

## UNDERSTANDING ISLAMIC CONTRACT THEORY IN SMART CONTRACTS: BLOCKCHAIN AND SHARIAH ANALYSIS

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**Abstract:** *This manuscript examines the integration of Islamic contract theory within smart contracts by analyzing the compatibility between blockchain technology and Shariah principles. The purpose of this study is to explore how fundamental Islamic contractual elements—such as consent (ijab and qabul), object of contract (ma'qud 'alaih), contractual capacity, and the prohibition of gharar, riba, and maisir—can be applied and enforced through smart contracts on blockchain platforms. The study adopts a qualitative doctrinal and conceptual research method, combining classical Islamic jurisprudence analysis with contemporary blockchain and smart contract literature. The findings reveal that smart contracts can support Shariah-compliant transactions by enhancing transparency, immutability, and automation, particularly in contracts such as murabaha, ijarah, and wakalah. However, several challenges remain, including legal enforceability, coding rigidity, oracle dependency, and potential Shariah non-compliance arising from ambiguity in contract execution. The study concludes that while smart contracts offer significant opportunities for strengthening Islamic financial contracts, Shariah governance frameworks, standardized contract templates, and collaboration between Shariah scholars and technology developers are essential to ensure compliance. This research contributes to the growing discourse on Islamic fintech by providing a structured Shariah analysis of smart contracts and highlighting pathways for their ethical and lawful implementation in Islamic finance.*

**Keywords:** *Islamic Contract Theory, Smart Contracts, Blockchain, Shariah Compliance, Islamic Fintech*

### Introduction

Advances in blockchain technology, particularly through smart contracts, offer significant opportunities to enhance efficiency, transparency, and accountability in financial transactions. Several studies indicate that smart contracts are capable of automatically executing agreements based on pre-programmed rules, thereby potentially reducing human error and operational costs in Islamic financial transaction (Nisa, Agmar, and Bashori 2025). However, the implementation of this technology within the context of Islamic finance still requires in-depth examination of Shariah principles, such as the prohibition of *riba* (interest) and *gharar* (uncertainty). Consequently, the automated structure of smart contracts must be carefully designed to ensure that it does not incorporate elements that contradict these principles (Lhokseumawe, Hye, and Ph 2025).

Furthermore, smart contracts must be aligned with Islamic contract (*akad*) theory, which emphasizes the free consent of contracting parties and adequate oversight to prevent unintended Shariah risks (Cahyani 2025). Research also highlights that although blockchain technology can strengthen transaction integrity and operational efficiency, issues such as contractual uncertainty, the need for Shariah scholar supervision, and regulatory challenges remain significant barriers to its adoption in the Islamic finance sector. Therefore, collaboration between technology developers and Shariah authorities is essential to achieve Shariah-compliant implementation (Wardani, Luayyi, and Awalina 2025).

This article aims to bridge Islamic jurisprudence and blockchain technology, analyzing smart contracts through a Shariah lens. We explore how smart contracts can embody Islamic contracts like murabaha (cost-plus financing) or ijara (leasing), while addressing potential pitfalls. The analysis is timely, given the rise of Islamic fintech initiatives, such as those by the Islamic Development Bank and platforms like Blossom Finance, which seek to leverage blockchain for halal (permissible) transactions.

This study aims to examine Islamic contract theory and its application within smart contracts by analyzing the compatibility between blockchain technology and Shariah principles. Specifically, it seeks to explore how fundamental Islamic contractual elements such as mutual consent, contractual capacity, and the prohibition of *riba*, *gharar*, and *maysir*, can be implemented through smart contract mechanisms. In addition, this study identifies potential synergies and challenges arising from the interaction between Islamic jurisprudence and automated blockchain-based contracts, as well as proposing conceptual frameworks for developing Shariah-compliant smart contracts.

This research is significant as it contributes to the growing interdisciplinary discourse at the intersection of Islamic law, financial technology, and blockchain innovation. For Islamic scholars, it offers a structured analysis of emerging digital contract mechanisms from a Shariah perspective. For blockchain developers and regulators, this study provides insights into designing and governing ethical fintech systems that align with Islamic principles. Furthermore, this research responds to the increasing global demand for ethical and Shariah-compliant financial solutions in the rapidly expanding Islamic finance industry.

The scope of this study covers theoretical and conceptual analysis supported by selected case examples of smart contract applications in Islamic finance. However, the study is limited by the dynamic nature of both Shariah interpretation and blockchain technology development, which may affect the applicability of certain findings over time. This research primarily reflects Sunni jurisprudential perspectives while acknowledging the diversity of opinions across Islamic schools of thought.

This article is structured as follows. Following the introduction, the second section reviews relevant literature on Islamic contract theory and blockchain technology. The third section outlines the research methodology employed in this study. The fourth section presents an analysis of Shariah principles in relation to smart contracts. The fifth section discusses the implications of the findings for Islamic fintech development, and the final section concludes the study.

## Literature Review

**Islamic Contract Theory: Foundations and Principles** Islamic contract theory is encapsulated in the Shariah's framework of *mu'amalat* (transactions), governed by principles from the Quran and Hadith. The concept of '*aqd*' denotes a binding agreement between parties, requiring offer (*ijab*), acceptance (*qabul*), and mutual consent. Essential pillars include:

Riba: Prohibited as it leads to exploitation. Riba al-nasi'ah (interest on loans) is explicitly condemned in Quran 2:275-279. Islamic alternatives include profit-sharing models like *mudarabah* (partnership).

Gharar :Excessive uncertainty invalidates contracts. Minor gharar is tolerated, but major forms, as in speculative trading, are forbidden.

Maysir :Gambling-like elements are banned, promoting risk-sharing over risk transfer.

Other Principles :Contracts must involve *halal* (permissible) objects, with emphasis on justice (*'adl*) and benevolence (*ihsan*). Scholars like Ibn Taymiyyah and modern jurists such as Yusuf al-Qaradawi have expanded these to contemporary contexts.

Literature highlights Islamic finance's growth, with works like Chapra's "The Future of Economics" critiquing conventional finance and advocating Islamic models. Recent studies (Mulyono 2025) apply these to digital assets, noting cryptocurrencies' potential for *riba*-free transactions if structured as commodities.

### Blockchain and Smart Contracts: Technological Overview

Blockchain, introduced by Satoshi Nakamoto in 2008, is a distributed ledger ensuring transparency and immutability through consensus mechanisms like Proof-of-Work. Smart contracts, as defined by Nick Szabo in 1994, are programmable agreements executed via code on platforms like Ethereum. Key features include:

Automation : Eliminates intermediaries, reducing costs.

Immutability : Prevents tampering, enhancing trust.

Decentralization : Aligns with Islamic ideals of community oversight. However, challenges include scalability issues (e.g., Ethereum's gas fees) and vulnerabilities like the DAO hack (2016), exposing smart contracts to exploits.

Literature on blockchain in finance includes Tapscott's (2016) "Blockchain Revolution," which envisions transformative applications. In Islamic contexts, studies like those by (Budiyanto, Madura, and Bangkalan 2023) explore blockchain for *zakat* (almsgiving) distribution, emphasizing transparency.

### Intersection of Islamic Finance and Blockchain

Emerging research bridges the two fields. Khan (2018) argues blockchain can facilitate Islamic banking by enabling transparent profit-sharing. However, concerns arise: smart contracts' code-based execution might lack the human element required for Shariah validation. For instance, automated interest calculations could mimic *riba*. Case studies include:

Etherium-based Islamic Tokens :Projects like OneGram aim for gold-backed, *riba*-free cryptocurrencies.

Shariah-Compliant DeFi :Platforms like Aave have faced scrutiny for interest-bearing features, prompting Islamic adaptations.

Gaps in literature include empirical studies on user adoption and regulatory frameworks. This article addresses these by providing a comprehensive Shariah analysis.

## Method

This study employs a qualitative, interpretive approach, integrating Islamic jurisprudence with technological analysis. Data sources include primary Shariah texts (Quran, Hadith), secondary sources (fiqh literature), and blockchain documentation.

## Research Design

**Theoretical Framework:** Grounded in maqasid al-Shariah (objectives of Shariah), focusing on protection of wealth, religion, intellect, lineage, and life. **Comparative Analysis:** Contrasts Islamic contracts with smart contract mechanics. **Case Study Method:** Examines real-world examples, such as Ethereum's smart contracts and Islamic fintech platforms.

## Data Collection and Analysis

**Literature Synthesis:** Reviewed peer-reviewed articles from databases like JSTOR, Scopus, and Islamic finance journals. **Expert Consultations:** Hypothetical insights from Shariah scholars (e.g., AAOIFI standards). **Ethical Considerations:** Ensures neutrality, avoiding bias toward either paradigm. **Reliability** is enhanced through triangulation of sources. **Limitations** include subjective interpretations of Shariah. **VVAnalysis:** Shariah Compliance in Smart Contracts. **Core Shariah Principles and Smart Contract Alignment**  
**Mutual Consent and Offer-Acceptance**

In Islamic contracts, consent must be explicit and voluntary. Smart contracts encode terms in code, executed upon predefined conditions. This aligns with automation but raises issues: parties must understand code, akin to informed consent. Shariah requires verbal or written ijab; digital signatures could suffice if verifiable.

**Example:** A murabaha smart contract on blockchain could automate payment schedules, ensuring transparency. However, if code lacks flexibility for amendments, it might violate Shariah's emphasis on renegotiability.

## Results and Discussion Shariah Compliance in Smart Contracts

Based on the doctrinal and conceptual analysis of Islamic contract theory and blockchain-based smart contracts, this study finds several key results. First, smart contracts are potentially compatible with Islamic contract principles when they are designed to fulfill essential elements of 'aqd, including mutual consent (ijab and qabul), lawful contract objects, and contractual capacity. The use of blockchain technology enhances transparency and traceability, which supports Shariah requirements for clarity and fairness in transactions.

Second, the findings indicate that smart contracts can effectively mitigate prohibited elements such as riba, gharar, and maysir when structured appropriately. Profit-sharing mechanisms embedded in smart contracts, such as those used in mudarabah and murabaha, demonstrate the possibility of avoiding interest-based returns. Deterministic code execution reduces excessive uncertainty, thereby minimizing gharar.

Third, the study finds that despite these advantages, significant Shariah-related challenges remain. These include the rigidity of smart contract code, which limits renegotiation, dependence on external oracles that may introduce uncertainty, and difficulties in ensuring accountability due to blockchain's pseudonymous nature.

These results suggest that blockchain technology offers meaningful opportunities to strengthen Shariah-compliant financial transactions, particularly by enhancing transparency and automation. The alignment between blockchain characteristics and Islamic ethical values supports earlier studies that emphasize blockchain's role in promoting trust and reducing information asymmetry in Islamic finance.

However, the rigidity of smart contracts raises important concerns when viewed through the lens of Islamic jurisprudence, which allows contractual flexibility and renegotiation under certain conditions. This finding reinforces scholarly arguments that smart contracts cannot fully replace human oversight in Shariah-based transactions. Instead, hybrid models that combine automated execution with off-chain Shariah supervision appear more appropriate.

Furthermore, reliance on external data sources (oracles) introduces potential gharar if the data is speculative or unverifiable. This underscores the need for Shariah-compliant oracle systems and governance frameworks involving Islamic scholars, regulators, and technology developers. Overall, the discussion highlights that while smart contracts can operationalize Islamic contract theory, Shariah governance remains indispensable to ensure ethical and lawful implementation.

### **Prohibition of Riba**

Riba is forbidden in all forms. Conventional smart contracts often include interest (e.g., lending protocols). Islamic adaptations involve profit-sharing: a smart contract for *mudarabah* could distribute profits based on performance metrics, avoiding fixed interest. Analysis: Blockchain's immutability prevents *riba* by enforcing profit-only returns. Yet, oracles (external data feeds) must be Shariah-compliant to avoid speculative inputs.

#### Avoidance of Gharar

Gharar invalidates contracts with excessive uncertainty. Smart contracts reduce gharar through deterministic code, but external dependencies (e.g., price feeds) introduce risks. Shariah allows minor gharar in necessities; thus, smart contracts for essential services like insurance could be permissible if structured as *takaful* (mutual insurance).

Case: Crop insurance smart contracts using IoT data minimize gharar by basing payouts on verifiable events, aligning with Islamic risk-sharing.

#### Elimination of Maysir

Speculative elements are banned. Decentralized exchanges (DEXs) with automated trading might resemble gambling if leveraged. Shariah-compliant DEXs could enforce spot trading only, prohibiting derivatives.

#### Halal Objects and Ethical Considerations

Contracts must involve permissible assets. Smart contracts on blockchain can tokenize halal commodities (e.g., Islamic bonds or *sukuk*), ensuring traceability via blockchain.

#### Blockchain-Specific Challenges

Immutability vs. Shariah Flexibility: Shariah allows contract amendments; blockchain's immutability conflicts, potentially requiring off-chain governance.

Anonymity and Accountability: Blockchain's pseudo-anonymity aids privacy but complicates Shariah's requirement for known parties. Energy Consumption: Proof-of-Work mining raises environmental concerns, conflicting with Shariah's *maqasid* for environmental protection.

### **Proposed Shariah-Compliant Models**

Hybrid Smart Contracts: Combine on-chain automation with off-chain Shariah audits. Islamic DeFi Protocols: Platforms like Islamic Coin Finance use smart contracts for halal lending via *qard hasan* (interest-free loans). Tokenization of Islamic Instruments: *Sukuk* smart contracts automate profit distributions transparently. Empirical evidence from pilot projects (e.g., Dubai's blockchain initiatives) shows feasibility, with 70% Shariah compliance in tested models (Al-Jundi, 2021). (Kornelius and Jakarta 2025)

### Implications for Islamic Fintech

The findings of this study indicate that blockchain technology has considerable potential to broaden access to Islamic finance, particularly by enabling halal transactions to be conducted globally without geographical limitations. Nevertheless, its implementation is accompanied by several challenges that require institutional and technical innovation. One important development is the introduction of Shariah oracles, namely trusted entities responsible for verifying the compliance of blockchain-based transactions with Shariah principles.

For technology developers, this implies that fatwas and Shariah guidelines should be embedded into the design of smart contracts, not merely as supporting features but as integral components of the system. At the same time, regulators play a crucial role in establishing clear and consistent standards, similar to the frameworks developed by institutions such as AAOIFI, to ensure accountability and uniformity in the application of Islamic fintech.

Other challenges include limited adoption in relatively conservative markets and gaps in technological literacy among users. In this regard, future research may focus on the development of more adaptive smart contracts, for instance through the use of artificial intelligence, to support dynamic and context-sensitive Shariah compliance.

### Conclusion

Smart contracts offer operational efficiencies that can be aligned with Islamic contract theory, provided that prohibited elements such as *riba*, *gharar*, and *maysir* are effectively mitigated. The transparency inherent in blockchain technology reinforces core Shariah principles, particularly those related to fairness and clarity in transactions. However, the immutability of blockchain systems requires careful design to ensure that a degree of contractual flexibility, as recognized in Islamic jurisprudence, can still be accommodated.

This study therefore emphasizes the importance of collaborative frameworks between technology developers and Shariah scholars in building an ethical and sustainable Islamic fintech ecosystem. Future research should place greater emphasis on empirical validation and the development of internationally recognized standards to support the broader adoption of blockchain-based solutions in Islamic finance.

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