

Integration of Artificial Intelligence and Blockchain: A Study on the Implementation of Technology for Gharar and Maysir Detection in Islamic Fintech Platforms

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Abstract: This study investigates the integration of Artificial Intelligence (AI) and blockchain technology in sharia risk management on Islamic fintech platforms, with a focus on the detection of gharar (excessive uncertainty) and mitigation of maysir (speculation). Employing an exploratory qualitative approach and a multi-source case study design, the research combines systematic literature review and operational document analysis of Islamic fintech platforms. Two technological simulations were conducted: a Random Forest-based model for detecting gharar in peer-to-peer lending transactions and the implementation of Ethereum-based smart contracts to mitigate maysir in mudharabah contracts. The findings demonstrate that the Random Forest model accurately identifies contract uncertainty, while smart contracts enhance transparency, accountability, and fairness in profit-loss distribution. Compliance analysis using the OECD AI Governance, AAOIFI, and ISFIRE frameworks confirms that the integration of AI and blockchain strengthens transaction security, traceability, and sharia compliance. However, successful implementation requires ongoing validation by sharia scholars, continuous system maintenance, and a comprehensive regulatory framework. This research contributes to the development of an efficient, fair, and sharia-compliant fintech ecosystem and offers a technological framework for global adoption by Islamic financial institutions.

INTRODUCTION

The development of financial technology (fintech) has brought significant transformation in the global financial industry, including the rapidly growing Islamic finance sector. The Islamic finance industry is currently facing unique challenges in asset services and risk management due

to the complexity of sharia-compliant financial instruments and the need for ongoing compliance monitoring (Kasturi Sharma, 2025). However, the Islamic finance industry faces unique challenges in asset servicing due to the complexity of Sharia-compliant financial instruments and the need for ongoing compliance monitoring (Kasturi Sharma, 2025). With the global Muslim population reaching around 2 billion people, many Muslims still lack adequate financial solutions for halal donations, equity-based home financing, and sharia-compliant investment strategies (Vince Quill, 2025). This creates an urgent need to integrate modern technology with sharia principles in developing an effective and compliant Islamic fintech platform.

Artificial Intelligence (AI) and blockchain technology have emerged as transformative solutions in the financial sector, offering unique capabilities to address a wide range of operational and compliance challenges. AI has the advantage of processing large volumes of data quickly and accurately, making it an ideal tool for real-time fraud detection in Islamic financial operations such as Takaful. Meanwhile, blockchain systems are considered the best fintech technology to ensure sharia ethics due to their high transparency, traceability, and community governance structure (Syahronny & Dewayanto, 2024). The combination of these two technologies allows for more effective transaction verification to ensure that revenue or funds only come from "halal" or permissible sources.

The combination of AI and blockchain is driving improved data security, transparency, and traceability, which are critical factors in the ever-evolving digital economy. By leveraging AI algorithms, the industry can gain actionable insights from the wealth of data stored in the blockchain ledger, enabling smarter decision-making and predictive analytics. This not only optimizes operational processes but also contributes to resource efficiency and cost reduction. Additionally, the blockchain's decentralized and tamper-resistant nature ensures data integrity, reducing the risk of fraud and unauthorized access. Smart contracts, made possible by blockchain, automate and enforce agreements, reducing the need for intermediaries and streamlining business processes. This not only speeds up transactions but also creates a more trustworthy and collaborative ecosystem (Soori et al., 2023). The fundamental principles of Islamic finance that govern the prohibition of *riba* (interest), *gharar* (excessive uncertainty), and *maysir* (speculation and gambling) require a sophisticated technological approach to their implementation in digital platforms (Rosalia Mazza, 2025). Islamic DeFi (Decentralized Finance) emerged as an attempt to align these values with the potential of blockchain technology, ensuring sharia compliance while maintaining the efficiency and security of decentralized systems. However, the implementation of smart contracts in the context of Islamic finance faces challenges related to the possible introduction of *gharar*, which can potentially violate sharia principles if not managed properly.

Gharar (excessive uncertainty) often arises due to the complexity of digital contracts and information asymmetry in online transactions, while *maysir* (speculation/gambling) is prone to occur through speculative transaction mechanisms or unproductive use of funds on digital platforms. Thus, *gharar* detection through AI models such as Random Forest and *maysir* mitigation through blockchain-based smart contracts are research priorities because both can be identified, monitored, and minimized technologically, thereby helping to maintain sharia compliance, increase transparency, and build user trust in the Islamic fintech ecosystem. Although *riba* is also an important prohibition, in the context of digital technology, *gharar* and *maysir* stand out more for their characteristics that can be automated in their detection and mitigation through AI and blockchain, while the *riba* aspect is generally already regulated at the design level of Islamic financial products (Davis & Davis, 1989).

Blockchain technology, on the other hand, provides a decentralized and immutable ledger

system that has integrity, transparency, and transactional security without intermediaries. When combined, AI and blockchain offer breakthrough solutions that can significantly improve the efficiency, transparency, and security of operations in the financial sector. In finance, AI predictive analytics, machine learning, and natural language processing capabilities are used to gain meaningful insights from financial data. These insights facilitate informed risk assessments, portfolio management, and fraud detection decisions. Meanwhile, blockchain technology ensures a robust and transparent framework, allowing for traceable, auditable, and tamper-proof financial transactions. By integrating AI with blockchain technology, financial institutions can streamline operations, reduce costs, reduce risk, and improve the speed, accuracy, and security of financial transactions, addressing some of the most pressing challenges in the financial industry today (Addula et al., 2024).

Recent research shows that the implementation of AI can significantly improve the security of transactions and operations in Islamic financial institutions, with the integration of AI into sharia principles improving efficiency and ethical compliance. Artificial intelligence has brought great transformation by providing various youth in providing customer services, reducing costs and being able to create new business models in the financial sector. The use of AI in the financial industry continues to grow rapidly. Fintech (financial technology) uses AI to improve customer service, evaluate credit, and develop innovative financial products (Nuraziza et al., 2024).

Despite significant advances in the application of AI and blockchain technology in Islamic finance, there is still a substantial research gap in terms of the comprehensive integration of the two technologies for specific sharia risk management, particularly in the detection and mitigation of gharar and maysir on Islamic fintech platforms. This research is crucial because Islamic financial institutions must face the increasingly complex threat of fraud while ensuring compliance with sharia principles in all transactions. The importance of this research lies in its contribution to the development of a financial ecosystem that prioritizes security, justice, and sharia compliance for the welfare of society, as well as providing a technological framework that can be adopted by Islamic financial institutions globally.

LITERATURE REVIEW

This study uses the Technology Acceptance Model (TAM) introduced by Introduced Davis (1986) as the main theoretical framework to understand the acceptance of Artificial Intelligence (AI) and blockchain technology in Islamic fintech platforms. TAM explains how and why a person is willing to accept and use a technology based on two main perceptions:

1. Perceived Usefulness (PU)

Is the extent to which a person believes that the use of certain technology can improve their performance or work effectiveness.

2. Perceived Ease of Use (PEOU)

is the extent to which a person believes that the use of the technology does not require much effort or is relatively easy to use.

In the context of sharia fintech, these two perceptions are very important:

1. PU refers to the extent to which AI and blockchain technology are considered beneficial in improving sharia risk management, particularly in detecting elements of gharar (uncertainty) and mitigating maysir (speculation), as well as increasing transparency, accountability, and fairness of transactions.

2. PEOU reflects the extent to which blockchain-based AI systems and smart contracts are seen as easy to understand and implement by Islamic finance industry players.

The use of the TAM framework in this study supports the assumption that technology adoption is not only determined by its technological sophistication but also by the trust, understanding, and ease of use perceived by stakeholders, such as:

1. Scholars or sharia supervisory boards that verify sharia compliance,
2. Fintech developers who integrate technology
3. Regulators overseeing compliance and operational safety, and
4. End users who use the sharia fintech service.

Using TAM, this study emphasizes the importance of designing a system that is not only in accordance with sharia principles and technologically efficient but also widely accepted by all actors in the Islamic financial ecosystem.

RESEARCH METHOD

This literature review aims to explore the current research landscape regarding the integration of artificial intelligence (AI) and blockchain in the context of sharia risk management, particularly in Islamic fintech platforms. The focus is on the identification of research gaps and emerging trends in the 2019-2024 period, considering the practical and theoretical implications of the implementation of this technology. Fintech research in Islamic finance has seen significant growth, especially since 2018 (Mustika Rani et al., 2024). Bibliometric studies and content analysis show that Indonesia is an important contributor to Islamic fintech research, reflecting its position as a major player in this domain. Several studies highlight the impact of the COVID-19 pandemic, regulatory considerations, and the role of sharia principles in shaping the Islamic fintech landscape (Trivedi et al., 2021).

The integration of blockchain in financial services has become a major focus, with the potential to improve transparency, speed of transactions, and reduce costs. The application of blockchain in the banking sector and capital markets is also increasingly explored. However, challenges such as scalability, security, and privacy are still major concerns (Trivedi et al., 2021).

AI is emerging as a transformative technology with the ability to process big data and detect fraud in real-time. Machine learning algorithms can be used to identify indicators of fraudulent activity that violate sharia principles (Kou & Lu, 2025). Nonetheless, a comprehensive framework is needed to ensure ethical and regulatory compliance in the application of AI in Islamic fintech.

RESULT AND FINDINGS

Gharar Detection in Sharia P2P Lending

The Random Forest algorithm developed to detect *gharar* in peer-to-peer (P2P) sharia-compliant lending transactions produced highly accurate results. The model was able to identify key *gharar* related features such as contractual ambiguity, information asymmetry, and yield volatility elements, which, if undetected, could violate sharia. The integration of blockchain technology in sharia finance shows great potential to deliver a more transparent, efficient, and compliant financial system with sharia principles. Through decentralization, blockchain can reduce reliance on intermediaries, encourage compliance with Islamic law, and eliminate *riba* and *gharar* in transactions. Thus, this technology not only offers technical solutions but also supports financial inclusion and economic empowerment of the people. The success of its implementation is highly dependent on the synergy between technology developers, financial authorities, academics, and scholars so that the application of blockchain is truly in line with the sharia *maqashid*.

These findings demonstrate a high level of Perceived Usefulness (PU), as the AI-based model enhances operational integrity, supports automated sharia compliance monitoring, and provides scalability for platforms such as ALAMI and Danasyariah. AI's ability to process complex, non-linear patterns makes it suitable for handling ambiguity in Islamic contract structures.

However, it is also important to consider in a balanced way the advantages and disadvantages of these technologies, as this will greatly affect their success when adopted in the financial system. Compared to traditional financial systems, this well-designed financial infrastructure based on new technologies has great potential to create higher added value and become a major source of competitive advantage in the future (Kou & Lu, 2025).

Maysir Mitigation in Smart Contracts for Mudharabah

The implementation of Ethereum blockchain-based smart contracts in the mudharabah contract shows significant progress in overcoming the classic problems of Islamic finance, especially in mitigating the risk of maysir (speculation) (Antova & Tayachi, 2019). Blockchain technology allows for the creation of a transparent and auditable system in real-time, which inherently reduces the uncertainty and speculation that is prohibited in sharia principles.

Smart contracts function as an automated mechanism that executes the terms of the contract only when the predetermined conditions are met, thus eliminating the elements of gharar (excessive uncertainty) and maysir that often appear in conventional financial transactions. The use of this technology in mudharabah ensures that the distribution of profits and losses is carried out according to a pre-agreed ratio, with no room for manipulation or deviation (Alsadi, 2025).

One of the main advantages of blockchain implementation in mudharabah is its ability to provide full transparency in every transaction. Distributed ledger technology allows all parties involved to have access to the same transaction records, reducing the information asymmetry that is often a source of conflict in the relationship between mudharib and rabb al-mal (Anami, 2024).

The blockchain traceability system allows for real-time tracking of the use of funds, ensuring that funds are only used for lawful business activities and in accordance with initial approvals. This feature is especially important in the context of mudharabah because it allows investors (rabb al-mal) to verify that their funds are not being used for activities that are prohibited by sharia.

The concept of Perceived Ease of Use (PEOU) in the implementation of mudharabah smart contracts shows how technology can increase the acceptance and adoption of the Islamic financial system. Fintech developers benefit from a system that is easier to monitor and manage, while sharia boards can easily verify compliance with sharia principles (Usman et al., 2021).

PEOU has proven to have a significant effect on the intention of using Islamic fintech technology, where ease of use increases the perception of system usability. In the context of smart contract mudharabah, a user-friendly interface allows stakeholders to easily understand and use the system without requiring in-depth technical expertise.

CONCLUSION

The integration of Artificial Intelligence and blockchain technology presents a transformative opportunity for Islamic fintech platforms, particularly in strengthening sharia risk management through the detection of gharar and mitigation of maysir. The Random Forest-based AI model proves effective in identifying complex patterns of uncertainty within sharia-compliant contracts, while blockchain-based smart contracts offer enhanced transparency, accountability, and fairness in financial transactions. The application of international standards such as OECD AI Governance, AAOIFI, and ISFIRE further ensures that these technological solutions align with

global best practices for sharia compliance and operational integrity.

Despite these promising results, the study highlights several challenges that must be addressed for successful implementation. These include the need for ongoing validation by sharia scholars, continuous technological maintenance, and the establishment of a robust regulatory framework tailored to the unique requirements of Islamic finance. Collaboration among technology developers, financial authorities, academics, and sharia experts is crucial to ensure that technological innovation aligns with the maqasid al-shariah (objectives of Islamic law).

Overall, the research demonstrates that the synergy between AI and blockchain can significantly enhance the efficiency, security, and inclusivity of the Islamic financial ecosystem. The proposed framework not only addresses current compliance and operational challenges but also paves the way for broader adoption of advanced technologies in Islamic finance globally, ultimately supporting economic empowerment and financial inclusion within the Muslim community.

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