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Article

Unleashing the power of artificial intelligence in Islamic banking: A case study of Bank Syariah Indonesia (BSI)

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Abstract: This research examines the challenges and opportunities of AI integration in Islamic banks through a case study of Bank Syariah Indonesia. A qualitative method was applied using an interview approach. Four experts from the IT division of Bank Syariah Indonesia were interviewed. The results suggest that AI applications offer potential benefits such as automation, improved decision-making and efficiency, customer recommendations, and enhanced customer experience. However, the challenges of AI integration include implementation costs, cyber security risks, Shariah compliance, and ethical issues. The research recommends that stakeholders in Islamic banks invest more in cybersecurity and educate their customers about the importance and usage of AI technology. Additionally, the research suggests that the government implements policies related to the ethical regulation of AI technology. Future research should provide comparative analysis and use a mixed-method approach to better understand the challenges and opportunities of AI integration in Islamic banks.

Keywords: artificial intelligence, chatbot, Indonesia, Islamic banks, SWOT analysis.

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1. Introduction

Nowadays, many customers have become cultured and well-informed when doing transactions. Frequently, they prefer limiting human interactions. Industries must look for automation that can help them target more customers. In this realm, the scope of technology is much broader and can potentially improve the overall financial system performance by providing automation and accurate results (Rahim et al., 2018). Artificial Intelligence (AI) is considered the pioneer in scientific and technological discoveries (Bhagat et al., 2022). Artificial intelligence has shown significant acceptance and gained important consideration worldwide. Its effects are enormous, and many global organizations cannot deny them. Its application confirms that decisions made by the organization are economically feasible and precise (Bhagat et al., 2022).

The role of AI in industries has mostly taken global consideration since the advent of the global financial crisis in 2008 and the latest COVID-19 pandemic. After the financial crisis, Northey et al. (2022) argued that innovation in banking industries started being applied to the products that generated the most revenue for the banks. Banks have started innovating products that generate colossal revenue to recover from the financial crisis. Among these innovations, AI technology has widely spread to automate financial transactions. Despite the effects of COVID-19, annual revenue from the global banking sector is likely to exceed US$5.5 trillion in 2022 (Northey et al., 2022). Global banking revenues, on the other hand, are under intense pressure, and the global epidemic has

caused many banks to reconsider their strategy and tactics. Consequently, the banking industry is undergoing a digital revolution that will significantly transform the industry (Northey et al., 2022). Accordingly, the outbreak of this pandemic has increased online banking by 23%, with mobile banking growing by 30%. Banks using digital banking services have seen efficacy gains that have doubled. The main area in which banks invested heavily to boost their efficiency is using Artificial Intelligence (AI) and automation (Brackert et al., 2021).

Despite its minor effect, the incorporation of AI into Muslims' daily lives is nevertheless observed. Wahed Invests, for example, is an online Halal investment platform that has facilitated and utilized more automation in Islamic investment. They have also made Shariah-compliant equities investing more affordable (Gazali et al., 2020). Now, the time has come for the stakeholders of the Islamic finance industry to broaden the objectives of the industry in the next decade in a way that the millennials and the new generation are looking at the financial services industry (Jamshidi & Hussin, 2018). The new generation is looking for baking and financial services in a completely new way, quite distinct from the good old days; everything is faster, intelligent, digital, virtual, and artificial (Rabbani et al., 2021). Integrating AI into Islamic finance can bring significant benefits, such as improving the efficiency and effectiveness of financial operations, enhancing the delivery of financial and social services, and enabling better risk management.

However, the application of AI in Islamic finance also raises ethical and legal issues, as it must be aligned with the principles and values of Islamic finance (Zainordin et al., 2021). These principles include fairness, transparency, and prohibiting interest-based transactions and speculation. Ensuring the alignment of AI with Islamic finance requires careful consideration of these principles and the development of appropriate guidelines and regulations. Therefore, Aysan et al. (2022) argued that most newly developing technologies have a low implementation level in Islamic banking operations globally, except mobile banking, which already has a vast global infrastructure. Their results warn Islamic banks to invest more capital and energy in the developing fields of financial technologies to keep abreast of their conventional banking counterparts. Therefore, examining the opportunities and challenges of integrating AI technology in the Islamic banking industry with country-based evidence seems necessary.

Indonesia is considered to have the largest Muslim population in the world. This demographic makes it a significant market for Islamic Banking. It provides an opportunity to explore how AI can be tailored to meet a diverse Islamic community's financial needs and preferences. Furthermore, it has the potential to develop the Islamic banking system. In 9M22, Indonesia's Islamic banking sector experienced 18.8% financing growth, primarily due to consumer segment expansion. Recent consolidations, like PT Bank Syariah Indonesia Tbk, have positioned Islamic banks better for syndication loans. The sector's financing market share increased to 7.6% (Fitchrating Report, 2023). In 2022, BSI made investments with a total budget allocation of Rp266 billion to support the capability fulfillment of Digital Banking, Enterprise, and surrounding Applications, Digitalization and Office Automation, Enhancement of features on the existing application as well as IT infrastructure and security devices in order to increase IT capacity and capability. One interesting point is that BSI employees have recently received training about Robot Automation and Machine Learning models (Annual Report BSI, 2022).

Therefore, the first objective of this research is to understand the feasibility of Integrating AI solutions in Indonesian Islamic Banks by conducting a case study of Bank Syariah Indonesia (BSI). The second and third are to identify AI tools used in BSI and explore the benefits and challenges of AI tools from the perspective of AI experts working in BSI. To achieve these objectives, our study used qualitative methods with a case study approach. It was conducted by interviewing three IT department experts and one staff in customer relationships.

The findings of this study suggest that AI integration in Islamic banks is feasible as long as it does not violate the principles of Shariah law. Moreover, chatbots and AI-enabled mobile banking are the leading AI tools used in BSI. Our SWOT analysis identified the following opportunities: AI tools can help in process automation, improved decision-making, increased efficiency, enhanced customer experience, and customized financial products. Nevertheless, these opportunities cannot be present without challenges. It has been identified that implementation costs, cybersecurity, Shariah compliance, and ethical issues are among the challenges of AI tools. Furthermore, based on institutional theory, two more challenges have been found: customers' knowledge of technology and their demography, such as Age. It is shown that most of their customers are not the younger generation; however, the youth mainly adopt the technology. Perhaps the exponential emergence of AI technology can bring positive developments to Islamic banks, such as improved financial inclusion, risk management, and personalized customer services.

Our study relates mainly to the scarce literature on AI in Islamic banks. The studies of Sarea et al. (2021), Aysan et al. (2022), Narayan and Phan (2019), and Suhartanto et al. (2021) are among the few researches conducted in the Islamic banking sector. However, their findings are more related to the general context of AI applications without any reference to a specific Islamic banking practice. To fill this gap in the literature on AI integration in Islamic banks, this paper looks at a case study of Bank Syariah Indonesia, which has over 50% of the Indonesian Islamic bank market. As a result, these findings will be used as a reference for other Indonesian Islamic banks and the global banking sector to understand better and make judgments on AI applications in their firms. Consequently, this research is the first attempt to examine the perspectives of Indonesian Islamic bank stakeholders on the opportunities and challenges of AI integration in Islamic banks. Accordingly, the research outcomes will contribute to the literature by bringing new findings about AI integration opportunities and challenges in Islamic banks. Secondly, it will help the government set a policy for integrating AI, a disruptive technology. Thirdly, it will help Islamic bank managers draw new solutions to facilitate AI integration in their companies.

The rest of this article is organized as follows: The second section will present the literature review on the Theoretical foundation of AI and its application in Islamic banks. The third section will explain the data collection steps and analysis methods to address the research questions. The fourth section will present and discuss the findings. Finally, the last section provides a brief conclusion and practical implications of the research.

2. Literature review

2.1. Overview of Islamic banking and finance

Islamic banks are intermediary financial institutions that assist in connecting individuals or firms who have surplus funds (savers) with individuals or firms who need financing (borrowers) (Jallow, 2023). Islamic banks operate differently from conventional banks by following the principles of Islamic Shariah, which aligns with the Quran, sunnah, and fiqh. Because Allah SWT states in Surah Al-Baqarah 257 that He permits trade but forbids trading with interest, Islamic banks reject interest-based transactions (riba) (Shahar et al., 2017). Besides, since conventional banks are profit-driven financial institutions, they charge high interest rates on loans, which exploit borrowers and low-income earners because they may not be able to acquire loans due to high interest rates. As a result, Muslim leaders worldwide began to formulate the concept of interest-free banking, an attempt made in Pakistan in the 1940s but ultimately failed. The second attempt was launched in Egypt in 1963 with the establishment of the Mit Ghamr Local Saving Bank, which greatly assisted rural communities and farmers. However, the local savings Bank did not last long due to the country's political tension, thereby leading to the takeover by the country's Central Bank (Jallow, 2023). Moreover, the creation of the

Organization of Islamic Cooperation (OIC) plays a vital role in promoting the establishment of Islamic Banks. The organization organizes conferences to discuss issues affecting its members, including economic-related activities and possible solutions. As a result, the organization discusses setting up Shariah compliance banks that prohibit interest-based transactions and promote profit sharing. The first modern private Islamic bank was the Dubai Islamic Bank, established in 1975 by a group of Muslim businessmen from different countries. This development was followed by the establishment of two Islamic banks in 1977 by the Faysal Bank in Egypt and Sudan (Jallow, 2023). The Islamic banking sector has expanded in several Islamic nations since 1950. These days, this industry has also expanded to non-Islamic nations. In the middle of the 1990s, the value of Islamic financing reached a peak of USD 150 billion (Hamadou, 2022).

Globally, Saudi Arabia leads the world in the percentage of Islamic banking assets, with roughly 30.6 percent, followed by Iran with 17% while Indonesia is among the top ten countries with the most prominent Islamic financial index. However, conventional banks still dominate the nation's economy (Statista, 2022). Over the past 20 years, Shariah banking has changed the banking landscape. The founding of PT Bank Muamalat Indonesia (BMI) in 1992 marked the beginning of the development of Indonesia's Islamic banking industry (Hamadou & Ashraf, 2022). The country has witnessed rapid development in the sector as there are 14 Islamic Commercial Banks, 20 Shariah Business Units, and 164 Shariah Rural Banks (Marlina et al., 2021). Besides, the total assets of Islamic banks in Indonesia accounted for 676.74 trillion Indonesian rupiahs, with Bank Rakyat being the biggest bank in Indonesia in terms of assets, followed by Bank Mandiri and Bank Central Asia; the three Banks combined have a total asset of about 71 billion USD (Statista, 2022).

2.2. What is AI?

Many studies defined AI as a system that thinks or acts like a human or thinks and performs rationally Volkmar et al. (2022). The above definitions highlight technological or human focus. The first one emphasizes the ability of machines, computer programs, algorithms, or robots to think, identify their environment, and solve complex problems. The latter means that these technical systems, as humans do, require intelligence to solve problems (Daugherty & Wilson, 2018). There is no consistent definition of artificial intelligence in the literature, and its term is still a hot topic for both Königstorfer and Thalmann (2020). John McCarthy et al. (1955) claimed in a proposal for the Dartmouth conference, one of the first conferences focusing on AI, that they sought to explore "machines that can be made to simulate [intelligence]." According to Russell and Norvig (2013), AI is the study of an intelligent agent that executes activities. According to Huang et al. (2004), what distinguishes AI from other methods is that AI develops models from the data structure, with no one needing to teach the program what to search for or how to respond. In a nutshell, AI refers to a computer's ability to learn and act rationally in the same way as humans do (Artificial et al.) or better than humans do (Artificial General Intelligence).

2.3. AI applications in the Islamic banking industry

AI has been used in various industries, including government payments, healthcare, internet trade, logistics, and financial industries (Rodrigues et al., 2022). With the swift advancements in information technology, the challenge of upgrading equipment resources and training human resources arises, typically resulting in a significant cost burden for financial institutions. Artificial intelligence (AI) may be highly beneficial in addressing this issue, and it can be used in several ways in the financial and banking industries (Khan & Rabbani, 2021). As artificial intelligence (AI) gets traction in banking, financial institutions (FIs) are building on existing solutions to address increasingly complex problems (Digalaki, 2022). According to Patel et al. (2022), AI-powered digital financial services are more efficient and quicker than traditional techniques for executing

different financial computing tasks in banking operations. Furthermore, the fundamental nature of AI and the competitive working environment of banking make employing AI in banking operations unavoidable.

Da Silva (2021) argued that adopting and deploying AI technology has assisted banks in preventing fraud. It implies that AI can be applied in banking to detect fraud. Roseline et al. (2022) claimed that traditional methodologies are no longer viable in the age of big data. As a result, AI techniques such as machine learning approaches are employed to identify credit card fraud automatically and do not account for deception processes or behavioral issues that may trigger alarms. Maja and Letaba (2022) mentioned that AI models influenced operations, dependability, and accuracy in the banking industry. Recently, Doumpos et al. (2023) did a biometric investigation of AI applications in the banking industry. Their findings demonstrated that AI may improve bank efficiency, performance, risk management, regulation, and consumer recommendations. This means that using AI techniques in banking can increase efficiency and minimize financial risk while conforming to banking regulations. Furthermore, Hariguna and Ruangkanjanases (2024) supposed that the idea of the customer experience in the context of AI emphasizes the role of AI technology in increasing customer happiness and loyalty. Companies may use AI to identify client preferences and behaviors, allowing them to create more personalized services. For example, AI-powered chatbots can answer client questions quickly and effectively, whereas predictive analytics may assist businesses in anticipating and meeting consumer demands before they are articulated.

Artificial intelligence (AI) has many applications in Islamic finance, and the Islamic financial services industry is growing. It is eager to embrace any financial innovation that will improve efficiency, friendliness, transparency, and cost-effectiveness for Islamic financial service users (Alam et al., 2019; Ali et al., 2019). Practically, Islamic banks, such as Dubai Islamic Bank (DIB), Abu Dhabi Islamic Banks (ADIB), and Kuwait Finance House, utilize AI and machine learning-powered chatbots to address consumer inquiries. Chatbots are robust AI technologies that efficiently handle front-office duties such as connecting with clients in many languages, providing answers at lightning-fast speeds, and increasing accuracy. Chatbots may handle bright and appealing communication with several consumers in multiple languages on behalf of banks, resulting in cost savings and enhanced overall satisfaction (Khan & Rabbani, 2020). AI can replace human interference and bring automation with more efficiency and transparency. Since Islamic finance has to go under strict supervision, it has even more applications in regulatory technology (Reg-tech) for Shariah compliance (M. Ali et al., 2020). According to Hasan et al. (2020), incorporating AI in Islamic mobile banking may increase Sharīʿah compliance and cost-effectiveness.

Sarea et al. (2021) examined the current and prospective use of artificial intelligence (AI) for risk management in Islamic banking. Their findings highlight AI's usefulness in combatting financial crime, such as trader irresponsibility, fraud detection, and money laundering. Machine learning (ML) can process massive volumes of data, enabling a more excellent in-depth examination of Islamic financial products and services. However, the author argued that AI has practical limits in data management rules, transparency, and a lack of crucial skills inside financial companies. Aysan et al. (2022) examined Islamic banks' situation with AI technology and whether they are taking sufficient steps to incorporate them into their institutions' infrastructure. They concluded that Islamic banks had a low level of AI deployment. Incorporating AI into Islamic finance, a financial system founded on Islamic law (Shariah) and regulated by ethical norms, has received minimal attention in the literature (Narayan & Phan, 2019). As a result, Islamic bank stakeholders need to make significant investments to compete with the traditional banking system. From the perspective of customers, Suhartanto et al. (2021) explored how AI supported mobile banking and increased Islamic banks' customer loyalty. They collected data from Aceh province and discovered that AI-enabled mobile banking allows customers to receive better service and improves their mood. Furthermore, they suggested that the

benefits of AI-enabled mobile banking mean that incorporating AI into Islamic mobile banking can improve the efficiency of Islamic banks' operations while also assisting in providing superior customer care to their clients.

2.4. Theoretical framework

2.4.1. SWOT analysis

SWOT Analysis is an organizational strategic planning method that aids in the creation of competitive strategies. It assists organizations in comprehending their interactions with their environments, identifying internal and external features, and analyzing these settings for better strategic management (Gürel & Tat, 2017). Most SWOT studies are case studies employed in different industries, while few papers are allocated to the methodological category and applied-methodological. SWOT studies also widely use survey questionnaires (Karbhari et al., 2020).

Wonglimpiyarat (2014) used a SWOT analysis to assess the competitiveness and challenges of mobile banking adoption in Thailand. This analysis was used to understand the factors that influence competition level and analyze the challenges of mobile banking systems. Therefore, their findings provide insightful implications for challenges and competition under 3G and 4G mobile phone networks. They recently applied a SWOT analysis to understand manufacturing managers' opinions about industry 4.0 adoption. Therefore, their study identified internal and external factors that can help organizations evaluate their strengths, ameliorate weaknesses, exploit opportunities, and protect against external challenges and threats beforehand while implementing industry 4.0 technologies. This study will use a SWOT analysis to examine the strengths and limitations of AI integration within a bank and identify external opportunities and threats.

2.4.2. Institutional theory

The environment of an institution's perspective structure and layout is specified by Institutional Theory (IT). It relates to how an organization maintains its status and legitimacy by adhering to legal and regulatory frameworks, laws, court decisions, and other social and cultural norms that impose conformity demands and standards in the organizational context (Talib et al., 2020). The institutional theory approach highlights the role of the external environment of organizations. Institutional studies focus on the boundary between organizational authority and legitimacy bestowed by the institutional environment (Lammers & Garcia, 2017). The insight of institutionalism is that organizations and organizations are transcended by institutionalized ideas, beliefs, rules, and messages (Lammers, 2011). Many studies have used institutional theory to assess the influence of external factors such as regulatory framework, competition, and cultural aspects. Shi et al. (2008) applied institutional theory (INT) to assess environmental factors that affect the adoption of Internet banking. Another study by Karbhari et al. (2020) revealed that social factors and the legal environment of Islamic banks are related to the proposition of Institutional theory. This research used institutional theory to investigate how external factors like regulatory frameworks, industry standards, and societal expectations generate barriers and opportunities for AI integration in the banking sector. Therefore, this theory can provide valuable insights into AI integration and adoption in Islamic banks.

2.5. Overview of Bank Syariah Indonesia (BSI)

The Indonesian banking industry has created new history with the existence of PT Bank Syariah Indonesia Tbk (BSI), which was officially established on February 1, 2021, or 19 Jumadil Akhir 1442 H. President Joko Widodo opened Indonesia`s largest Shariah bank in the state palace. BSI is a bank established through the merger of PT Bank BRI Syariah Tbk, PT Bank Shariah Mandiri, and PT Bank BNI Shariah. The Financial Services Authority (OJK) formally approved the merger of three Shariah banking businesses on January 27, 2021. BSI also reflects the aspects of Indonesian Shariah banking, which is

modern, universal, and suitable for all natures (Rahmatan Lil 'Aalamiin). Apart from positive performance growth, climate support, and the fact that the Indonesian government is tasked with building a halal industrial ecosystem and having a large and robust state-owned Shariah bank, Indonesia is the world's largest Muslim-majority bank. It can be an essential intermediary for all economic activities in the halal industry ecosystem and an attempt to realize the country's aspirations (Annual Report BSI, 2022).

Currently, BSI has 1,112 Branch Offices and Sub-Branch Offices across Indonesia. It has over 17,797,506 customers. One of the strategies BSI uses to increase its customers is information technology to optimize marketing personnel, such as simplifying business processes and digitizing financing. Therefore, they use digital technology to generate a simple (lean), efficient, and data-driven way of work. With this strategy, BSI has improved its vital performance. Financing in the micro segment in 2022 increased by 15.15% from 2021, amounted to Rp16.28 trillion and Rp18.74 trillion. The net profit obtained by the micro-segment in 2022 amounted to Rp112.06 billion (Annual Report BSI, 2022). In 2022, BSI made investments with a total budget allocation of Rp266 billion to support the capability fulfillment of Digital Banking, Enterprise, and surrounding Applications, Digitalization and Office Automation, Enhancement of features on the existing application as well as IT infrastructure and security devices in order to increase IT capacity and capability. One interesting point is that BSI employees have recently received training about Robot Automation and Machine Learning models (Annual Report BSI, 2022).

3. Methods

3.1. Data collection process

This study used qualitative methods with an interview approach. It is an exploratory study in nature. This method is chosen because it allows researchers to collect and interpret experts' sentiments about AI integration in Islamic banks to generate helpful information for this emerging technology (Eriksson et al., 2020). The selected participants are stakeholders of Islamic banks currently working with AI tools in Bank Syariah Indonesia (BSI). Because of the exploratory method chosen in this study, the collected data will be analyzed manually instead of using the software. This can allow the researcher to add important information (Salda~na, 2015). This study used purposive sampling to select the participants. According to Campbell et al. (2020), purposive sampling is selected based on the study's objective with the expectation that each respondent will provide a rich and unique answer. Therefore, this study used purposive sampling because AI is a new concept, and it is crucial to get insight into AI applications from experts currently working with AI tools.

3.2. Description of the data

Four BSI employees were interviewed. Three of them work in the IT division and have been involved in AI projects. The interview was conducted using guided questions. Therefore, the collected data will be analyzed using an appropriate approach. The respondents' profiles are summarized in Table 1.

Table 1. Interview respondents' profiles

Code	Education level	Position	Institution
R1	High School Degree	Teller	Bank Syariah Indonesia
R2	Bachelor Degree	Digital Technology Analyst	Bank Syariah Indonesia
R3	Bachelor of Telecommunication Engineering	IT Project Manager	Bank Syariah Indonesia
R4	Bachelor Degree	IT Team	Bank Syariah Indonesia

Source: Authors' conception from the interview results.

4. Discussion

This section discusses the interview results. The selected themes are derived from them based on the research objectives and theoretical framework.

4.1. Feasibility of Integrating AI tools in Islamic banks

It is determining whether AI integration requires understanding the compatibility of Shariah principles with AI usage cases. The interview results show that AI can be integrated into BSI if it does not violate Islamic values and laws. Two respondents cited, *"There is no problem as long as it does not violate Islamic rules/Shariah. AI is nothing more than a machine that has no inanimate taste. As long as the AI does not become a trust or turn away from belief, it seems legitimate". R4 "Integrating AI in Islamic banks is feasible and can enhance efficiency in various operations, such as customer service, risk management, and fraud detection"* R3. The studies of Aysan et al. (2022) and Suhartanto et al. (2021) showed that AI integration in Islamic banks is feasible and offers various opportunities. Furthermore, AI could be implemented to replace human intervention and deliver automation more efficiently and transparently. Because Islamic finance is subject to severe Shariah supervision, it has a greater use in regulatory technology (Regtech) for Shariah compliance (Syed et al., 2020).

4.2. Implemented AI tools

Implementing AI tools in a company has to be in line with the company's objectives. This research identified two AI tools already implemented in BSI from the interview results of IT experts working with AI tools. The two tools are AI-chat bot and AI-enabled mobile banking.

4.2.1. AI-Chatbot

Several banks worldwide have recently started using chatbots to engage with their clients (Hmoud et al., 2023). The AI chatbot is a unique and exciting tool that interacts with clients and answers their queries (Mogaji et al., 2021). This AI technology solves customers' queries and collects data on customers' behavior to solve complex problems in the future (Huang & Lee, 2022). One of the AIs used in Bank Shariah Indonesia is an AI chatbot. It is used to enhance customer interaction and support services 24/7 without stopping. One of the respondents cited that: *"As an employee at Bank BSI, in our company, we utilize an AI chatbot to enhance customer interactions, provide more efficient customer service, and support day-to-day operations."* R3 Similarly, the study of Khan and Rabbani (2020) showed that one of the AI tools used in Islamic banks is an AI chatbot implemented by Dubai Islamic Bank (DIB), Abu Dhabi Islamic Banks (ADIB), and Kuwait Finance House. These chatbots function with the data trained by machine learning models to address consumer inquiries.

4.2.2. AI-enabled mobile banking

AI-Mobile banking is a type of mobile banking app in which AI functions have been included. AI mobile banking helps customers perform financial transactions using a single device, such as a mobile phone (Zhou et al., 2021). AI mobile banking is used in BSI to support customer services and helps customers perform financial transactions online. AI mobile banking in BSI is unique and very helpful for Muslim customers. It has numerous functions related to religious practices, such as calculating zakat, making Azan every daily prayer, and recognizing qiblah and alms reminders. One of the employees mentioned: *"Our mobile banking is beneficial, especially for Muslims, because it has not only transactional functions but also many religious functions, including reminders for the call to prayer, qurban calculator, juz ama, alms reminders, even determining the Qibla tool"* R1. This is supported by Suhartanto et al. (2021) in their research on customer loyalty while using AI-enabled mobile banking. They mentioned that Islamic banks in Aceh province are using AI-

powered mobile banking. They further argued that AI-powered mobile banking enhances customer loyalty.

4.3. SWOT analysis of AI applications in Bank Syariah Indonesia

Because of the rapid advancement of these technologies during the fourth industrial revolution, the potential consequences of machine learning and the usage of artificial intelligence (AI) in society have attracted a great deal of attention (Khogali & Mekid, 2023). As a result, a detailed identification of the drawbacks and advantages of AI technology in society is necessary. Thus, this section provides a detailed discussion of the challenges and opportunities of AI integration in BSI.

4.3.1. Challenges of AI integration

One of the challenges of AI integration in BSI is implementation cost. AI integration requires massive investment in hardware and software. One respondent argued, *"Implementing AI technology can involve significant upfront infrastructure, software, and training costs. Islamic banks must consider these costs carefully against the expected benefits"* R2. Many studies found that there are several costs associated with technology adoption, and these costs influence the willingness to accept technology. Lin (2014) argued that high costs inhibit technology implementation. The expense of obtaining and using AI technology is referred to as the cost of adoption (Wong et al., 2020). Despite the tremendous benefits of digital technology, its adoption in many businesses is still restricted (Elrefaey et al., 2022). Therefore, Islamic banks must carefully evaluate the associated benefits before deciding.

Another challenge is Cybersecurity. It encompasses technology to defend and secure software and hardware from cyber-attacks (Bhardwaj et al., 2022). Cybersecurity is one of the most challenging issues due to technological advancement. This development significantly increased cyberattacks with dangerous effects (Chithaluru et al., 2023; Kaur et al., 2023). Similarly, Islamic banks that use AI technology face challenges in ensuring cyberattacks because implementing cybersecurity is sometimes costly and requires sufficient investment in hardware and software after implementing the technologies. From the interview results, this research identified cybersecurity as one of the challenges of integrating AI tools in BSI. One respondent said, *"Like every technology, AI systems in banks are vulnerable to cybersecurity threats. Ensuring strong security measures is important to protect sensitive financial and customer data"* R2. This result supports the study of Shah et al. (2023), who stated that using AI comes with cybersecurity concerns and problems. Reducing cybersecurity risk ensures consumer data safety and privacy. As a result, stakeholders in Islamic banks should be aware of it and take appropriate precautions to ensure a successful and secure implementation.

4.3.2. Opportunities for AI tools

AI technology offers various opportunities in the banking industry. It can be used to automate, reduce risk, and improve efficiency. In BSI, AI tools offer potential benefits. One respondent mentioned that: *"Potential opportunities of AI tools in various companies include process automation, improved decision-making through data analysis, enhanced customer experience, and increased operational efficiency"* R3. This argument is supported by the studies of Doumpos et al. (2023) and Goodell et al. (2021). From their analysis, AI tools have potential benefits in banking industries, ranging from automation to risk management and improved efficiency. Once more, according to Patel et al. (2022), AI-powered digital financial services are more efficient and quicker than traditional techniques for executing different financial computing tasks in banking operations.

The AI chatbot presents numerous opportunities in BSI, such as customer support and product recommendation. One of the respondents argued that: *"One of the benefits of AI in our company is Service and Interaction with Customers: Chatbots for Customer Support, AI-based chatbots can provide 24/7 customer support, answer questions, and assist in basic*

transactions by Shariah banking principles. Again, AI can analyze customer behavior and preferences to offer personalized financial products and services to Shariah principles. Therefore, AI can help develop innovative Islamic financial products by analyzing market trends and customer needs" R2. This result aligns with the study of Khan and Rabbani (2020) and Hariguna and Ruangkanjanases (2024). They argued that Chatbots may handle bright and appealing communication with several consumers in multiple languages on behalf of banks, resulting in cost savings and enhanced overall satisfaction. Karthik and Ganapathy (2021) argued that AI tools such as deep learning and machine learning could be used to analyze large amounts of customer behavior data and recommend specific products to customers. For Fuzzy logic, one of the methods used in machine learning models helps to improve the prediction accuracy of the recommendation list and gives highly personalized and exciting products to the customer.

Table 2 below summarizes the SWOT analysis of AI integration in BSI. It shows the strengths (automation, improved decision-making, and efficiency) and weaknesses (implementation costs, Cybersecurity) of AI integration within a BSI, as well as external opportunities (improved customer experience and customer recommendation) and threats (Shariah compliance and legal issues).

Table 2. SWOT analysis of AI integration in BSI

Strengths	**Opportunities:**
• Process Automation	• Enhanced Customer Experience
• Improved Decision making	• Customized Financial Products
• Increased Efficiency	
Weaknesses	**Threats:**
• Implementation Costs	• Shariah Compliance
• Cyber Security	• Legal Issues

Source: Authors' conception based on the interview results.

4.4. Institutional factors

From the interview results, this research highlights, according to Institutional Theory, the internal and external factors that can be the challenges of AI integration in Bank Shariah Indonesia (BSI). Internal Factors are Shariah compliance and Ethical Issues. It is sometimes used to ensure Shariah compliance with specific AI tools that align with Islamic principles. Some AI tools, such as Robots and Virtual chatbots with human designs, mimic human behavior and raise unethical principles of Shariah banking. Again, AI raises ethical concerns. The behavior of AI models is observed as unethical because these models, created and executed by humans, try to behave like humans and claim to be more intelligent than humans. One of the respondents argued that: *"Challenges of AI integration in Islamic banks may include ensuring compliance with Shariah principles, addressing ethical concerns, and adapting AI models to the specific financial products and services offered by Islamic banks"* R3. Other respondents argued, *"One of the challenges is Islamic Compliance: Ensuring that AI systems comply with Islamic financial principles (Shariah Compliance) is crucial. Technology must align with ethical and legal considerations in Islamic banking"* R2. This finding can be justified from the research of Zainordin et al. (2021). He posited that the application of AI in Islamic finance also raises ethical and legal issues, as it must be aligned with the principles and values of Islamic finance.

Among the external factors, we have customers' demography and knowledge, such as the Age of the customers and their level of knowledge about digital technology usage, mainly how to use mobile banking applications. This can be found from the following respondents: *"The difficulty is educating customers about the importance of digitalization,*

especially since people's interest in Shariah banking is not yet high, and to be honest, the customers I meet in the office are mostly older ladies and gentlemen who still think old-fashioned and do not understand how to use gadgets. Apart from that, another challenge is the system security. However, our IT team has recently improved the system so that our banking car remains optimal and performs best". R1 This result is supported by the study of Rabbani et al. (2021). They argued that the young generation can mainly adopt technology. Therefore, it is tough to deal with the old generation. There will be a small number of complications when using mobile banking applications. Once more, Noreen et al. (2023) argued that although there is an attraction to AI implications in the banking industries, there are some challenges in terms of its adoption. One of these challenges is a lack of knowledge about AI technology among customers. **Table 3** below summarizes the external and internal factors based on institutional theory.

Table 3. Institutional theory factors

External Factors	Internal Factors
• Customer demographics	• Shariah compliance
• Customer knowledge	• Ethical issues

Source: Authors' conception,

5. Conclusion and practical implications

This research aimed to examine the feasibility of implementing AI tools in Islamic banks and the implemented AI tools and explore the challenges and opportunities of these tools based on SWOT analysis and Institutional Theory. A BSI case study was conducted by interviewing three IT department experts and one staff in a customer relationship. The findings suggested that AI integration in Islamic banks is feasible as long as it does not violate the principles of Shariah law. Once more, chatbots and AI-enabled mobile banking are the leading AI tools used in BSI. The SWOT analysis identified the following opportunities: AI tools can help in Process Automation, Improved Decision-making, Increased Efficiency, Enhanced Customer Experience, and Customized Financial Products. Nevertheless, these opportunities cannot be present without challenges. It has been identified that implementation costs, cybersecurity, Shariah compliance, and ethical issues are among the challenges of AI tools. Furthermore, based on institutional theory, two more challenges have been found: customers' knowledge of technology and their demography, such as Age. It is shown that most of their customers are not the younger generation; however, the youth mainly adopt the technology. Perhaps the exponential emergence of AI technology can bring positive developments to Islamic banks, such as improved financial inclusion, risk management, and personalized customer services. This research recommends that Islamic banks stakeholders invest more and educate their customers about the importance and usage of AI technology. They must support technological development in order to compete with conventional banks. However, it is crucial to mitigate ethical considerations and religious compliance challenges. To the government, this research recommends the implementation of ethical regulations related to AI technology. This study is limited to single-country evidence. Future research should provide global analysis and use a mixed method to gain in-depth knowledge about the challenges and opportunities of AI integration in Islamic banks.

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Appendix A

Interview Questions:

1. Which Islamic bank are you working with? And what is your position?
2. What is your level of education?
3. What do you know about AI technology?
4. Which AI tools are you using in your company?
5. What do you think about the feasibility of integrating AI technology in Islamic banks?
6. What are the challenges of AI integrating in Islamic Banks?
7. What are the potential opportunities for AI tools in your company?
8. What do you think about the exponential emergence of AI technology and the development of Islamic banks?

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