

The Utilization of Artificial Intelligence and Chatbots in the Personalization of Islamic Financial Products in Indonesia

Sulistiar Putri¹, Nur fitri Hidayanti², Muhirdan³, Mukhlishin⁴, Nur'ain⁴

^{1,2,3,4}Sharia Economic, Universitas Muhammadiyah Mataram, Indonesia

sulistiaraputri1@gmail.com, Nurfitri.hidayanti@gmail.com, danmuhir@gmail.com,
mukhlishin@ummat.ac.id, aininingrum77@gmail.com

Abstract: This study aims to examine the utilization of Artificial Intelligence (AI) and chatbots in the personalization of Islamic financial products in Indonesia through a Systematic Literature Review (SLR). The analyzed literature was sourced from internationally recognized databases, namely Scopus, the Directory of Open Access Journals (DOAJ), and Google Scholar, covering publications from 2015 to 2025. The findings reveal that the application of AI and chatbots has made significant contributions to innovation across multiple sectors, including Islamic finance, education, and healthcare. Within the context of Islamic finance, AI serves as a strategic instrument to enhance operational efficiency, deliver personalized services, and support Sharia compliance through real-time violation detection mechanisms. In the field of education, AI-powered chatbots have been shown to improve conceptual understanding, literacy skills, and student engagement through adaptive interaction. In healthcare, chatbots provide psychological and therapeutic support with personalized approaches that foster user attachment. These findings underscore that the integration of AI and chatbots not only enhances service quality but also expands Islamic financial inclusion, strengthens the educational ecosystem, and supports adaptive healthcare services. Accordingly, this study contributes theoretically to the growing body of literature on technology-driven Islamic finance, while offering practical implications for policymakers and service providers in designing innovative, ethical, and Sharia-compliant digital ecosystems.

Keywords: Artificial Intelligence, Chatbots, Islamic Finance

Article History:

Received: 02-09-2025

Online : 30-09-2025



This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license

----- ◆ -----

A. INTRODUCTION

Over the past decade, digital technologies have experienced significant acceleration, particularly with the emergence of Artificial Intelligence (AI) and chatbots, which have brought fundamental changes to the global financial sector (Wahyuni, 2025). These technologies are no longer confined to operational support; rather, they have become key drivers in shaping adaptive and responsive financial service models. Through the use of AI and chatbots, financial institutions are able to design personalized strategies tailored to users'

preferences and risk profiles, thereby enhancing both the relevance and the added value of financial services (Putra, 2024). Furthermore, the integration of these technologies contributes to operational efficiency by automating processes, reducing costs, and providing faster, more accessible services. Consequently, AI and chatbots can be regarded as fundamental elements in the ongoing transformation of the financial industry toward a more inclusive, efficient, and customer-centered digital ecosystem.

In Indonesia, Islamic financial institutions are undergoing a process of digital transformation that has intensified in response to global economic dynamics and rising public demand for services that are fast, secure, and compliant with Sharia principles (Qothrunnada et al., 2023). One of the most visible manifestations of this transformation is the adoption of digital technologies, particularly AI and chatbots, as strategies to strengthen competitiveness in an increasingly complex financial landscape (Nurwulan et al., 2025). These technologies not only enhance operational efficiency but also enable the development of more personalized and interactive services that adapt to customer needs and preferences. Digital transformation is therefore a strategic necessity for Islamic financial institutions, ensuring they remain relevant in the digital economy while offering differentiated value compared to conventional financial institutions (Mukharom et al., 2024). In this regard, the integration of AI and chatbots is a crucial step in reinforcing the sustainability and competitive positioning of Islamic finance both nationally and globally.

The demand for personalized Islamic financial products has become increasingly prominent due to the growing diversity of customer profiles, varying levels of financial literacy, and differences in preferences based on Sharia principles (Purwanto et al., 2024). Differences in social background, economic conditions, and understanding of Islamic finance compel institutions to abandon standardized product approaches and instead pursue strategies tailored to individual needs (Yunita, 2025). Within this framework, personalization is viewed as a strategic means of enhancing customer satisfaction by offering products aligned with specific circumstances, aspirations, and religious values (Aminah, 2025). Moreover, personalized services have the potential to strengthen customer loyalty, as products that are perceived as both relevant and Sharia-compliant foster trust and long-term commitment (Rakhli, 2025). Thus, personalization emerges as a key factor in developing Islamic financial services oriented toward inclusivity, sustainability, and competitiveness in the digital era.

The application of AI and chatbots has expanded considerably in supporting personalized recommendations for Sharia-compliant financial products while also offering real-time financial consultation services (Latifah, 2023). For instance, the chatbot "Smart Trader" in Saudi Arabia integrates natural language processing and machine learning to provide investment suggestions customized to user preferences based on real-time stock market data. Similarly, generative AI models demonstrate strong potential in offering Sharia-based financial advice by identifying compliance issues and referencing relevant fiqh muamalah principles, although human oversight remains necessary in complex cases (Safriatullah et al., 2025). Additionally, innovations in fintech that combine blockchain and AI are being developed to ensure real-time Sharia compliance of financial products, thereby enhancing global competitiveness (Aminin, 2024). Collectively, these developments reflect a shift toward

more adaptive, efficient, and personalized financial services that align with Islamic ethical standards.

The implementation of AI and chatbots in Indonesia's emerging Islamic financial market presents both significant opportunities and strategic challenges. By 2021, Indonesia had recorded 61 Islamic fintech companies, a development supported by enabling regulations and technology-driven efforts to expand financial inclusion (Hamid & Rohmaningtyas, 2024). AI technologies are widely recognized for their ability to improve operational efficiency and broaden service accessibility, thereby enhancing customer engagement and satisfaction (Masaguni et al., 2024; Zubairi, 2024). Nonetheless, several barriers persist, including regulatory gaps, data security concerns, and the need for stronger digital infrastructure (Hapiyah et al., 2024; Hasyim et al., 2024). Furthermore, low levels of financial literacy and limited public trust in digital transactions pose challenges to realizing the full potential of AI in the sector (Kusumaningtyas & Wulansari, 2025). Addressing these issues requires strong collaboration between government, industry actors, and society to establish a supportive ecosystem for sustainable Islamic fintech growth.

Recent studies in Indonesia also highlight the growing adoption of AI-powered chatbots in education, particularly in language learning and student engagement. For example, chatbot applications have been shown to significantly improve business vocabulary acquisition among polytechnic students, although such studies remain limited in scope and sample size (Romadhon, 2025). Similarly, the use of ChatGPT has been found to enhance behavioral, cognitive, and emotional engagement in English writing classes at an Islamic university (Anjarani et al., 2024). Other research suggests that AI chatbots contribute to improved writing skills, feedback literacy, and engagement in courses such as Economic English by incorporating interactive and gamified learning strategies (Oktarin et al., 2024). At the secondary school level, chatbot use has supported conceptual understanding and independent learning by providing direct feedback and fostering critical thinking skills. However, these studies have not specifically addressed the application of AI chatbots in Islamic finance, indicating an important research gap.

The rapid advancement of AI and chatbot technologies across multiple domains including Islamic finance and education demonstrates their potential in enhancing personalization, efficiency, and accessibility. Within Islamic finance, AI and chatbots have proven effective in recommending Sharia-compliant products, improving service efficiency, and expanding financial access, albeit facing challenges such as regulatory limitations, data security risks, low financial literacy, and limited public trust in digital systems. In education, AI chatbots have been shown to improve engagement, conceptual understanding, independent learning, and language acquisition, although most studies remain narrow in focus and have not yet extended into the realm of Islamic finance. This synthesis reveals a critical research gap: the absence of studies exploring advanced AI applications such as hybrid forecasting models that combine ARIMA and Long Short-Term Memory (LSTM). Such models hold promise for supporting data-driven decision-making in both the energy and Islamic finance sectors. Accordingly, this study employs a Systematic Literature Review approach to explore the potential of hybrid forecasting models in generating more accurate energy consumption

predictions, while also contributing methodological and practical insights to the advancement of AI-driven strategies in Islamic finance and energy industries in Indonesia.

B. METHOD

This study aims to systematically examine the utilization of Artificial Intelligence (AI) and chatbots in the personalization of Islamic financial products in Indonesia. The main focus is directed toward identifying the forms of application, the benefits achieved, the challenges of implementation, and the prospects for development in alignment with Sharia principles. Accordingly, the study is expected to provide theoretical contributions by enriching the academic literature and practical contributions by supporting the development of technology-based personalization strategies for Islamic financial services. The literature search was conducted systematically across several international and national academic databases, including Scopus, DOAJ, Google Scholar, and Garuda. The keywords used in the search were "Artificial Intelligence," "AI," "chatbot," "personalization," "Islamic finance," "financial technology," and "Indonesia," combined with Boolean operators (AND, OR). The publication timeframe was limited to the years 2013–2025 to ensure both relevance and novelty.

The inclusion criteria comprised: (1) articles published in reputable academic journals, conference proceedings, or research reports; (2) literature addressing the application of AI and/or chatbots in the context of Islamic finance, financial service personalization, or Sharia-compliant financial technology; and (3) studies focused on Indonesia or with relevance to the Islamic financial system more broadly. The exclusion criteria included: (1) non-academic sources such as opinion pieces, news articles, or blogs; (2) publications unavailable in either English or Indonesian; and (3) studies that did not explicitly address personalization or its connection to Islamic finance.

The literature selection process consisted of several stages. First, titles and abstracts were screened to identify relevance to the research topic. Second, the full texts of potentially relevant articles were evaluated to ensure methodological rigor and thematic alignment. Articles meeting the criteria were then subjected to data extraction, capturing key information such as publication details (author, year, source), research objectives, methodology, application context of AI and chatbots, forms of personalization offered, benefits, challenges, and recommendations for further research. The extracted data were qualitatively analyzed to generate a synthesis of findings and to identify research gaps that may serve as a foundation for future studies.

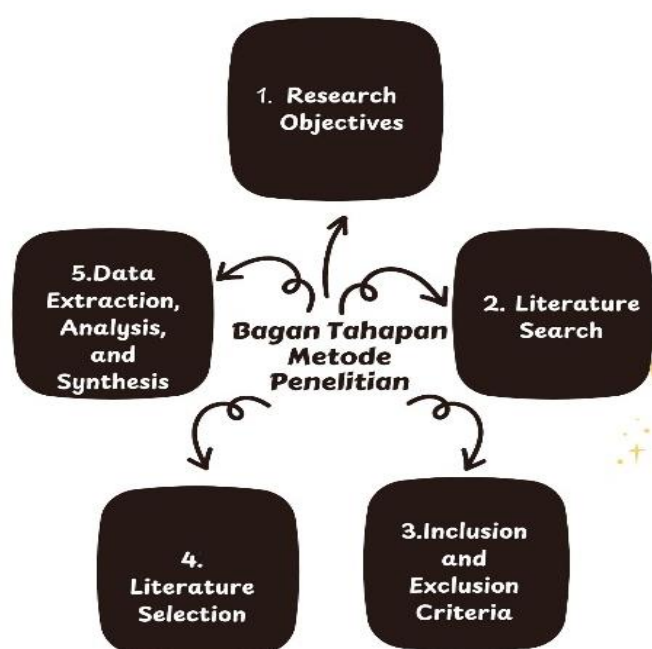


Figure 1. Flowchart of the Research Methodology

C. RESULTS AND DISCUSSION

To obtain a comprehensive overview of recent research developments, a literature mapping was conducted to categorize studies into several key areas of focus. This mapping highlights three major clusters within the domain of Islamic finance: product personalization and efficiency, interactive services and financial inclusion, and Sharia compliance and ethical investment. In addition, the literature demonstrates the significant role of AI and chatbots in the education sector, which can be further divided into three subfields: learning effectiveness and learner autonomy, language development and academic literacy, and the enhancement of student participation and engagement. Equally important, health and psychological therapy have also emerged as new areas of exploration, particularly in the use of chatbots for emotional support and therapeutic connection. The analysis of research findings on AI and chatbots is presented in Table 1.

Table 1. Analysis of Research Findings on AI and Chatbots

No.	Field / Main Focus	Authors	Key Insights / Research Variables
1.	Islamic Finance - Product Personalization & Efficiency	Omar & Sa'ad (2024); Kulkarni et al. (2025); Behera et al. (2025); Hamadou et al. (2024); Adams et al. (2024); Annisa & Albahi (2024)	<ul style="list-style-type: none"> • Artificial Neural Networks (ANN) support Sharia-based decision-making and operational efficiency. • AI-driven robo-advisors for Islamic investment. • Natural Language Processing (NLP) enables hyper-personalized financial services. • AI platforms ensure real-time Sharia compliance.

No.	Field / Main Focus	Authors	Key Insights / Research Variables
2.	Islamic Finance – Interactive Services & Financial Inclusion	Masaguni et al. (2024); Nufus et al. (2024); Fadila & Soumena (2025); Tarumingkeng (2024)	<ul style="list-style-type: none"> • Chatbots enhance service satisfaction and financial inclusion. • Digital technology adoption and cross-sector collaboration address regulatory barriers. • NLP-based chatbots facilitate real-time customer communication.
3.	Islamic Finance – Sharia Compliance & Ethical Investment	Jokhio & Jaffer (2024); Putri & Samsuri (2025); Fitriyanti (2024); Safriatullah et al. (2025)	<ul style="list-style-type: none"> • Large Language Models (LLMs) identify Sharia compliance issues. • AI supports the design of Sharia-compliant products (including Sukuk) with an ESG focus. • AI strengthens real-time compliance with Islamic principles. • Highlights the importance of regulation and human oversight in AI integration.
4.	Education – Learning Effectiveness & Independence	Kusuma et al. (2024); Rahmad et al. (2025); Susanyah et al. (2025); Muin & Kusmaladewi (2025); Saputra (2025)	<ul style="list-style-type: none"> • AI chatbots significantly improve learning effectiveness (normalized gain 0.87 vs. 0.60). • Enhance conceptual understanding and learner autonomy. • More effective compared to traditional teaching methods.
5.	Education – Language & Academic Literacy	Romadhon (2025); Oktarina et al. (2024); Dawam & Syaidah (2025); Fajriati et al. (2024)	<ul style="list-style-type: none"> • Chatbots support mastery of business ESP vocabulary. • ChatGPT improves writing skills and feedback literacy. • Encourages engagement in community-based learning.
6.	Education – Student Participation & Engagement	Fazira (2024); Hawa & Nasir (2025); Sulaeman et al. (2024); Algiyantoro (2025)	<ul style="list-style-type: none"> • Chatbots increase behavioral, cognitive, and emotional participation. • Improve critical thinking skills through direct feedback. • Co-activity and conversation visualization foster openness and trust.
7.	Healthcare – Therapy	/ Azizah (2025)	<ul style="list-style-type: none"> • Health chatbots improve user engagement through personalized messages, daily

No.	Field / Main Focus	Authors	Key Insights / Research Variables
	Psychological Support		<p>tips, and positive communication styles, though challenges remain with repetitive conversations and limited navigation.</p> <ul style="list-style-type: none"> • Psychotherapy chatbots foster therapeutic bonds comparable to human therapists.

Table 1 highlights that research on AI and chatbots extends beyond innovations in Islamic financial products, encompassing applications in education and healthcare. Within the Islamic finance sector, studies primarily emphasize strategies for service personalization, enhancing financial inclusion, and strengthening Sharia compliance in the design of financial instruments. In the field of education, the focus shifts toward exploring how AI and chatbots contribute to improving learning effectiveness, academic literacy, and student engagement. Meanwhile, in healthcare, research centers on the role of chatbots in supporting psychological therapy and enhancing the quality of user interaction. Collectively, the scope of these studies provides a broad conceptual foundation for understanding the potential of AI and chatbots across sectors, while simultaneously opening avenues for further integration in support of sustainability and ethical values.

1. Research trends on the utilization of AI and chatbots in Islamic finance, particularly in the area of product personalization, over the last decade (2013–2025).

Over the past decade, the integration of Artificial Intelligence (AI) and chatbots into the Islamic finance industry has advanced considerably, particularly in the domain of product personalization. Several studies demonstrate that the application of Artificial Neural Networks (ANN) can support Sharia-based decision-making processes in digital banking, while simultaneously enhancing operational efficiency and addressing ethical considerations in Islamic finance (Omar & Sa'ad, 2024). At the same time, AI-driven personalized financial services—such as robo-advisors for investment—have begun to emerge in response to increasingly complex customer needs and preferences (Kulkarni et al., 2025). Advances in Natural Language Processing (NLP) have further enabled the development of hyper-personalization, where financial services are dynamically tailored through real-time data analysis and user emotion recognition (Behera et al., 2025). Moreover, AI-powered chatbots have been shown to positively contribute to the profitability of Islamic financial institutions by enhancing customer engagement while improving operational performance. Collectively, these developments highlight a significant transformation toward more personalized, efficient, and responsive Islamic financial services.

Recent research also indicates that the adoption of AI-driven chatbots has expanded considerably in the context of education and interactive learning, with substantial implications for personalized learning experiences (Sulaeman et al., 2024). Studies have found that chatbots can enhance user engagement through non-conversational features such as co-activity and the visualization of conversational dynamics, which foster self-disclosure and build trust. Within the educational domain, AI chatbots—particularly ChatGPT—have proven effective in

increasing student participation across behavioral, cognitive, and emotional dimensions by providing personalized feedback and facilitating interactive learning approaches (Fazira, 2024). Other findings suggest that AI chatbots significantly improve conceptual understanding and learner autonomy by delivering real-time feedback and encouraging critical thinking (Hawa & Nasir, 2025). Furthermore, chatbots play an important role in developing writing skills, feedback literacy, and learning engagement through strategies such as interactive exercises, personalized learning designs, and the creation of learning communities (Fajriati et al., 2024). Overall, empirical evidence underscores the potential of AI chatbots to create personalized, learner-centered environments that contribute to improved learning outcomes.

These findings may be interpreted as evidence of a paradigm shift from “one-size-fits-all” services to adaptive and contextualized solutions. AI enables more nuanced customer segmentation, product recommendations aligned with individual Sharia preferences, and real-time interactions that adjust both language and tone. The role of ANN and machine learning algorithms further illustrates the potential to process complex fiqh rules—as integral components of business logic—so that product recommendations and service decisions can be semi-automatically assessed against Sharia compliance criteria. On the technical side, the convergence of NLP and emotion analytics (sentiment and emotion analysis) supports hyper-personalization, whereby service content is tailored based on users’ real-time signals. The strength of the existing literature lies in its diverse methodological approaches (bibliometrics, case studies, field experiments) and the growing body of practical evidence from institutions that have adopted AI.

2. Forms and Core Functions of AI and Chatbots in the Personalization of Islamic Financial Products

Artificial Intelligence (AI) and chatbots play a pivotal role in personalizing Islamic financial products by enhancing customer engagement while ensuring compliance with Sharia principles. The development of generative AI, particularly Large Language Models (LLMs), demonstrates strong potential in providing Sharia-based advisory services by identifying compliance issues and offering relevant guidance, although human supervision remains necessary in addressing complex cases (Jokhio & Jaffer, 2024). Meanwhile, chatbots powered by Natural Language Processing (NLP) facilitate real-time client interactions, enabling Islamic financial institutions to deliver more personalized services and efficient communication tailored to customers’ specific needs (Tarumingkeng, 2024). Furthermore, AI-driven platforms can automate compliance checks and support the design of Sharia-compliant products, including Sukuk, by integrating contemporary frameworks such as Environmental, Social, and Governance (ESG) criteria. This integration strengthens ethical value propositions, thereby appealing to socially responsible investors (Putri & Samsuri, 2025). Collectively, the synergy of AI technologies fosters an adaptive, responsive, and personalized ecosystem for Islamic financial services, improving both customer satisfaction and institutional operational efficiency.

Research on AI-based chatbots has also highlighted their effectiveness across various sectors through features of personalization and interactivity. In healthcare, chatbots have been shown to improve user engagement by delivering personalized support, positive messaging,

and daily tips, although challenges remain regarding repetitive conversations and limited navigational autonomy (Azizah, 2025). In education, AI-powered chatbots have proven superior to traditional instructor-led training in military education, while studies with secondary school students revealed significant improvements in conceptual understanding and learning autonomy compared to control groups. These outcomes were driven by mechanisms such as real-time feedback and the stimulation of critical thinking (Muin & Kusmaladewi, 2025). Additional design features—including co-activity functions and conversational visualization—further enhanced user openness and trust-building. Overall, these findings affirm that the core functions of AI chatbots lie in personalized interaction, real-time feedback, and adaptive learning support, though their success depends heavily on careful attention to conversational design and user navigation.

Within the framework of Islamic financial product personalization, different forms of AI serve as complementary functional layers. Artificial Neural Networks (ANNs) and machine learning algorithms enable the processing of complex behavioral patterns and risk profiles, thereby supporting quantitatively tailored product recommendations. LLMs and NLP operate as semantic interfaces between clients and institutions by interpreting user queries, assessing Sharia compliance, and delivering comprehensible explanations. Recommendation systems then translate this information into relevant product options, which chatbots communicate through dialogic interaction—personalizing the experience by adapting language, tone, or the level of detail. Automated compliance checks and the integration of non-financial considerations (e.g., ESG criteria) illustrate that AI not only optimizes user experience but also strengthens product governance to attract ethically oriented investors. Thus, AI transforms the design, delivery, and communication of Islamic financial products from a rule-based, manual process into an adaptive system that simultaneously incorporates individual preferences and Sharia constraints. The key strength of AI lies in its scalability and speed in processing large datasets to generate detailed personalization, alongside its ability to embed Sharia rules into automated logic, thereby accelerating product structuring. Cross-domain evidence from healthcare and education further reinforces the conceptual effectiveness of chatbot design features—such as co-activity and conversational visualization—which may prove equally relevant for fostering trust in the context of Islamic finance.

3. Alignment of AI and Chatbot Applications with Sharia Principles in the Personalization of Financial Products

The application of Artificial Intelligence (AI) and chatbots in the personalization of financial products can be consistent with Sharia principles, provided that it adheres to the foundational tenets of Islamic finance, such as the prohibition of *riba* (interest) and *gharar* (excessive uncertainty) (Safriatullah et al., 2025). Recent studies indicate that generative AI, particularly Large Language Models (LLMs), has the capacity to identify potential Sharia compliance concerns and provide relevant guidance, although its limitations in addressing complex cases necessitate continued human oversight (Jokhio & Jaffer, 2024). Furthermore, AI-driven financial innovations have the potential to enhance real-time Sharia compliance while supporting the development of more suitable Islamic financial products, as evidenced in recent findings (Fitriyanti, 2024). Nevertheless, the integration of AI must be approached with

caution to ensure that ethical standards and Sharia principles are consistently maintained. This highlights the need for a comprehensive regulatory framework and collaborative engagement among key stakeholders to foster a sustainable AI-enabled Islamic financial ecosystem. Overall, while AI presents significant opportunities to improve efficiency and personalization in Islamic finance, its deployment requires a balanced approach that harmonizes technological innovation with strict adherence to Sharia principles.

Emerging research also underscores the increasing effectiveness of AI-powered chatbots and personalization technologies in educational and therapeutic domains. Within education, AI chatbots have been shown to improve learning outcomes by enhancing conceptual understanding and learner autonomy. For instance, secondary school students utilizing chatbots achieved stronger conceptual mastery and independence compared to peers employing traditional learning methods (Saputra, 2025). Similarly, AI tools such as ChatGPT have proven effective in developing students' scientific argumentation skills in Islamic Religious Education, with the experimental group achieving significantly higher mean scores (76.34) compared to the control group (55.34) (Algiyantoro, 2025). Additionally, AI chatbots have contributed to improvements in English writing proficiency, feedback literacy, and student engagement through interactive and personalized learning approaches (Dawam & Syaidah, 2025). In the therapeutic sphere, personalized AI chatbots have demonstrated the capacity to establish strong therapeutic alliances comparable to those formed with human therapists, with users particularly valuing adaptive communication, personalized interaction, and transparency in the process.

In the context of Islamic finance, AI and chatbots serve not only as technological enablers but also as instruments for reinforcing Sharia compliance. The personalization of services facilitated by chatbot interactions fosters greater consumer trust, while AI's ability to conduct real-time monitoring and automate compliance mechanisms helps ensure that Islamic finance remains aligned with the *maqāṣid al-sharī'ah* – namely, the promotion of justice, sustainability, and ethical business conduct. Despite these benefits, significant challenges remain. LLMs still require human oversight in addressing complex Sharia-related cases, as misinterpretations may result in non-compliance risks. Moreover, the integration of AI into Islamic finance necessitates robust regulatory structures and coordinated collaboration among Sharia scholars, financial regulators, and technology developers to ensure that innovation evolves within the boundaries of Islamic law.

4. The Potential Development of AI and Chatbots in Supporting Innovation in Islamic Financial Products in Indonesia's Future

The potential utilization of Artificial Intelligence (AI) and chatbots in driving innovation within Islamic financial products in Indonesia is considerable, as evidenced by numerous studies highlighting the importance of technological integration in this sector. AI contributes to enhancing operational efficiency, strengthening decision-making processes, and providing more personalized customer experiences – factors that are crucial for expanding the customer base of Islamic banking (Hamadou et al., 2024). Furthermore, AI-driven platforms can ensure real-time compliance with Shariah principles, thereby supporting the development of

competitive financial products that remain aligned with Islamic regulations (Annisa & Albahi, 2024). The use of chatbots and virtual assistants has also been shown to improve service satisfaction while expanding financial inclusion, particularly for communities previously underserved by the banking system (Masaguni et al., 2024). Moreover, the adoption of digital technologies, accompanied by cross-sectoral collaboration, holds the potential to overcome regulatory barriers and improve financial literacy, thus fostering a more inclusive financial ecosystem in line with Islamic values (Fadila & Soumena, 2025). Consequently, the integration of AI in Islamic finance not only serves as a driver of product innovation but also as a strategic instrument for supporting ethical and sustainable economic development and investment in Indonesia.

Recent studies also indicate a significant potential for the use of AI-powered chatbots in the context of education in Indonesia. Several studies confirm that implementing AI chatbots has led to better learning outcomes compared to traditional teaching methods. For instance, students using AI chatbots achieved a high level of learning effectiveness, with a normalized gain of 0.87 compared to the control group's 0.60, and a Cohen's D effect size of 0.93 (Algiyantoro, 2025). Similarly, a quasi-experimental study involving 100 secondary school students revealed substantial improvements in conceptual understanding and independent learning after using AI chatbots (Susanyah et al., 2025). University students in Indonesia who engaged with ChatGPT also demonstrated significant progress in writing skills, feedback literacy, and learning engagement through interactive strategies, personalized learning plans, and community-based approaches.

The ability of AI and chatbots to process data rapidly, provide tailored recommendations, and deliver interactive services forms the foundation of their contribution to innovation. In the Islamic finance sector, this ability represents an opportunity to design financial products that are more responsive to customer needs while ensuring consistent Shariah compliance. In the field of education, it underscores the capacity of AI chatbots to replace certain traditional instructional roles with more adaptive and personalized approaches, ultimately improving human capital quality. These empirical findings highlight a positive trend, while also pointing to several challenges that must be addressed. On the one hand, the studies consistently demonstrate the effectiveness of AI and chatbots in improving both service quality and learning outcomes. On the other hand, challenges related to regulation, technological literacy, data security, and alignment with Shariah values remain significant. If these challenges can be mitigated through cross-sectoral collaboration, regulatory strengthening, and the enhancement of digital literacy within society, the integration of AI into Islamic finance will be increasingly optimized.

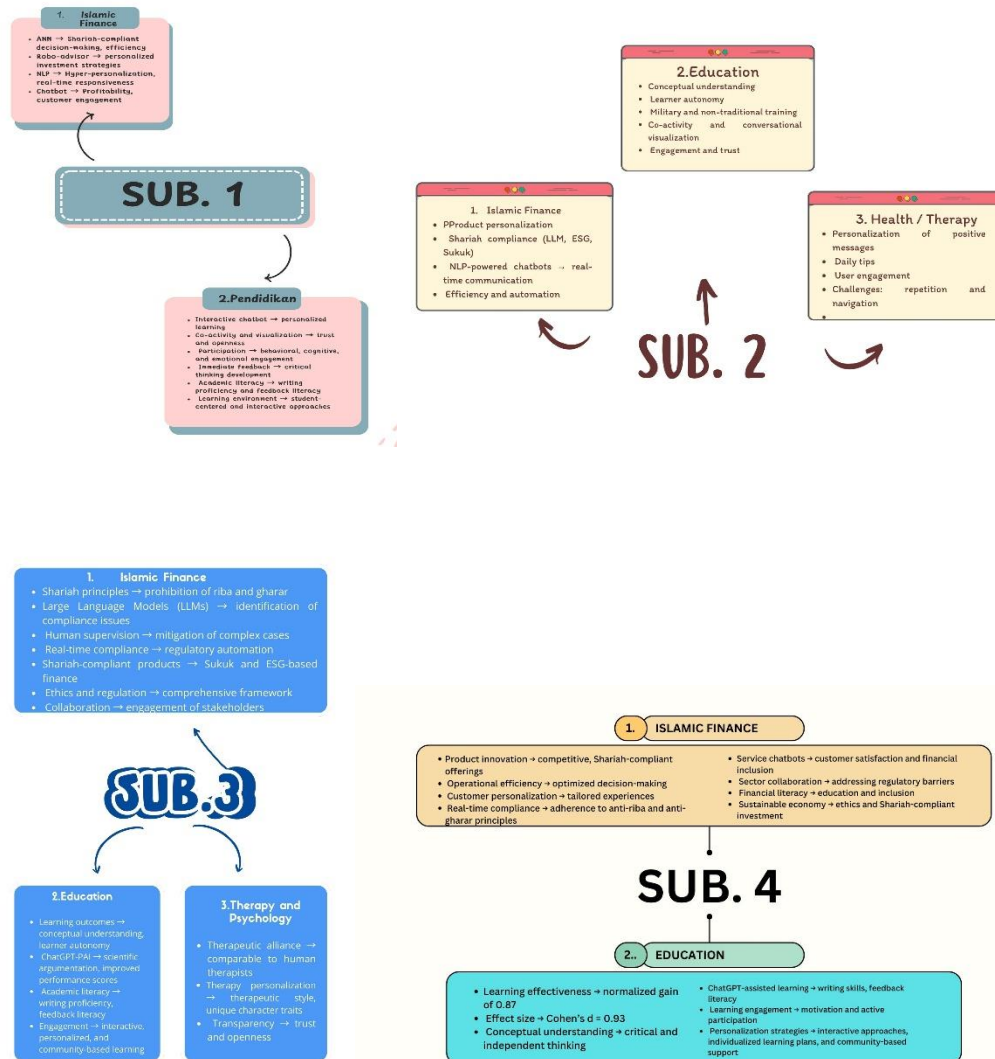


Figure 2. Diagram of Analysis Results and Grouping of Studies on the Application of AI and Chatbots

The diagram in Figure 2 illustrates that the utilization of AI and chatbots has evolved into a multidimensional research variable encompassing the domains of Islamic finance, education, and healthcare/therapy, with primary focus on innovation, personalization, and ethical compliance. In Islamic finance, technologies such as Artificial Neural Networks (ANN), robo-advisors, Natural Language Processing (NLP), and Large Language Models (LLMs) play a significant role in enhancing operational efficiency, ensuring real-time Shariah compliance, and developing competitive products (e.g., ESG-based Sukuk), while simultaneously strengthening customer engagement, financial literacy, and financial inclusion through chatbot services. In the field of education, AI chatbots have been shown to improve learning effectiveness—evidenced by high normalized gains and Cohen's D—while enhancing conceptual understanding, learner autonomy, academic literacy, and writing skills. These

outcomes are supported by interactive features, co-activity, immediate feedback, and personalized strategies that foster a student-centered learning environment. Meanwhile, in the domain of therapy, AI chatbots facilitate the personalization of psychological interactions by establishing a therapeutic alliance comparable to human therapists, delivering positive messages, daily tips, and transparent support that reinforce trust, engagement, and openness, although technical challenges such as conversational repetition and navigation limitations persist. Overall, these variables demonstrate that AI and chatbots function not merely as technological tools but as strategic instruments linking innovation, efficiency, compliance, personalization, and sustainability across multiple sectors.

D. CONCLUSIONS AND SUGGESTIONS

Based on the evaluation results, it can be concluded that the utilization of Artificial Intelligence (AI) and chatbots has demonstrated significant effectiveness in supporting cross-sector innovation, encompassing Islamic finance, education, and healthcare. In the context of Islamic finance, AI serves not only as a technological tool to enhance operational efficiency and product personalization but also as a mechanism for Shariah compliance capable of detecting potential violations in real time. In the fields of education and healthcare, chatbots have been shown to improve learning outcomes, literacy skills, and the quality of therapeutic interactions through personalized approaches and adaptive feedback. Nevertheless, several limitations remain challenging. These include the need for human supervision in complex Shariah cases, potential algorithmic bias, constraints in conversational design, and data security risks. Research gaps persist in several critical areas. First, there is a limited number of AI models specifically designed to integrate fiqh-based rules into algorithmic logic, meaning fully automated Shariah compliance remains unattainable. Second, empirical studies are scarce on how AI-driven personalization can effectively build trust and enhance financial literacy, particularly among underbanked populations who have historically been underserved by the banking system. Third, regulatory and governance aspects of AI in the Islamic finance ecosystem remain underexplored, despite their essential role in ensuring alignment with maqāṣid al-shariah.

Addressing these gaps, urgent research topics for future investigation include: (1) the development of fiqh-based algorithmic frameworks to support automated Shariah compliance; (2) analyses of the effectiveness of chatbots in enhancing Shariah financial literacy and customer trust among underbanked communities; (3) comparative studies on AI regulatory and governance models in Islamic finance across different jurisdictions; and (4) the integration of ethical considerations, data security, and maqāṣid al-sharī'ah principles into the design of adaptive and sustainable AI systems.

REFERENCES

- Algiyantoro, F. (2025). Efektivitas Model Self Organized Learning Environment (SOLE) Berbantuan ChatGPT dalam Meningkatkan Keterampilan Berpikir Kritis Peserta Didik.

- Retrieved from <https://repository.uinjkt.ac.id/dspace/handle/123456789/84805>
- Aminah, S. (2025). Pengaruh Kualitas Layanan Dan Religiusitas Terhadap Kepuasan Menabung Generasi Muda Di Bank Syari'ah Melalui Byond By BSI.
- Aminin, R. I. (2024). Analisis Implementasi Teknologi Blockchain dalam Meningkatkan Transparansi, Efisiensi, dan Keamanan Transaksi Keuangan Perbankan Syariah Indonesia. *Jurnal Hukum Ekonomi Syariah: AICONOMIA*, 3(2), 92–106. <https://doi.org/10.32939/acm.v3i2.4575>
- Anjarani, S., Furqon, M., & Rakhmawati, F. (2024). ChatGPT to Foster Students' Engagement in Writing Class: An Intervention Study. *Voices of English Language Education Society*, 8(3), 630–640. <https://doi.org/10.29408/veles.v8i3.27687>
- Annisa, R., & Albahi, M. (2024). Manajemen Keuangan Syariah untuk Optimalisasi Keberlanjutan Bisnis di Era Digital. *At-Tajdid: Journal of Islamic Studies*, 4(3), 109. <https://doi.org/10.24014/at-tajdid.v4i3.35117>
- Azizah, A. N. (2025). Anteseden Loyalitas dan Keterlibatan Konsumen Terhadap Penggunaan Chatbot "MITA" Bank Mandiri, 11(1), 1–14. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/28459981/%0Ahttps://doi.org/10.1016/j.reserv.2025.100208%0Ahttp://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www>
- Behera, H. B., Ghosh, P., & Chakraborty, S. (2025). Predictive intelligence in finance: Emerging trends in AI and NLP for customizing services. *International Journal of Computing and Artificial Intelligence*, 6(1), 01–08. <https://doi.org/10.33545/27076571.2025.v6.i1a.122>
- Dawam, A., & Syaidah, K. (2025). Mengintegrasikan Teknologi Digital dan Artificial Intelligence (AI) Untuk Pengalaman Belajar Mahasiswa Yang Lebih Baik. *Prosiding Seminar Nasional Fakultas Ilmu Tarbiyah Dan Keguruan UIN Syarif Hidayatullah Jakarta*, 2(1), 235–252. <https://doi.org/10.64277/semnas.v2i1.170>
- Fadila, N., & Soumena, F. Y. (2025). Sinergi Pemerintah Dan Lembaga Keuangan Syariah Dalam Peningkatan Literasi Ekonomi Islam. *JEI: Jurnal Ekonomi Islam*, 3(1), 56–86. <https://doi.org/10.56184/jejjournal.v3i1.501>
- Fajriati, A., Wisroni, W., & Handrianto, C. (2024). Pemanfaatan Teknologi Artificial Intelligence (Ai) Dalam Pembelajaran Berbasis Peserta Didik Di Era Digital. *Pemanfaatan Teknologi Artificial Intelligence (Ai) Dalam Pembelajaran Berbasis Peserta Didik Di Era Digital*, 06(2024), 71–85.
- Fazira, A. (2024). Pengaruh Penggunaan Chatgpt Terhadap Kualitas Informasi Pada Mahasiswa Fisipol Universitas Medan Area, 1–125. Retrieved from https://repositori.uma.ac.id/jspui/bitstream/123456789/25801/1/208530030-AliciaFaziraFulltext.pdf?t&utm_source=perplexity
- Fitriyanti, E. (2024). *Masa Depan Lembaga Keuangan Syariah Di Era Artificial Intelligence (AI)*.
- Hamadou, I., Yumna, A., Hamadou, H., & Jallow, M. S. (2024). Unleashing the power of artificial intelligence in Islamic banking: A case study of Bank Syariah Indonesia (BSI). *Modern Finance*, 2(1), 131–144. <https://doi.org/10.61351/mf.v2i1.116>
- Hamid, A. M., & Rohmaningtyas, N. (2024). Revolusi Ekonomi Umat dengan Fintech Syariah: Analisis dan Peluang. *ADILLA: Jurnal Ilmiah Ekonomi Syari'ah*, 7(2), 59–80. <https://doi.org/10.52166/adilla.v7i2.6738>
- Hapiyah, Marbawani, A., Ramadhanty, Y. N., & Qamariah, Z. (2024). Exploring the Digital Frontier: Challenges and Opportunities in Sharia Banking Development. *CEMERLANG: Jurnal Manajemen Dan Ekonomi Bisnis*, 4(3), 22–30.

- <https://doi.org/10.55606/cemerlang.v4i3.2974>
- Hasyim, M., Afifah, Z., Sakinah, N., & Safira, V. (2024). Peluang dan Tantangan Pada Perkembangan Fintech Syariah di Indonesia. *Journal of Education Religion Humanities and Multidiciplinary*, 2(2), 1066–1071. <https://doi.org/10.57235/jerumi.v2i2.4040>
- Hawa, N., & Nasir, A. M. (2025). Pemanfaatan AI Berbasis Chatbot dalam Kemandirian Belajar Siswa Materi Hukum Newton. *Prosiding Seminar Nasional FKIP ...*, 2(1), 36–41. Retrieved from <http://ejournals.umma.ac.id/index.php/semnas/article/view/2798%0Ahttps://ejournals.umma.ac.id/index.php/semnas/article/download/2798/1482>
- Jokhio, M. N., & Jaffer, M. A. (2024). Generative AI in Shariah Advisory in Islamic Finance: An Experimental Study. *Business Review*, 19(2), 74–92. <https://doi.org/10.54784/1990-6587.1665>
- Kulkarni, A. S., Gaikwad, R., Zad, P., Lahane, S., & Shelke, S. (2025). AI for Personalized Financial Assistance: Review of Recent Trends, Algorithms and Datasets. *International Conference in Emerging Trends in Computer Science*, 15–23. <https://doi.org/10.34293/icetcs2024.ch002>
- Kusumaningtyas, M., & Wulansari, D. (2025). Literasi Digital dan Fintech: Strategi Menghadapi Disinformasi di Indonesia, 4(3), 4640–4645.
- Latifah, H. R. (2023). Analisis Kualitas Layanan Berbasis Artificial Intelligence pada Nasabah Bank Syariah Indonesia (Analysis Of Service Quality Based On Artificial Intelligence For Customers Of Indonesian Sharia Bank), 1–118.
- Masaguni, O. S., Patadjenu, W., K. Hasan, K., Katili, A. Y., & Pasingi, M. R. (2024). Pemanfaatan Artificial Intelligence (Ai) Dalam Meningkatkan Inklusi Ekonomi Dan Keuangan. *Publik: Jurnal Manajemen Sumber Daya Manusia, Administrasi Dan Pelayanan Publik*, 11(4), 1499–1512. <https://doi.org/10.37606/publik.v11i4.1637>
- Muin, & Kusmaladewi. (2025). Efektivitas Peningkatan Pembelajaran Berbasis Kecerdasan Buatan. *Jurnal Studi Guru Dan Pembelajaran*, 8(2), 618–631.
- Mukharom, Nuryanto, A. D., & Ula, K. A. el. (2024). Peran Lembaga Keuangan Sosial Syariah Di Indonesia Menuju Tranformasi Digital. *Jurnal Ilmiah Mahasiswa Perbankan Syariah (JIMPA)*, 4(1), 365–382. <https://doi.org/10.36908/jimpa.v4i1.335>
- Nurwulan, D., Maulana, F. C., & Prisasti, T. handoyo. (2025). Inovasi tanpa batas potensi ai dalam menciptakan sistem transaksi keuangan digital. *Jurnal Ilmiah Ekonomi Dan Manajemen*, 3(6), 417–431.
- Oktarin, I. B., Saputri, M. E. E., Magdalena, B., Hastomo, T., & Maximilian, A. (2024). Leveraging ChatGPT to enhance students' writing skills, engagement, and feedback literacy. *Edelweiss Applied Science and Technology*, 8(4), 2306–2319. <https://doi.org/10.55214/25768484.v8i4.1600>
- Omar, M. N., & Sa'ad, A. A. (2024). Exploring the Potential of Artificial Neural Network in Shari'ah Decision-making for Digital Banking: A Literature Review. *TAFHIM: IKIM Journal of Islam and the Contemporary World*, 17(2), 105–130. <https://doi.org/10.56389/tafhim.vol17no2.5>
- Purwanto, H., Sakir, M., Munir, S., & Adinugraha, H. H. (2024). Analisis Pengaruh Prinsip-Prinsip Tasawuf, Literasi Keuangan Syariah, dan Kualitas Pelayanan terhadap Keputusan Nasabah dalam Memilih Produk Perbankan Syariah. *Velocity: Journal of Sharia Finance and Banking*, 4(2), 133–149. <https://doi.org/10.28918/velocity.v4i2.8935>
- Putra, A. septa A. (2024). Analisis Literatur tentang Inovasi Layanan Digital dalam Perbankan: Implikasi terhadap Efisiensi Operasional dan Kepuasan Nasabah. *Jurnal Riset Ekonomi Dan Manajemen Perbankan*, 01(02), 89–93. Retrieved from <https://synergizejournal.org/index.php/JREMP/article/view/60>

- Putri, F. W., & Samsuri, A. (2025). Peran Fintech Syariah Dalam Mendorong Investasi Berbasis ESG (Environmental, Social, Governance) di Pasar Modal Syariah Digital. *LLABATILA: Jurnal Ilmu Ekonomi Islam*, Volume, 9(01), 38–57. <https://doi.org/10.33507/lab.v9i01.2802>
- Gothrunnada, N. A., Iswanto, J., Fitrotus, D., Hendrarti, B. G., & Subekan, S. (2023). Transformasi Digital Lembaga Keuangan Syariah: Peluang dan Implementasinya di Era Industri 4.0. *Indonesian Journal of Humanities and Social Sciences*, 4(3), 741–756. Retrieved from <https://ejournal.iai-tribakti.ac.id/index.php/IJHSS>
- Rakhli, M. R. A. (2025). Analisis Pengaruh Kualitas Layanan Dan Kepercayaan Terhadap Kepuasan Dan Loyalitas Nasabah Bank Bsi Syariah. *Sustainability (Switzerland)*, 11(1), 1–14. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/28459981/> <https://doi.org/10.1016/j.resenv.2025.100208> <http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y> <http://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005> <https://doi.org/10.1016/j.resenv.2025.100208>
- Romadhon. (2025). Replika AI Chatbot as a Tool for Enhancing ESP Business Vocabulary Acquisition: A Study on Polytechnic Students. *SALEE: Study of Applied Linguistics and English Education*, 6(1), 183–201. <https://doi.org/10.35961/salee.v6i1.1671>
- Safriatullah, S., Auliadi, R., Amrullah, A., Nurmawati, N., & Jais, M. (2025). Tantangan Implementasi AI di Perbankan Syariah: Perspektif Regulasi dan Etika. *Jurnal Ilmiah Guru Madrasah*, 4(1), 34–51. <https://doi.org/10.69548/jigm.v4i1.40>
- Saputra, H. (2025). Pemanfaatan Chatbots dalam Pembelajaran Matematika di Sekolah Dasar: Pengaruh terhadap Pemahaman dan Kemandirian Belajar. *Pentagon : Jurnal Matematika Dan Ilmu Pengetahuan Alam*, 3(1), 80–98. <https://doi.org/10.62383/pentagon.v3i1.410>
- Sulaeman, Anggraini, R., Paramansyah, A., Husnul Fata, T., & Judijanto, L. (2024). Peran Artificial Intelligences sebagai Alat Bantu dalam Meningkatkan Keterampilan Menulis Mahasiswa Pendidikan Agama Islam Di Era Disruptif. *INNOVATIVE: Journal Of Social Science Research*, 4(1), 5206–5216.
- Susanyah, S., Fajar, A., & Hendrawan, J. H. (2025). Pemanfaatan Artificial Intelligence (AI) untuk Meningkatkan Efektivitas Pembelajaran Akuntansi. *Selami Ips*, 18(2), 131–138. <https://doi.org/10.36709/selami.v18i2.115>
- Tarumingkeng, R. c. (2024). Natural language processing, (1–2), 76–92. [https://doi.org/10.1016/0010-4655\(90\)90107-C](https://doi.org/10.1016/0010-4655(90)90107-C)
- Wahyuni, S. (2025). InsurTech dan Revolusi Industri 5 . 0 : Masa Depan Asuransi di Pasar Global, 3(5), 294–301.
- Yunita. (2025). Peran Pengembangan Strategi Pemasaran Pada Produk Pembiayaan Mudharabah Di Bank Aman Syariah Sekampung.
- Zubairi, A. (2024). Pemanfaatan Teknologi Fintech Berbasis Ai Dalam Layanan Keuangan Syariah. *Al-Idarah : Jurnal Manajemen Dan Bisnis Islam*, 5(1), 1–7. <https://doi.org/10.35316/idarrah.2024.v5i1.1-7>