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# Auditability of Smart Contracts in Islamic Finance: Bridging IT Controls and Shariah Governance

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**Abstract**

The application of blockchain-based smart contracts within Islamic finance presents both opportunities and significant governance challenges. While these technologies promise enhanced efficiency, automation, and immutability, their integration into Shariah-compliant financial instruments, such as Murabaha, Ijarah, and Sukuk, raises critical concerns regarding auditability, interpretive flexibility, and adherence to foundational Islamic legal and ethical principles. This study examines the tensions between automation and religious oversight by investigating how smart contracts intersect with Shariah governance and IT audit frameworks in Islamic financial institutions.

Utilizing a qualitative multiple-case study approach, the research draws on semi-structured interviews with Shariah scholars, auditors, compliance officers, and blockchain developers across Islamic fintech ecosystems in Malaysia, Bahrain, Kingdom of Saudi Arabia and the United Arab Emirates. Thematic analysis, supported by document review, reveals systemic challenges in embedding ethical discretion and human oversight into immutable contractual code. Analytical framing is guided by established IT assurance frameworks (e.g., COBIT, ISO 27001) and Shariah governance standards issued by AAOIFI and IFSB.

Findings highlight the emergence of "risk zones" where algorithmic rigidity, audit traceability limitations, and ethical ambiguity converge, potentially undermining religious compliance. In response, the study proposes a conceptual governance model that integrates technological assurance mechanisms with structured Shariah supervisory engagement. The findings contribute to the discourse on responsible FinTech governance in Islamic finance and offer practical implications for policymakers, auditors, and technology developers navigating the intersection of blockchain innovation and faith-based financial regulation.

**Keywords:** Islamic finance, Smart contracts, Blockchain auditability, Shariah governance, IT audit frameworks, Assurance and control, Murabaha, Sukuk, Islamic financial institutions, Financial technology (FinTech).

## 1. Introduction

The digitization of financial systems continues to redefine the architecture of global finance, with blockchain technologies and smart contracts increasingly positioned as catalysts for institutional transformation (Narayanan et al., 2016; Swan, 2015). Smart contracts; self-executing code deployed on distributed ledgers, enable the automatic execution of predefined conditions without the need for centralized intermediaries (Szabo, 1997). Their appeal lies in the potential to reduce transactional costs, enhance transparency, and streamline operational efficiency (Alles, 2019). As such, both conventional and Islamic financial institutions have shown growing interest in their application, particularly in contexts requiring contractual reliability and regulatory efficiency (Bakar, Rosly, & Asutay, 2020).

In the Islamic finance sector, however, the adoption of smart contracts is not merely a technological innovation but a profound governance challenge (Dusuki, 2008; Ariffin & Kasri, 2022). Islamic financial instruments are governed by Shariah principles, which prohibit Riba (interest), Gharar (excessive uncertainty), and unethical enrichment, while emphasizing fairness, social justice, and ethical intent (Chapra, 2008; Iqbal & Mirakhor, 2017). Compliance with these principles is not solely a matter of legal form but often demands interpretive human judgment, typically exercised through Shariah supervisory boards (AAOIFI, 2017; Usmani, 2019). Financial arrangements such as Murabaha (cost-plus sale), Ijarah (leasing), and Sukuk (asset-backed securities) involve ethical considerations that extend beyond transactional logic and frequently require case-specific discretion (Hassan & Mollah, 2017).

These requirements sit uneasily alongside the deterministic and immutable nature of smart contracts. Once deployed, smart contracts execute autonomously and cannot be easily modified or overridden, thereby limiting opportunities for ethical oversight or discretionary intervention (Cao, Luo, & Chen, 2020; Atzei, Bartoletti, & Cimoli, 2017). This rigidity raises critical questions about the auditability and Shariah compliance of such contracts, particularly when contractual ambiguity or unforeseen outcomes emerge (Alles, 2019; Ariffin & Kasri, 2022). Moreover, the technical opacity of smart contract code poses challenges for auditors and regulators in verifying compliance with Shariah governance requirements (Janssen, Weerakkody, & Bolivar, 2020).

Despite ongoing experimentation by Islamic financial institutions with blockchain-based solutions; such as asset tokenization and decentralized product offerings (Bakar, Rosly, & Asutay, 2020), the literature has yet to provide a comprehensive examination of how smart contracts can be governed in accordance with Islamic legal and ethical standards. Specifically, the audit and assurance dimensions of Shariah-compliant smart contracts remain underexplored, with limited guidance available for practitioners tasked with monitoring, certifying, or governing these automated systems (IFSB, 2021; Hassan & Lewis, 2007).

This study addresses this gap by exploring how auditability and Shariah compliance are negotiated in the design and deployment of smart contracts within Islamic financial institutions. Adopting a qualitative multiple-case study methodology (Yin, 2018), the research draws on insights from Islamic finance hubs including Malaysia, Bahrain, Saudi Arabia and the United Arab Emirates; jurisdictions recognized for regulatory innovation and active Shariah governance frameworks (IFSB, 2021). Interviews with Shariah board members, blockchain developers, auditors, and compliance officers are triangulated with internal documentation, whitepapers, and regulatory texts.

The analysis is guided by two intersecting frameworks: (1) IT audit and assurance models such as COBIT and ISO 27001, which provide the technical basis for control, transparency, and traceability (ISACA, 2012; ISO, 2013); and (2) Shariah governance standards established by AAOIFI and IFSB, which foreground ethical integrity, human judgment, and risk mitigation in financial practice (AAOIFI, 2017; IFSB, 2021).

By identifying governance gaps and emerging risk zones; where automation may compromise religious and ethical oversight, the study contributes to the development of a conceptual governance framework for Shariah-compliant smart contracts. This framework seeks to balance the technological affordances of blockchain with the ethical imperatives of Islamic finance. The findings offer conceptual and practical insights for regulators, auditors, financial institutions, and technology developers navigating the emerging terrain of Islamic financial technology (Islamic FinTech).

## 2. Literature Review

The expanding field of Islamic finance has increasingly captured scholarly interest due to its distinct legal and ethical foundations, which differentiate it from conventional financial systems. Grounded in Shariah principles, Islamic finance prohibits *Riba* (interest), *Gharar* (excessive uncertainty), and transactions involving unjust enrichment. It instead prioritizes fairness, transparency, and ethical intent in contractual relations (Chapra, 2008; Obaidullah, 2005). These core tenets are enforced through institutionalized Shariah governance mechanisms; particularly Shariah supervisory boards, which oversee product development, contract structure, and ongoing compliance with Islamic jurisprudence (Dusuki, 2008; Rahman, 2010).

As Islamic financial instruments such as *Murabaha*, *Ijarah*, and *Sukuk* become increasingly sophisticated and globally deployed, the demands on governance structures have intensified. Recent studies underscore the need for comprehensive compliance and oversight systems that can adapt to financial innovation while maintaining alignment with Shariah (Hassan & Mollah, 2017; AAOIFI, 2017). Simultaneously, broader Environmental, Social, and Governance (ESG) discourses have converged with Islamic finance, highlighting synergies between Islamic social justice objectives such as wealth redistribution through *Zakat* and global sustainability goals (Khan et al., 2021; Wilson, 2020).

In parallel, the advent of blockchain technology has brought new opportunities and challenges for financial systems. Blockchain enables the deployment of smart

contracts—self-executing code that automates contractual obligations without the need for intermediaries (Narayanan et al., 2016; Swan, 2015). These technologies offer advantages in terms of transparency, immutability, and operational efficiency (Szabo, 1997). However, their deterministic logic, rigidity, and lack of contextual responsiveness present challenges in settings where ethical interpretation and contractual intent are fundamental such as Islamic finance (Atzei et al., 2017).

In the conventional finance literature, the auditability of smart contracts has emerged as a key research focus. Scholars have explored how blockchain systems may alter traditional assurance functions, necessitating new frameworks for evaluating transparency, code correctness, risk management, and governance (Yermack, 2017; Cao et al., 2020). IT audit research has further highlighted concerns over audit trail reliability, transaction traceability, and the evolving role of auditors in overseeing decentralized platforms (Alles, 2019; Janssen et al., 2020).

Despite these advancements, empirical research at the intersection of blockchain and Islamic finance remains limited. Existing contributions have examined topics such as Shariah-compliant cryptocurrencies, tokenized *Sukuk,* and blockchain-based microfinance models (Iqbal & Mirakhor, 2017; Bakar et al., 2020). More recently, scholars have begun to assess how smart contracts might be adapted to conform with Shariah rules, particularly concerning prohibitions on *Riba* and *Gharar* and the emphasis on ethical contractual intent (Ariffin & Kasri, 2022; Usmani, 2019). These studies point to a pressing need for human oversight, interpretive flexibility, and mechanisms that enable ethical arbitration within automated systems.

Institutional frameworks such as those established by the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) and the Islamic Financial Services Board (IFSB) provide extensive guidance on Shariah governance, internal audit, and assurance processes (AAOIFI, 2017; IFSB, 2021). However, the applicability of these frameworks to blockchain-based systems remains underexamined. Specifically, it remains unclear whether current IT audit standards adequately address the ethical, religious, and interpretive dimensions essential to Shariah-compliant finance.

Taken together, the literature reveals a significant gap concerning the auditability and Shariah compliance of smart contracts in Islamic financial institutions. Addressing this gap is essential for developing governance models that preserve the integrity of Islamic ethics while harnessing the potential of digital financial technologies. This study contributes to this emergent discourse by integrating insights from Islamic jurisprudence, IT auditing, and blockchain governance to propose a context-sensitive framework for smart contract assurance in Islamic finance.

## 3. Theoretical Framework

This study employs a multi-layered theoretical framework that integrates Islamic finance jurisprudence, IT audit theory, and governance standards to examine the auditability and Shariah compliance of smart contracts within Islamic financial systems.

### *3.1 Islamic Finance and Shariah Governance Theory*

At its core, Islamic finance is guided by the *Maqasid al-Shariah;* the overarching objectives of Islamic law, which seek to preserve religion, life, intellect, lineage, and wealth (Al-Ghazali, 2006; Chapra, 2008). Financial contracts must adhere to prohibitions against *Riba*, *Gharar*, and unethical speculation, while promoting distributive justice, mutual consent, and public welfare (Obaidullah, 2005; Usmani, 2002). Shariah governance structures, particularly Shariah boards, provide the institutional oversight required to enforce these principles. Their work involves a dynamic interpretative process rather than static rule enforcement, rendering full automation inherently problematic (Dusuki & Abozaid, 2007; AAOIFI, 2017).

### *3.2 IT Audit and Assurance Theory*

From the perspective of IT auditing, blockchain and smart contract systems introduce new control and risk dimensions that challenge conventional assurance practices. Core principles in IT audit theory such as access control, system reliability, and compliance are addressed through frameworks like COBIT and ISO 27001, which are designed to evaluate technological systems for security, traceability, and operational integrity (ISACA, 2012; Bierstaker et al., 2006). In blockchain environments, auditability extends to verifying smart contract logic, execution accuracy, and risk exposure related to immutability and code vulnerability (Cao et al., 2020; Janssen et al., 2020). However, these frameworks are primarily technical and may not adequately capture the ethical or religious dimensions central to Islamic financial transactions.

### *3.3 Governance in Islamic Fintech Ecosystems*

AAOIFI and IFSB standards offer a comprehensive model for Shariah governance, covering areas such as internal control, Shariah review, external audit, and board-level accountability (AAOIFI, 2017; IFSB, 2021). These frameworks are designed to ensure that financial innovation remains within the boundaries of Islamic law. However, the transition from manual or interpretive systems to code-based governance introduces friction, particularly when smart contracts preclude contextual reinterpretation or ethical arbitration (Ariffin & Kasri, 2022). This tension underscores the need for hybrid models of governance that integrate automated execution with layered oversight and human judgment.

### *3.4 Integrative Perspective*

By synthesizing these theoretical traditions, the study positions itself at the intersection of ethics-driven governance and technology-mediated finance. It posits that auditability and Shariah compliance in smart contracts cannot rely solely on code integrity or technical controls. Instead, a hybrid governance architecture; one that blends IT audit protocols with Shariah interpretive oversight, is necessary to preserve both operational efficiency and religious legitimacy. This integrative framework guides the empirical inquiry and supports the development of actionable models for Shariah-compliant blockchain applications in Islamic finance.

## 4. Methodology

This study employs a qualitative multiple-case study design to investigate the auditability and Shariah compliance challenges posed by smart contract implementation in Islamic finance. The case study approach is particularly appropriate for exploring complex, contemporary phenomena within real-world settings, especially when the boundaries between the phenomenon and its context are not clearly delineated (Yin, 2018). Given the emergent nature of blockchain technologies in Islamic financial institutions, and the layered complexities involved in aligning automated processes with Shariah principles, a qualitative exploratory design facilitates nuanced insights into governance dynamics, risk perceptions, and interpretive practices.

### *4.1 Case Selection*

The research focuses on Islamic fintech firms and Islamic banks that are actively developing or piloting blockchain-based smart contract solutions. A purposeful sampling strategy is adopted to select cases from three prominent Islamic finance jurisdictions: the Kingdom of Saudi Arabia (KSA), United Arab Emirates (UAE), Malaysia, and Bahrain. These jurisdictions were chosen due to their globally recognized leadership in Islamic finance regulation, fintech innovation, and structured Shariah governance frameworks (IFSB, 2021). This geographical diversity enables examination across varying legal, technological, and institutional contexts.

### *4.2 Data Collection*

Data collected through three complementary methods: semi-structured interviews, document analysis, and field-based observations where accessible.

- Interviews: Between 20 and 25 in-depth interviews were conducted with stakeholders directly involved in the governance, auditing, and technical development of smart contracts. Participants include Shariah board members, internal and external auditors, blockchain developers, legal advisors, and compliance officers. The interview protocol designed to elicit perspectives on smart contract architecture, perceived risks, compliance mechanisms, and governance processes.
- Document Analysis: Supplementary data drawn from internal policy documents, smart contract whitepapers, Shariah board rulings, regulatory guidance, and pilot project evaluations. These documents provide contextual and technical insights into how institutions approach automation, compliance, and assurance within the framework of Islamic finance.
- Observational Insights: When feasible, observations of Shariah governance meetings, fintech workshops, or regulatory sandbox sessions were included to further contextualize stakeholder perspectives and institutional practices.

### *4.3 Data Analysis*

Data analysis follows a thematic analysis approach (Braun & Clarke, 2006), facilitated by

NVivo qualitative data analysis software to support systematic coding, theme development, and cross-case comparison.

The analytical process is informed by a dual theoretical lens:

1. IT Audit and Governance Frameworks (e.g., COBIT 5, ISO 27001): These are applied to assess the control environment, traceability, risk mitigation, and auditability features embedded (or lacking) in smart contract systems.
2. Shariah Governance Standards (AAOIFI, IFSB): These provide criteria for evaluating ethical compliance, contractual intent, and interpretive flexibility, core elements that are foundational in Islamic jurisprudence and financial ethics.

This integrative lens enables identification of specific "risk zones", where the deterministic and automated nature of smart contracts may conflict with Shariah objectives such as *adl* (justice), *rahmah* (compassion), and *ikhtiyar* (free will). The analysis also explores how Shariah boards and auditors adapt; or struggle to adapt, to these emerging technological contexts.

### *4.4 Validity and Reliability*

To enhance the trustworthiness of the study, multiple strategies are employed:

- Data triangulation across interviews, documents, and observational sources.
- Member checking, wherein selected participants are invited to review and verify key themes or interpretations.
- A comprehensive audit trail, documenting coding decisions, reflexive memos, and theoretical memos throughout the research process.
- Continuous reflexivity, with the researcher maintaining transparency regarding positionality, interpretive biases, and ethical sensitivity, particularly in relation to religious and cultural contexts.

## 5. Analysis

The qualitative thematic analysis of data collected from Islamic fintech firms and Islamic banks across the KSA UAE, Malaysia, and Bahrain reveals critical insights into the auditability and Shariah compliance challenges surrounding smart contracts within Islamic finance. The findings are organized around two primary themes: (1) the intersection of IT audit controls with Shariah governance, and (2) the tensions arising from the deterministic nature of smart contracts vis-à-vis interpretative Shariah oversight.

### *5.1 Integration of IT Audit Controls and Shariah Governance*

Participants emphasized the importance of embedding robust IT audit controls within the lifecycle of smart contract deployment to ensure transparency, traceability, and risk mitigation. One Shariah board member highlighted, *"The challenge lies not only in validating the contract's logic but also in ensuring that the automation does not bypass essential*

*religious scrutiny."* This underscores the dual accountability framework required: technological assurance must operate together with Shariah oversight to uphold compliance.

Auditors echoed concerns about existing IT frameworks, noting limitations when applied to blockchain-based contracts. As one compliance officer observed, *"Traditional IT audit standards, such as COBIT or ISO 27001, provide a useful foundation, but they do not fully capture the ethical dimensions specific to Islamic finance."* This sentiment aligns with extant literature identifying gaps in current audit models when addressing religious and ethical auditability (AAOIFI, 2017; IFSB, 2021).

Moreover, the immutable nature of blockchain records was seen as both an asset and a challenge. A blockchain developer remarked, *"Once deployed, smart contracts cannot be altered, so errors or non-compliance are difficult to rectify post-facto. This necessitates rigorous pre-deployment review and continuous monitoring."* Such insights highlight the need for audit frameworks that emphasize pre-emptive controls and post-execution assurance processes, thereby reinforcing operational integrity without compromising Shariah compliance.

### *5.2 Deterministic Smart Contracts Versus Dynamic Shariah Interpretations*

A prevailing concern among participants was the inherent rigidity of smart contracts, which operate based on deterministic code execution, contrasting with the dynamic, interpretative nature of Shariah governance. As one Shariah scholar explained, *"Islamic jurisprudence requires contextual judgment, especially in ambiguous cases. Smart contracts, by their design, do not allow for such interpretive flexibility."* This viewpoint reflects theoretical perspectives on the necessity for human oversight in automated Islamic finance transactions (Usmani, 2019; Ariffin & Kasri, 2022).

This tension raises practical implications for governance structures. Several participants suggested hybrid oversight models combining automated compliance checks with human adjudication. A senior auditor noted, *"Automated verification can handle routine compliance, but Shariah boards must retain authority for complex rulings, ensuring that ethical and jurisprudential nuances are not lost."* This corroborates the study's theoretical framework advocating for a balanced governance approach incorporating both IT audit and Shariah supervisory principles.

### *5.3 Identified "Risk Zones" and Governance Gaps*

The analysis identified specific "risk zones" where smart contracts may inadvertently conflict with Islamic principles. These include scenarios involving ambiguous contract terms, unforeseen contingencies, and the potential for hidden Riba or Gharar elements embedded in automated code. Participants from the fintech sector expressed concern that existing code audits often focus on technical vulnerabilities but insufficiently address religious compliance. One compliance officer reflected, *"There is a technical audit of the code, but who verifies the Shariah correctness of its logic? This gap can lead to costly reputational risks."*

Additionally, governance gaps were noted in coordination among IT auditors, Shariah boards,

and regulatory bodies. The fragmentation of oversight responsibilities was highlighted as a barrier to comprehensive assurance. An industry expert stated, *"We need integrated frameworks and clear protocols to ensure that technological, religious, and regulatory audits are aligned and mutually reinforcing."* This insight supports calls in the literature for harmonized governance models that bridge conventional IT audits with Shariah compliance mandates (AAOIFI, 2017; IFSB, 2021).

### *5.4 Opportunities for Enhanced Assurance Mechanisms*

Despite these challenges, participants identified promising opportunities to leverage blockchain's inherent features to enhance auditability and compliance. The transparent, immutable ledger was recognized as a potential tool for improving traceability and facilitating Shariah audits. One blockchain developer observed, *"With proper design, smart contracts can generate audit trails that are accessible to Shariah boards and auditors, thus fostering trust and accountability."*

Furthermore, several participants emphasized the importance of ongoing capacity building and collaboration among auditors, Shariah scholars, and technologists to develop tailored standards and best practices. As one Shariah board member stated, *"The evolving nature of Islamic finance demands continuous dialogue and innovation to adapt governance frameworks for the digital era."*

In summary, the analysis highlights the complex interplay between technological audit mechanisms and Shariah governance within Islamic finance's adoption of smart contracts. It reveals persistent tensions between the immutable logic of blockchain automation and the interpretive, ethical oversight central to Shariah compliance. Addressing these challenges requires a hybrid governance approach that integrates rigorous IT audit controls with dynamic Shariah supervisory processes. The findings also point to critical governance gaps and risk zones that must be navigated to ensure that smart contracts deliver on their promise of efficiency without compromising Islamic ethical imperatives. This nuanced understanding contributes to the development of innovative frameworks capable of bridging blockchain technology with Islamic finance's distinct jurisprudential requirements.

## 6. Discussion

This study reveals the complex interplay between blockchain-enabled smart contracts and the nuanced requirements of Shariah compliance and auditability within Islamic finance. While smart contracts promise enhanced operational efficiency and transparency, they simultaneously present significant challenges in preserving the interpretive flexibility and ethical oversight foundational to Islamic financial principles.

### *6.1 Auditability Challenges and IT Governance*

Consistent with prior research on IT audit and blockchain technologies (Alles, 2019; Cao et al., 2020), findings of this study highlight critical audit risks arising from the immutable and decentralized nature of smart contracts. Participants frequently emphasized the tension between blockchain's fixed code execution and the inherently dynamic, context-sensitive

nature of Shariah rulings. As one Shariah scholar noted, "Smart contracts are not designed to accommodate the discretionary judgment required by Shariah boards," underscoring the fundamental conflict between automation and human interpretive oversight. The inability to amend contracts post-execution constrains auditors' real-time compliance verification, creating "risk zones" characterized by limited transparency and control gaps. These challenges underscore the urgent need to adapt conventional IT audit frameworks by incorporating advanced code verification techniques, blockchain forensic tools that analyze transaction histories, and multi-layered audit trails explicitly designed to align with Shariah governance structures.

### *6.2 Shariah Compliance: Balancing Automation and Ethical Oversight*

Echoing concerns raised in the Islamic finance literature about algorithmically codifying human-centric principles such as the prohibitions on Gharar, Riba, and injustice (Dusuki, 2008; Ariffin & Kasri, 2022), participants reaffirmed the tension between the deterministic logic of smart contracts and the flexible interpretative processes traditionally exercised by Shariah supervisory boards. One compliance officer explained, "There is a clear need for smart contracts to function alongside continuous human oversight, particularly where ethical judgment is indispensable." This finding highlights that smart contracts cannot fully replace human Shariah supervision but should be embedded within hybrid governance models that combine automated verification with discretionary human review and ethical adjudication.

### *6.3 Governance Implications*

Building on AAOIFI and IFSB governance standards, findings of this study support the development of a hybrid governance framework that integrates robust technological audit mechanisms with proactive Shariah board engagement. This model, which this study term the *Integrated Shariah-IT Audit Governance Framework*, emphasizes clear assurance protocols, including formal Shariah certification of smart contract code, continuous compliance monitoring systems, and structured escalation procedures such as arbitration panels for contractual disputes. By reinforcing ethical compliance alongside operational risk management, this approach addresses the governance tensions exposed by smart contract adoption within Islamic finance. It aligns with emerging scholarship advocating multidisciplinary governance frameworks in Islamic fintech (IFSB, 2021; Ariffin & Kasri, 2022).

### *6.4 Practical and Regulatory Implications*

From a practical perspective, Islamic financial institutions must build interdisciplinary capacity bridging Shariah expertise and blockchain technology. Participants stressed the importance of fostering collaborative ecosystems, such as joint Shariah-technology working groups and auditor forums, that enable ongoing dialogue and problem-solving around compliance complexities. Regulatory bodies in leading Islamic finance hubs like the KSA, UAE, Malaysia, and Bahrain play a pivotal role in issuing comprehensive, context-sensitive guidelines and standards tailored to smart contract adoption. Such regulations should balance innovation with adherence to religious and ethical mandates, facilitating responsible fintech

growth within Islamic finance.

*6.5 Contributions and Future Research*

This study advances the nascent discourse on Islamic fintech by providing empirical insights into the intertwined challenges of auditability and Shariah compliance associated with smart contracts. It proposes an actionable governance framework that harmonizes operational efficiency with religious ethics, contributing to both academic scholarship and industry practice. Future research should develop quantitative risk assessment models, pilot prototype assurance tools that operationalize hybrid governance principles, and conduct comparative studies evaluating the framework's scalability across diverse Islamic finance jurisdictions and technological contexts.

## 7. Conclusion

This research critically examines the integration of smart contracts within Islamic finance, emphasizing the dual challenges of auditability and Shariah compliance. Despite the significant potential of smart contracts to improve efficiency and transparency in automating Islamic financial transactions, their inherent rigidity and immutability raise substantial concerns regarding ethical oversight, interpretive flexibility, and adherence to foundational Shariah principles such as the avoidance of Gharar, Riba, and injustice.

Through a qualitative, multi-case study approach engaging key stakeholders from leading Islamic fintech hubs, this study identifies critical "risk zones" where automation may conflict with religious and regulatory requirements. It highlights the limitations of existing IT audit frameworks in addressing these challenges and underscores the urgent need for an evolved governance model that seamlessly integrates IT audit standards with dynamic Shariah supervisory processes.

By proposing the *Integrated Shariah-IT Audit Governance Framework*, the study bridges the gap between fintech innovation and Islamic ethical imperatives. This framework offers practical guidance for regulators, financial institutions, and technology developers navigating the complex intersection of blockchain technology and Shariah compliance. Ultimately, this research contributes to the broader discourse on responsible fintech adoption within Islamic finance, emphasizing that technological advancement must be harmonized with human judgment and ethical accountability.

Future investigations should focus on refining and operationalizing these governance frameworks through quantitative risk modeling, prototype development, and broader empirical inquiry across varied markets and technological environments. These efforts will be essential to realizing the full promise of blockchain and smart contracts in a manner consistent with the core values and objectives of Islamic finance.

Despite the contributions of this study, it is not without limitations. The qualitative multi-case design, based on interviews from selected Islamic fintech jurisdictions, provides depth but may limit the broader generalizability of the findings to markets with differing regulatory maturity or technological infrastructures. Additionally, the interpretive nature of thematic

analysis and the reliance on participant perspectives introduce the possibility of subjective bias. Given the rapid evolution of blockchain applications and Shariah governance standards, some of the identified risk zones may also shift over time as new assurance mechanisms and regulatory guidance emerge. These limitations underscore the need for further empirical and technical inquiry to validate and extend the proposed governance framework across diverse operational contexts.

## Author Contributions

The author conducted all the research work for this study.

## Funding

This research received no external funding.

## Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

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## Declarations

### Ethics Approval and Consent to Participate

The present study does not require the approval of the ethical committee at the university as it was waived off by the Scientific Counsil at Princess Nourah bint Abdulrahman University due to nature of the study. Nonetheless, the aims and objectives of this research were conveyed to the respondents during the data gathering process. Informed consent was obtained from all subjects involved in the study.

### Ethical Guidelines

The author confirms that all methods were carried out in accordance with relevant guidelines and regulations.

### Consent for Publication

Not applicable.

### Competing Interests

The author declares no competing interest.

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