potential to streamline service and deliver efficient self-help options that impress customers. As AI-powered chatbots continue to evolve, advanced natural language capabilities and a deeper understanding of context and semantics should translate to even more lifelike and satisfying chat conversations. Chatbots may be empowered to empathetically handle sensitive customer situations and better address the full spectrum of support inquiries. This could significantly

enhance customer satisfaction levels on the long run (Del Prete, 2021). Hence, the following is hypothesized:

H2: AI Chatbots service quality positively affects customer satisfaction.

2.4. Effect of Customer Satisfaction on Customer Loyalty

Customer satisfaction and customer loyalty are closely intertwined concepts in marketing. A satisfied customer is more likely to exhibit loyal behaviour towards a company or brand. However, a satisfied customer does not necessarily exhibit loyal behaviours, since satisfaction with one purchase or interaction does not ensure repeat purchases or recommendations. Other factors such as the price or availability of substitutes can influence future decisions (Salam et al. 2022). Moreover, the level of satisfaction needed to trigger loyalty can vary among customers and contexts. For example, a minor dissatisfaction may deter one customer permanently, whereas another can simply overlook it. Hult et al. (2022) argues that the strength of the relationship is not uniformly proportional since loyal behaviours can be driven by other motivations beyond satisfaction alone. This study hypothesizes the following:

H3: Customer satisfaction positively affects customer loyalty.

2.5. The Mediating Role of Customer Satisfaction

Companies increasingly deploy AI chatbots for customer assistance and simple questions. Chatbot quality may affect the customer experience. If chatbots are smart, responsive, easy to use, and good at solving problems, users may be pleased. Glitchy chatbots that mislead or do not understand customers may diminish pleasure. Customer satisfaction with the chatbot may affect brand loyalty (Hsu & Lin, 2023). Satisfying chatbot interactions may improve customer perceptions of the organisation. Customers who are satisfied with chatbots are more likely to create emotional ties, trust, and dedication to the brand, increasing customer loyalty. Superior chatbot experience may promote brand loyalty by increasing satisfaction. However, negative chatbot experiences may lower customer satisfaction and brand loyalty, even if other brand interactions are positive (Tsai et al. 2021). The study argues that AI chatbot service quality affects customer loyalty through customer satisfaction. It is hypothesized that:

H4: Customer satisfaction mediates the relationship between AI chatbots service quality and customer loyalty.

3. Methods

The present study employs an empirical and descriptive research approach to investigate customers' experiences with AI chatbots. The study focuses on employed individuals who have prior experience with AI chatbots in the context of FinTech services provided by Egyptian banks. The sample for the study was selected using a judgemental nonprobability sampling technique. Online questionnaires were distributed through Google forms, and a total of 729 respondents completed the survey. The sample size was determined based on Cochran's (1963) formula:

$$n = \frac{Z^2 * p * (1-p)}{e^2} = \frac{(1.96)^2 * 0.5 * (1-0.5)}{0.05^2} = 385 < 729 \quad (1)$$

Prior to distributing the questionnaires, a panel study was conducted to incorporate the opinions of experts, and a pilot study involving 30 respondents was carried out. Based on the feedback received, the questionnaire was modified accordingly. The questionnaire comprised four main sections. Section A collected demographic information, including age, gender, education, and occupation. Section B focused on customers' experiences with AI chatbot service quality in the

context of FinTech services. This section encompassed dimensions such as always available (Venkatesh et al. 2011), omnipresence (Baek & Yoo, 2018), consistency (Alge, 2001), accuracy of response (Mayer & Davis, 1999), availability of human service alternatives (Furneaux & Wade, 2011), self-learning (Rijsdijk et al. 2007), ease of use (Gefen et al. 2003), personalized recommendation (Zhang et al. 2011), and human-like empathy (Pitt et al. 1995). Section C pertained to customer satisfaction (Fang et al. 2014), while Section D focused on customer loyalty (Harris & Goode, 2004). Measurement items in the questionnaire were rated on a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The data collected were analysed using the Statistical Package for the Social Sciences (SPSS) and Structural Equation Modelling (SEM) techniques, employing the Smart Partial Least Squares (PLS) software. To summarize, the final dataset used in this study was collected over a 2-month period from November 2023 to December 2023. The online questionnaire was distributed through social media channels and banking forums to target respondents with experience using AI chatbots for financial services. To reduce sampling bias, the questionnaire was broadly distributed with no specific targeting by demographics. The final dataset was checked for potential biases by analysing respondent demographics and ensuring adequate distribution across gender, age groups, income levels and geographic locations in Egypt. Out of 986 total responses collected, 729 completed responses were retained for the final analysis after excluding incomplete responses. While the non-probability sampling methodology limits generalizability compared to a purely random sample, the large sample size and broad distribution of the survey aimed at gathering representative data within the context of Egyptian banking customers with AI chatbot familiarity. Future studies can build on these findings through expanded random sampling of the wider population.

4. Results and Discussion

4.1. Descriptive Analysis

The sample comprised 412 females and 317 males. The majority of respondents, accounting for 44.9% of the sample, fell within the age range of 21-30 (327 individuals). Only 27.8% of the sample were aged between 31-40 (203 individuals), approximately 10.2% were over 50 years old (74 individuals), and 17.1% were aged between 41-50 (125 individuals). In terms of academic qualifications, 91.9% of the sample held bachelor's degrees (670 individuals), while only 6.6% held postgraduate degrees (48 individuals). Regarding occupations, 41.4% of the respondents were employed in private organizations (302 individuals), 41.1% were employed in public organizations (300 individuals), and 17.4% were business owners (172 individuals).

Table 1.
Frequency Table for Demographic Variables

Variable	Categories	Frequency	Percentage
Gender	Female	317	43.5
	Male	412	56.5
Age	21-30	327	44.9
	31-40	203	27.8
	41-50	125	17.1
	Over 50	74	10.2
Academic	High School	11	1.5
Experience	Bachelor’s degree	670	91.9
	Postgraduate Degree	48	6.6
Occupation	Private Organization	302	41.4
	Public Organization	300	41.1
	Business Owner/ Self Employed	127	17.4

Source: Calculations based on sample collected through surveys using SPSS software

4.2. Confirmatory Factor Analysis (CFA)

To address common method bias, the full collinearity approach was employed. The variance inflation factors (VIFs) were found to be less than five, indicating that common method bias was not an issue (Shrestha, 2020). Confirmatory Factor Analysis (CFA) was performed to assess reliability and validity. The Cronbach alpha coefficients exceeded 0.7, indicating satisfactory reliability. Composite Reliability (CR) and Average Variance Extracted (AVE) exceeded recommended thresholds, indicating adequate construct validity (Ribeiro *et al.* 2021).

Table 2.
Model Measurements of the Phenomenon

Variable	Components	Loadings	Outer VIF	CA	CR	AVE
AI Chatbot	AI1	0.594	2.028	0.930	0.939	0.506
	AI2	0.630	2.303			
	AI3	0.708	2.251			
	AI4	0.737	2.480			
	AI5	0.720	2.701			
	AI6	0.785	2.939			
	AI7	0.658	2.117			
	AI8	0.723	2.917			
	AI9	0.751	3.474			
	AI10	0.738	2.410			
	AI11	0.786	2.977			
	AI12	0.716	2.770			
	AI13	0.731	2.531			
	AI14	0.636	2.098			
	AI15	0.725	2.254			
Customer Loyalty	L1	0.774	2.398	0.926	0.936	0.530
	L2	0.812	3.097			
	L3	0.743	2.093			
	L4	0.692	2.057			
	L5	0.699	1.988			
	L6	0.737	2.277			
	L7	0.760	2.308			
	L8	0.683	2.116			
	L9	0.749	2.159			
	L10	0.748	2.349			
	L11	0.654	2.130			
	L12	0.753	2.337			
	L13	0.641	2.111			
Customer Satisfaction	S1	0.867	2.523	0.866	0.910	0.716
	S2	0.888	2.675			
	S3	0.861	2.265			
	S4	0.764	1.611			

Source: Calculations based on sample collected through surveys using SmartPLS

As shown in Table 3, discriminant validity was confirmed using the Fornell-Larcker criterion, where the square root of AVE surpassed the correlation coefficients of other constructs as recommended by Afthanorhan et al. (2021).

Table 3.
Fornell-Larcker Criterion for Measuring Discriminant Validity

	AI Chatbot	Customer Loyalty	Customer Satisfaction
AI Chatbot	0.711		
Customer Loyalty	0.630	0.728	
Customer Satisfaction	0.760	0.540	0.846

Source: Calculations based on sample collected through surveys using SmartPLS

4.3. Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) was employed to examine the relationships depicted in Figure 1.

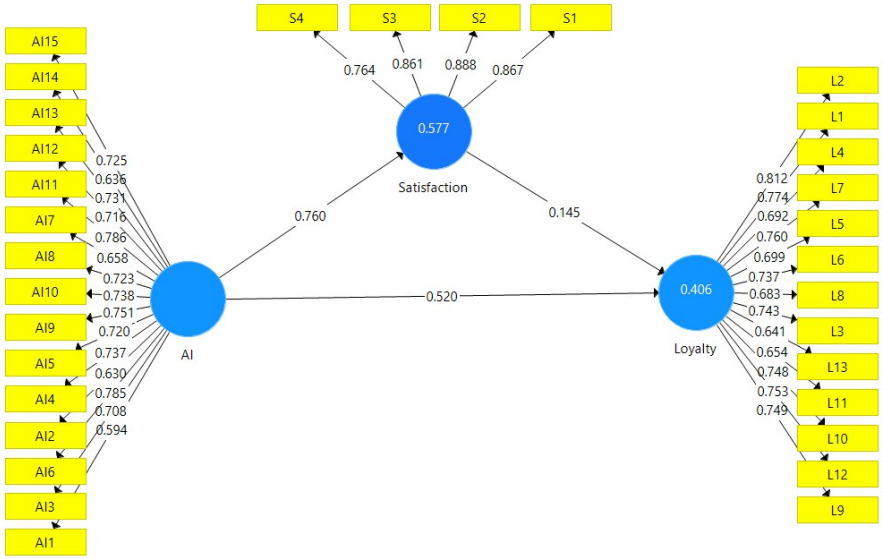

Figure 1. Structural Equation Model for Phenomenon

The results in Table 4 revealed that AI chatbot service quality had a significant positive influence on customer loyalty (β=0.520) and customer satisfaction (β=0.760) at a 99% confidence level. Customer satisfaction also had a significant positive impact on customer loyalty (β=0.145) at a 99% confidence level, indicating that customer satisfaction mediates the relationship between AI chatbot service quality and customer loyalty. The mediating effects were significant at a 99% confidence level, suggesting that customer satisfaction acts as a partial mediator.

Table 4.
Path Coefficients of the Model

	Original Sample	**Standard Deviation**	**P Values**
AI Chatbot-> Customer Loyalty	0.520	0.046	**0.000**
AI Chatbot -> Customer Satisfaction	0.760	0.020	**0.000**
Customer Satisfaction -> Customer Loyalty	0.145	0.050	**0.004**
Mediating Effects			
AI Chatbot -> Customer Satisfaction -> Customer Loyalty	0.110	0.038	**0.004**

Source: Calculations based on sample collected through surveys using SmartPLS

As shown in Table 5, the model explained 40.5% of the variation in customer loyalty. Moreover, according to Hair et al. (2017), the goodness-of-fit indices (Q2 and SRMR) indicated that the model fit the data well. In conclusion, the study found that AI chatbot service quality positively influences customer satisfaction and loyalty, with customer satisfaction playing a mediating role. The proposed model demonstrated a good fit and explained a substantial portion of the variation in customer loyalty.

Table 5.
Model Evaluation Metrics

	SSO	**SSE**	**Q^2**	**R Square**	**R Square Adjusted**
Customer Loyalty	9477.000	7505.835	0.208	0.406	0.405

SRMR=0.077, d_ULS=3.158, d_G=1.790, Chi-Square=6286.929, NFI=0.655
Source: Calculations based on sample collected through surveys using SmartPLS

The current study, which has various theoretical ramifications, creates a new research viewpoint to investigate how customer pleasure functions as a mediator between AI chatbot service quality and customer loyalty. The theoretical significance of customer satisfaction as a primary motivator of client loyalty is supported and reaffirmed by the literature review. Customer happiness and customer loyalty are positively correlated, according to several research conducted in a variety of businesses. This study adds to the body of knowledge by examining how customer satisfaction functions as a mediator in the context of chatbots, as demonstrated below:

Reconceptualizing service quality for AI chatbots. The study conducted by Chen et al. (2022) suggested that traditional service quality dimensions may not be suitable for evaluating AI chatbots. Accordingly, the study identified dimensions such as accuracy of response, omnipresence, personalized recommendation, self-learning, consistency, human-like empathy, always available, ease of use, and availability of human service alternatives, to provide a comprehensive framework for assessing AI chatbot service quality. Understanding the impact of AI chatbot service quality on customer loyalty. The study hypothesizes that AI chatbot service quality positively affects customer loyalty in the banking sector (Khan et al. 2021). By providing high-quality service, AI chatbots have the potential to enhance customer loyalty, leading to increased repeated business, positive word-of-mouth, and improved brand reputation. Recognizing the role of customer satisfaction. The study highlights the importance of customer satisfaction in the relationship between AI chatbots and customer loyalty. Satisfied customers are more likely to exhibit loyal behaviour and engage in repeat purchases and positive word-of-mouth (Hult et al. 2022). Enhancing customer satisfaction through AI chatbot service quality. The study emphasizes the impact of AI chatbot service quality on customer satisfaction. Parameters such as accuracy of responses, ease of use, promptness, and clarity of communication influence customer satisfaction (Lubbe & Ngoma, 2021). By designing and improving AI chatbots to deliver high-quality service, organizations can enhance customer satisfaction. Linking customer satisfaction and customer loyalty. The study supports the positive relationship between customer satisfaction and customer loyalty. Satisfied customers are more likely to exhibit loyal behaviours and engage in repeat purchases and positive word-of-mouth (Salam et al. 2022). Implications for the banking sector: The study focuses on the banking sector and its specific context. The proposed hypotheses and theoretical implications have relevance for organizations operating in the banking industry (Sidaoui et al. 2020). This study provides insights that guide strategic decision-making and operational procedures in the banking industry by analysing the link between AI chatbots, customer satisfaction, and customer loyalty.

The practical implications of this study in relation to the banking sector are as follows. Firstly, the study highlights the importance of paying attention to the service quality of AI chatbots in the banking industry, as it can significantly impact customer loyalty to the organization. Unlike viewing AI chatbots solely as information systems, it is crucial for bank managers to recognize that AI chatbot service quality is distinct from system quality. Customers perceive AI chatbots as providing human-like interactions and evaluate the quality of their service accordingly. The study demonstrates that improving the service quality of AI chatbots can enhance customer loyalty to a bank. Given that robots have become integrated into frontline service roles, the service quality of AI chatbots holds significant value for banks in terms of promoting customer engagement, cultivating loyalty, and deriving greater value from loyal customers, such as positive attitudes, continued patronage, and recommendations to others. Therefore, in addition to focusing on improving the system quality of AI chatbots as information systems, banks should prioritize enhancing their service quality. Secondly, this study offers insights for banks seeking to enhance the user experience during interactions with AI chatbots. The study

demonstrates that customers' perceptions of AI chatbot service quality significantly influences their perceived value and satisfaction. These psychological states, in turn, impact customer loyalty. To retain customers, banks can effectively showcase the high service quality of AI chatbots. Based on the research findings, the study identifies nine factors of AI chatbot service quality that contribute to perceived value and satisfaction. Banks can highlight these advantages on the chat interface to demonstrate the service quality of AI chatbots. For instance, regarding self-learning, an AI chatbot can inform customers, *"Feel free to communicate with me. The more we interact, the better I can assist you."* Additionally, banks can provide reminders on the chat interface about the availability of human service alternatives, stating, *"Click here to connect with a human customer service representative immediately, and we will work together to serve you."*. Thirdly, the attributes of AI chatbot service quality proposed in this study offer guidance for the development, adoption, and post-adoption stages of AI chatbots in the banking sector. These attributes serve as critical elements to consider for banks or departments involved in AI chatbot development. They can also be used to assess whether the developed AI chatbot meets the standards of high-quality service. Banks or departments considering the adoption of AI chatbots can use these attributes as a reference for selecting AI chatbot services. Furthermore, banks can create questionnaires based on these attributes to gather customer feedback and effectively improve the service quality of AI chatbots.

5. Conclusion

The objective of this study was to examine the impact of service quality chatbots on customer loyalty within the banking sector. The research employed a quantitative research approach, utilizing an online survey that targeted 729 employed participants selected through judgemental nonprobability sampling. The collected data were analysed using Smart PLS. The study identified various service quality attributes associated with AI chatbots, including their availability, omnipresence, consistency, accuracy of response, availability of human service alternatives, self-learning capabilities, ease of use, personalized recommendation, and human-like empathy. The findings indicated that the service quality of AI chatbots significantly influenced customer satisfaction, which, in turn, influenced customer loyalty. These findings contribute to the existing body of knowledge and provide valuable insights for practitioners in understanding the key factors that impact customer experiences. As the integration of AI chatbots in the banking sector continues to evolve, there are several avenues for future research that can further enhance our understanding of this dynamic relationship. One potential direction for future research is to explore the long-term impact of AI chatbots on customer loyalty and how customer perceptions and attitudes may change over time. Additionally, investigating the role of trust and privacy concerns in the context of AI chatbots could provide valuable insights, as these factors can significantly influence customer satisfaction and loyalty. Furthermore, a comparative analysis of AI chatbot adoption and performance across different banks or financial institutions, considering regional and cultural variations, could offer a broader perspective on the subject. Lastly, examining the ethical and regulatory implications of AI chatbot interactions in the financial sector is becoming increasingly relevant, and future research in this area could shed light on the responsible use of AI technology.

Data availability: The data generated and/or analysed during the current study are available from the first author on request.

Competing interests: The authors report no conflicts of interest.

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