LAA MAISYIR: Jurnal Ekonomi Islam
p-issn: 2476-9371
e-issn: 2580-9512
Vol:13 No. 1 2026
DOI: 10.24252/lamaisyir.v13i1.66216

Integrating Islamic Finance, Blockchain, and ESG: A Systematic Literature Review of the Halal Supply Chain Ecosystem

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Received: 3 Marc 2026; Revised: 12 May 2026; Published: 26 June 2026

Abstract

This systematic literature review critically examines the evolving nexus between Islamic finance, digital technology, and sustainability within Halal Supply Chain Management (HSCM). Its primary aim is to synthesize existing knowledge and identify critical research gaps to advance the field beyond thematic silos. The study employs the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol, analyzing 130 peer-reviewed articles sourced from the Scopus database. The findings reveal a maturing yet fragmented research landscape. While studies robustly establish digital technologies, particularly blockchain, as transformative solutions for ensuring halal integrity and traceability, and increasingly link HSCM with sustainability principles (halalan thayyiban), the strategic role of Islamic finance remains conspicuously underdeveloped. Our novel triadic framework exposes this as a fundamental disconnect: literature largely treats finance as a peripheral or macroeconomic factor, failing to specify how Sharia-compliant instruments (e.g., Sukuk, Takaful) can strategically fund digital adoption or incentivize sustainable practices. This represents a critical gap between identified operational needs and the financial mechanisms for their realization.

Keywords: Islamic finance; Halal Supply Chain; Blockchain; ESG; Systematic literature review

1. INTRODUCTION

The convergence of Islamic finance and the global halal industry has emerged as a critical area of scholarly inquiry, particularly within Muslim-majority economies. While foundational research focused on distinct elements-such as the risk-mitigation role of Islamic financial instruments (Farihana & Rahman, 2020) or the operational definitions of Halal Supply Chain Management (M. I. Khan et al., 2018). contemporary discourse recognizes a necessary evolution. The inherent complexity of ensuring Shariah compliance from source to consumer has shifted attention toward the synergistic potential where Islamic finance strengthens halal logistics and operations. This is evidenced by studies demonstrating how technologies like blockchain enhance traceability and trust

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DOI: 10.24252/lamaisyir.v13i1.66216
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in countries like Malaysia and Indonesia (Ali et al., 2021) ; (Susanty et al., 2023) thereby creating broader investment avenues in sectors from halal tourism to pharmaceuticals (Sulong et al., 2024). Today, Islamic financial institutions are increasingly framed not merely as funders but as vital enablers of a resilient, sustainable halal ecosystem, aligning financial practices with broader Sustainable Development Goals (Umar, 2024) and highlighting the interdependence of entrepreneurship and finance (Raimi et al., 2024).

This evolution reflects a paradigm shift from compliance-centric, standard-driven models to holistic frameworks integrated with digital innovation and sustainability. Early HSCM literature emphasized physical logistics and certification (Ali & Suleiman, 2018); (Poniman et al., 2015), approaches often challenged by transparency gaps and fraud risks (M. I. Khan et al., 2021). The last decade, however, has been defined by the disruptive adoption of blockchain and AI, enabling immutable, real-time supply chain transparency that significantly bolsters integrity assurance (Usmanova et al., 2022); (Yakubu et al., 2025) Concurrently, the scope of research has expanded beyond halal assurance to encompass the halalan thayyiban principle, integrating ethical, quality, and socio-environmental considerations into a cohesive ecosystem view that links operational efficiency with Islamic finance and sustainability objectives (Haleem et al., 2024); (Napitupulu et al., 2024). External drivers like the COVID-19 pandemic have further accelerated this shift, exposing vulnerabilities and underscoring the need for digital, resilient supply chains (Hidayat et al., 2021).

Despite this progress, a critical synthesis gap persists. Previous review studies while valuable have largely examined Islamic finance, digital technology, and sustainability within separate thematic silos. Bibliometric analyses have effectively mapped dominant clusters around certification, traceability, and logistics (Wahyuni et al., 2024); (Rusydiana et al., 2023)(Indarti et al., 2020), yet they often fail to adequately integrate the dimension of Islamic finance as a core structural support for the HSC ecosystem. This creates a disconnect from empirical realities showing the complex, sometimes counterintuitive, impact of Shariah-compliant financing on supply chain outcomes (Rofik et al., 2025); (Yuli & Rofik, 2023). Furthermore, methodological limitations, such as reliance on single databases like Scopus, risk selection bias and may overlook significant contributions from diverse scholarly sources.

Addressing these gaps, the novelty of this study lies in its integrative triadic framework, systematically synthesizing literature at the intersection of Islamic Finance, Blockchain Technology, and ESG Sustainability. This review makes three key contributions: first, it provides a cohesive conceptual map that

transcends traditional thematic boundaries to illuminate the dynamic interactions between these three pillars. Second, it employs a methodologically robust, multi-source approach to mitigate database bias and capture a more comprehensive view of the field's evolution. Third, it precisely identifies underexplored nexus points, particularly concerning how specific Islamic financial instruments (e.g., Sukuk, Takaful) interact with digital traceability solutions to drive sustainable performance. To guide this inquiry, we pose the following research questions: (1) What are the longitudinal publication trends and dominant theoretical foundations in HSCM research (2015-2025)? (2) How have core research themes evolved, and how are finance, technology, and sustainability dimensions represented and interconnected? (3) Based on our integrated framework, what specific research gaps emerge at the intersections of these dimensions? The paper is structured to answer these questions, proceeding from methodology to bibliometric and thematic findings, a discussion of gaps and future agenda, and a concluding summary.

This section also clearly and systematically describes the research results conducted by previous researchers that are relevant to this research. Provide a strong argument that the research written is fascinating to read. This section also contains the existing theoretical basis and is written concisely to strengthen this article's argument. Previous studies must be relevant to this paper and be valid and reliable primary sources.

2. METHODS

This study was conducted as a Systematic Literature Review (SLR), adhering to the established protocol of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to ensure methodological rigor, transparency, and reproducibility (Mohd Shuhaimi et al., 2025). The complete process, visualized in Figure 1, unfolded through four distinct stages: identification, screening, eligibility, and inclusion. The identification phase commenced with a targeted search in the Scopus database, selected for its comprehensive and curated index of high-impact, peer-reviewed journals, which provides greater reliability compared to broader but less filtered academic search engines (Harwati et al., 2025) We constructed a search string using key terms such as "Sharia-compliant financing," "Halal Supply Chain Management," and "sustainable halal ecosystem," bounded by the publication years 2015 to 2025 to capture the most relevant contemporary discourse. This initial search yielded 389 records, which were subsequently managed and subjected to preliminary

automated filtering using the Watase System to enhance efficiency (Wahyuni et al., 2024)(Wahyudi, 2024).

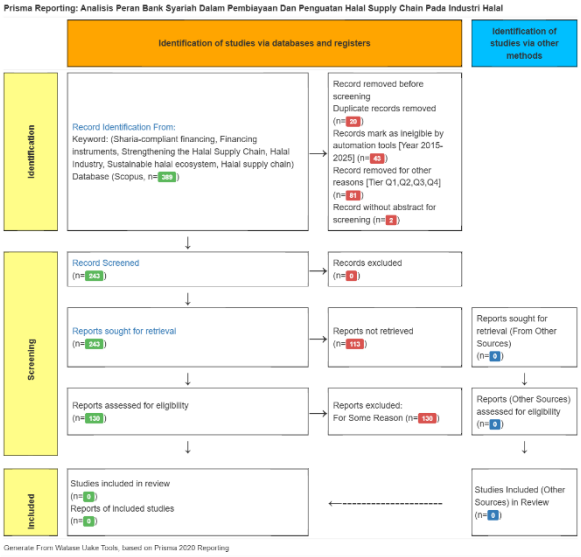

Figure 1Prisma Reporting

The screening stage involved a multi-tiered refinement process. After removing 20 duplicates, we applied exclusion criteria sequentially: 43 records were automatically filtered out for falling outside the specified publication window, 81 were excluded for not being published in Scopus-indexed journals (Q1-Q4), and 2 were removed due to missing abstracts. This left 243 records for title and abstract screening, from which none were excluded, leading to full-text retrieval attempts. We successfully obtained the complete manuscripts for 130 articles, while 113 were inaccessible. The eligibility stage involved a thorough full-text review of these 130 studies against the inclusion criteria, which confirmed their direct relevance to the research focus; consequently, no studies were excluded at this final hurdle. Thus, all 130 articles were included in the qualitative synthesis. For data analysis, we employed a thematic analysis approach, facilitated again by the Watase System, to systematically code, categorize, and synthesize the literature, identifying dominant patterns and emerging themes related to the convergence of Islamic finance, digital technology, and sustainability within the halal supply chain ecosystem.

3. RESULT AND FINDINGS ANALYSIS

Our systematic review of 130 key studies reveals a dynamic and evolving body of scholarship on Halal Supply Chain Management (HSCM). The intellectual landscape, as visualized through keyword mapping, clusters around several dominant themes that reflect both the field's foundational concerns and its emerging frontiers. At its core, the literature is preoccupied with 'Halal Supply Chain' and 'Halal Industry'—themes that anchor the fundamental challenge of integrating religious compliance into complex global logistics. This operational core is invariably linked to the pursuit of 'Halal Integrity' and 'Traceability', underscoring a persistent industry and academic imperative to maintain a product's Shariah-compliant status from its origin to the consumer's hand (Vanany et al., 2024)

Interestingly, the keyword analysis reveals a powerful secondary cluster dominated by 'Blockchain' and the 'Internet of Things (IoT)'. This technological dimension is not treated in isolation but is robustly connected to the core operational themes, demonstrating its perceived role as a primary enabler for solving traditional challenges of transparency and verification(Ali et al., 2021) (Yakubu et al., 2025) .A more muted, yet significant, presence is noted for financial themes such as 'Islamic Finance' and 'Sharia-compliant Financing'. Their relatively lower frequency and more peripheral connectivity in the keyword network suggest that while recognized as important, the integration of Islamic financial mechanisms into the operational fabric of HSCM remains a less developed, and arguably more fragmented, stream of inquiry. Geographically, the discourse is overwhelmingly shaped by research from Malaysia and Indonesia, a concentration that provides rich contextual insight but also points to a potential regional bias in the prevailing models and solutions (Susanty et al., 2

1. Navigating the Literature Through an Integrative Lens

To move beyond a descriptive mapping and critically synthesize these diverse themes, we apply the integrative triadic framework proposed in our introduction. This framework-which examines the intersections of Islamic Finance (IF), Digital Technology (DT), and ESG Sustainability (ESG)-proves invaluable in structuring the literature and revealing its connective tissues and, more importantly, its disconnects.

The literature concerning Digital Technology (DT) as a Transformer is arguably the most vigorous and solution-oriented. A strong consensus positions Blockchain not merely as a useful tool, but as a paradigm-shifting technology

capable of delivering the immutable, end-to-end traceability that has long eluded traditional halal assurance systems (Sumarliah et al., 2023). This is complemented by growing research on AI for predictive analytics and IoT for real-time monitoring, painting a picture of a highly technologized future for HSCM (N. Khan et al., 2025).

Simultaneously, an evolving discourse positions ESG Sustainability (ESG) as an Integrator of halal principles with broader ethical and planetary concerns. This stream, crystallizing around the concept of Halal-Sustainable Supply Chain Management (HSSCM), compellingly argues that the Islamic principle of halalan thayyiban inherently transcends ritual permissibility to encompass environmental stewardship, social justice, and ethical governance (S. Khan et al., 2020). Studies here begin to model these connections, particularly for small and medium enterprises (Karahalil, 2020).

In contrast, the body of work on Islamic Finance (IF) as an Enabler presents a more complex picture. Foundational studies rightly identify the need for supportive financing as a critical success factor, and subsequent research examines specific instruments like Murabahah for operational needs (Mohd Nawawi et al., 2019). However, a closer reading reveals a curious bifurcation. At a macroeconomic level, studies probe the impact of Islamic finance on industry growth, with findings that can be surprisingly contradictory, as seen in Yuli and Rofik's (2023) analysis of employment effects. At the micro-level, the focus is often on basic Shariah-compliant working capital. What remains conspicuously underdeveloped is the strategic linkage—the meso-level analysis of how Islamic finance can be specifically structured to catalyze and fund the very technological and sustainable transitions the other two streams describe.

2. Critical Analysis: Maturity, Convergence, and Glaring Omissions

A deeper thematic analysis exposes not just the field's strengths but also its significant blind spots, which are often found at the intersections of our three framework pillars.

The Operational-Technological Nexus is where the literature is most mature. The argument for blockchain's utility in combating fraud and ensuring integrity is now well-rehearsed and convincing (McElwee et al., 2017). However, this maturity masks a critical implementation chasm. An overwhelming majority of blockchain proposals remain conceptual or confined to pilot studies (Ahamed et al., 2023). The literature is notably silent on the practicalities of scalable governance 023).

The literature is notably silent on the practicalities of scalable governance models, the true total cost of ownership for SMEs, and the necessary evolution of halal certification standards to recognize digital, decentralized proofs of compliance. The focus remains stubbornly techno-centric, with insufficient attention paid to the socio-organizational changes required for adoption.

Conversely, the Sustainability Convergence represents the field's most significant conceptual advancement, successfully repositioning halal from a niche religious market to a participant in global ethical consumption. The gap here, however, is one of empirical substantiation. While frameworks like HSSCM are eloquently proposed (Karahalil, 2020), there is a striking scarcity of research that moves from conceptual alignment to quantitative measurement. We find few studies that empirically quantify, for instance, the carbon footprint reduction from optimized halal logistics or the social impact of ethical sourcing practices mandated by halal principles. Without such metrics, claims of sustainability risk remaining aspirational rather than demonstrable.

The most glaring omission, however, lies in the underexplored role of Islamic Finance. Our analysis confirms it as the weakest and least-integrated pillar. The literature fails to convincingly bridge finance with the other two domains. We are left with pressing, unanswered questions that sit at the heart of building a resilient halal ecosystem: How can Islamic financial instruments be innovatively structured to fund the capital-intensive adoption of blockchain or IoT systems? Could risk-sharing instruments like Mudharabah be designed to enhance collective supply chain resilience, distributing the burdens and benefits of disruption recovery? Perhaps most intriguingly, is there potential to design green Sukuk or preferential Takaful models that directly incentivize suppliers' adoption of sustainable practices, creating a tangible financial link between IF and ESG outcomes? The current literature offers few clues.

This analysis is further contextualized by the field's pronounced geographic concentration. The deep, contextual knowledge gained from focusing on Indonesia and Malaysia is invaluable. Yet, it inevitably introduces a bias. The models and solutions are tailored to specific regulatory and economic environments, limiting their transferability. We lack understanding of how the finance-technology-sustainability nexus operates in Muslim-minority export nations like Australia or Thailand, or in regions with strong Islamic finance hubs but different halal market dynamics, such as the Gulf Cooperation Council countries. This contextual gap limits the generalizability of the field's findings.

3. Synthesizing the Research Frontier and Charting a Path Forward

The synthesis of our findings, particularly when visualized as a network of concepts, paints a revealing picture. The current body of knowledge forms a dense, well-connected cluster around the "Operational Integrity + Digital Transformation" nexus, with a steadily growing branch reaching toward "ESG Sustainability." The node for "Islamic Finance," however, appears somewhat isolated, connected by thin, largely theoretical threads rather than robust, empirical links.

This visualization makes the research frontier starkly clear: the largely uncharted territory between Islamic Finance and the Digital/Sustainability clusters. The primary contribution of this review is to map this white space and propose pathways for its exploration. Future research must actively build these connections. Promising directions include developing and testing integrated theoretical models where Islamic finance is positioned as a direct antecedent to technology adoption; engaging in action research to design and pilot novel financial products for supply chain digitization; and conducting rigorous comparative studies across diverse geographic contexts to build a more universal and robust theory of the integrated halal ecosystem. By moving to address these gaps, scholars can transition from describing the convergence of finance, technology, and sustainability to actively explaining its mechanisms and facilitating its realization, ultimately contributing to a more resilient, ethical, and prosperous global halal industry.

4. DISCUSSION

This systematic review has sought to navigate and synthesize the increasingly complex research terrain where Islamic finance, digital innovation, and sustainability concerns converge within Halal Supply Chain Management (HSCM). By applying a novel integrative lens the triadic framework of Islamic Finance (IF), Digital Technology (DT), and ESG Sustainability (ESG) we have moved past merely listing dominant themes to critically examine how these streams of inquiry relate to, and perhaps more tellingly, fail to inform, one another. The analysis reveals a field in vigorous pursuit of technological solutions to enduring integrity challenges, yet one that appears to be operating with a curiously underdeveloped financial-strategic vocabulary. Put simply, the literature excels at diagnosing the problem and proposing high-tech cures, but remains surprisingly quiet on the crucial question of who pays for the treatment

and how the economics of the cure are structured. This discussion interprets these findings within the broader scholarly conversation, weighs their theoretical consequences, and clarifies the distinctive contribution of this review.

1. Interpreting the Landscape: Confirmation, Nuance, and a Stark Omission

Our findings strongly affirm that the heart of contemporary HSCM research beats within an operational-technological nexus. The preeminence of themes like 'Halal Integrity' and 'Traceability,' coupled with their robust linkage to 'Blockchain' and 'IoT,' squarely aligns with the trajectory noted in earlier reviews by Wahyuni et al. (2019) and Indarti et al. (2020). The academic consensus is clear: digital technology is viewed as the definitive answer to historical vulnerabilities of fraud and opacity in halal chains (McElwee et al., 2017; Ali et al., 2021). However, our synthesis introduces a necessary dose of pragmatism to this techno-optimistic narrative. While the blueprints for blockchain-based traceability are impressively detailed in studies like those of (Susanty et al., 2023)Susanty et al. (2023) and (Adhiwibowo et al., 2025)Adhiwibowo et al. (2025), the literature largely stalls at the pilot stage. What is conspicuously absent is a frank discussion of the messy realities of scaled implementation: the governance models for decentralized networks, the true cost-benefit calculus for a small-scale halal meat processor, or the procedural hurdles in getting a traditional halal certification body to accept a digital ledger as proof. In this sense, our review extends prior work by shifting the focus from technical feasibility to the socio-institutional feasibility of these technological promises.

Simultaneously, the emergence of a sustainability convergence marks a significant and welcome evolution in the field's self-conception. This development powerfully resonates with the arguments of (S. Khan et al., 2020)Haleem et al. (2020) and (Napitupulu et al., 2024)Napitupulu et al. (2024), who posit that the halalan thayyiban principle inherently embraces ethical and environmental stewardship. This reframing is strategically astute, positioning the halal industry as a natural ally in global sustainable development. Yet, herein lies a curious contradiction. In contrast to the technically detailed DT research, the sustainability discourse often remains conceptually elegant but empirically light. We found a striking scarcity of studies that move beyond framing to actually measure the environmental footprint of a halal logistics model or quantify the social impact of its ethical sourcing guidelines. Without such empirical grounding, the alignment between halal and sustainability risks being a compelling assertion rather than a demonstrated outcome a gap our review brings into sharp relief.

The most significant and novel insight from our analysis, however, concerns the peripheral and fragmented role of Islamic Finance. While previous reviews, such as those by (Rusydiana et al., 2023)Rusydiana et al. (2023) or (Arifin et al., 2022)Mustapha et al. (2024), acknowledged the presence of financial themes, they typically catalogued them in isolation. Our integrative framework exposes a more fundamental issue: Islamic finance operates in a parallel scholarly universe, only loosely connected to the core operational and technological debates. The literature splits, somewhat unhelpfully, between macroeconomic analyses of industry growth (Yuli & Rofik, 2023)(Rofik et al., 2025) and micro-level studies on basic Shariah-compliant working capital (Jaswir et al., 2023) (Aderemi & Ishak, 2022). What is almost entirely missing—and this is the critical void our review identifies is research that treats Islamic finance as a strategic toolkit. Where are the studies exploring Ijara-based leases for blockchain infrastructure, or Green Sukuk structured to finance renewable energy in halal production facilities? The silence on these questions reveals a profound disconnect between the industry's aspirational goals and the financial engineering required to achieve them.

The distinct contribution of this SLR lies not in discovering new, isolated themes, but in rigorously diagnosing the disconnects between the themes that already dominate the literature. Previous reviews have been excellent cartographers, mapping the mountains of 'blockchain research' and the valleys of 'sustainability studies' (Wahyuni et al., 2019; Indarti et al., 2020). Our review, however, acts as a geologist, examining the fault lines between these areas. We demonstrate that the field's infrastructure is unstable because its financial foundations are not fully integrated with its technological and ethical ambitions.While scholars have adeptly used theories like the Resource-Based View (RBV) to explain how halal certification creates competitive advantage (Abd Rahman et al., 2021), our analysis suggests this theory needs retooling. It must account for Shariah-compliant capital itself as a strategic resource that enables the acquisition and development of other capabilities. Similarly, the prevalent focus on linear models linking finance directly to performance overlooks the complex reality. Our findings suggest that technology adoption and institutional pressure are not mere control variables but are likely key mediators that transform financial input into operational outcome. By highlighting these missing connections, we provide a more coherent, if more complicated, picture of the halal ecosystem one where success depends on synergistic alignment, not parallel progress.

2. Theoretical Repercussions: A Call for More Ambitious Frameworks

The implications for theory development are substantial. First, there is a pressing need to build hybrid theoretical models that can comfortably accommodate faith-based norms alongside economic and technological variables. For instance, can elements of Institutional Theory, which explains how organizations respond to regulatory pressure, be blended with the Technology-Organization-Environment framework to predict how Islamic banks might fund blockchain adoption under different national halal policies? The field requires these more sophisticated, mid-range theories to move beyond simple correlation studies.

3. For Practitioners and Policymakers: The Imperative for Integration

For those shaping the real-world halal industry, the message from this review is unequivocal: silos are a luxury that cannot be afforded. A stunning blockchain traceability system is of little use if the smallholder farmers in the chain cannot afford the sensors or if the financing to implement it carries prohibitive terms. Therefore, Islamic financial institutions face both a challenge and an opportunity. The challenge is to innovate beyond standardized Murabahah contracts and develop tailored products—like technology leasing (Ijara) funds or sustainability-linked Takaful-that directly address the capital needs of a modernizing halal supply chain.

For policymakers and industry bodies, the task is to foster connective tissue. This could involve creating innovation grants that require consortiums of tech firms, Islamic banks, and SMEs to apply together, thereby forcing collaboration. Halal certification authorities must also modernize, developing the expertise to audit digital trails and provide assurances that are as robust in the digital realm as they are on the factory floor. In essence, building a resilient and ethical global halal industry is not a sequential process of first ensuring integrity, then adding technology, and later considering finance. It is an integrative endeavor where all three elements must be designed and advanced in concert. This review, by mapping the current gaps in that integration, hopes to provide a roadmap for a more coherent and impactful path forward.

Second, the heavy geographic concentration of research in Southeast Asia, while providing rich depth, serves as a cautionary note. It suggests that many of our current theoretical assumptions are deeply context-embedded, shaped by the specific regulatory and market conditions of Indonesia and Malaysia. This limits their generalizability. Future theoretical work must explicitly incorporate

dimensions of institutional distance and market maturity, allowing for predictions about how the finance technology sustainability nexus might function in, say, the GCC's top-down industrial contexts or in Muslim-minority

5. CONLUSION

This systematic review has sought to unravel the intricate tapestry of research connecting Islamic finance to Halal Supply Chain Management. Our journey through the literature reveals a field alive with innovation, particularly in harnessing digital technologies like blockchain to solve enduring challenges of traceability and integrity. Equally compelling is the emerging narrative that weaves halal principles into the broader fabric of sustainability, suggesting an industry keen to align with global ethical imperatives. Yet, amidst these advances, our analysis uncovers a puzzling and consequential shortcoming. The role of Islamic finance—the very lifeblood that could animate these technological and sustainable aspirations—remains curiously underdeveloped, often relegated to the sidelines of strategic discussion.

The central contribution of this review, therefore, is to shine a light on this critical disjunction. We have moved beyond cataloging popular themes to diagnose a systemic gap: a field adept at prescribing high-tech cures and ethical frameworks, but surprisingly hesitant to detail the economic prescription the specific financial mechanisms required to administer them. This is not merely a gap in the literature; it represents a fundamental strategic lacuna for the industry itself. The promising convergence of digital and sustainable HSCM cannot reach its full potential without a parallel evolution in Islamic financial engineering designed explicitly to support it. Looking ahead, we see fertile ground for research that deliberately bridges these divides. Future studies should pivot from asking if Islamic finance is important to investigating how it can be innovatively applied. Three avenues seem particularly promising:

ACKNOWLEDGEMENT:

We thank our institution, **Universitas Darunnajah** for providing aplace to conduct this research.

AUTHORS' CONTRIBUTIONS:

Hadiyanto Arief, Zaenal Abidin, Wildan Sifaudin, Writing oiginal draft preparation. Ideas; formulation or evolution of overarching research goals and aims.

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