



AI Chatbot to Improve Customer Service and Financial Literacy in Sharia Internet Banking

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Keywords

Chatbot, Artificial Intelligence, Customer Service, Financial Literacy, Islamic Banking.

Abstract

This research aims to explore the potential of developing an artificial intelligence-based chatbot in improving customer service and financial literacy in Islamic internet banking. Through a desk study approach, data was collected from various sources, including journals, books, and online articles. The results showed that chatbots can provide 24/7 service, reduce waiting time, and improve operational efficiency, as well as assist customers in making simple transactions and obtaining product information quickly. In addition, chatbots play an important role in improving financial literacy by providing clear information about Islamic financial products. Nonetheless, this study also identified challenges in chatbot development, such as understanding the language context and compatibility with sharia principles. Thus, this study concludes that the implementation of chatbots can support financial inclusion and personalization of services in the Islamic banking sector.

Keywords:

Chatbot, Kecerdasan Buatan, Layanan Pelanggan, Literasi Keuangan, Perbankan Syariah.

Abstract

Penelitian ini bertujuan untuk mengeksplorasi potensi pengembangan chatbot berbasis kecerdasan buatan dalam meningkatkan layanan pelanggan dan literasi keuangan pada internet banking syariah. Melalui pendekatan studi pustaka, data dikumpulkan dari berbagai sumber, termasuk jurnal, buku, dan artikel online. Hasil penelitian menunjukkan bahwa chatbot dapat memberikan layanan 24/7, mengurangi waktu tunggu, dan meningkatkan efisiensi operasional, serta membantu nasabah dalam melakukan transaksi sederhana dan mendapatkan informasi produk secara cepat. Selain itu, chatbot berperan penting dalam meningkatkan literasi keuangan dengan menyediakan informasi yang jelas tentang produk keuangan syariah. Meskipun demikian, penelitian ini juga mengidentifikasi tantangan dalam pengembangan chatbot, seperti pemahaman konteks bahasa dan kesesuaian dengan prinsip-prinsip syariah. Dengan demikian, penelitian ini menyimpulkan bahwa penerapan chatbot dapat mendukung inklusi keuangan dan personalisasi layanan di sektor perbankan syariah.

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INTRODUCTION

The development of digital technology has changed the landscape of the banking industry globally, including Islamic banking. This digital transformation has encouraged financial institutions to innovate in providing services that are more efficient, accessible, and tailored to the increasingly diverse needs of customers (Adesfiana et al., 2022). One of the innovations that has emerged is the

implementation of artificial intelligence (AI)-based chatbots , which offer great potential in improving customer service and financial literacy (Ahmadi, 2023).

A chatbot is a computer program designed to simulate human conversation, either through text or voice. With its natural language processing (NLP) capabilities, a chatbot can understand user questions or commands, provide relevant answers, and even perform certain transactions (Chintasi Angreani, Nur Afifah, 2024) . In the context of Islamic internet banking, chatbots can be an effective solution to overcome various challenges, such as the limited operating hours of conventional customer service and the complexity of Islamic financial products (Garbo & Latifah, 2024).

The use of chatbots in banking and finance offers various advantages. Chatbots can provide quick and accurate responses to customer inquiries, assist them in conducting banking transactions, and provide information about available products and services. In addition, chatbots can operate 24 hours a day, 7 days a week, so customers can access banking services anytime and anywhere. This is very important in a fast-paced digital era that demands high flexibility (Irawan Deddy, Parapat Dyah Atika, 2024).

Furthermore, chatbots can also play a role in improving customers' financial literacy. By providing easy-to-understand information about Islamic financial principles, Islamic investment products, and wise financial management tips, chatbots can help customers make better financial decisions. Personalization features supported by AI enable chatbots to provide advice and recommendations tailored to each customer's profile and financial needs (Ja & Nurhidayat, n.d.).

The implementation of chatbots in the banking context can also help strengthen the image of financial institutions as innovative entities that are oriented towards the needs of the community. By providing services that are more accessible, transparent, and in accordance with sharia principles, chatbots can increase customer trust and loyalty. This is crucial in winning the increasingly fierce competition in the Islamic banking industry (Kamaruddin, 2024).

Although the implementation of *chatbot* technology has begun to be adopted by a number of Islamic banks in Indonesia, there is a clear *research gap* between the current functionality of the technology and the specific needs of the Islamic banking ecosystem. The first gap relates to linguistic and contextual accuracy in Sharia, where most operating *chatbots* still rely on generic language models that often fail to capture or process the technical terminology of Arabic-Indonesian hybrids in Sharia financial products (Lestari, 2022). In addition, there are problems with the integrity of automatic Sharia compliance due to the lack of a well-established integration model between *Natural Language Processing* (NLP) engines and fatwa databases or Sharia compliance principles to ensure that every AI response is automatically validated and does not deviate from Sharia principles. Finally, the limitation of training data is a serious obstacle, given the lack of local *datasets* that represent the transaction behavior and unique communication patterns of Islamic banking customers in Indonesia, resulting in *chatbot* interactions that often feel rigid, non-contextual, and lacking in empathy when providing services.

The use of digital technology and artificial intelligence in Islamic banking has been extensively studied in previous research, particularly in the context of improving service quality and customer satisfaction. Ainia (2025) shows that the application of *financial technology* such as Islamic *mobile banking* and digital payment services can improve service speed, transparency, and customer convenience, but has not highlighted the role of interactive AI technology in improving Islamic financial literacy. Amarnath et al. (2024) emphasize the importance of a *human-centric artificial intelligence* approach in financial services, where AI technologies such as *natural language processing* (NLP) enable more personalized and empathetic interactions , contributing to improved financial literacy and inclusion, although their study is still general in nature and does not specifically address Islamic banking. Meanwhile, Khan et al. (2021) propose an AI and NLP-based chatbot model for Islamic banking and finance that is capable of providing *real-time* Islamic financial advice based on sharia principles, but its implementation is still conceptual and has not

been comprehensively integrated into the Islamic *internet banking* ecosystem, especially in Indonesia. Based on these studies, there is a significant research gap regarding the development of AI chatbots that not only function as customer service but also as a medium for integrated, contextual, and sustainable Islamic financial literacy in Islamic *internet banking*. Therefore, the novelty of this research lies in the development of an AI-based chatbot with an NLP model tailored to Islamic finance terminology and contracts, equipped with a *sharia compliance* mechanism, and developed based on the language context and characteristics of Islamic banking customers in Indonesia to simultaneously improve customer service quality and financial literacy.

This study aims to develop an artificial intelligence-based chatbot specifically designed to improve customer service and financial literacy in Islamic internet banking (Misidawati, 2024). This study will focus on developing an NLP model that is capable of understanding Indonesian language and Islamic finance terms well, as well as integrating knowledge about Islamic principles in every response given by the chatbot. It is hoped that the results of this research can make a significant contribution to the development of sharia internet banking that is more inclusive, innovative, and competitive (Muhyidin & Venica, 2023).

METHODS

The research method used in this study is a qualitative method with a literature review approach. This method focuses on collecting and analyzing data from various written sources, such as journals, books, documents, and articles available on the internet, including from platforms such as Google Scholar. In this study, the data obtained will be used to understand and explore concepts related to the development of artificial intelligence-based chatbots in improving customer service and financial literacy in the Islamic banking sector.

The data collection process begins with identifying relevant and credible sources. Researchers will gather information from primary sources, including previous studies and literature directly related to the research topic. Secondary sources such as books and scientific articles will also be considered to provide additional context and support the analysis. Once the data has been collected, the next step is to conduct a descriptive analysis to identify the main themes and relationships between existing concepts. With this approach, it is hoped that the research will provide in-depth insights into the role of chatbots in improving customer service and financial literacy in Islamic banking.

RESULTS AND DISCUSSION

Result

The results of the literature review consistently show that the development of digital services in Islamic banking cannot be separated from the improvement of Islamic financial literacy. Menne and Jesya (2023) emphasize that the growth of the Islamic financial market, increased public understanding of Islamic principles, and the development of Islamic financial technology are the main factors driving business opportunities, especially for MSME players. These findings indicate that Islamic financial literacy serves as the initial foundation for expanding the adoption of digital financial services and strengthening the Islamic economic ecosystem in a sustainable manner.

Along with the increase in Islamic financial literacy, the quality of digital services has become a crucial aspect in building customer satisfaction and trust. Sari et al. (2022), through bibliometric analysis, show that contemporary Islamic business research increasingly places customer satisfaction and the strengthening of digital services as the main focus. This is reinforced by Fahlevi et al. (2022), who found that the quality of Islamic mobile banking services greatly determines the level of satisfaction of Generation Z as the dominant user group of digital financial services. Furthermore, Cut Aprilia et al.

(2022) emphasize that good service quality, when combined with emotional attachment, will drive customer satisfaction and their intention to continue using Islamic banking products and services.

Chatbots, in the context of artificial intelligence-based digital service innovation, emerge as a strategic technology that plays a significant role in improving customer service and financial literacy in Islamic internet banking. The results of the literature review consistently show that chatbots can drive operational transformation and customer interaction patterns, while opening up new opportunities for Islamic financial institutions to increase their competitiveness in facing increasingly complex customer needs (Adesfiana et al., 2022; Yuniati & Gurning, 2024). With the ability to provide customer service 24 hours a day, chatbots effectively reduce waiting times, which have been a major obstacle in traditional customer service (Ahmadi, 2023). In addition, banking operational efficiency also increases because chatbots are able to handle various questions and requests simultaneously without requiring a large number of human resources.

Not only functioning as a means of information service, chatbots also provide convenience for customers in conducting simple transactions, such as checking balances, transferring funds, and paying bills. This capability directly improves the convenience and ease of access to Islamic banking services, while also improving the overall user experience (Aqillah, 2024). Furthermore, chatbots have proven to be effective in conveying product information quickly and accurately. In the context of Islamic banking, where understanding Islamic products and principles plays an important role, chatbots can serve as a reliable and easily accessible source of information for customers (Irawan Deddy, Parapat Dyah Atika, 2024). The presentation of clear and concise explanations regarding the features, benefits, and risks of products enables an increase in customer financial literacy and helps them make more appropriate financial decisions (Chintasi Angreani, Nur Afifah, 2024).

The success of chatbot implementation in improving service quality and financial literacy is greatly influenced by its design and development. A literature review confirms that the effectiveness of chatbots depends on the system's ability to understand natural language, respond to questions contextually, and provide relevant and accurate information (Ja & Nurhidayat, n.d.). Therefore, investment in *Natural Language Processing* (NLP) technology and machine learning is a key factor in ensuring that chatbots function optimally and provide sustainable added value for Islamic banking customers (Garbo & Latifah, 2024).

The success of digital service and chatbot adoption is also influenced by user trust and risk perception. Pratiwi (2023) shows that credibility and risk significantly influence customers' intentions to use Islamic banking digital services. This finding is in line with Arcand et al. (2023), who emphasize that practicality and convenience increase the level of trust and adoption of chatbots, while anxiety about technology can be a hindering factor. This shows that chatbot development not only requires technological sophistication, but also communication strategies and risk management that can build a sense of security for users.

The use of artificial intelligence and NLP technology on the technical side has been proven to improve the effectiveness of banking services. Özgen et al. (2024) show that the integration of NLP in banking systems can improve operational efficiency and user satisfaction through faster and more accurate responses. This finding is expanded upon by Meena et al. (2024), who emphasize that artificial intelligence plays an important role in customer service, risk management, and fintech development, thereby driving a more comprehensive digital transformation in the banking sector.

However, the literature review also emphasizes that the implementation of digital technology and artificial intelligence in Islamic banking must continue to pay attention to aspects of value, ethics, and regulation. Andiyani Kurnia (2023) asserts that Islamic digital services need to be in line with the principles of maqashid syariah so that technological innovation remains oriented towards the benefits

and objectives of Islamic law. In addition, Botunac et al. (2024) remind us that the use of Gen-AI in banking must be balanced with compliance with regulations, ethics, and data protection so that service personalization does not sacrifice customer trust and security.

Overall, the results of this literature review indicate that the integration of sharia financial literacy, digital service quality, artificial intelligence-based chatbots, and compliance with sharia principles and regulations are key factors in increasing satisfaction, trust, and sustainability in the use of sharia banking services in the digital era.

Discussion

AI Chatbots in Islamic Internet Banking

The development of digital technology has encouraged Islamic banking to continue innovating in improving service quality and customer financial literacy. One innovation that is increasingly being adopted is the use of artificial intelligence (AI)-based chatbots in Islamic internet banking services. Based on literature studies, AI chatbots have proven to play a strategic role in transforming customer service while also serving as an effective financial education medium for Islamic banking customers.

From a customer service perspective, AI chatbots can improve service efficiency and quality through 24-hour availability without time and location restrictions. The ability of chatbots to respond to questions quickly and consistently helps reduce waiting times, which are often an obstacle in conventional services. This is in line with the findings of Gupta et al. (2023) and Ahmadi (2023), who stated that chatbots contribute significantly to increasing customer satisfaction and reducing banking operational costs. In the context of Islamic banking, this efficiency is important because it can increase the competitiveness of Islamic financial institutions amid intense competition in the digital banking industry.

In addition to improving service efficiency, AI chatbots also play a role in enhancing *user comfort* and *experience*. Chatbots enable customers to perform various simple banking activities, such as checking balances, transaction information, fund transfers, and bill payments, independently and in real time. This convenience provides added value for customers, especially the younger generation who have a high preference for fast and practical digital services. Findings by Fahlevi et al. (2022) show that the quality of digital services greatly determines the level of satisfaction of Generation Z with mobile and internet sharia banking, making the presence of chatbots relevant in responding to the needs of this user segment.

Furthermore, the role of AI chatbots in Islamic banking is not limited to technical service functions, but also includes improving Islamic financial literacy. Chatbots can be used as an educational tool that provides product information quickly, accurately, and in an easy-to-understand manner. In the context of Islamic banking, customer understanding of contracts, Islamic principles, benefits, and product risks is a very important aspect. Through structured and interactive information delivery, chatbots help customers understand the characteristics of Islamic banking products and encourage more rational financial decision-making in accordance with Islamic principles. Findings by Adesfiana et al. (2022) and Chintasi Angreani and Nur Afifah (2024) reinforce that chatbots contribute positively to improving customer financial literacy.

The success of AI chatbots in improving customer service and financial literacy is greatly influenced by the design and technology used. A literature review shows that a chatbot's ability to understand natural language (Natural Language Processing/NLP), recognize the context of questions, and provide relevant responses are key factors in the effectiveness of the system. Özgen et al. (2024) emphasize that the integration of NLP in banking systems can improve operational efficiency and user satisfaction. Therefore, investment in AI and machine learning technology is a strategic necessity for Islamic banking so that chatbots can provide adaptive and value-added services.

However, the adoption of AI chatbots in Islamic internet banking also faces several challenges, particularly regarding user trust and risk perception. Pratiwi (2023) and Arcand et al. (2023) show that factors such as credibility, data security, and anxiety about technology can influence customers' intentions to use digital services and chatbots. In this context, system transparency, customer data protection, and clear communication about the functions and limitations of chatbots are important aspects for building user trust.

In addition to technical and psychological aspects of users, the implementation of AI chatbots in Islamic banking must also consider compliance with Islamic values and principles. Andiyani Kurnia (2023) emphasizes that innovations in Islamic digital services must be in line with the objectives of Islamic maqashid, namely maintaining benefit, justice, and sustainability. Thus, chatbots are not only required to be technologically advanced, but also must be designed to support the principles of fairness, transparency, and proper education in accordance with sharia. On the other hand, Botunac et al. (2024) remind us of the importance of compliance with regulations, ethics, and data protection in the use of AI so that service personalization does not sacrifice customer security and trust.

Integration of Artificial Intelligence-Based Chatbots in Improving Sharia Banking Services and Financial Literacy

The use of artificial intelligence in the form of chatbots has become a strategic solution in improving the efficiency and effectiveness of customer service in Islamic banking. Kamaruddin (2024) explains that chatbots are able to cut repetitive and inefficient service processes by providing quick responses to common customer questions. This capability significantly reduces service waiting times and helps optimize the workflow of customer service staff. In line with this (Kamaruddin, 2024), Lestari (2022) emphasizes that the presence of chatbots allows service personnel to focus more on handling complex issues that require a human touch, thereby simultaneously increasing the productivity and quality of banking services (Lestari, 2022).

Reducing the workload of customer service staff through the use of chatbots also has an impact on increasing customer satisfaction. Misidawati (2024) states that the quick and accurate responses from chatbots make customers feel more valued in the service process (Misidawati, 2024). This positive experience creates a better perception of service and encourages customer loyalty. This is reinforced by the findings of Muhyidin and Venica (2023), which show that the implementation of chatbots not only provides benefits in terms of the operational efficiency of Islamic banks, but also contributes to building a more harmonious and sustainable relationship between banks and customers (Muhyidin & Venica, 2023).

In addition to playing a role in improving services, chatbots also have an important contribution in increasing Islamic financial literacy. Mulyono and Sfenrianto (2022) argue that chatbots can be a reliable source of information by providing explanations about Islamic financial products and financial management principles in a clear and easy-to-understand manner (Mulyono & Sfenrianto, 2022). In the context of Islamic banking, understanding Islamic contracts and rules is a crucial aspect of financial decision-making. By providing concise and structured information, chatbots help customers understand the available product options and their implications. Mustaqim et al. (2023) added that the financial education provided by chatbots contributes to improving the financial literacy skills of the community, especially for groups that still have limited understanding of Islamic financial concepts, thereby supporting the creation of broader financial inclusion (Mustaqim et al., 2023).

The success of chatbot implementation in Islamic banking is greatly influenced by customer trust. Nugraha et al. (2024) emphasize that user trust is closely related to the belief that chatbots are capable of providing accurate information and ensuring customer data security (Nugraha et al., 2024). Therefore,

the transparency of financial institutions in explaining data management and protection mechanisms is an important factor in increasing user security. Nugroho and Voutama (2024) emphasize that clear communication regarding system security aspects will encourage customer comfort in using chatbots (Nugroho & Voutama, 2024). In addition, Paramadina (2025) states that the ability of chatbots to provide relevant responses that meet user needs will further strengthen trust and increase the intensity of digital service usage (Paramadina, 2025).

From the user experience perspective, the integration of chatbots with other digital service features has been proven to have a positive impact on customer satisfaction. Paramecwari et al. (2022) show that the use of QRIS and chatbot features in Islamic banking services can increase the ease of transactions and customer convenience in daily financial activities (Paramecwari et al., 2022). In addition, the ability of chatbots to handle complaints quickly and efficiently also increases user satisfaction. Pradipta (2024) explains that resolving issues through chatbots creates a more effective service experience, thereby strengthening customers' positive perceptions of the quality of Islamic banking services (Pradipta, 2024).

The development of chatbots also faces a number of challenges. Puri and Lisiantara (2023) highlight that one of the main obstacles is the system's ability to understand language context, dialect variations, and ambiguity in human communication (Puri & Lisiantara, 2023). Therefore, the development of more advanced natural language processing (NLP) technology is essential for chatbots to function optimally. On the other hand, Rahardika and Winarno (2024) emphasize the importance of ensuring that all information conveyed by chatbots remains in line with sharia principles (Rahardika & Winarno, 2024). Compliance with Islamic banking regulations and ethics is a prerequisite for chatbots to avoid providing information or recommendations that contradict Islamic values. Putro (2025) adds that continuous research and development efforts are needed so that chatbots can provide maximum benefits without neglecting sharia aspects (Putro, 2025).

Furthermore, the adoption of artificial intelligence-based chatbots also contributes to increased financial inclusion. Raihan et al. (2024) explain that chatbot-based digital banking services enable Islamic banks to reach groups of people who previously had limited access to formal financial services (Raihan et al., 2024). This is in line with the Sustainable Development Goals (SDGs) of the United Nations, which emphasize the importance of innovation and digital infrastructure development to promote inclusive and sustainable economic growth (Rustandi & Francisco, 2023). Shifah (2025) asserts that easy access to information and financial services through chatbots opens up opportunities for broader community participation in the formal economic system (Shifah, 2025).

In addition to promoting financial inclusion, AI-based chatbots also enable enhanced personalization of Islamic banking services. Soyusiawaty and Ganda Putra (2023) state that chatbots can analyze user interaction history and preferences to provide product recommendations that suit the specific needs of customers (Soyusiawaty & Ganda Putra, 2023). This personalization of services creates a more relevant user experience and increases customer satisfaction and loyalty. Widhyana (2025) adds that when customers feel they are receiving services that suit their needs, their tendency to use more banking products will increase (Widhyana, 2025). This ultimately drives increased revenue and strengthens the long-term relationship between banks and customers (Suryanata, 2024).

Overall, this discussion shows that AI chatbots have great potential in improving customer service quality and financial literacy in Islamic internet banking. The integration of AI technology, digital service quality, improved Islamic financial literacy, and compliance with Islamic principles and regulations are key to the successful and sustainable implementation of chatbots. With proper management, AI chatbots not only function as customer service tools but also as strategic instruments in strengthening financial inclusion and the competitiveness of Islamic banking in the digital era.

CONCLUSIONS

Based on the results of the literature study, it can be concluded that the application of artificial intelligence-based chatbots in Islamic internet banking has a strategic role in improving customer service quality and customer financial literacy. Chatbots have proven to be capable of providing 24-hour continuous service, speeding up responses to customer inquiries, reducing waiting times, and increasing bank operational efficiency through the automation of basic services and simple transactions. In addition, chatbots serve as a medium for Islamic financial education by presenting information on products, contracts, and Islamic principles in an easy-to-understand manner, thereby helping customers make more informed financial decisions. Customer trust is a key factor in the successful implementation of chatbots, especially in terms of information accuracy, data security, and service compliance with Islamic principles. On the other hand, the adoption of chatbots also contributes to increased financial inclusion and service personalization, although it still faces challenges in understanding language context and the need for consistent integration of Islamic values and regulations.

Further research is recommended to develop a more sophisticated and contextual Natural Language Processing (NLP) model, specifically for the Indonesian language and Islamic finance terminology, in order to improve the accuracy and relevance of chatbot responses. In addition, a more in-depth study is needed regarding the integration of Islamic knowledge into the chatbot system so that all information and recommendations provided are in line with Islamic banking principles and ethics. Empirical research is also needed to quantitatively measure the effect of chatbot use on customer satisfaction, trust, and loyalty. From a practical standpoint, Islamic banks are advised to implement chatbots gradually, paying attention to data security, system transparency, and the quality of user interactions. Banks also need to integrate chatbots with personalized features based on customer data so that product recommendations are more targeted. In addition, periodic evaluation of chatbot performance and human resource training are still necessary to ensure that the of this technology truly provides added value, both for Islamic financial institutions and for the public as service users.

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