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Problems and Strategies for Developing Sharia Fintech in Indonesia: Regulatory, Operational, Technology, Financing, and Human Resources Perspectives

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Abstract

The development of financial technology (fintech) in Indonesia has increased significantly over the past two decades, expanding access to digital financial services, including payments, financing, and investment. Amid this trend, Islamic fintech has emerged as an alternative that operates in accordance with Sharia principles, such as the prohibition of *riba* (interest), *gharar* (uncertainty), and *maisir* (gambling). However, its implementation continues to face challenges in regulatory, operational, technological, financial, and human resource aspects. This study aims to identify the main problems facing Islamic fintech in Indonesia and to formulate development strategies from regulatory, operational, technological, financial, and human resource perspectives. This research adopts a qualitative approach with a case study design. Data were collected through in-depth interviews with informants, including industry practitioners, regulators, and academics, focus group discussions (FGDs), document analysis, and field observations. Semi-structured interviews were conducted to obtain in-depth insights. Data analysis employed thematic analysis and content analysis, with triangulation used to ensure the credibility of the findings. The results reveal several key issues, including the absence of optimal and specific regulations for Islamic fintech, low levels of digital Islamic financial literacy, limited technology-based supervision, and challenges in integrating technology with the existing Islamic financial ecosystem. Financial challenges are also prominent, particularly the risk of default in Sharia-compliant peer-to-peer (P2P) lending services and limited funding sources. The implications of this study highlight the importance of strengthening regulatory frameworks, enhancing Islamic financial literacy, utilizing big data and artificial intelligence for Sharia-compliant credit scoring, and developing integrated human resources to strengthen the inclusion and competitiveness of Islamic fintech in Indonesia.

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INTRODUCTION

The development of financial technology (fintech) over the past two decades has transformed the global financial services landscape through faster, more efficient, and more accessible services, including digital payments, financing, investment, financial management, and insurance (Feriyanto et al., 2024; Harlan, 2025; Iman, 2020; Mashoene et al., 2025). Empirical evidence indicates that the adoption of fintech innovations can deepen financial inclusion by improving access, affordability, and ease of use of digital financial services, particularly for previously underserved populations (Komariyah & Febriana, 2025; Senyo & Osabutey, 2020). In developing countries, fintech is often viewed as a lever for bridging gaps in financial service infrastructure while expanding access to

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funding for households and small businesses. In Indonesia, the acceleration of digitalization has been driven by increasing internet penetration and smartphone usage, which has, in turn, stimulated rapid growth in the fintech industry and diversification of service models. Regulatory data indicate that by 2023 there were more than 100 licensed fintech lending providers, serving as alternative financing channels for unbanked and underbanked communities (Mashoene et al., 2025). This development aligns with SDG 8 (inclusive economic growth) and SDG 9 (industry, innovation, and infrastructure), as financial innovation contributes to productivity, entrepreneurship, and service transformation (Sunarta et al., 2025). Thus, fintech has evolved not merely as a technological phenomenon, but also as a policy instrument closely linked to the sustainable development agenda.

In line with this trend, Islamic fintech has emerged as an alternative that offers a value proposition grounded in Sharia principles and ethical considerations, with the aim of expanding access to financial services that align with values of justice and social welfare (Firmansyah & Harsanto, 2022). The literature suggests that fintech innovation within the Islamic finance ecosystem creates opportunities for efficiency, inclusivity, and broader service reach, while simultaneously demanding robust governance and compliance frameworks (Dawood et al., 2022). Indonesia possesses significant market potential due to its demographic characteristics and the growing preference for Sharia-compliant financial services, alongside opportunities to accelerate Islamic financial inclusion through digital channels. From an SDG perspective, Islamic fintech is closely related to SDG 10 (reduced inequalities), as it expands fairer access to financing for vulnerable groups and micro, small, and medium-sized enterprises (MSMEs) (Komariyah & Febriana, 2025; Nasution & Alif, 2025). Nevertheless, market dynamics indicate that differentiation in Islamic fintech cannot rely solely on Sharia-compliant contracts, but must also encompass product design, risk governance, and technological innovation that are consistent with the objectives of Sharia (maqasid al-shariah). Therefore, the development of Islamic fintech requires strategies that integrate value-based principles, technology, and sustainability to ensure measurable contributions and resilience to industry risks (Hidayah & Rosyadi, 2025; Sulistiawati & Hastuty, 2025).

Recent studies emphasize that the sustainability of fintech, including Islamic fintech, faces multidimensional and interrelated challenges, ranging from financial literacy and credit risk to regulatory compliance and cybersecurity (Alshater et al., 2022; Dawood et al., 2022). In the financing dimension, research on peer-to-peer (P2P) lending indicates that default risk is influenced by macroeconomic factors and borrower credit characteristics, implying that portfolio stability requires robust screening and monitoring systems (Nigmonov et al., 2022). Information asymmetry has also been shown to affect borrowing behavior and increase default probabilities, making the strengthening of screening and signaling mechanisms a critical issue (Wang & Li, 2023). From a regulatory perspective, the literature highlights that policy responses such as regulatory sandboxes can foster innovation ecosystems; however, their effectiveness depends on institutional design, regulatory capacity, and inter-authority coordination (Goo & Heo, 2020; Kálmán, 2025). Some critical studies further argue that sandboxes may give rise to “riskwashing” if innovation is not accompanied by adequate consumer protection and risk controls (Brown & Piroska, 2022). In addition, cybersecurity threats have become increasingly prominent within the fintech ecosystem, necessitating stronger risk management frameworks and institutional preparedness (Idayani et al., 2024). Accordingly, the challenges facing Islamic fintech should be understood as systemic issues that require cross-dimensional strategies rather than isolated or partial solutions.

Based on a preliminary study involving a review of regulatory documents and industry reports, the development of Islamic fintech in Indonesia exhibits several early indications that underscore the urgency of further research. First, while the growth in the number and variety of fintech services has been rapid, differentiation in Islamic fintech services often remains limited to contractual adjustments, without being accompanied by sufficient technological innovation and risk governance. Second, in the context of P2P lending, issues related to the quality of credit assessment and default risk mitigation remain critical, as they directly affect platform sustainability and user trust (Nigmonov et al., 2022). Third, cybersecurity and data protection challenges have become increasingly important, given the vulnerability of digital financial services to cyberattacks and data breaches, which ultimately threaten system stability and consumer protection (Idayani et al., 2024).

Fourth, the need for adaptive regulatory frameworks has intensified, as innovation continues to outpace the updating of supervisory instruments (Goo & Heo, 2020; Kálmán, 2025). These preliminary findings reinforce the need for more focused research to systematically map existing challenges and derive operationalizable strategic recommendations for both industry stakeholders and regulators.

Building on this gap, this study aims to (1) identify and classify the key challenges of Islamic fintech in Indonesia across regulatory, operational, technological, financial, and human resource dimensions; and (2) formulate development strategies for a sustainable Islamic fintech ecosystem aligned with the SDGs. The gap addressed by this study lies in the limited number of studies that integrate P2P credit risk, innovation governance, cybersecurity, and advanced technological approaches into a single coherent strategic framework, particularly within the context of Islamic fintech. The novelty of this research resides in the development of an integrative strategic framework that positions credit risk and cybersecurity as prerequisites for sustainability, while promoting the use of data analytics and artificial intelligence (AI) to enhance credit decision quality. Empirical evidence on the role of AI in credit scoring further demonstrates its potential to improve financial inclusion through changes in credit approval rates and risk management effectiveness, making it highly relevant for contextualization within Sharia-compliant credit scoring design (Li et al., 2024). Theoretically, this study enriches the Islamic fintech literature by integrating issues of adoption, risk, and governance into a unified analytical model. Practically, the proposed recommendations are intended to assist regulators and industry practitioners in strengthening regulatory frameworks, risk infrastructure, and innovation strategies toward greater sustainability.

METHOD

This study employs a qualitative approach with a case study design to explore in depth the challenges and development strategies of Islamic fintech in Indonesia across regulatory, operational, technological, financial, and human resource dimensions. The case study design was selected because it allows researchers to understand contemporary phenomena within their real-life context and to examine policy dynamics, industry practices, and interactions among actors within the Islamic fintech ecosystem (Yin, 2018). A qualitative approach is considered appropriate for generating a comprehensive understanding of processes, meanings, and stakeholders' interpretations of the issues under investigation (Creswell & Poth, 2018). This research is descriptive–analytical in nature, aiming to describe the current conditions of Islamic fintech while simultaneously analyzing the challenges faced and alternative strategies that can be implemented. The analysis focuses on identifying key barriers and deriving both policy and managerial implications for strengthening industry sustainability. With this design, the study not only maps existing problems but also assesses the interrelationships among dimensions that influence ecosystem sustainability.

The research data consist of both primary and secondary sources. Primary data were collected through in-depth interviews with Islamic fintech industry practitioners, relevant regulators such as the Financial Services Authority (Otoritas Jasa Keuangan, OJK) and the National Sharia Council of the Indonesian Ulema Council (DSN–MUI), as well as academics or Islamic economics experts with substantial knowledge of industry development and Sharia compliance. Semi-structured interviews were conducted to maintain focus while allowing flexibility to probe deeper into issues emerging from informants' responses (Creswell & Poth, 2018). In addition to interviews, the study also employed focus group discussions (FGDs) with stakeholders, including Islamic fintech providers and service users, to capture diverse perspectives and enrich understanding of the issues identified. Secondary data were obtained from OJK reports on fintech development, academic publications (journal articles and books), and normative documents such as DSN–MUI fatwas and relevant regulations. Document analysis was used to examine policy frameworks, compliance standards, and formally documented industry developments (Yin, 2018). Observations were also conducted to gain insight into operational practices, risk management, and service mechanisms among Islamic fintech providers, ensuring that the findings were not solely dependent on informants' narratives but were supported by contextual evidence.

Data analysis was conducted using thematic analysis and content analysis. Thematic analysis was applied to identify patterns, organize findings into key themes, and develop systematic interpretations of data derived from interviews and FGDs (Braun & Clarke, 2006). Content analysis was used to extract core issues from regulatory documents, fatwas, and industry reports, particularly those related to regulation, technology, financing, operations, and human resource capacity. The analytical process followed the general stages of data reduction, data display, and conclusion drawing with iterative verification to ensure that interpretations remained consistent with the available evidence (Miles et al., 2014). The credibility of the findings was ensured through methodological and data source triangulation by comparing information obtained from interviews, FGDs, documents, and observations to check for consistency (Yin, 2018). Furthermore, informants were purposively selected based on their expertise and experience in the field of Islamic fintech to ensure the relevance and richness of the data. This study also adhered to research ethics principles, including informed consent, the protection of participants' confidentiality, and the use of data solely for academic purposes.

RESULTS AND DISCUSSION

Financial Technology

Financial technology (fintech) refers to financial service innovations that leverage digital technology to enhance operational efficiency and expand public access to financial products and services. Fintech not only represents the digitalization of financial transactions but also reflects a transformation in financial sector business models toward more inclusive, faster, and more transparent systems (Negarawati & Rohana, 2024). In practice, fintech encompasses a wide range of services, including digital payments, fund transfers, electronic wallets (e-wallets), financial planning, as well as application-based financing and investment services.

In Indonesia, Bank Indonesia classifies fintech into several main categories, namely crowdfunding, peer-to-peer (P2P) lending, market aggregators, and risk and investment management, including mobile payment and online banking services. This classification highlights the strategic role of fintech in improving the efficiency of payment systems and expanding financial inclusion, particularly for communities that have previously lacked access to formal banking services. Empirical findings indicate that the development of fintech in Indonesia has been exceptionally rapid, in line with increasing digital technology adoption and the growth of financial startups. This phenomenon has contributed to reduced operational costs, enhanced transaction transparency, and the acceleration of digital economic transformation aligned with the national financial inclusion agenda. Fintech has also acted as a catalyst in expanding access to financing for micro, small, and medium-sized enterprises (MSMEs), which have traditionally faced constraints in accessing conventional financial institutions.

Within this context, Islamic fintech has emerged as an alternative form of financial innovation grounded in Sharia principles, namely the prohibition of *riba* (interest), *gharar* (excessive uncertainty), and *maysir* (gambling). The operations of Islamic fintech typically employ Sharia-compliant contracts such as *murabahah*, *ijarah*, and *musyarakah*, which emphasize fairness, transparency, and profit-and-loss sharing. Although relatively new compared to conventional fintech, analytical findings indicate that Islamic fintech has experienced growth in tandem with increasing public awareness and preference for financial services that align with Islamic values. Overall, both conventional and Islamic fintech play an important role in expanding financial inclusion, improving economic efficiency, and strengthening the transparency of the national financial system. However, these findings also suggest that the sustainable development of fintech, particularly Islamic fintech, requires stronger regulatory frameworks, technological readiness, and adaptive operational models to ensure that the benefits of digital innovation can be optimized without undermining financial system stability.

The Development of Islamic Fintech in Indonesia

The advancement of digital technology has brought significant transformation to the global financial system, including in Indonesia. The digitalization of the financial sector has driven the emergence of financial technology (fintech) as an innovation that leverages information technology to enhance operational efficiency, strengthen transparency, and expand public access to financial services. From the perspective of Islamic economics, this transformation has given rise to Islamic fintech, namely digital financial services that operate based on Sharia principles by emphasizing values of justice, openness, and the prohibition of *riba* (interest), *gharar* (uncertainty), and *maysir* (gambling) (Dwi et al., 2021).

The findings indicate that Islamic fintech began to receive significant attention in Indonesia around 2016, alongside growing public awareness of the importance of using financial products and services that comply with Sharia principles. Data from the Financial Services Authority (Otoritas Jasa Keuangan (OJK), 2024), show that the number of licensed Islamic fintech providers has continued to increase, with more than twenty companies having obtained official legal authorization. This finding suggests substantial potential for the development of a Sharia-compliant digital financial ecosystem, particularly given that Indonesia has the largest Muslim population in the world. From an institutional and regulatory perspective, the development of Islamic fintech in Indonesia is relatively supported by a comprehensive legal framework and Sharia fatwas. Fintech operations, particularly information technology–based lending services, are regulated under OJK Regulation No. 77/POJK.01/2016. Meanwhile, Sharia compliance is reinforced through the issuance of the National Sharia Council of the Indonesian Ulema Council (DSN–MUI) Fatwa No. 117/DSN-MUI/II/2018 concerning information technology–based financing services in accordance with Sharia principles. The existence of these regulations and fatwas serves as an important instrument in ensuring that Islamic fintech operations remain compliant with Islamic law, while also providing legal certainty for industry players and protection for consumers.

Empirically, the development of Islamic fintech has made a tangible contribution to enhancing Islamic financial inclusion in Indonesia. The use of digital technology enables Sharia-compliant financial services to reach segments of society that were previously underserved by formal financial institutions, particularly in regions with limited banking infrastructure. Access to financing, investment, and other financial services has become faster, easier, and more transparent. This condition aligns with the policy direction outlined in the Indonesian Sharia Economy Master Plan 2019–2024, which positions financial digitalization as a key pillar in strengthening the national Sharia economy. Furthermore, (Otoritas Jasa Keuangan (OJK), 2024), indicate that the national Islamic financial literacy index increased from 8.93% in 2019 to 12.7% in 2022. This increase correlates with the growing number of Islamic fintech users, particularly among younger generations with high levels of digital technology adoption. These findings suggest that Islamic fintech not only functions as a financial transaction platform but also plays a role in raising public awareness of the importance of efficient financial services that are aligned with Islamic ethical and moral values.

Despite showing a positive growth trend, the analysis also reveals that the Islamic fintech industry in Indonesia continues to face several structural challenges. These challenges include low levels of Sharia-based digital literacy, limited human resources with dual competencies in technology and *fiqh muamalah*, and the suboptimal implementation of technology-based supervisory systems (regtech) that are suited to the characteristics and operational complexity of Islamic fintech (Irimia-Diéguez et al., 2024). These conditions indicate that the sustainability of Islamic fintech development depends not only on technological innovation but also on strengthening human resource capacity and adaptive supervisory systems.

Regulatory Challenges

Regulation is a fundamental aspect in ensuring the sustainability and operational compliance of Islamic fintech in Indonesia. As part of the relatively new digital financial industry, Islamic fintech requires a legal framework that not only regulates technical aspects, security, and consumer protection, but also ensures operational compliance with Islamic legal principles (*Sharia compliance*). Although the development of Islamic fintech shows a positive trend, the findings of this study reveal that regulatory aspects still face various normative, institutional, and implementation-related challenges.

Dualism Between Conventional Regulators and Sharia Authorities

One of the main regulatory challenges facing Islamic fintech in Indonesia is the dualism of authority between the Financial Services Authority (OJK) and the National Sharia Council–Indonesian Ulema Council (DSN–MUI). OJK is responsible for regulating prudential aspects, financial system stability, and consumer protection, while DSN–MUI ensures that business models and contractual structures comply with Sharia principles. However, the absence of an integrated coordination mechanism between these two institutions has resulted in inconsistencies in supervisory and Sharia certification processes (Otoritas Jasa Keuangan (OJK), 2024). In practice, some Islamic fintech providers have obtained operational licenses from OJK but have not yet received Sharia certification from DSN–MUI due to differing interpretations of the contracts used. This condition creates legal uncertainty and has the potential to undermine public trust in the legitimacy of Islamic fintech services. These findings underscore the need for integrated regulatory governance to align financial supervision with Sharia certification authority.

Limited Availability of Specific Regulations for Islamic Fintech

Another key challenge is the absence of specific regulations (lex specialis) that explicitly govern Islamic fintech. To date, fintech operations in Indonesia still primarily refer to OJK Regulation No. 77/POJK.01/2016 on Information Technology–Based Lending Services, which does not substantively distinguish between conventional and Islamic fintech (Jatnika et al., 2024). The lack of specific regulations forces Islamic fintech providers to comply with general rules that do not fully accommodate the characteristics of Sharia contracts, profit-and-loss sharing mechanisms, and risk management based on Islamic principles. Although DSN–MUI has issued Fatwa No. 117/DSN-MUI/II/2018 as an operational guideline, this fatwa does not carry binding legal force equivalent to government regulations. This situation highlights the urgency of establishing specific Islamic fintech regulations capable of comprehensively bridging positive law and Islamic law.

Regulatory Lag in Adapting to Technological Innovation

The analysis also reveals a gap between the rapid pace of fintech technological innovation and the slow adaptation of regulatory frameworks. Emerging business models such as blockchain-based crowdfunding, smart contracts, and Sharia-compliant decentralized finance (DeFi) lack clear legal foundations in Indonesia. This regulatory lag creates legal risks for businesses and weakens consumer protection (Sa'ad et al., 2022). Moreover, the limited adoption of Sharia-based regulatory technology (RegTech) further reduces the effectiveness of supervision. Without adaptive digital supervisory systems, regulators face difficulties in monitoring fintech transactions that are real-time, complex, and cross-border in nature.

Limited Synergy Between Supervisory Institutions and Industry

Another identified challenge is the limited synergy between regulators, Islamic financial institutions, and Islamic fintech industry players in policy formulation. Most regulations remain largely top-down and do not fully involve industry players as key stakeholders (Persaulian, 2021). As a result, some policies are considered insufficiently responsive to the business dynamics of Islamic fintech, particularly in the areas of microfinance, halal investment, and blockchain utilization. These findings suggest the need for a more collaborative and participatory regulatory approach involving OJK, DSN–MUI, industry practitioners, and Islamic economics scholars to ensure that resulting policies are not only legally sound but also practical and sustainable.

Lack of Standardization of Contracts and Sharia Compliance

The absence of standardized guidelines for the application of Sharia contracts in fintech services also represents a critical challenge. Although DSN–MUI has issued several fatwas, interpretations of contracts such as *murabahah*, *mudharabah*, and *wakalah bil ujrah* vary across providers (Arkham, 2019). Such variations risk blurring the distinction between Sharia-compliant and conventional products and may generate uncertainty among users. Therefore, the development of nationally applicable digital Sharia contract standards is necessary to strengthen Sharia compliance and enhance public trust in Islamic fintech transactions.

Limited Consumer Protection and Sharia Legal Literacy

The final issue concerns consumer protection and Sharia legal literacy. Many Islamic fintech users do not fully understand the differences between Islamic and conventional fintech services. Low levels of legal and financial literacy have led some consumers to use services that claim to be Sharia-compliant despite lacking official certification from DSN–MUI or OJK (Prastyanti & Habib, 2023). These findings emphasize the need to strengthen regulatory frameworks that focus not only on industry supervision but also on enhancing public education and transparency regarding the Sharia compliance status of fintech providers.

Operational Challenges

The analysis indicates that operational challenges constitute one of the main obstacles to the development of Islamic fintech in Indonesia. These challenges are primarily related to low public literacy regarding Islamic fintech, limited system integration between fintech platforms and the core banking systems of Islamic banks, as well as issues of data security and consumer protection. These three aspects are interrelated and directly affect adoption rates, public trust, and the operational sustainability of Islamic fintech.

Limited Public Literacy on Islamic Fintech

Islamic financial literacy is a key determinant of Islamic fintech adoption. Data from the 2022 National Survey of Financial Literacy and Inclusion (SNLIK) conducted by the Financial Services Authority (OJK) show that the Islamic financial literacy index in Indonesia reached only 9.14%, significantly lower than the conventional financial literacy index of 49.68% (Rahmawati et al, 2025). This low level of literacy indicates that the public has an inadequate understanding of the fundamental principles of Islamic fintech, including the use of contracts such as *murabahah*, *mudharabah*, and *wakalah*, as well as the prohibition of *riba*, *gharar*, and *maysir*.

This limited understanding hampers the public's ability to distinguish between Islamic and conventional fintech services, which in turn reduces user interest and trust. These findings are consistent with previous studies (Muzakkar et al., 2024) demonstrating that Islamic financial literacy significantly influences public interest in using Sharia-compliant P2P lending services. Furthermore, low levels of digital literacy, particularly in regions with limited internet access, widen the adoption gap for Islamic fintech. Therefore, enhancing Islamic financial literacy and digital literacy should be prioritized through collaboration among regulators, industry players, educational institutions, and community leaders.

Challenges in Integrating Fintech Systems with Islamic Bank Core Banking

System integration between fintech platforms and the core banking systems of Islamic banks is a crucial prerequisite for building an inclusive and efficient Islamic financial ecosystem. However, the findings reveal that this integration process still faces various technical and regulatory barriers. From a technical perspective, differences in technological infrastructure particularly the reliance on legacy systems by many Islamic banks limit application programming interface (API) compatibility and real-time data synchronization. From a regulatory standpoint, any form of integration must undergo Sharia compliance testing by the Sharia Supervisory Board (Dewan Pengawas Syariah, DPS), as well as supervision by OJK and Bank Indonesia. While these procedures are essential to ensure compliance with Sharia principles, they often require a relatively long process, thereby slowing the implementation of digital innovations (Surbakti & Nurzaman, 2024). Nevertheless, integration between fintech platforms and Islamic banking remains a key strategy for expanding the reach of Islamic fintech services, as it enables the utilization of existing banking infrastructure such as ATMs, mobile banking, and e-banking to enhance national Islamic financial inclusion.

Data Security and Consumer Protection

Data security and consumer protection represent highly critical operational challenges in Islamic fintech. The management of sensitive customer data makes fintech platforms vulnerable to data breaches, cyberattacks, and fraudulent practices. Several data breach cases involving Islamic financial institutions indicate that existing cybersecurity systems remain inadequate (Rohainul et al., 2024). This condition not only threatens public trust but also contradicts the principle of *amanah* (trustworthiness), which is a fundamental value in Islamic finance.

In addition, consumer protection in Islamic fintech continues to face challenges, particularly with respect to information transparency, complaint handling mechanisms, and dispute resolution. Many users lack a clear understanding of their rights and obligations as consumers of Islamic fintech services, while some providers have yet to establish effective complaint management systems. Accordingly, strengthening the operational aspects of Islamic fintech requires improvements in cybersecurity infrastructure, technology-based supervision, and continuous consumer education to ensure that the Islamic fintech industry can develop in a healthy, sustainable, and trustworthy manner.

Financing Challenges

The findings of this study indicate that financing-related challenges in Islamic fintech in Indonesia represent significant barriers to expanding financial inclusion and ensuring sustainable growth. These challenges are mainly associated with high default risk in Sharia-compliant peer-to-peer (P2P) lending services, limited implementation of Sharia-compliant credit scoring mechanisms, and constraints in funding sources derived from Sharia-based capital. These three issues are interconnected and affect the effective and inclusive distribution of financing, particularly for micro, small, and medium-sized enterprises (MSMEs).

High Default Risk in Sharia-Compliant P2P Lending

One of the key findings of this study is the high default risk experienced by Islamic P2P lending services. This risk primarily arises because most borrowers come from MSMEs and informal sectors that are vulnerable to economic fluctuations, limited capital, and unstable cash flows. Moreover, the Sharia context restricts the application of interest-based penalties or fines due to the prohibition of *riba*, thereby weakening incentives for timely repayment compared to conventional models. The accumulation of defaults has the potential to erode investor confidence, strain platform liquidity, and threaten the sustainability of Sharia-compliant financing models. These findings underscore the importance of innovative risk mitigation mechanisms, such as the establishment of reserve funds, the application of *takaful* (Islamic insurance) concepts, and the use of big data and machine learning technologies for early detection of default risk and optimization of credit decision-making.

Limited Sharia-Based Credit Scoring Mechanisms

Another challenge lies in the limited availability of credit scoring mechanisms that fully reflect Sharia principles. In practice, credit assessment models used by Islamic fintech providers in Indonesia still largely adopt conventional approaches that rely primarily on formal financial data. However, within a Sharia context, borrower assessments should also consider moral aspects, integrity, and adherence to Islamic principles, which are not fully captured by conventional methods. This limitation becomes more complex when Islamic fintech providers serve MSMEs and informal sectors that often lack formal financial records. While the use of alternative data—such as digital transaction histories, e-commerce records, and payment behavior on digital platforms—has the potential to improve credit scoring accuracy, it also introduces new challenges related to data validity, algorithmic bias, and data privacy. These findings highlight the need for inclusive credit scoring innovations that not only accurately capture credit risk but also align with Sharia principles and are supported by robust regulatory oversight.

Limited Sources of Sharia-Based Funding

An equally important financing challenge is the limited availability of funding sources for Islamic fintech. The findings show that Islamic fintech funding in Indonesia remains heavily dependent on capital from individual investors through P2P lending models, while participation from large institutional investors and the utilization of Sharia-based social funds such as *zakat*, *infaq*, *sadaqah*, and productive *waqf* remain minimal (Desky & Savitri, 2024). This condition constrains the capacity to channel financing to MSMEs with substantial capital needs, particularly in segments that are not yet bankable. Furthermore, low institutional capital participation is influenced by concerns over platform stability, weak regulatory frameworks, and uncertainty regarding default risks within the Islamic fintech ecosystem. This situation underscores the strategic need to diversify funding sources, including through the integration of Islamic social funds and collaboration with traditional Islamic financial institutions, to strengthen industry resilience and promote microeconomic empowerment.

Technological Challenges

The analysis indicates that technological aspects constitute one of the most critical challenges in the development of Islamic fintech in Indonesia. These challenges are not limited to technical capabilities in platform development but also encompass cost efficiency, system interoperability within the national digital financial ecosystem, and vulnerability to cybercrime risks. Such complexity places Islamic fintech in a more challenging position compared to conventional fintech, particularly for startups with limited resources.

High Costs of Developing Sharia-Compliant Platforms

The cost of developing technological platforms represents a major barrier to the growth of Islamic fintech. Platform development requires not only reliable and scalable digital infrastructure but also robust cybersecurity systems and compliance with Sharia principles through certification and supervision by the Sharia Supervisory Board (Dewan Pengawas Syariah/DPS). The need for periodic audits and continuous system adjustments in line with fatwas issued by the National Sharia Council–Indonesian Ulema Council (DSN-MUI) further increases operational costs, especially for startups that are still in the early stages of development.

These findings indicate that high technological costs may widen the competitiveness gap between Islamic fintech and conventional fintech, which generally benefits from stronger capital support. Therefore, government policy support through fiscal incentives, technology incubation programs, and strategic collaboration with Islamic banks and institutions managing Islamic social funds (such as zakat and productive waqf) is essential to ensure the sustainability of Islamic fintech innovation amid increasingly intense digital competition.

Interoperability Challenges with the Broader Digital Financial Ecosystem

System interoperability is a crucial prerequisite for Islamic fintech to be optimally integrated with the broader digital financial ecosystem, including banking institutions, e-wallets, marketplaces, and national payment systems. However, the findings indicate that Islamic fintech continues to face significant obstacles due to differences in technical standards, limited application programming interface (API) integration, and misalignment of cross-sector regulations (Alfathimi et al., 2024).

These interoperability constraints have a direct impact on the limited ease of cross-platform transactions, reduced user experience, and weakened competitiveness of Islamic fintech compared to other digital financial service providers. The findings underscore the need for API standardization, strengthened shared security protocols, and a regulatory framework that promotes seamless system integration so that Islamic fintech can operate efficiently and competitively within the national digital financial ecosystem.

Issues of Fraud, Phishing, and Cyberattacks

Cybersecurity issues have become an increasingly critical technological challenge in the operations of Islamic fintech. Dependence on digital systems makes fintech platforms vulnerable to various forms of cybercrime, including data theft, transaction manipulation, phishing, malware, and social engineering attacks. These risks not only have the potential to cause financial losses but may also undermine public trust in the Islamic financial ecosystem as a whole.

The analysis shows that mitigating cyber risks requires a comprehensive approach through the implementation of financial intelligence technologies, big data analytics, and machine learning to enable early detection of suspicious transaction patterns (Efendi et al., 2025). Nevertheless, the adoption of advanced security technologies is often constrained by high costs and a shortage of competent human resources. Therefore, cybersecurity strategies in Islamic fintech should encompass technological strengthening, enhanced digital security literacy among users, stricter regulatory frameworks, and continuous system audits to safeguard system integrity and maintain public trust.

Human Resource Challenges

The analysis indicates that human resource (HR) constraints constitute one of the structural factors hindering the development of Islamic fintech in Indonesia. These challenges are not merely related to the number of personnel, but more critically to the quality of competencies required to integrate digital technology expertise with an in-depth understanding of Sharia principles. This gap directly affects product innovation capacity, operational effectiveness, and the ability of Islamic fintech to sustainably respond to market demands.

Limited Availability of Hybrid Human Resources: Technology and Islamic Finance

One of the main challenges in the development of Islamic fintech is the limited availability of human resources with dual competencies, namely expertise in financial technology and a deep understanding of Islamic finance principles. Data show that approximately 80–90% of human resources in the Islamic finance sector in 2023 did not have an educational background in Sharia, resulting in gaps in the understanding of fundamental Islamic values such as justice, transparency, and the prohibition of riba (Ceasario & Nisa, 2025). This condition weakens the integration of digital technologies with Sharia-compliant principles, particularly in system design, digital contracts, and Sharia-aligned risk mitigation mechanisms. Consequently, Islamic fintech faces difficulties in developing innovative products that are not only technologically advanced but also possess strong Sharia legitimacy. These findings suggest that strengthening human resources with hybrid competencies is a critical prerequisite for the successful digital transformation of Islamic fintech.

Limited Product Innovation Oriented toward Maqashid Sharia

Human resource challenges are also reflected in the limited innovation of Islamic fintech products that are substantively oriented toward *maqashid sharia*. *Maqashid sharia*, which encompass the protection of religion (*hifz al-din*), life (*hifz al-nafs*), intellect (*hifz al-ʻaql*), progeny (*hifz al-nasl*), and wealth (*hifz al-mal*), require human resources who not only understand the legal–formal aspects of Sharia but are also capable of translating these values into the design of digital products and services. The findings indicate that the limited availability of competent human resources has led to inconsistent understandings of *maqashid sharia* across Islamic financial institutions, resulting in product innovations that tend to replicate conventional products with only contractual adjustments. Moreover, gaps in digital technology adoption further constrain the potential development of *maqashid sharia*–based products with broad social impact, such as inclusive financing, MSME empowerment, and the strengthening of the ummah's economy. This condition underscores that Islamic fintech innovation has not yet been fully directed as an instrument for achieving the socio-economic objectives of Islam (Mappaterru, 2025).

Limited Integration between Academic Research and Business Practice

Human resource challenges in Islamic fintech are further exacerbated by weak integration between academic research and business practice. Research on Islamic finance human resources in Indonesia remains dominated by normative, legal, and social studies, while industry-oriented research focusing on practical competency development and technological innovation remains limited. Consequently, higher education graduates are not fully prepared to meet the dynamic and technology-driven demands of the Islamic fintech industry. This condition is compounded by systemic challenges in the education sector, such as limited access in remote areas, curricula that are insufficiently adaptive to developments in the digital industry, and inadequate training for educators. The impact is evident in the low quality of human resources within the MSME sector, characterized by limited managerial skills, low technological literacy, and weak adaptability to digital market changes. This situation indirectly constrains the Islamic fintech ecosystem, given that MSMEs constitute the primary user segment of Sharia-based financing services (Pakpahan, 2025).

Impact on Islamic Banking

The development of Islamic fintech has significant implications for the existence and role of Islamic banking in Indonesia. The findings indicate that the emergence of Islamic fintech not only creates competitive dynamics but also opens opportunities for strategic collaboration that can strengthen the Islamic financial ecosystem as a whole. At the same time, however, there is a potential risk of disintermediation that must be carefully managed so as not to weaken the intermediation function of Islamic banks.

Fintech as a Competitor or Collaborator for Islamic Banks

Islamic fintech has the potential to become a competitor to Islamic banks by offering financial services that are faster, more flexible, and more easily accessible through digital platforms, such as peer-to-peer lending, crowdfunding, and digital wallets. With relatively lower operational cost structures and high technological adaptability, fintech firms are able to reach segments of society that have not been optimally served by Islamic banks, particularly micro, small, and medium enterprises (MSMEs) and communities in remote areas. This condition poses a distinct challenge for Islamic banks, which still face constraints in digital transformation and service efficiency (Zuhroh, 2021).

Nevertheless, Islamic fintech also has substantial potential as a collaborative partner for Islamic banks. Collaboration can be pursued through the integration of digital technologies, such as the development of mobile banking, digital payment systems, and the use of Application Programming Interfaces (APIs) to expand service outreach. Such synergy enables Islamic banks to enhance financial inclusion, broaden their customer base, and develop more innovative Sharia-compliant financing products based on *murabahah*, *mudharabah*, and *ijarah* contracts in digital formats. In this context, the role of the Sharia Supervisory Board (SSB) is crucial to ensure that all products and services resulting from collaboration remain compliant with Sharia principles (Mulyana et al., 2024).

Furthermore, collaboration between fintech and Islamic banks can also serve as a solution to various structural challenges identified earlier, such as low levels of Islamic financial literacy, limited human resources with combined technological and Sharia competencies, and an Islamic fintech regulatory framework that is not yet fully comprehensive. By establishing strategic partnerships, both entities can complement each other's strengths fintech with technological innovation, and Islamic banks with stability, public trust, and regulatory legitimacy. Therefore, the relationship between fintech and Islamic banks is not purely competitive but increasingly reflects a *coopetition* model that supports the strengthening of the digital Islamic financial ecosystem (Marlina & Fatwa, 2021).

Potential Disintermediation of Islamic Banking

On the other hand, the development of Islamic fintech also gives rise to the potential disintermediation of Islamic banking. Disintermediation occurs when the role of banks as financial intermediaries is displaced by Islamic fintech platforms such as peer-to-peer (P2P) lending, e-wallets, and digital payment systems that enable fund owners and financing recipients to transact directly in accordance with Sharia principles. This phenomenon may reduce the collection of Third-Party Funds (DPF) and put pressure on the profitability of Islamic banks, thereby forcing them to shift revenue sources from traditional intermediation toward fee-based services and digital financial services. Although disintermediation can enhance efficiency and financial inclusion, without proper management it may weaken the stability of Islamic banking. Therefore, a robust regulatory framework, consistent Sharia compliance supervision, and strong synergy among regulators, Islamic banks, and Islamic fintech providers are required to ensure that digital innovation does not erode the strategic role of Islamic banking within the national financial system. Such a collaborative approach is essential to ensure that digital transformation remains aligned with prudential banking principles and Sharia values (Muhammad & Lanaula, 2019).

Solutions and Recommendations

Islamic fintech represents a strategic innovation in the Islamic financial sector, as it integrates Sharia principles with advances in digital technology. However, the analysis shows that the development of Islamic fintech in Indonesia still faces various structural challenges, ranging from low levels of Islamic financial literacy and limited specific regulations to constraints in product innovation and financing risks that are difficult to assess using conventional approaches. Therefore, systemic solutions and strategic recommendations are required to ensure that Islamic fintech can develop in a sustainable, inclusive manner while remaining within the boundaries of Sharia principles.

Enhancing Digital Islamic Financial Literacy

Improving digital Islamic financial literacy is a fundamental prerequisite for the healthy and sustainable growth of Islamic fintech. Limited public understanding of Islamic financial principles such as mudharabah, musyarakah, and wadiah contracts combined with low levels of digital literacy has led to low adoption rates and limited trust in Islamic fintech platforms. Consequently, public education must be conducted continuously and innovatively through various channels, including seminars, social media campaigns, and digital learning platforms. In addition to understanding Sharia principles, digital literacy must also be strengthened so that the public can use financial technology safely and responsibly. Education on digital risks, personal data protection, and fraud prevention is essential to building public trust. Collaboration among regulators, Islamic financial institutions, educational institutions, and religious organizations can enhance the effectiveness of these literacy programs. The development of interactive modules and digital-based multimedia content is considered effective in reaching younger generations and communities that have traditionally had limited exposure to formal financial services. Thus, enhancing digital Islamic financial literacy not only promotes financial inclusion but also strengthens the sustainability of the national Islamic fintech ecosystem (Ismahani et al., 2025).

Strengthening Regulation and Sharia Governance

Clear regulations and strong Sharia governance constitute the main foundation for the sustainability of Islamic fintech. The discussion indicates that weak specific regulations and suboptimal coordination among authorities remain major obstacles to industry development. Therefore, strengthening the regulatory framework is necessary, including standards for operations, Sharia compliance, digital consumer protection, and transparent, adaptive supervisory mechanisms that respond to technological innovation. The role of the Sharia Supervisory Board (SSB) needs to be reinforced not only as a fatwa-issuing body, but also as an active supervisor conducting regular audits of Islamic fintech operations and assessing the Sharia compliance of new products. Policy harmonization among the Financial Services Authority (OJK), the National Sharia Council Indonesian Council of Ulama (DSN-MUI), and Bank Indonesia is a strategic step to reduce supervisory dualism and enhance legal certainty. With strong Sharia governance and responsive regulation, Islamic fintech can build a credible and transparent ecosystem capable of adapting to technological dynamics and market needs without neglecting Islamic values (Dusuki & Abdullah, 2007).

Utilizing Big Data and Artificial Intelligence for Sharia-Based Credit Scoring

The use of big data and artificial intelligence (AI) represents a strategic solution to overcome the limitations of Sharia-based credit scoring systems that still largely rely on conventional approaches. The integration of these technologies enables more comprehensive financing eligibility assessments by considering not only financial capacity but also transactional behavior, compliance with contractual obligations, and ethical aspects aligned with Sharia principles. Big data allows the analysis of alternative data from multiple sources, while AI can process large-scale data quickly and accurately, including detecting potential transactions that are not in line with Sharia principles. Nevertheless, the implementation of these technologies also faces challenges, such as data security concerns, limited human resources with expertise in both technology and fiqh muamalah, and the absence of comprehensive Sharia-oriented digital regulations. Therefore, the development of Sharia-based credit scoring using big data and AI must be accompanied by strengthened regulations, capacity building for human resources, and system integration between Islamic banks and fintech platforms. Incorporating maqashid al-shariah values into algorithm design is also crucial to ensure that technological innovation not only enhances efficiency but also upholds justice, transparency, and financial inclusion. Through this approach, Islamic fintech can more effectively mitigate financing risks while expanding access to financing for micro, small, and medium enterprises (MSMEs) and the informal sector (Sari, 2022).

CONCLUSION

Islamic fintech represents a strategic innovation in the contemporary Islamic financial system due to its ability to integrate Sharia principles with advances in digital technology. The findings of this study indicate that although Islamic fintech has significant potential to enhance financial inclusion and strengthen the Islamic economic ecosystem in Indonesia, its development continues to face multidimensional challenges. These challenges include the absence of a specific and integrated regulatory framework, low levels of digital Islamic financial literacy, limited human resource capacity with simultaneous expertise in technology and Sharia principles, high financing risks particularly in peer-to-peer (P2P) lending services as well as technological issues related to system interoperability and data security. This study also emphasizes that the relationship between Islamic fintech and Islamic banking is not purely competitive but tends to evolve toward a strategic collaborative pattern. Strengthening synergy between these two entities is essential to prevent excessive disintermediation while promoting the inclusive and sustainable expansion of Islamic financial services. In this context, bank–Islamic fintech collaboration has the potential to reinforce the stability of the national Islamic financial system through the integration of digital technologies that remain within the boundaries of Sharia compliance.

From a practical perspective, the findings underscore the urgency of establishing clear and robust regulations for Islamic fintech, strengthening Sharia governance and supervision, and leveraging advanced technologies such as big data analytics and artificial intelligence in the development of Sharia-based credit scoring systems that are more equitable, transparent, and adaptive to the characteristics of micro, small, and medium enterprises (MSMEs). These efforts must be accompanied by improvements in digital Islamic financial literacy and the enhancement of human resource capacity to ensure that technological innovation not only increases efficiency but also aligns with the values of *maqashid al-shariah*. From a theoretical standpoint, this study contributes to the Islamic fintech literature by proposing an integrative analytical framework that links regulatory, operational, technological, financing, and human resource dimensions within the *maqashid al-shariah* perspective. This framework may serve as a foundation for future research examining the development of digital Islamic financial ecosystems in developing countries. Therefore, sustained collaboration among regulators, academics, and industry practitioners is a fundamental prerequisite for realizing an Islamic fintech ecosystem that is inclusive, secure, transparent, and sustainable, thereby delivering broad social and economic benefits to society.

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