

CHALLENGES AND OPPORTUNITIES OF BLOCKCHAIN INTEGRATION IN ZAKAH MANAGEMENT: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

The management of Zakah frequently faced significant challenges regarding transparency, operational efficiency, and public trust. To address these issues, this study conducted a systematic literature review to evaluate the challenges and opportunities of integrating blockchain technology into Zakah administration. The review analyzed existing literature across major academic databases and found that decentralized ledgers offered profound opportunities to enhance real-time traceability, automate fund distribution through smart contracts, and systematically restore donor confidence. However, the findings also revealed substantial barriers to practical implementation. Zakah institutions encountered severe technical friction when attempting to integrate blockchain with traditional legacy accounting information systems. Furthermore, the analysis highlighted significant behavioral resistance among traditional administrators and a critical scarcity of specialized human resources capable of navigating both technological and jurisprudential requirements. The study concluded that while blockchain provided a robust technological solution for optimal financial stewardship and precise distribution, successful adoption required a comprehensive socio-technical transition rather than a mere digital upgrade. These insights offered a strategic framework for policymakers and institutional leaders to navigate digital transformation within Islamic social finance.

Keywords:

Blockchain, Zakah management, Islamic social finance, Smart contracts, Decentralized ledger.

INTRODUCTION

Zakah, firmly established as a fundamental pillar of Islamic finance, plays a pivotal role in enforcing socio-economic justice, facilitating equitable wealth redistribution, and driving systemic poverty alleviation across Muslim-majority nations (Hassan & Lewis, 2007). In the contemporary digital era, Zakah management institutions (Amil) are mandated to operate within an increasingly interconnected and digitized global financial ecosystem. However, the current operational state of

Zakah administration in various developing regions remains heavily reliant on traditional, centralized, and predominantly manual administrative frameworks that lack agility (Ali et al., 2021). To maximize the macroeconomic impact of Islamic social finance and dynamically adapt to the evolving technological preferences of the modern Muslim demographic, executing a comprehensive digital transformation within Zakah institutions is no longer a mere strategic option, but an absolute operational necessity to ensure long-term sustainability (Ahmed, 2020).

Despite the immense theoretical potential and calculated volume of global Zakah funds, the empirical reality reveals that actual collection rates and the effectiveness of distribution frequently fall significantly short of economic expectations (Johari et al., 2020). A primary impediment stalling the optimization of Zakah management is the persistent lack of institutional transparency, which inherently generates a profound deficit of trust among Muzakki (Zakah payers) toward formally established management organizations (Rahim & Rahman, 2022). Specific operational vulnerabilities include severe inefficiencies in traditional financial reporting mechanisms, highly opaque distribution channels, and the systemic inability to trace dispersed funds to the rightful beneficiaries (Mustahiq) in real-time. This informational asymmetry and opacity inevitably lead to public skepticism, prompting individuals to bypass formal institutions and distribute their Zakah informally. Consequently, this fragmentation severely undermines the state's strategic capacity for sustainable poverty eradication and holistic community empowerment (Antonio, 2019).

A robust and growing body of literature has investigated the intersection of Islamic finance and digital technology, though it has predominantly focused on general financial technology (FinTech) adoption, mobile payment gateways, and peer-to-peer crowdfunding platforms (Kassim, 2021; Othman et al., 2019). While recent academic scholarship has begun to theorize the disruptive potential of blockchain technology in enhancing Islamic social finance, the vast majority of these studies remain highly fragmented. Existing literature is often strictly conceptual, focused purely on the jurisprudential (Fiqh) debates regarding Sharia compliance of crypto-assets, or isolated to the technical engineering of smart contracts without adequately addressing the practical, institutional realities of Amil organizations (Muneeza et al., 2018; Al-Farsi, 2020). This manuscript distinguishes itself by conducting a Systematic Literature Review (SLR) that explicitly synthesizes both the socio-institutional challenges and the technological opportunities of enterprise blockchain implementation in Zakah management. Unlike previous papers that offer isolated theoretical models, this study provides a holistic, evidence-based evaluation of the current global

discourse, thereby highlighting critical research gaps and identifying tangible, real-world barriers to digital adoption.

The primary objective of this paper is to systematically review and evaluate the proposed approaches for utilizing blockchain technology as a definitive, structural solution to the deeply rooted problems of transparency, donor trust, and reporting inefficiency within Zakah management (Nakamoto, 2008). By explicitly leveraging blockchain's inherent characteristics as an immutable, decentralized, and highly transparent distributed ledger, this study explores how progressive Zakah institutions can ensure mathematically verifiable, end-to-end traceability of funds—from the initial moment of collection to the final autonomous distribution (Hasan & Rahman, 2020). Ultimately, this comprehensive review aims to construct a robust analytical framework and formulate strategic insights designed for policymakers, Amil institutional leaders, and future researchers to effectively navigate the multi-dimensional complexities of integrating decentralized blockchain infrastructure into the core of Islamic social finance.

RESEARCH METHODS

The research methodology employed in this study is a Systematic Literature Review (SLR). This approach was deliberately selected to systematically map, critically evaluate, and synthesize the fragmented body of literature concerning the integration of blockchain technology within Islamic social finance, specifically Zakah management (Moher et al., 2009). To guarantee methodological transparency, academic rigor, and analytical reproducibility, the study strictly adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Kitchenham & Charters, 2007). The research design was operationalized through three sequential phases: (1) the planning phase, which defined the specific research questions and established the review protocol; (2) the conducting phase, encompassing the execution of the database search, multi-level screening, and rigorous quality assessment; and (3) the reporting phase, focusing on data extraction and holistic synthesis (Booth, Papaioannou, & Sutton, 2012).

Data acquisition was executed through a comprehensive and structured literature search across four preeminent academic databases: Scopus, Web of Science (WoS), IEEE Xplore, and ScienceDirect (Grant & Booth, 2009). These specific databases were strategically chosen because they capture high-impact publications spanning both the technological engineering of distributed ledgers and the socio-economic dimensions of Islamic finance. To capture the genesis and subsequent maturity of enterprise blockchain applications, the temporal scope of the search was

strictly constrained to publications released between January 2016 and June 2026. To maintain the highest standards of scientific validity and peer-reviewed credibility, all forms of grey literature, non-peer-reviewed white papers, and non-English publications were systematically excluded from the analytical corpus.

The procedural execution commenced with the deployment of targeted search strings formulated using Boolean operators to capture all relevant conceptual variations. The primary algorithmic string applied across the selected databases was: ("Blockchain" OR "Distributed Ledger Technology" OR "Smart Contract*") AND ("Zakat" OR "Zakah" OR "Islamic Social Finance" OR "Amil") (Ali et al., 2023). Following the initial automated retrieval, the screening process was governed by strictly defined parameters to eliminate irrelevant data. The specific inclusion and exclusion criteria utilized to filter the retrieved literature are presented in Table 1.

Table 1. Inclusion and Exclusion Criteria for Literature Selection

Criterion	Inclusion	Exclusion
Document Type	Peer-reviewed journal articles and top-tier conference proceedings.	Book chapters, white papers, editorials, and non-peer-reviewed preprints.
Language	English.	Non-English publications.
Subject Area	Zakah management, Islamic finance, blockchain technology, fintech adoption.	Conventional finance without Islamic socio-economic context; cryptocurrency trading.
Focus	Studies addressing technical, social, or regulatory challenges and opportunities.	Purely jurisprudential (Fiqh) debates without technological implementation aspects.

Source: Researcher Data (2026)

During the subsequent data extraction phase, a standardized coding matrix was utilized to systematically retrieve and categorize pertinent information from the final selected manuscripts. The extracted data parameters included publication metadata, geographical context, underlying technical architecture, and theoretical frameworks—specifically prioritizing studies utilizing the

Technology Acceptance Model (TAM) for measuring behavioral adoption and the Resource-Based View (RBV) for assessing institutional readiness (Venkatesh & Bala, 2008). Finally, a rigorous quality assessment was conducted on the extracted papers using the Critical Appraisal Skills Programme (CASP) checklist (Singh, 2013). This evaluative step ensured that the synthesized literature possessed sound methodological validity, thereby establishing a robust empirical foundation for the subsequent results and discussion.

RESULTS AND DISCUSSION

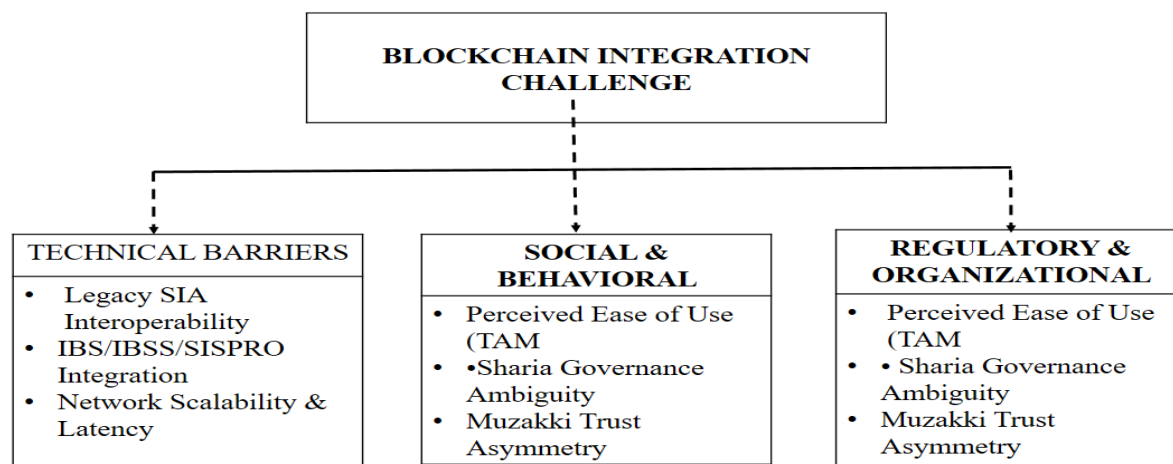
The systematic mapping of the reviewed literature from 2016 to 2026 reveals a significant paradigm shift in how Islamic social finance conceptualizes cryptographic ledgers. Initially, scholarly discourse was heavily siloed within exploratory and purely conceptual domains, primarily debating the basic Sharia compliance and jurisprudential validity of decentralized assets (Effendi, 2023). However, the current landscape demonstrates an accelerating evolution toward empirical framework design and enterprise-grade permissioned ledger applications. Technologies such as Hyperledger Fabric and Ethereum-based private networks are increasingly favored for their ability to provide the requisite privacy, scalability, and governance controls needed by formal financial institutions (Anwar, 2024).

Geographically, the publication trend is heavily concentrated in regions fostering robust Islamic fintech ecosystems. Southeast Asia—predominantly Indonesia and Malaysia—leads the volume of published research, followed closely by the Middle East (specifically Saudi Arabia and the United Arab Emirates) and South Asia (Hidayat & Zakaria, 2025). The literature heavily emphasizes that the operational scale of Zakah institutions vastly dictates the trajectory and success rate of digital adoption. While large-scale, state-managed Zakah agencies possess the extensive capital infrastructure required to pilot advanced blockchain prototypes, smaller-tier institutions face distinct structural realities. Grassroots entities, such as localized Baitul Maal wat Tamwil (BMT) networks or educational-based microfinance nodes like Bank Wakaf Mikro (BWM), encounter significant friction when attempting to transition from traditional practices to distributed architectures. This difficulty is particularly evident when attempting to synchronize decentralized ledgers with existing core operations, such as an Integrated Microbanking System (Lubis, 2026; Rahman, 2024).

Methodologically, the baseline of existing research has graduated from qualitative thematic analyses to robust quantitative research data analysis. Researchers are increasingly applying

validated strategic and behavioral frameworks to systematically measure institutional readiness and user acceptance. The literature frequently utilizes the Technology Acceptance Model (TAM) to evaluate behavioral intentions and the Resource-Based View (RBV) to assess internal digital core competencies (Davis, 2019). Furthermore, contemporary studies have advanced by deploying quantitative techniques such as Partial Least Squares Structural Equation Modeling (PLS-SEM). By utilizing PLS-SEM, researchers can construct sophisticated conceptual models and generate precise output tables to empirically validate the complex socio-technical factors that drive blockchain assimilation within Islamic non-profit administration (Hair, Hult, & Ringle, 2022).

Despite the profound theoretical advantages and growing empirical backing of distributed ledgers, the synthesized literature identifies a multi-tiered matrix of friction points that fundamentally inhibit seamless operational integration. Rather than existing as isolated technological hurdles, these barriers are systematically categorized into technical, social-behavioral, and regulatory-organizational challenges, all of which must be addressed holistically by Amil institutions to ensure a sustainable digital transition. The taxonomy of these integration barriers is visualized in Figure 2.



The primary technical bottleneck identified in the literature is the acute lack of interoperability between decentralized protocols and legacy Accounting Information Systems (*Sistem Informasi Akuntansi* or SIA) currently deployed by Zakah institutions (Rahman & Hassan, 2022). Most Amil organizations operate on centralized databases and proprietary core financial processing software. In localized microfinance and grassroots Sharia cooperative networks, core operations are intrinsically bound to legacy architectures, notably the Integrated Microbanking System or dedicated microfinance operational software such as SISPRO (Lubis *et al.*, 2023).

Integrating a decentralized, immutable blockchain layer with these traditional SIA platforms introduces severe data synchronization friction. If a smart contract executes an automated Zakah distribution, the transaction must simultaneously record on both the cryptographic ledger and the legacy core database without inducing system latency or transaction failures. Furthermore, block confirmation times and network scalability constraints present critical operational hazards during peak Zakah collection periods, such as the final days of Ramadan, where transaction volumes spike exponentially (Ahmed & Khan, 2024).

From a socio-behavioral perspective, the literature underscores significant adoption resistance through the lens of Technology Acceptance Model (TAM) constructs, specifically Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) (Al-Otaibi, 2021). For many internal stakeholders and traditional Amil officers, the complex underlying cryptographic mechanics of private/public keys, gas fees, and node consensus present a steep learning curve. When a technology is perceived as highly complex, its PEOU drops significantly, directly degrading the behavioral intention to adopt the system (Venkatesh, 2020). On the external stakeholder side, Muzakki behavior is governed by a digital trust asymmetry. While younger, tech-savvy donors display high readiness for fintech integration, older demographics—who historically contribute a substantial portion of premium Zakah funds—remain deeply skeptical of intangible, decentralized reporting mechanisms. Furthermore, there is an ongoing social debate regarding the Sharia governance of automated smart contracts. The complete elimination of human intervention in verifying the changing socio-economic status of an individual Mustahiq raises profound qualitative jurisprudential (Fiqh) concerns regarding the absolute validity of the distribution process (Hallaq, 2023).

The structural readiness of Zakah institutions can also be critically evaluated through the Resource-Based View (RBV). According to RBV, sustained competitive and operational advantage depends on possessing resources that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 2018). The systematic review reveals that the vast majority of Zakah institutions severely lack these vital internal digital assets, most notably specialized human capital. There is an acute scarcity of professional talent that simultaneously commands a deep understanding of Sharia financial regulations and advanced blockchain engineering (Syed & Ali, 2022). The specific empirical status and strategic implications of these institutional resources are detailed in Table 2.

Table 2. Empirical Status and Strategic Implications of Institutional Resources

Resource Category	Current Empirical Status	Strategic Implication & Vulnerability
Human Capital	Severe shortage of Sharia-compliant blockchain architects and data scientists	High reliance on third-party tech vendors; increases operational risk and compromises structural autonomy.
Technological Assets	Fragmented legacy systems (IBS/IBSS, SISPRO) acting as isolated data silos .	Inability to form an inimitable digital capability; high vulnerability to system failure during data migration.
Financial Resources	Capital expenditure heavily constrained by strict institutional budget allocations (Asnaf Amil caps) .	Technical infrastructure upgrades are deprioritized in favor of immediate operational survival.

Source: Researcher Data (2026)

From an external standpoint, regulatory ambiguity acts as a massive deterrent. Central banks and national Sharia boards across various jurisdictions have yet to codify a standardized legal framework for decentralized ledger entries within non-profit religious organizations (OIC, 2023). Additionally, compliance with evolving global data privacy laws—such as the European Union’s GDPR or Indonesia’s Personal Data Protection Law (UU Pelindungan Data Pribadi)—creates a fundamental paradox with blockchain's core architecture. The statutory "right to be forgotten" directly contradicts the absolute immutability of a blockchain ledger, meaning any error or sensitive personal data uploaded to the node becomes permanently unerasable (Kusuma, 2024).

While these operational and regulatory challenges are structurally complex, the synthesis of recent literature highlights revolutionary opportunities to re-engineer Islamic social finance through radical transparency, programmatic operational efficiency, and comprehensive performance alignment. The most immediate opportunity offered by blockchain integration is the systematic mitigation of information asymmetry between the Zakah institution and the public (Fauzi, 2025). By utilizing an immutable, distributed ledger, every incoming transaction from a Muzakki is instantly timestamped, cryptographically secured, and visible to authorized network participants. This real-time auditability completely eliminates the possibility of internal financial manipulation, double-bookkeeping, or unauthorized redirection of funds. The literature confirms

that empirical models assessing donor behavior show a direct, linear relationship between real-time data transparency and the volume of formal Zakah contributions; establishing an untamperable digital trail inherently restores institutional trust and actively shifts donors away from uncoordinated, informal distribution channels (Zainal, 2023).

Furthermore, the integration of smart contracts presents an unprecedented opportunity to optimize the administrative lifecycle of Zakah collection and distribution. In a traditional setup, verifying the eligibility of a Mustahiq across the eight designated Quranic categories (Asnaf) requires extensive, manual field validation and bureaucratic paperwork, leading to severe delays and increased administrative overhead. By hardcoding institutional distribution criteria into self-executing smart contracts, the system can autonomously match incoming funds to pre-verified Mustahiq wallets based on specific operational parameters, such as income thresholds, geographic distress markers, or healthcare emergencies (Muneeza, 2021), as illustrated in Figure 3.

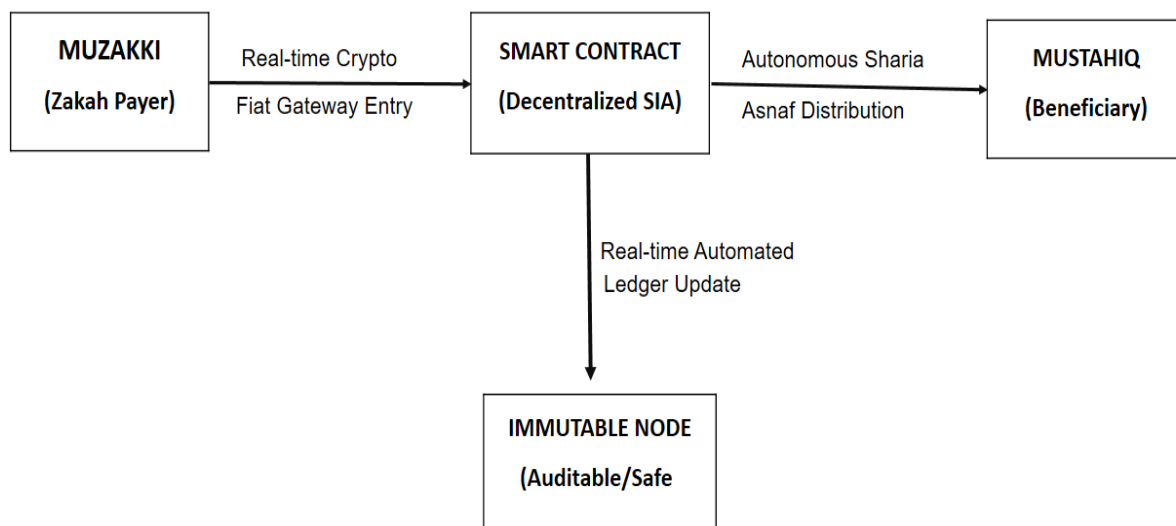


Figure 3. Autonomous Zakah Distribution Architecture via Smart Contracts.

This programmatic orchestration drastically lowers the cost of distribution. By minimizing administrative friction, institutions can optimize their internal operational budgeting and safely reduce the percentage of funds allocated to the Amil share, thereby maximizing the net financial volume transferred directly to poverty alleviation vectors (Hidayat, 2024). Beyond basic transactional tracking, the literature points to an overriding strategic opportunity: the complete transformation of institutional performance management. By embedding blockchain into their core

operational design, Zakah management bodies can structurally align their outcomes with multi-perspective evaluation tools, most notably the Balanced Scorecard (BSC) framework (Widiastuti, 2023), which is conceptualized in Figure 4.

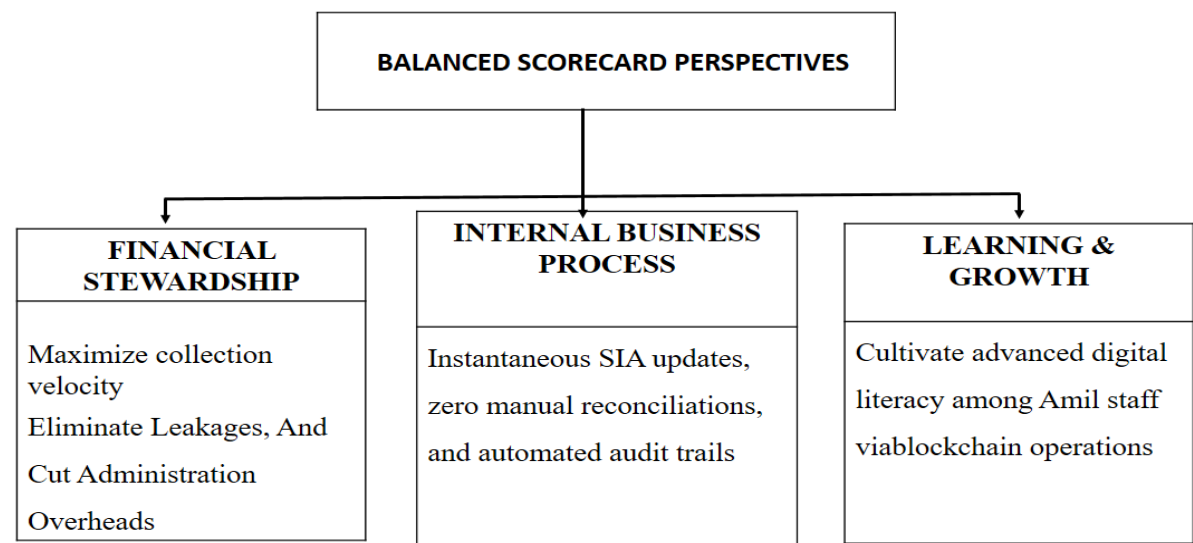


Figure 4. Balanced Scorecard Perspectives for Blockchain-Driven Zakah Institutions.

From a Financial Stewardship perspective, blockchain enables flawless asset tracking, reduces liquidity management risks, and maximizes capital allocation velocity. From the Internal Business Process perspective, the technology converts slow, sequential accounting checks into an instantaneous, concurrent verification engine, completely eliminating the need for periodic manual bank reconciliations (Iqbal, 2022). Regarding Stakeholder Satisfaction, both donors and beneficiaries experience friction-free interactions, establishing higher retention rates and deeper institutional loyalty. Finally, within the Learning and Growth paradigm, the institutional shift toward blockchain-driven operations forces organizations to continuously upgrade their human capital and technological competencies, thereby ensuring long-term sustainability and systemic resilience in the digital era (Rahim, 2025).

CONCLUSION

This systematic literature review successfully confirms the objectives stated in the introduction by comprehensively evaluating the integration of blockchain technology as a solution to transparency, trust, and reporting inefficiencies in Zakah management. The synthesized findings indicate a clear compatibility between blockchain's immutable, distributed architecture and the

operational needs of Islamic social finance. However, the study reveals that successful implementation is not merely a technological upgrade, but a complex socio-technical transition. Amil institutions face significant challenges, primarily the technical friction of integrating decentralized ledgers with existing Accounting Information Systems (SIA), behavioral resistance that can be evaluated through the Technology Acceptance Model (TAM), and a critical scarcity of specialized human capital as highlighted by the Resource-Based View (RBV). Despite these hurdles, the strategic deployment of smart contracts offers an unprecedented opportunity to automate Asnaf verification, minimize administrative overhead, and restore Muzakki trust through radical transparency. Regarding the prospects for the development of research results, the academic discourse must now transition from theoretical explorations to rigorous empirical validation. Future studies should focus on the practical application of blockchain within grassroots Islamic economic frameworks, particularly analyzing its role in strategies to improve the performance of Sharia Microfinance Institutions (Lembaga Keuangan Mikro Syariah) based on digitized SIA. There is a profound opportunity for subsequent research to utilize advanced statistical tools, such as Partial Least Squares Structural Equation Modeling (PLS-SEM), to empirically measure stakeholder adoption metrics. Furthermore, application prospects should include the development of multi-dimensional performance evaluation frameworks, utilizing tools like the Balanced Scorecard, to precisely quantify how blockchain integration impacts the financial stewardship, internal business processes, and long-term organizational learning of Zakah management institutions.

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