

AI-Sharia Risk Assessment Framework for Geopolitical Disruption and NPF Mitigation in Indonesian Islamic Banking

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Article Info	Abstract
Article history: Received March 10, 2026 Revised April 13, 2026 Accepted June 27, 2026 Available online August 15, 2026 *Corresponding author email: dedeardianti66@gmail.com Keywords: AI Risk Scoring, Explainable AI, Geopolitical Disruption, Non-Performing Financing (NPF), Sharia Banking.	Introduction/Main Objectives: This study examines how geopolitical risks affect financing quality in Indonesia's Islamic banking sector and proposes an Artificial Intelligence (AI)-based Sharia-compliant risk mitigation model. Research Methods: An exploratory qualitative approach using framework analysis was applied to OJK Islamic banking statistics for December 2024–March 2026, regulatory documents, and Scopus- and SINTA-indexed literature. Finding/Results: Geopolitical risks may affect financing quality through supply-chain disruptions, exchange-rate pressures, and declining aggregate demand. AI adoption remains limited by governance, algorithm transparency, data quality, regulation, and human-resource readiness. The study proposes an AI-Sharia model based on data intelligence, a Sharia compliance filter, and human oversight. Conclusion: AI can support early financing-risk detection while maintaining transparency, fairness, and Sharia compliance, although the proposed model still requires empirical validation.
Page: 311-325	AICIE with CC BY license. Copyright © 2026, the author(s)

INTRODUCTION

The increasingly complex global geopolitical developments in recent years have created real pressure on the stability of the international financial system, including Indonesia's sharia banking sector. The Russia-Ukraine armed conflict, the strategic rivalry between the United States and China, as well as instability in the Middle East, have triggered disruptions in global distribution channels, with far-reaching impacts on supply chains and the investment climate (Venessa, 2025; Zaza et al., 2025). Tensions in the Middle East, in particular, have also shaken global energy markets, which in turn have affected domestic macroeconomic conditions and inflationary pressures in Indonesia (Amin et al., 2025; Aprida, 2025). The transmission of these global pressures has made the domestic financial system, including the sharia banking sector, increasingly vulnerable to external shocks beyond the control of domestic authorities.

Sharia banking in Indonesia faces fluctuations in financing risk that require thorough scrutiny. At the end of 2024, the industry actually recorded a fairly solid performance with a controlled gross Non-Performing Financing (NPF) ratio at 2.12% and a net NPF of 0.79% (OJK, 2025b). This stability was short-lived due to the spillover effects of global economic shocks. Entering the first quarter of 2025, pressure on customers' repayment capacity began to increase, as indicated by a surge in the gross NPF ratio to 2.33% as of March 2025 (OJK, 2025).

It turns out that this pressure is not temporary but rather confirms the existence of a prolonged latent risk. Based on the latest data as of March 2026, the gross NPF ratio for sharia banking remained at a high level of 2.28%, with net NPF creeping up to 0.87% (OJK, 2026). The persistence of risk pressure for two consecutive years has occurred amid the inherently more complex risk profile of sharia banking compared to conventional banks, since, in addition to credit, market, and operational risks, sharia banks also bear sharia non-compliance risk, which can affect institutional reputation and stability. (Lailiya & Kusumaningtias, 2024). Risk management is regulated by the IFSB-1 standards and the national regulation POJK No. 65/POJK.03/2016, which emphasizes the identification, measurement, monitoring, and control of risks in accordance with the characteristics of sharia contracts. (Rosman & Abdul Rahman, 2015).

Geopolitical disruptions to supply chains are increasingly driving the adoption of AI to strengthen resilience. (Dong et al., 2025). In the context of Indonesian Islamic banking, financing risk factors are spatial and contextual. (Khasanah & Wicaksono, 2025), yet there is still no study that integratively links AI risk scoring, geopolitical disruption to distribution channels, and NPF pressure within a single research framework grounded in sharia principles (Gustanto et al., 2025). In this study, the financing distribution channel is understood as a series of transmission mechanisms through which external pressures, namely, supply chain disruptions, exchange rate volatility, and weakening aggregate demand, affect debtor capacity to fulfill financing obligations, thereby potentially undermining the quality of Islamic banks' financing portfolios. This definition is important to distinguish the research focus from disruptions to banks' own operational

mechanisms for disbursing financing. Empirical evidence from the MENA region indicates that geopolitical uncertainty is associated with worsening non-performing financing ratios in both conventional and Islamic banks. (Aledeimat & Bein, 2025), although the strength of this relationship may vary by institutional and regulatory context in each country, including Indonesia.

To explain the impact of external pressures on financing quality, this study uses Uncertainty Theory (Knight, 1921), which views geopolitical risk as a form of uncertainty affecting economic decision-making, as well as Financial Accelerator Theory (Bernanke et al., 1999), which explains how external shocks can deteriorate financing quality through increased information asymmetry and contraction of credit distribution. Empirical findings also show that macroeconomic pressures, such as inflation and exchange rate volatility, contribute to increased NPF in Islamic banking (Hassan et al., 2024; Pratiwi, 2024).

In response to the increasing complexity of these risks, credit risk assessment approaches have evolved from conventional statistical models toward machine learning, which is considered more adaptive in detecting default patterns. (Altman, 2018). The Adaptive Neural Network-Based Fuzzy Inference System (ANFIS) approach, for example, has proven capable of increasing the precision of banking risk indices. (Ahmed et al., 2023), while the application of AI in credit risk management has demonstrated the capacity to detect potential defaults at an earlier stage (Bi & Bao, 2024). However, in the context of Islamic banking, the implementation of AI cannot solely pursue predictive accuracy; the transparency and accountability of algorithmic decisions must also be maintained to remain aligned with Sharia principles, making the Explainable AI (XAI) approach relevant for adoption. (Wazin et al., 2025). Thus, AI integration is positioned not merely as a predictive tool but as a strategic instrument to strengthen the response of Islamic banking to geopolitical pressures amid the development of the digital financing and Islamic fintech ecosystem.

Existing literature so far tends to discuss these three issues separately. On the one hand, studies on BPRS in Riau show that adaptive, Sharia-value-based risk management can significantly reduce the NPF ratio despite rising geopolitical and macroeconomic challenges. (Putra et al., 2025), and financing risk factors in Indonesian Islamic banking have been proven to be spatial and contextual (Khasanah & Wicaksono, 2025). On the other hand, empirical findings indicate that macroeconomic pressures such as inflation and exchange rate volatility contribute to the increase of NPF. (Hassan et al., 2024; Pratiwi, 2024), consistent with the predictions of Financial Accelerator Theory (Bernanke et al., 1999) that external shocks worsen the quality of financing by increasing information asymmetry and contracting credit distribution. This framework complements Uncertainty Theory. (Knight, 1921), which positions geopolitical risk as a form of uncertainty that affects the economic decisions of business actors and, in turn, the repayment capacity of debtors. Together, these two theories explain the conceptual pathway from geopolitical uncertainty to NPF pressure. However, no study has yet explicitly positioned AI

risk scoring as a mitigation instrument within this causal chain, particularly within a Sharia compliance framework.

Geopolitical disruptions to supply chains are now increasingly driving the adoption of AI as a tool for strengthening institutional resilience (Dong et al., 2025), however, an integrative study linking AI risk scoring, geopolitical disruptions in financing distribution channels, and NPF pressures within a single analytical framework grounded in Sharia principles remains unavailable, particularly in the context of Indonesian Sharia banking (Gustanto et al., 2025). This gap is twofold: conceptually, no model has yet to integrate the transmission mechanisms of geopolitical risk with Sharia governance principles within an AI risk-scoring system; empirically, bank-level evidence on AI adoption in Indonesian Sharia banking remains limited and scattered across unintegrated sources.

Based on these gaps, this study aims to answer three questions: first, how do geopolitical risk transmission mechanisms affect the quality of financing in Indonesian Islamic banking through the financing distribution channels defined above? Second, to what extent have AI-based risk-scoring systems been implemented in Indonesian Islamic banking as a mitigation tool against these pressures? Third, how can an AI-Sharia integration model be formulated to detect and respond to geopolitical risks adaptively without compromising Sharia compliance principles?

To answer these questions, this study aims to: (1) analyze the mechanisms through which geopolitical risks are transmitted to the quality of Islamic financing via three main channels supply chain disruptions, exchange rate pressures, and a decline in aggregate demand; (2) to map the implementation profile of AI risk scoring in Indonesian Islamic banking based on available secondary data sources; and (3) to formulate a risk mitigation model based on the integration of AI and Sharia principles that is contextual to Indonesia's regulatory and institutional conditions.

Theoretically, this study contributes to the development of a conceptual framework that links Uncertainty Theory and Financial Accelerator Theory to Sharia governance principles in the context of AI-based risk assessment. This synthesis has not been extensively explored in the Indonesian Islamic banking literature. Practically, the resulting AI-Sharia integration model is expected to serve as an initial reference for the Financial Services Authority (OJK), Bank Indonesia, and the management of Sharia banks in designing risk mitigation systems that are more proactive and adaptive to geopolitical dynamics, with the caveat that this model is conceptual in nature and requires further validation through primary data before it can be implemented operationally.

METHOD

This study employs an exploratory qualitative design using a document- and literature-based analysis approach, chosen because it is suitable for examining a phenomenon that is still evolving and lacks an established conceptual framework: the integration of AI risk scoring into Islamic banking risk management in Indonesia amid geopolitical pressures and rising Non-

Performing Financing (NPF) (Creswell & Creswell, 2018). Data were sourced from three types of secondary sources: (1) OJK Islamic banking statistics for December 2024, March 2025, and March 2026 as the basis for analyzing gross and net NPF ratios (OJK, 2024, 2025, 2026), (2) regulatory documents, namely POJK No. 65/POJK.03/2016 on Islamic bank risk management and POJK No. 3/2024 on financial technology innovation, and (3) academic literature indexed in Scopus and SINTA, retrieved using keywords from January 2023 to June 2026. The literature was purposively selected from the Scopus and SINTA databases based on its relevance to the three research themes (AI risk scoring, geopolitical disruptions in financing distribution channels, and NPF pressure), with inclusion criteria consisting of peer-reviewed journal articles or conference proceedings that substantively address at least one of the research themes and for which the full text is accessible; Exclusion criteria included non-academic sources, duplicates, and documents that merely mention keywords in passing without substantive discussion of the core topics.

Of the total 35 sources used in this study, the reference list consists of 8 articles (23%) indexed in Scopus, including publications in *Risks* and the *International Journal of Financial Studies* (MDPI), the *Iranian Economic Review*, and journals published by Springer, Elsevier, SAGE, and Emerald; 15 articles (43%) sourced from Indonesian national journals and conference proceedings, including two that are verified as SINTA-accredited (*Journal of Finance and Islamic Banking* SINTA 3, and *Journal of Central Banking Law and Institutions* published by the Bank Indonesia Institute SINTA 2); 4 official data documents and regulations from Bank Indonesia and the Financial Services Authority (OJK) as the basis for quantitative empirical analysis; and 4 references to classical theories and methodologies. (Bernanke et al., 1999; Creswell & Creswell, 2018; Knight, 1921; Ritchie & Spencer, 2002) that serve as the conceptual and analytical foundation of the research.

The analysis followed the five-stage framework. (Ritchie & Spencer, 2002): data familiarization, identification of themes based on the three research focuses (AI risk scoring, geopolitical disruption, and NPF pressure), coding using an inductive code book, cross-source mapping, and interpretation, leading to the development of a three-tiered AI-Sharia integration model (data intelligence, Sharia compliance filter, and human oversight). Coding was conducted independently. The level of AI adoption was measured using the four-dimensional composite index from Ihyani et al. (2025) Applied to the available literature synthesis, it is not a new index. Validity was ensured through source triangulation among regulatory documents, banking publications, and academic literature. Key limitations: secondary data without primary validation, meaning the relationship between geopolitical disruption and NPF is a conceptual association, and the resulting model requires further validation before operational implementation.

RESULT AND DISCUSSION

Profile of AI Risk Scoring Implementation in Indonesian Sharia Banks

The level of AI adoption in the Indonesian sharia banking sector remains in its early stages, with uneven implementation across institutions. This assessment was compiled through a synthesis of prior research, published banking reports, and documentation of technology implementation in the sharia banking industry. According to Ihyani et al. (2025) The measurement was conducted using a composite index covering four dimensions: customer service, operations and compliance, credit and risk analysis, and strategic investment. Two additional indicators support the claim that the adoption rate falls into the moderate category.

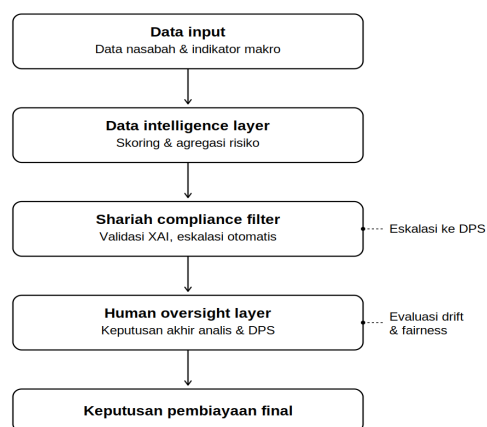
First, a cross-country study based on quantitative data involving 26 Islamic and conventional banks in 11 countries across the MENA region and Southeast Asia found that Islamic banks consistently scored 0.5–0.8 points lower on the FinTech Adoption Index than conventional banks during the same period, even though the adoption of this technology was shown to improve stability (Z-score increased by 3.6 points) and reduce the non-performing financing ratio by 0.1% (Meero, 2025). This finding indicates that the 'moderate' category is not merely a qualitative impression but is reflected in a measurable adoption gap compared to the conventional banking sector.

As the digital transformation in the financial sector progresses, the use of alternative data is increasingly viewed as a complement to conventional credit information sources in the financing risk assessment process. This alternative data includes e-commerce transaction records, patterns of telecommunications service usage, and various digital behavior indicators, which are processed using AI-based approaches to enhance credit scoring. Various studies show that integrating alternative data can improve risk prediction, expand access to financing for groups with limited formal credit histories, and support more adaptive decision-making compared with approaches that rely solely on traditional credit bureau data.

Meanwhile, the level of technology integration in the banking industry still shows variations in implementation capacity, consistent with the findings on cross-country adoption gaps mentioned above. (Meero, 2025). Some institutions have begun to leverage data and analytics in their risk management processes. In contrast, others still rely on relatively fragmented assessment systems that are not yet fully integrated with their core banking infrastructure. These differences in readiness levels indicate that developing a more standardized, adaptive AI implementation framework tailored to the characteristics of Islamic banking is critical to strengthening the response to the dynamics of financing risks and NPF pressures in the future.

Based on the research findings, AI in Islamic banking is positioned not as an automation tool, but as a support for risk decision-making that remains within Sharia guidelines, through a three-layer model: the data intelligence layer processes customer financing data, payment behavior indicators, and macro indicators including geopolitical risks (exchange rates, supply

chain disruption indices) through weighting and aggregation to produce a financing risk rating; this rating is then validated against a Shariah compliance filter using the Explainable AI (XAI) approach so that the rationale behind every algorithmic decision can be traced, with an automatic escalation mechanism that forwards scores reaching high-risk thresholds or those potentially conflicting with Shariah principles to human oversight rather than being decided by the system and every filter decision is recorded in an audit trail that can be reviewed by the Shariah Supervisory Board (DPS); the final decision remains with the human oversight layer namely, risk analysts and the DPS who are also responsible for monitoring model drift (a decline in model accuracy as data patterns change over time) through periodic evaluations, as well as ensuring that the principles of fairness (no systematic bias against specific customer segments) and customer data privacy are upheld in accordance with applicable data protection regulations.



Through this model, geopolitical pressures are translated into risk indicators such as exchange rate volatility, supply chain disruptions, and changes in payment behavior, which are processed through an AI-based early warning system. This approach aligns with practices in Malaysia, which has leveraged AI for compliance and governance functions despite still facing issues regarding algorithmic authority. (Bin Abdul Rahim, 2025; Zulkepli, 2025). Empirical evidence from nine Islamic banks in the UAE also shows a statistically significant relationship between fintech adoption and risk management effectiveness. (Al Hammadi et al., 2024), although digital transformation maturity alone, without adequate fintech capabilities, has not been shown to enhance that effectiveness sufficiently.

Mechanisms of Geopolitical Risk Transmission to Non-Performing Loans (NPLs) at Islamic Banks

Three main transmission channels have been identified linking increased geopolitical risk to NPL pressure on Indonesian Islamic banks; however, none have yet been statistically tested and are understood as mutually reinforcing patterns based on a literature review. The first channel operates through disruptions in the global commodity supply chain: conflicts in strategic shipping lanes such as the Red Sea and the Strait of Hormuz have the potential to hinder the availability of real transaction objects in murābahah schemes, a vulnerability that is structurally

linked to the dependence of global Islamic banks on commodity murābahah instruments a pattern that, if it continues, risks further straining customers' ability to meet their obligations in the commodity financing segment.

The second channel involves pressure on the rupiah exchange rate, which could, in theory, affect the repayment capacity of financing customers that rely on imported components. Based on official data from Bank Indonesia in the Indonesian Economic and Financial Statistics (SEKI) and the press release on the Development of Rupiah Exchange Rate Stability Indicators, the rupiah's central exchange rate against the U.S. dollar showed a significant weakening trend throughout the 2021-2024 period. The exchange rate, which stood at Rp14,265 per U.S. dollar at the close of December 2021, continued to weaken amid global market uncertainty, driven by the U.S. Federal Reserve's aggressive monetary tightening policies, which triggered capital outflows from emerging markets, including Indonesia. The pressure peaked toward the end of 2024, when the rupiah exchange rate stood at Rp15,920 per U.S. dollar according to Bank Indonesia's monitoring as of December 12, 2024, with a tendency to weaken further in early 2025 (BI, 2024). This persistent weakening of the exchange rate has the potential to increase production and operational costs for small and medium-sized enterprises that rely on imported raw materials, which in turn could strain the repayment capacity of micro and small businesses, which dominate the financing portfolios of Islamic banks in Indonesia.

The third channel involves a decline in market confidence and a drop in aggregate demand due to geopolitical uncertainty, which could potentially lead to payment delays in the productive financing segment. The determinants of NPFs in Islamic banking exhibit different patterns across time horizons: exchange rates and inflation tend to have an impact in the short term. At the same time, operational efficiency and economic growth are the primary determinants in the long term. (Pratiwi, 2024). This pattern reinforces the hypothesis that the transmission of geopolitical risks to financing quality is multi-layered and does not occur through a single mechanism, consistent with findings that geopolitical uncertainty is associated with changes in the non-performing financing ratio at Islamic banks in the MENA region. (Aledeimat & Bein, 2025) Although the strength of this association in the Indonesian context has not yet been empirically tested in this study.

These findings indicate that implementing AI in Indonesia's Islamic banking sector requires stronger governance to ensure effective operation and alignment with Sharia principles. Although POJK No. 3 of 2024 has opened the door to technological innovation in the financial sector, the regulation does not yet specifically address the use of AI in Islamic banking. Therefore, there is a need to strengthen oversight involving the Sharia Supervisory Board, improve data quality and integration, and update the risk management framework to accommodate algorithm transparency, AI model governance, and risk testing based on geopolitical scenarios.

The Effectiveness of AI in the Early Detection and Mitigation of NPF

AI has the potential to enhance the early detection of Non-Performing Financing (NPF) through real-time analysis of customer behavior data, thereby enabling the identification of financing risks before they are reflected in financial statements. In the case of BSI, the integration of AI into the digital sharia financing system was implemented through automated credit scoring, an early warning system, and machine learning-based analysis, which enable more accurate, real-time risk identification and drive a shift from a reactive approach toward data-driven predictive risk management (Safitri, 2026). An interview-based study of BSI IT experts also showed that the implementation of AI, including chatbots and AI-based mobile banking services, is considered appropriate as long as it does not conflict with Sharia principles (Hamadou et al., 2024). These findings are further supported by research showing that machine learning models such as Random Forest and XGBoost have superior default prediction performance compared with traditional credit scoring methods (Siddquee, 2025).

AI is understood not as a substitute for human judgment, but as a tool to enhance banks' ability to identify risks more quickly and adaptively. Therefore, the effectiveness of AI implementation in Islamic banking is determined not only by the technology used but also by its integration with risk management frameworks and Sharia principles of prudence. This aligns with the challenges identified in BSI's implementation, namely limitations in data quality and integration, human resource readiness, information security risks, and issues regarding algorithm transparency related to Sharia compliance.

Nevertheless, AI still has limitations, such as potential bias in historical data, the risk of overfitting, and difficulty anticipating extreme events (black swan events). Therefore, the human role remains essential in the decision-making process, particularly in Sharia banking, where AI is positioned as an analytical support tool rather than the final decision-maker. This approach is increasingly important because financing decisions must also consider aspects of Sharia compliance that cannot be assessed solely through algorithms. (Rani et al., 2024).

The effectiveness of AI in Islamic banking is not primarily determined by the level of service digitization, but rather by the ability to integrate risk data, decision-making mechanisms, and Sharia governance. Financing risks triggered by geopolitical pressures do not arise in isolation, but are transmitted through changes in macroeconomic conditions, customer behavior, and the limitations of conventional risk assessment systems. AI holds strategic value when used to accelerate early detection and expand risk analysis capabilities, rather than merely as a tool for operational automation.

Implementation Challenges: Sharia, Regulatory, and Human Resource Dimensions

The implementation of AI in Islamic banking in Indonesia still faces several challenges. One of these is the potential conflict between algorithmic efficiency and the principles of Sharia justice. Black-box AI models often produce decisions that are difficult to explain to customers, potentially introducing an element of uncertainty (gharar) into the financing process. (Sain &

Adinugraha, 2025). Although AI can help accelerate Sharia compliance oversight, final decisions and interpretations still require the involvement of Sharia scholars and the Sharia Supervisory Board.

From a regulatory perspective, the OJK, through POJK No. 3 and No. 26 of 2024, has begun to accommodate the use of AI in the digital finance sector. However, a gap remains between Sharia provisions and the implementation of technology on the ground. This gap becomes more apparent when compared to international AI governance frameworks. The European Union, through the EU AI Act (Regulation 2024/1689) which was officially adopted on June 13, 2024, and entered into force on August 1, 2024 explicitly classifies AI systems for creditworthiness assessment as a high-risk category (Annex III, point 5(b)), requiring system providers to implement documented risk management, data governance, algorithmic transparency, human oversight, and suitability assessments before the system is operated, with full compliance obligations for high-risk systems taking effect on August 2, 2026. Such a framework currently has no direct counterpart in Indonesia's Islamic banking regulations or in international Islamic finance standards.

Both AAOIFI and IFSB, as global Sharia standard-setting bodies, have so far only begun to address fintech and AI issues within the framework of Sharia compliance, without any structured, binding standards. This gap indicates that the challenges of Sharia AI governance are global in nature not merely a domestic issue for Indonesia but this actually reinforces the urgency for Indonesia to adopt elements of a risk-based framework, such as those in the EU AI Act (risk level classification, documentation requirements, and mandatory human oversight), while ensuring alignment with Sharia principles, rather than waiting for international Sharia standards that are not yet available. Malaysia sets a more advanced regional precedent in this regard, having begun to revolutionize the functions of Sharia secretariats through AI. (Bin Abdul Rahim, 2025), although the issue of algorithmic decision-making authority within the realm of fiqh remains debated (Zulkepli, 2025). In addition, limitations in human resource competencies also pose a significant challenge: Sharia experts need to improve their technological literacy. In contrast, technology developers need to understand Sharia principles to ensure AI implementation proceeds optimally and in accordance with Sharia objectives. (Wahab & Mahdiya, 2025).

Scenario 1: Sudden geopolitical shock. A sharp depreciation of the exchange rate over a short period (e.g., triggered by an escalation of regional conflict) causes a simultaneous spike in risk scores within the data intelligence layer for financing customers who rely on imports. Without throttling mechanisms or verification delays, this surge risks causing a disproportionate, mass-scale drop in scores that is unrelated to individual customers' circumstances. The resulting failure scenario is that the system escalates a volume of cases that exceeds the manual review capacity of the Sharia Supervisory Board (DPS) and risk analysts, causing the human oversight layer to become a bottleneck rather than a safeguard.

Scenario 2: Conflict between algorithmic efficiency and Shariah principles. The Shariah compliance filter detects transaction patterns that statistically resemble indicators of default, even though these transactions actually reflect contract restructurings that are valid under Shariah principles (e.g., rescheduling under a ta'widh scheme). Resulting failure condition: if the XAI system lacks sufficient transparency to distinguish Shariah-compliant restructuring from genuine default patterns, it risks triggering false escalations that unfairly burden customers acting in good faith.

Scenario 3: Model drift due to post-geopolitical structural changes. Following a prolonged period of geopolitical pressure, customer payment behavior shifts structurally rather than merely experiencing seasonal fluctuations, causing a decline in the accuracy of models trained on pre-shock historical data. Without explicit, periodic evaluation of model drift at fixed intervals within the human oversight layer, this decline in accuracy can go undetected until it eventually manifests as a significant spike in NPF, a condition that this early-detection model is precisely designed to prevent.

These three scenarios underscore that the effectiveness of the three-layer model depends on the institutional capacity to handle escalating volumes, sufficient algorithmic transparency to distinguish Sharia-compliant cases, and scheduled, periodic evaluation mechanisms, not merely on the availability of technology. The four identified dimensions of challenges, namely, the tension between algorithmic transparency and Sharia principles, the limited regulation of AI in Islamic banking, the human resource competency gap, and the suboptimal data infrastructure, do not operate in isolation but rather reinforce one another and form structural barriers to the effective implementation of AI. Based on the findings of this study, the low readiness of Islamic banking to respond to geopolitical risk pressures and the persistence of NPFs are influenced more by governance aspects than by technological limitations alone. Therefore, strengthening AI implementation must be understood as an ecosystem transformation that encompasses regulatory updates, human capacity building, and the integration of data standards as the foundation for the Sharia-compliant AI model proposed in this study.

CONCLUSION

This study shows that global geopolitical dynamics can increase the complexity of financing risks in Indonesia's Islamic banking sector through three main mechanisms: supply chain disruptions, exchange-rate pressures, and a decline in aggregate demand. Conceptually, these three mechanisms are linked to increasing pressure on financing quality, as reflected in the rise in the gross Non-Performing Financing (NPF) ratio from 2.12% in December 2024 to 2.28% in March 2026. This situation indicates that conventional and reactive risk management approaches need to be supplemented with systems that are more adaptive, predictive, and data-driven.

This study also found that the implementation of AI in Indonesia's Islamic banking sector remains at an early-to-moderate stage. The use of AI has the potential to strengthen the early detection of financing risks; however, its effectiveness is determined not only by technological capabilities but also by adequate governance, algorithmic transparency, data quality and integration, human resource readiness, and regulatory support aligned with Sharia principles. Therefore, this study proposes an AI-Sharia integration model consisting of three main components: data intelligence, a Sharia compliance filter, and human oversight as a conceptual framework to support risk decision-making that is more adaptive, transparent, and in accordance with Sharia principles.

Nevertheless, all analyses in this study are still based on secondary data; therefore, the relationship between geopolitical disruptions, AI implementation, and NPF pressure has not yet been empirically tested at the bank level. The proposed Sharia AI model is also still conceptual and requires further validation through case studies, primary data collection, prototype development, backtesting, geopolitical scenario simulations, and testing of accuracy, explainability, algorithmic fairness, and model reliability before it can be implemented operationally. The findings of this study are expected to inform the OJK, Bank Indonesia, the Sharia Supervisory Board, and the Islamic banking industry in designing AI governance frameworks that strengthen the Islamic banking system's resilience against geopolitical risks.

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