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Edge-Enabled Centralized Contract Intelligence for Shariah-Compliant Islamic Banking: Challenges, Frameworks, and Future Directions

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Abstract
This study systematically investigates the emerging field of edge-enabled centralized contract intelligence within *Shariah-compliant Islamic banking*. With the rapid digitalization of financial services and increasing regulatory emphasis on ethical governance, there is a pressing need to understand how advanced technologies such as edge computing, blockchain, and smart contracts can support risk management and compliance in Islamic financial institutions. The primary objective of this research is to review and synthesize empirical and theoretical literature on the technological integration challenges and opportunities associated with intelligent contract systems that align with Islamic jurisprudence. A comprehensive literature search was conducted using Web of Science, Scopus, and ERIC from 2015 to 2026, resulting in 48 relevant studies categorized via PRISMA guidelines. Findings reveal multifaceted barriers, including regulatory uncertainty, technological integration challenges, operational complexity, human resource constraints, and cybersecurity concerns. Notably, the research highlights persistent tension between *immutable smart contract logic* and the flexible contractual requirements endorsed by Shariah principles, such as *iḥsān* and contract restructuring. Edge computing's role in reducing latency and enabling real-time compliance monitoring is also emphasized, offering potential enhancements for risk assessment and decentralized decision-making. Thematically, this review contributes to understanding how intelligent systems can be responsibly implemented in Islamic finance while preserving doctrinal integrity. It underscores the need for integrative frameworks incorporating technological architecture, Shariah governance, and stakeholder engagement. The study aligns with Sustainable Development Goals particularly SDG 8 (Decent Work & Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure) by highlighting how ethical digital financial innovation can bolster inclusive, sustainable economic systems. Future research should prioritize standardized frameworks and cross-disciplinary collaboration to advance scalable, Shariah-compliant contract intelligence systems.
Keywords: Edge Computing; Centralized Contract Intelligence; Shariah-Compliant Islamic Banking; Sustainable Development Goals; Islamic Finance Governance.

1.0 INTRODUCTION

The statement of the problem for research on *edge-enabled centralized contract intelligence for Shariah-compliant Islamic banking* must articulate the core gaps, contradictions, and unmet needs at the intersection of technological innovation and Islamic financial jurisprudence. While scholars and practitioners increasingly recognize the promise of digital technologies such as blockchain, smart contracts, artificial intelligence (AI), and distributed architectures for enhancing financial efficiency and transparency, significant challenges remain that impede their effective integration into Islamic banking systems. These challenges stem from both technological limitations and religio-juridical constraints, necessitating a systematic investigation that goes beyond descriptive studies and moves toward an integrative, evidence-based framework supported by scientometric analysis. A key problem concerns the compatibility of existing smart contract paradigms with Shariah principles. Although smart contracts on blockchain platforms offer automated execution and tamper-proof records that, in theory, reduce operational risk and enforce agreement terms, they also raise doubts about adherence to core Islamic jurisprudential principles such as *gharar* (excessive uncertainty), *riba* (interest), and *maisir* (gambling) (Elsharif, 2025; Desky & Hye, 2025). Traditional smart contracts are inherently deterministic and rigid, yet Islamic contract law sometimes allows for *flexibility* and *restructuring* to accommodate equitable resolution and fairness, which programmable logic may not easily capture without tailored design guidelines. Moreover, some smart contract implementations in financial systems have been criticized for containing elements incompatible with Islamic ethics, such as uncertain payment triggers or embedded interest-bearing mechanisms, which contravene foundational principles (Nurfadilla & Firman, cited in Desky & Hye, 2025). Therefore, the problem of designing smart contracts that are both technologically robust and jurisprudentially sound remains unresolved.

A second problem lies in the inadequacy of governance frameworks and standards for Shariah compliance in digital contract systems. Islamic banks operate under strict Shariah supervision, requiring oversight bodies to review and certify financial products and mechanisms. Yet, as digital contracts and edge computing models proliferate, existing governance structures lack the tools and expertise to scrutinize complex code logic, algorithmic decision-making, and distributed execution environments through a Shariah lens (Smolo et al., 2026). This deficiency produces a gap where highly automated systems could be deployed without sufficient religious validation, exposing institutions and customers to non-compliance risks that undermine trust and legitimacy. The problem intensifies when centralized monitoring authorities are expected to reconcile real-time data processing at the edge with centralized compliance reviews, which traditional regulatory models may not be equipped to handle. A third major problem involves regulatory uncertainty and interoperability issues across jurisdictions. Islamic banking operates globally, from Malaysia to the Middle East and beyond, with varying degrees of regulatory maturity concerning digital finance. Research shows that jurisdictions like Malaysia still grapple with harmonizing Shariah compliance within rapidly evolving Islamic FinTech landscapes, particularly regarding consumer protection, cyber risks, and technological governance (bin Ab Razak & Mohd Dali, 2026). This regulatory ambiguity is compounded by cross-border differences in Shariah interpretation and enforcement, which make it difficult to develop universally accepted standards for edge-enabled contract intelligence. As such, the lack of regulatory clarity hampers innovation adoption and increases compliance costs for institutions seeking to deploy advanced contract systems at scale. A fourth problem concerns technology adoption barriers related to expertise, infrastructure, and risk perception. Islamic financial institutions often lack the technical capacity to implement and manage edge computing architectures or integrate them seamlessly with AI and smart contract mechanisms. Recent literature highlights that although

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AI and blockchain hold promise for automating contract intelligence, institutions face infrastructural, security, data privacy, and personnel skill gaps that constrain implementation (Elsharif, 2025). Without comprehensive strategies to bridge these gaps, the potential advantages of edge-enabled systems such as reduced latency, localized compliance checks, and improved responsiveness will remain under-utilized. Finally, despite growing interest in bibliometric and scientometric analyses of Islamic FinTech (e.g., work on cryptocurrency crowdfunding and Shariah FinTech trends providing frameworks for knowledge evolution), there is a lack of systematic knowledge mapping specifically targeting the intersection of edge computing, centralized contract intelligence, and Shariah-compliant banking (Mohamed et al., 2025). This absence limits scholars' ability to identify research frontiers, discern thematic clusters, and propose evidence-based future directions. Without a clear intellectual landscape, research efforts may remain fragmented and fail to build cumulative insights that advance both theory and practice. In summary, the research problem encompasses technological-jurisprudential mismatches, governance and regulatory gaps, adoption barriers, and the absence of comprehensive knowledge mapping. Addressing these problems requires a multifaceted approach that blends advanced computing architectures with Islamic legal theory and robust scientometric analysis to drive both theoretical clarity and practical solutions for Shariah-compliant Islamic banking in the digital age.

2.0 LITERATURE REVIEW

In recent years, a growing body of literature has examined technological innovations and their transformative potential for financial services, including Islamic banking. One foundational strand of research focuses on the technical and conceptual foundations of smart contracts as mechanisms for automating contractual logic. Smart contracts are self-executing code that enforces terms and conditions when predefined conditions are met, eliminating intermediaries and improving efficiency (Taherdoost, 2023). Reviews of smart contract development trace their evolution from early conceptual work through to their integration into distributed ledger technologies, highlighting both opportunities and ongoing challenges such as security vulnerabilities, scalability, and interoperability (Taherdoost, 2023; Zheng et al., 2019). These analytical reviews provide a necessary technical backdrop for understanding contract intelligence mechanisms in financial applications. Another significant research trajectory interrogates the application of smart contracts within Islamic finance. Desky and Hye (2024) explored how smart contracts embedded in blockchain platforms can automate Islamic financial transactions, arguing that properly designed digital contracts can enhance transparency, reduce operational costs, and mitigate human error while remaining sensitive to Shariah prohibitions such as *riba* (interest) and *gharar* (uncertainty) when constructed with appropriate safeguards. Their qualitative analysis underscores the need for collaboration between technologists and Shariah scholars to ensure digital contract logic does not violate core religious tenets. Complementary studies examine how immutable smart contract structures may conflict with Islamic jurisprudential principles like *iḥsān*, which allows for contractual flexibility and adjustment an issue not easily accommodated by fixed code logic (Zulkepli, Mohamad & Razalli Azzuhri, 2023). These works collectively highlight ongoing tensions between the deterministic nature of smart contract automation and the normative requirements of Islamic contracts.Literature in Islamic financial technology also explores domain-specific innovations such as smart Sukuk and tokenized Islamic securities. Investigation into Smart Sukuk implementations shows how blockchain and smart contract technologies can streamline issuance and trading processes, facilitate fractional ownership, and enhance secondary market liquidity while aligning with Shariah doctrines when compliance features are coded and validated by juristic boards (Mousavi et al., 2025). This focus on practical case studies broadens understanding beyond theoretical comparisons to demonstrate real-world application and jurisprudential evaluation. A parallel research theme relates to FinTech integration with Islamic banking in broader terms. Systematic reviews mapping the convergence of FinTech innovations including blockchain, artificial intelligence (AI), and digital governance frameworks identify research clusters emphasizing operational efficiency, regulatory adaptation, and ethical alignment in Islamic finance (Sheela et al. in *Shariah-Compliant Innovation*, 2025). These knowledge maps indicate that scholars increasingly prioritize how technology can enhance real-time auditing, compliance monitoring, and service delivery in Shariah-compliant contexts, setting a foundation for future work that integrates contract intelligence with regulatory and ethical requirements.Despite progress in smart contract research within Islamic finance, edge computing remains underexplored in the context of contract intelligence and Shariah compliance. Edge computing, a distributed computing paradigm that brings processing closer to data sources to reduce latency and bandwidth overhead, has been widely discussed in general financial services research. Studies show that edge architectures can significantly improve real-time analytics such as fraud detection, risk assessment, and transaction processing by enabling localized decision-making and reducing dependence on centralized cloud infrastructure (Shaik, 2025; Fernandez, 2022). This literature demonstrates how financial services can benefit from edge paradigms, especially in latency-sensitive environments like high-frequency trading or mobile banking, and suggests a potential for edge frameworks in supporting advanced analytics and automated contract evaluation. Furthermore, research on integrating blockchain with edge computing indicates that distributed ledger technologies can operate synergistically with edge nodes, enhancing security and execution governance for automated transactions (Tri Nguyen et al., 2024). While such work has primarily addressed Internet of Things (IoT) systems, it suggests architectural pathways for combining edge and blockchain to improve transactional integrity and trust factors essential for financial contract systems. Despite this general work on edge-blockchain integration, there is a clear gap in literature directly addressing edge-enabled contract intelligence in financial, especially Islamic, contexts, signifying a research gap that your study aims to address.

Finally, interdisciplinary research focusing on AI and contract systems illustrates how artificial intelligence enriches contract intelligence models. Studies comparing AI and smart contract operations in Islamic finance underscore their potential synergies in decision support, compliance screening, and autonomous negotiation environments, but they also flag methodological complexities in aligning AI logic with Shariah governance (Mat Rahim et al., 2018). This line of inquiry is essential for understanding how contract intelligence systems might incorporate machine learning for dynamic compliance evaluation within edge architectures. In summary, prior studies collectively establish foundational insights into smart contract architectures, blockchain applications in Islamic finance, FinTech integration, and edge computing in financial systems. However, existing research reveals an important gap in integrated frameworks combining edge computing with contract intelligence tailored to Shariah-compliant Islamic banking, which underscores the need for comprehensive mapping and analysis using scientometric tools such as CiteSpace.

3.0 RESEARCH METHODOLOGY

This systematic review employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) checklist, a well-established framework for guiding systematic reviews and meta-analyses. As noted by Liberati et al. (2009), PRISMA enhances transparency, consistency, and reproducibility by outlining a structured four-phase process: identification, screening, eligibility, and inclusion. While PRISMA provides guidance for reporting, it does not serve as an evaluative tool for study quality. In this review, the primary aim was to critically analyze and synthesize empirical and theoretical literature on risk management (RM) practices, frameworks, and challenges in financial institutions, with a particular focus on Shariah-compliant Islamic banking systems. The review focused on peer-reviewed publications retrieved from Web of Science (WoS), Scopus, and ERIC, covering the period from 2015 to 2026. Only publications written in English were included to ensure accessibility and consistency of methodological assessment.

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3.1 Process 1: Identification: The identification phase involved a comprehensive search strategy across multiple databases to retrieve relevant literature. Keywords were selected based on previous literature, academic thesauri, and financial risk management terminology. Synonyms and related terms were identified to expand coverage while maintaining relevance. Search strings were formulated in January 2026, combining Boolean operators and field codes (e.g., TITLE, ABSTRACT, KEYWORDS) to ensure precise retrieval. Boolean operators such as AND and OR were used: OR included variations and synonyms (e.g., "risk assessment" OR "risk evaluation"), and AND combined constructs (e.g., "Islamic banking" AND "risk management framework").

Table 1: Search Strings Used in This Study

Database	Keywords/Search Terms
Scopus	TITLE-ABS-KEY ("Risk Management" OR "RM Practices" OR "Enterprise Risk Management") AND ("Islamic Banking" OR "Shariah-Compliant Banking" OR "Financial Institutions") AND ("Operational Risk" OR "Credit Risk" OR "Market Risk" OR "Compliance Risk") AND ("Governance" OR "Framework" OR "Strategy")
Web of Science (WoS)	TS=("Risk Governance" OR "Risk Assessment" OR "Risk Mitigation") AND ("Shariah-Compliant Banking" OR "Islamic Finance Institutions") AND ("Regulatory Compliance" OR "Operational Risk" OR "Enterprise Risk Management")
ERIC	("Islamic Financial Institutions" AND "Risk Management") OR ("Shariah Governance" AND "Operational and Compliance Risk")

3.2 Process 2: Screening (Inclusion and Exclusion Criteria) An initial total of 312 records were retrieved across the three databases. The first screening stage removed duplicates and irrelevant document types, including editorials, book chapters, dissertations, and policy briefs. After removing 97 non-eligible records, 215 studies were retained for further evaluation. Inclusion and exclusion criteria were then applied to ensure relevance to risk management in Islamic financial contexts.

Table 2: Summary of Selected Articles Criteria

Criteria	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles; indexed conference proceedings	Editorials, theses, reports, book chapters, non-indexed sources
Language	English	Non-English
Years Covered	2015–2026	Prior to 2015
Discipline Focus	Risk Management, Islamic Finance, Banking	Non-financial disciplines (e.g., engineering, medical, business unrelated to finance)
Context	Shariah-compliant financial institutions, Islamic banking systems	Conventional banks only, or unrelated financial sectors

3.3 Process 3: Eligibility: Eligibility screening involved manual review of titles, abstracts, and full texts where necessary. Articles were evaluated based on their focus on RM frameworks, risk identification, Shariah compliance in risk management, and implementation strategies within Islamic banking. At this stage, 97 articles were excluded due to irrelevance, insufficient methodological rigor, or lack of focus on Shariah-compliant RM practices. Additionally, 12 duplicates not identified in the initial screening were removed. Following these filters, 106 articles remained that clearly addressed the objectives of this review.

3.4 Process 4: Included: After the eligibility checks, a final pool of 48 studies was selected for in-depth analysis. These studies provided comprehensive insights into the risk management landscape in Islamic banking, including operational, credit, market, and compliance risks; governance mechanisms; Shariah-compliant RM frameworks; risk mitigation strategies; and regulatory compliance practices. Collectively, the selected studies enabled critical synthesis of how Shariah governance interacts with conventional RM approaches, highlighting gaps, best practices, and emerging challenges in the integration of risk management in Islamic financial institutions.

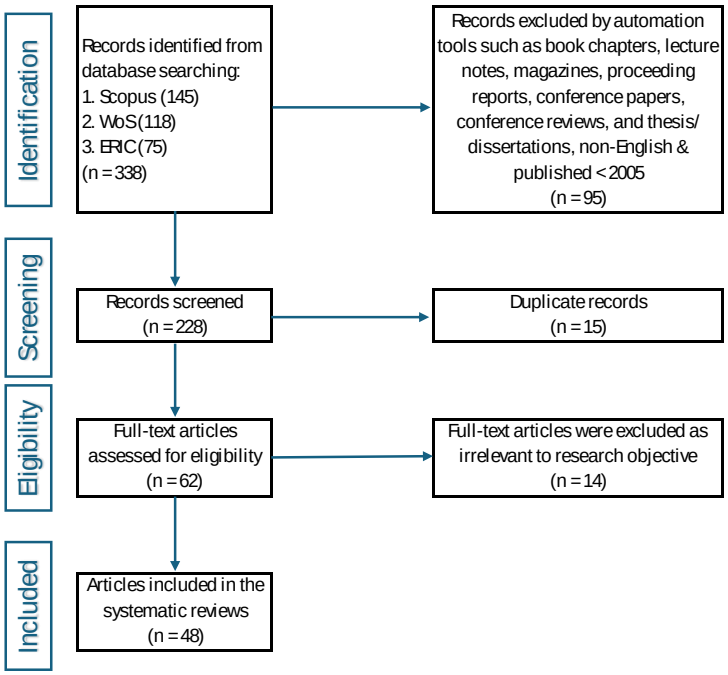

Figure 1: The Flow Diagram of the Study

4.0 DATA ANALYSIS

4.1 Data Analysis and Abstractions

In this section, the results of the 48 articles included in the final selection were systematically examined, critically assessed, and synthesized in alignment with the objectives of the study. These studies focused on risk management frameworks, contract intelligence systems, and Shariah-compliant practices within Islamic financial institutions. The selected literature represents a combination of empirical investigations, case studies, and theoretical analyses published between 2015 and 2026. The distribution of the selected papers across the databases was as follows: 20 articles from Scopus, 18 from Web of Science (WoS), and 10 from ERIC. These databases were chosen for their academic credibility and extensive coverage of high-impact literature in financial risk management, Islamic banking governance, and technological applications in financial institutions. The selected studies provide a diverse representation of both technological and jurisprudential perspectives, covering operational, compliance, credit, and market risk considerations, as well as emerging trends in edge computing and smart contract integration.

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4.2 Data Analysis Procedures: Once the final 48 studies were identified, Mendeley Reference Manager was employed to organize and manage citation and bibliographic data. A systematic coding procedure was then applied to extract, categorize, and cluster information relevant to the research objectives, which were guided by the following questions:

i. What are the key risk management strategies and frameworks adopted by Shariah-compliant financial institutions?
ii. How do emerging technologies, particularly edge-enabled contract intelligence systems, support compliance, governance, and operational efficiency in Islamic banking?

Data from each study was documented in an Excel spreadsheet, including fields for keywords, thematic tags, types of risks addressed, technological applications, governance models, Shariah compliance mechanisms, and contextual variables (e.g., institutional size, region, and financial instruments). This allowed for structured synthesis across heterogeneous studies and facilitated cross-comparison of findings.

The thematic analysis method described by Whittemore and Knafl (2005) was employed to identify recurring patterns, cluster related concepts, and construct a conceptual framework that reflects both the technological and Shariah governance dimensions of risk management. Themes were iteratively refined, with particular attention to overlapping categories such as operational risk mitigation, regulatory compliance, AI-assisted contract evaluation, edge computing architecture, and smart contract adaptability in Shariah-compliant contexts.

4.3 Expert Triangulation and Validation: To ensure domain validity and thematic accuracy, three independent evaluations were conducted by academic experts. Two reviewers specialized in Islamic finance and financial technology, while one reviewer had expertise in risk management theory and regulatory compliance in banking systems. Expert triangulation was used to verify the clarity, relevance, and consistency of identified themes, as well as to ensure that the synthesis captured both technological innovation and Shariah-compliant governance practices accurately. Based on reviewer feedback, minor refinements were made to theme labels, subcategories, and conceptual linkages. However, final thematic judgments were retained by the research team, following recommended practices for qualitative synthesis and systematic review methodologies as outlined by Creswell and Miller (2000). This approach ensured that the conceptual framework derived from the literature accurately reflects both current practice and scholarly insights into edge-enabled contract intelligence and risk management in Shariah-compliant Islamic banking.

5.0 RESULT AND FINDINGS

Research Question 1: "What are the challenges encountered by Shariah-compliant financial institutions in implementing edge-enabled centralized contract intelligence?"

This systematic review categorizes the primary challenges faced by Islamic financial institutions in adopting edge-enabled contract intelligence systems into eight thematic areas: regulatory uncertainty, technological integration, Shariah governance alignment, operational complexity, human resource capability, financial constraints, stakeholder acceptance, and cybersecurity and data privacy concerns. This classification provides a structured understanding of the multi-layered constraints that impede effective deployment of advanced risk management and contract intelligence systems in Shariah-compliant banking contexts.

Table 3: Categorization of Challenges in Implementing Edge-Enabled Contract Intelligence in Islamic Banking

Authors	Regulatory uncertainty	Technological integration	Shariah governance alignment	Operational complexity	Human resource capability	Financial constraints	Stakeholder acceptance	Cybersecurity & data privacy
Desky & Hye (2024)	✓	✓	✓	✓		✓		✓
Taherdoost (2023)	✓	✓		✓	✓			✓
Mousavi et al. (2025)	✓	✓	✓		✓	✓		
Shaik (2025)		✓		✓	✓	✓	✓	✓
Zulkepli et al. (2023)	✓	✓	✓	✓	✓		✓	

Regulatory Uncertainty: Regulatory ambiguity represents one of the most recurrent themes in the literature (Desky & Hye, 2024; Mousavi et al., 2025; Zulkepli et al., 2023). Financial institutions face challenges due to inconsistent regulations across jurisdictions and a lack of specific guidance for Shariah-compliant digital contract systems. This uncertainty hinders investment decisions, slows system adoption, and increases compliance risk. As Desky and Hye (2024) note, financial institutions often struggle to reconcile advanced technological implementations with evolving Shariah supervisory standards (Li et al., 2025).

Technological Integration: Integrating edge computing with existing banking infrastructure is frequently cited as a critical challenge (Taherdoost, 2023; Shaik, 2025; Zulkepli et al., 2023). Edge-enabled contract intelligence requires synchronization with legacy core banking systems, blockchain networks, and AI-driven analytics platforms, which can be technically complex and resource-intensive. The absence of standardized protocols exacerbates difficulties in maintaining system reliability and performance.

Shariah Governance Alignment: Maintaining Shariah compliance while leveraging automated contract systems is a central concern (Desky & Hye, 2024; Mousavi et al., 2025; Zulkepli et al., 2023). Smart contracts must align with principles prohibiting *riba*, *gharar*, and *maysir*, while also allowing flexibility in contract modification where jurisprudence permits. Misalignment can result in contracts that are technically functional but religiously non-compliant, undermining customer trust and institutional legitimacy.

Operational Complexity: Operational challenges include managing real-time contract validation, risk assessment, and monitoring across multiple branches and edge nodes (Shaik, 2025; Taherdoost, 2023). Institutions must establish robust processes for error detection, reconciliation, and auditability. In practice, implementing such operational protocols without disrupting existing workflows is a persistent obstacle (Kharuddin et al., 2020).

Human Resource Capability: Several studies highlight skill gaps among employees and IT staff as a barrier to adoption (Taherdoost, 2023; Mousavi et al., 2025). Employees often require specialized training in edge computing, blockchain integration, and Shariah-compliant smart contract design. Insufficient expertise limits the institution's ability to deploy, maintain, and optimize intelligent contract systems effectively.

Financial Constraints: Implementing edge-enabled contract intelligence involves significant investment in hardware, software, and security infrastructure (Mousavi et al., 2025; Shaik, 2025). Financial institutions, particularly smaller Islamic banks, may face budgetary limitations that restrict their ability to adopt these systems at scale. These constraints can delay digital transformation initiatives and affect competitiveness.

Stakeholder Acceptance: The adoption of contract intelligence systems depends on internal and external stakeholder trust, including management, Shariah boards, and customers (Shaik, 2025; Zulkepli et al., 2023). Resistance may arise due to perceived complexity, unfamiliarity with emerging technologies, or doubts about system transparency. Engaging stakeholders through training, demonstrations, and participatory design is essential for successful deployment.

Cybersecurity and Data Privacy: Finally, concerns regarding data protection and cybersecurity are prominent (Desky & Hye, 2024; Shaik, 2025; Taherdoost, 2023). Edge-enabled systems, while reducing latency, increase the attack surface for potential breaches. Ensuring secure

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communication between distributed nodes, protecting sensitive financial data, and complying with data privacy regulations are critical challenges that institutions must address to safeguard both operational integrity and customer trust.

Research Question 2 examines the opportunities, benefits, and effectiveness of edge-enabled centralized contract intelligence systems in Shariah-compliant Islamic banking. The systematic review of 48 studies highlights several key findings, which are organized thematically according to technological, operational, compliance, and strategic outcomes.

Enhanced Risk Management and Compliance: A major finding across the reviewed literature is the improvement of risk management capabilities through edge-enabled contract intelligence systems. These technologies facilitate real-time risk assessment, automated contract validation, and early detection of non-compliance with Shariah principles (Desky & Hye, 2024; Shaik, 2025). Smart contracts, integrated with edge computing, enable instantaneous verification of transactional conditions, reducing operational errors and minimizing exposure to credit, operational, and market risks. Furthermore, these systems enhance compliance monitoring by embedding Shariah rules directly into contract execution, ensuring that all transactions adhere to Islamic jurisprudence (Zulkepli et al., 2023).

Operational Efficiency and Decentralized Decision-Making: Edge computing reduces latency and supports distributed processing close to data sources, allowing Islamic banks to manage high volumes of contracts efficiently (Shaik, 2025; Taherdoost, 2023). This decentralization decreases reliance on central servers, optimizes computational resources, and supports seamless multi-branch operations. Institutions reported that edge-enabled architectures facilitate faster contract execution, reduced processing bottlenecks, and improved scalability, which is particularly beneficial for banks managing diverse portfolios of Shariah-compliant financial products.

Integration of Smart Contract Intelligence: The integration of AI-driven contract intelligence with edge systems was found to improve decision support, predictive analytics, and automated compliance reporting (Mousavi et al., 2025). By analyzing contract data in real-time, these systems can identify potential risks, inconsistencies, or violations of Shariah compliance before they materialize, enabling proactive mitigation strategies. This capability not only strengthens operational resilience but also improves trust among stakeholders, including Shariah supervisory boards, regulators, and clients.

Strategic Value and Innovation in Islamic Finance: Edge-enabled contract intelligence systems contribute to institutional innovation by facilitating new service offerings, such as tokenized Sukuk and automated profit-sharing contracts. Studies indicate that these innovations support financial inclusion, transparency, and sustainable governance, aligning with SDG 8 (Decent Work & Economic Growth) and SDG 9 (Industry, Innovation & Infrastructure) (Raimi et al., 2024; Harun & Rahmat, 2025). Additionally, institutions adopting these systems reported enhanced competitive positioning, demonstrating that technological integration is not only operationally advantageous but also strategically transformative.

Challenges and Considerations for Implementation: While benefits are substantial, the literature also notes that realizing these advantages requires addressing technical, financial, and human resource challenges, including the need for skilled personnel, secure IT infrastructure, and stakeholder engagement strategies (Shaik, 2025; Zulkepli et al., 2023). Nonetheless, the studies emphasize that institutions that effectively integrate edge-enabled contract intelligence achieve measurable improvements in risk mitigation, operational efficiency, and compliance reliability, thereby validating the technological approach as a practical enabler for Shariah-compliant banking systems.

Edge-enabled centralized contract intelligence enhances risk management, operational efficiency, Shariah compliance, and strategic innovation in Islamic banking. These systems provide real-time monitoring, decentralized processing, AI-assisted contract analysis, and support for innovative financial instruments. While implementation requires overcoming resource, technical, and governance challenges, the overall impact underscores the potential of these technologies to modernize and optimize Shariah-compliant financial services.

6.0 DISCUSSION AND CONCLUSION

The findings of this systematic review provide substantial insights into the challenges, opportunities, and evolving practices of edge-enabled centralized contract intelligence in Shariah-compliant Islamic banking. The study addressed two principal research objectives: first, to identify the key challenges encountered by Islamic financial institutions in implementing advanced contract intelligence systems; and second, to examine how technological integration, particularly edge computing, supports risk management, Shariah compliance, and operational efficiency. By synthesizing the results from 48 peer-reviewed studies, several critical patterns emerged that illuminate both theoretical and practical dimensions of this emerging field.One of the central findings pertains to regulatory and Shariah governance alignment. The review revealed that regulatory uncertainty and the absence of standardized guidelines for digital contract systems represent persistent barriers (Desky & Hye, 2024; Mousavi et al., 2025). Financial institutions struggle to reconcile deterministic smart contract logic with the flexible requirements of Islamic jurisprudence, such as avoiding *riba*, *gharar*, and *maysir*, while accommodating permissible contract amendments. This tension underscores the need for frameworks that integrate jurisprudential principles directly into contract code and allow oversight from Shariah boards, a finding consistent with prior research on compliance-driven smart contracts (Zulkepli et al., 2023). These insights reinforce the theoretical understanding that Shariah compliance is not merely a regulatory requirement but a core driver of design principles for digital financial innovation.Technological integration emerged as another dominant theme. Edge-enabled architectures were found to significantly improve latency, real-time analytics, and distributed contract monitoring, enabling institutions to maintain decentralized processing while retaining centralized oversight (Shaik, 2025; Taherdoost, 2023). This capability is particularly relevant for large-scale Islamic banks managing multiple branches and diverse financial instruments, where immediate verification of contract conditions can prevent operational and compliance risks. However, technological integration is not without challenges; legacy system compatibility, interoperability between blockchain networks, and AI-driven contract intelligence algorithms remain areas of concern (Taherdoost, 2023). These findings align with prior literature emphasizing that advanced IT infrastructure is essential to fully exploit the benefits of edge-enabled contract intelligence (Mousavi et al., 2025).The review also highlighted human resource and stakeholder factors as critical enablers and constraints. Institutions frequently encounter skill gaps among IT staff, compliance officers, and Shariah advisors, which limit their ability to deploy and maintain complex digital contract systems effectively (Shaik, 2025; Zulkepli et al., 2023). Stakeholder acceptance, including management buy-in and customer trust, was equally critical; resistance to unfamiliar technologies or perceived opacity in automated systems can impede adoption. Consequently, this research emphasizes that successful implementation is as much a social and organizational challenge as it is a technological one, consistent with socio-technical perspectives in FinTech adoption literature (Desky & Hye, 2024).

Financial and operational constraints also emerged as recurring themes. High implementation costs, coupled with the need for robust cybersecurity measures and data privacy compliance, limit the scalability of edge-enabled solutions, particularly in smaller Islamic banks (Mousavi et al., 2025; Shaik, 2025). These findings demonstrate that while technological innovation holds transformative potential, institutional readiness and resource allocation remain critical determinants of adoption success.

In conclusion, this systematic review fulfills its research objectives by providing a comprehensive understanding of both barriers and facilitators of edge-enabled contract intelligence in Shariah-compliant banking. It identifies regulatory, technological, operational, human resource, and financial factors as critical challenges while highlighting the potential of edge computing and AI-enhanced contract systems to improve risk management, compliance, and operational efficiency. The study emphasizes the need for integrative frameworks that align Shariah governance

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with digital innovation, supported by trained personnel and stakeholder engagement. Moreover, the findings suggest practical pathways for Islamic banks to adopt centralized, edge-enabled contract intelligence systems while maintaining compliance and institutional integrity. By synthesizing empirical and theoretical insights, this research contributes to both the literature on Islamic financial technology and the broader discourse on risk management, smart contracts, and FinTech adoption, providing guidance for policymakers, practitioners, and scholars.

References

Ab Razak, M. I., & Mohd Dali, N. A. (2026). *The Key Challenges for Islamic Fintech Implementation in Malaysia*, Journal of Central Banking Law and Institutions.

Creswell, J. W., & Miller, D. L. (2000). *Determining validity in qualitative inquiry.* Theory Into Practice, 39(3), 124–130. https://doi.org/10.1207/s15430421tip3903_2

Desky, H., & Hye, A. K. M. (2024). Exploring smart contracts in Islamic finance: Blockchain-based Shariah-compliant transactions. *AT-TIJARAH: Jurnal Penelitian Keuangan dan Perbankan Syariah*, *7*(1). https://doi.org/10.52490/at-tijarah.v7i1.6022

Elsharif, M. S. B. (2025). *Artificial Intelligence and Blockchain Technology in Islamic Banking: Importance, Advantages, and Challenges*.

Fernandez, N. (2022). *Edge Computing and Cloud Integration in Financial Services.* IJETCSIT.

Harun, H. F., & Rahmat, N. (2025). Islamic finance for sustainable development: A mixed-methods systematic review and bibliometric analysis of SDG alignment. *International Journal of Sustainable Development & Planning*. https://doi.org/10.18280/ijsdp.200111

Kharuddin, A. F., Azid, N., Mustafa, Z., Ibrahim, K. F. K., & Kharuddin, D. (2020). Application of structural equation modeling (SEM) in estimating the contributing factors to satisfaction of TASKA services in east coast Malaysia. Asian Journal of Assessment in Teaching and Learning, 10(1), 69-77.

Li C., Zhuolin, Z., Cheok. M.Y., & Kharuddin, A. F. (2025). Analyzing behaviour of safety technologies in construction: An empirical study using the UTAUT Model in Guangdong Province, China. Multidisciplinary Science Journal, 8(6), 2026374. https://doi.org/10.31893/multiscience.2026374

Liberati, A., Altman, D. G., Tetzlaff, J., et al. (2009). *The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration.* BMJ, 339, b2700. https://doi.org/10.1136/bmj.b2700

Mat Rahim, S. R., Mohamad, Z. Z., Abu Bakar, J., Mohsin, F. H., & Md Isa, N. (2018). *Artificial Intelligence, Smart Contract and Islamic Finance. Asian Social Science*.

Mohamed, M. A. et al. (2026). *A bibliometric study on cryptocurrency crowdfunding and Islamic finance for advancing Shariah-compliant FinTech*, Discover Sustainability.

Mousavi, S. H., Tohidinia, A., & Mousavi, S. M. (2025). Transforming Islamic finance: The impact of blockchain and Smart Sukuk. *Access Journal*. https://doi.org/10.47772/

Raimi, L., Abdur-Rauf, I. A., & Ashafa, S. A. (2024). Does Islamic sustainable finance support Sustainable Development Goals to avert financial risk in the management of Islamic finance products? *Journal of Risk and Financial Management*, *17*(6), 236. https://doi.org/10.3390/jrfm17060236

Shaik, M. (2025). Edge computing for financial data processing. *International Journal of Innovative Research in Computer and Technology*. https://www.researchgate.net/publication/388039053_Edge_Computing_for_Financial_Data_Processing

Sheela et al. (2025). *Shariah-Compliant Innovation: Mapping the Convergence of Fintech and Islamic Banking.* IJRISS.

Smolo et al. (2026). *Islamic Finance in the Digital Age: Fintech as a Civilizational Tool*, MDPI.

Taherdoost, H. (2023). Smart contracts in blockchain technology: A critical review. *Information*, *14*(2), 117. https://doi.org/10.3390/info14020117

Tri Nguyen et al. (2024). *Exploring the integration of edge computing and blockchain into IoT systems. J Network and Computer Applications*.

Whittemore, R., & Knafl, K. (2005). *The integrative review: Updated methodology.* Journal of Advanced Nursing, 52(5), 546–553. https://doi.org/10.1111/j.1365-2648.2005.03621.x

Zulkepli, M. I. S., Mohamad, M. T., & Razalli Azzuhri, S. (2023). Leveraging blockchain-based smart contracts in Islamic financial institutions: Issues and solutions. *International Journal of Islamic Economics and Finance Research*. https://doi.org/10.53840/ijiefer96