

Artificial Intelligence and Machine Learning in Financial Industry Transformation: A Comparative Analysis of Conventional and Sharia Fintech in Indonesia

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Abstract

Purpose: This study examines the role of Artificial Intelligence (AI) and Machine Learning (ML) in transforming Indonesia's financial industry by comparing their implementation in a conventional fintech company (JULO) and a Sharia-compliant fintech company (ALAMI). The study focuses on differences in AI adoption, value orientation, and their implications for operational efficiency and ethical compliance.

Method: This research employs a qualitative comparative case study using secondary data sources, including corporate reports and relevant literature. The analysis is guided by the Technology–Organization–Environment (TOE) framework, Socio-Technical Systems Theory, and Maqasid al-Shariah.

Result: The findings show that both companies utilize AI and ML to enhance decision-making and operational efficiency. However, JULO prioritizes speed and scalability, while ALAMI integrates Sharia principles such as justice, transparency, and the avoidance of *riba*.

Implication: The study highlights the importance of aligning AI innovation with ethical and Sharia values in Islamic fintech development.

Originality: This study offers a comparative, value-based analysis of AI-driven fintech from conventional and Sharia perspectives in Indonesia.

Keywords: Artificial Intelligence, Machine Learning, Fintech Transformation, Sharia Fintech, Conventional Fintech.

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Introduction

The rapid advancement of digital technology has reshaped the global financial industry, with Artificial Intelligence (AI) and Machine Learning (ML) becoming central drivers of innovation. In financial services, AI and ML enable automation, enhance decision-making processes, and support more accurate and efficient service delivery. These developments have accelerated the transition toward data-driven financial ecosystems worldwide. As AI adoption continues to expand, its role increasingly influences business models, operational strategies, and regulatory considerations across global finance.

In Indonesia, the adoption of AI-driven financial services has accelerated alongside the rapid expansion of the fintech industry. Statista (2024) projects that the value of Indonesia's fintech market will continue to grow significantly in the coming years, supported by increasing digital payments, alternative lending, and data-driven financial services. The Financial Services Authority (OJK) also reports a steady rise in fintech lending volume and user penetration, indicating that AI-enabled processes such as automated credit scoring and fraud detection are becoming more widely implemented. These empirical trends illustrate that Indonesia's financial sector is moving quickly toward AI-supported digital transformation.

Despite its rapid growth, the implementation of AI in fintech also raises several critical challenges. AI-based credit scoring models remain vulnerable to algorithmic bias, which may disadvantage certain borrower groups due to unequal data representation or opaque model logic (Rahman, 2023). Issues of fairness and transparency also emerge, as AI-driven decisions are often not easily explainable to users or regulators, increasing the risk of misinterpretation and potential harm (OECD, 2022). In addition, fintech platforms face growing exposure to fraud and cybersecurity threats as digital transactions expand. Regulatory oversight has not yet fully kept pace with these developments, particularly in areas of model governance, ethical AI standards, and data protection. These unresolved risks highlight the need for deeper analysis of how AI is adopted and controlled within different fintech models (Laldin, 2013; OECD, 2022).

In the context of Islamic finance, the adoption of AI must also align with Sharia principles that emphasize justice, transparency, and the avoidance of *riba* and *gharar*. These values serve as the ethical foundation for decision-making in Sharia-compliant financial institutions, requiring that algorithmic processes uphold fairness and ensure that customers are treated equitably (Laldin, 2013). The *Maqasid al-Shariah* provides a useful framework for evaluating whether AI-driven decisions protect essential objectives such as preservation of wealth, protection of rights, and prevention of harm (Laldin, 2013). To support this, several fintech platforms have begun developing digital audit mechanisms to verify Sharia compliance within automated processes. However, the integration of these ethical and religious principles into AI systems remains challenging due to the technical complexity of algorithms and the limited availability of standardized Sharia-AI governance guidelines. This creates an important context for understanding how Sharia-oriented fintech institutions manage AI adoption differently from their conventional counterparts.

Although AI adoption in Indonesia's fintech sector continues to expand, scholarly research comparing its implementation across different financial models remains limited. Existing studies generally focus on technical aspects of AI—such as model accuracy, fraud

detection, and credit scoring—while offering little insight into how value systems shape AI governance in financial institutions. Comparative analyses between conventional fintechs like JULO and Sharia-compliant fintechs such as ALAMI are particularly scarce, even though these institutions operate under fundamentally different ethical and regulatory frameworks. Furthermore, no prior study has integrated the Technology–Organization–Environment (TOE) framework, Socio-Technical Systems Theory, and the *Maqasid al-Shariah* to analyze how technological, organizational, and ethical dimensions interact in AI-driven decision-making. This gap highlights the need for a more holistic and value-oriented analytical approach to understand how AI is adopted, controlled, and interpreted within Indonesia’s diverse fintech ecosystem.

The purpose of this study is to examine how AI and Machine Learning are adopted within conventional and Sharia-compliant fintech institutions, and to analyze how differences in value orientation influence governance, decision-making processes, and ethical outcomes. By comparing JULO and ALAMI, this research aims to provide a deeper understanding of how technological, organizational, and Sharia-based factors shape AI implementation in Indonesia’s fintech ecosystem.

Literature Review

The development of Artificial Intelligence (AI) and Machine Learning (ML) technologies has brought about significant structural changes in the global financial sector, particularly within the financial technology (fintech) industry. Numerous studies have examined the integration of these technologies from various perspectives, including technical, economic, and social dimensions. However, systematic reviews reveal that conceptual and normative gaps remain, especially regarding ethical implications and Sharia compatibility in the context of AI-based fintech.

Within fintech literature, Artificial Intelligence (AI) and Machine Learning (ML) are frequently discussed in relation to improving service efficiency and promoting financial inclusion. Afriyie et al. (2023) demonstrated that supervised learning algorithms, such as decision trees and random forests, can significantly enhance the accuracy of fraud detection in financial transactions. This finding is further supported by Adewuyi et al. (2023), who showed that integrating non-traditional data—such as mobile phone usage, social media activities, and e-commerce transactions—into AI models accelerates the credit evaluation process and expands access to financial services for unbanked and underbanked populations. However, this approach tends to be instrumentally rational, positioning AI as a neutral tool for achieving economic objectives without sufficiently considering normative and justice-oriented dimensions. From a critical standpoint, the use of AI also carries the risk of reproducing structural biases when the underlying data are unrepresentative or inherently discriminatory.

The ethical and regulatory dimensions of AI utilization in financial services have also gained increasing scholarly attention. Khan et al. (2025) identified several ethical challenges associated with the use of generative AI, including risks of identity manipulation (deepfakes), document forgery, and dependence on opaque, black-box algorithms. They emphasize the importance of ethical governance grounded in the principles of accountability,

transparency, and auditability. Similarly, (Hurley & Adebayo, 2016) underscores the need for algorithmic accountability to prevent unfair or discriminatory AI-driven decisions. A major challenge for contemporary fintech lies in balancing technological innovation with consumer protection—particularly in light of the growing importance of personal data protection following the implementation of the GDPR in Europe.

Meanwhile, the integration of AI into Sharia fintech remains largely conceptual. (Shaikh, 2023) proposed an integrative framework that combines AI with the principles of *maqasid al-shariah*, such as justice, transparency, and the avoidance of *riba* (usury) and *gharar* (excessive uncertainty). However, this study does not elaborate on the technical implementation of aligning AI systems with Sharia contracts or discuss their operational limitations in practice. In Indonesia, a study by Saputra & Trisnawati (2025) on Islamic digital banks found that the use of AI remains limited to service personalization and financing selection, without a comprehensive integration of Sharia principles into the algorithmic design—particularly concerning digital Sharia audits and the automation of contracts in accordance with DSN-MUI fatwas.

Based on this literature review, several research gaps have been identified. First, studies on AI in fintech remain dominated by technically and efficiency-oriented approaches, with insufficient attention given to ethical and normative dimensions—particularly within local and Sharia contexts. Second, the implications of applying generative AI technologies, such as Large Language Models (LLMs) and Natural Language Processing (NLP), within the Sharia fintech ecosystem have not been thoroughly examined. Third, there is a lack of interdisciplinary research frameworks that integrate technology, regulation, digital ethics, and Sharia principles into a single, comprehensive analytical model. Fourth, existing studies tend to be largely descriptive and technically focused, failing to capture the normative and critical-transformational dimensions necessary for understanding the dynamics of AI implementation within the Islamic financial system.

Method

This research employs a qualitative comparative case study approach focusing on two Indonesian fintech companies: JULO (conventional) and ALAMI Sharia (Sharia fintech). Secondary data were collected between 2019 and 2024 from company annual reports, white papers, OJK and Bank Indonesia reports, DSN–MUI fatwas, reputable industry media (such as *DailySocial* and *Kontan*), and peer-reviewed academic literature. Systematic search keywords included “AI fintech Indonesia,” “Sharia fintech ALAMI,” “JULO annual report,” “AI credit scoring,” and “*Maqasid al-Shariah* fintech.” The documents were screened using the following inclusion criteria: (1) published between 2019 and 2024; (2) derived from primary corporate or regulatory sources, or from peer-reviewed journals; and (3) containing explicit discussions of AI or ML features. Data analysis followed the Miles and Huberman model (data reduction → data display → conclusion drawing) through content and thematic comparative analysis. Coding focused on technological characteristics, organizational structures, environmental and regulatory factors, and outcomes relevant to *Maqasid al-Shariah*. Research trustworthiness was ensured through triangulation of multiple document types and the establishment of an audit trail for coding decisions (Appendix A provides a list of all documents analyzed).

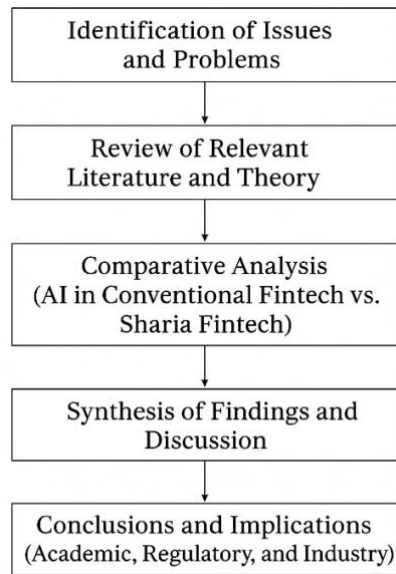


Figure 1. Research Flowchart (Qualitative-Comparative / Library Research)

The research process began with the identification of key issues and the collection of literature related to the development of Artificial Intelligence (AI) in the financial sector, encompassing both conventional and Sharia systems. Subsequently, a comparative analysis was conducted to examine the implementation models, opportunities, and challenges within both frameworks. The results of this analysis were then synthesized to formulate conclusions and research implications across academic, regulatory, and industrial dimensions.

To clarify the research stages, the research flow is presented in the form of a table below:

Table 1. Research Flow

Stage	Activity	Output	Analysis/Tools
Preparation	Problem identification and initial literature review.	Research framework and Literature analysis questions.	
Secondary Data Collection	Documentation study, digital observation, and systematic literature review of data from JULO, ALAMI, OJK, DSN-MUI, and academic literature.	Curated secondary data database.	Library research techniques.
Data Reduction & Coding	Selecting, focusing, and categorizing data based on themes relevant to the research questions.	Organized data ready for analysis.	Content and thematic analysis.
Comparative Analysis	Analyzing data to compare AI/ML implementation in JULO and ALAMI based on the	Findings on similarities, differences, and dynamics.	TOE Framework, Socio-Technical Systems Theory, <i>Maqasid al-Shariah</i> .

	TOE, Socio-Technical Systems, and <i>Maqasid al-Shariah</i> frameworks.		
Conclusion & Recommendation Formulation	Summarizing findings, answering research questions, and formulating implications and recommendations.	Final conclusions and strategic recommendations for regulators, industry, and academia.	Verification and interpretation of findings.

Result and Discussion

Profile and Context of AI Implementation in Conventional Fintech (JULO)

JULO is a conventional fintech company focused on providing digital lending services through its mobile application. Since its establishment, JULO has adopted Artificial Intelligence (AI) and Machine Learning (ML) technologies as the backbone of its operations. The company’s business model is centered on offering unsecured loans to unbanked and underbanked segments through a fast, technology-driven process. According to JULO's annual report (2023), the company has successfully disbursed loans to more than two million active users across Indonesia, with a cumulative disbursement value reaching approximately IDR 5 trillion.

In implementing AI and ML, JULO utilizes several key technologies. First, it employs a behavioral data–based alternative credit scoring system that analyzes more than 200 variables of non-traditional data, including smartphone usage patterns, digital transaction histories, and social media activities. This approach enables JULO to assess the creditworthiness of customers who lack formal credit histories (JULO, 2023). Second, the company uses a machine learning–based fraud detection system capable of analyzing over 10,000 transactions per second and detecting anomalies with an accuracy rate of 98% (DailySocial, 2024). Third, JULO has implemented a Natural Language Processing (NLP)–based chatbot service that manages more than 500,000 customer interactions per month, achieving an automatic resolution rate of 85% (Sood et al., 2024).

The impact of AI implementation on operational efficiency is evident in a 40% reduction in operational costs and an improvement in credit approval speed—from 24 hours to less than 10 minutes (JULO, 2023). From a financial inclusion perspective, JULO has successfully reached 65% of customers who previously lacked access to formal banking services. However, Nuka & Ogunola (2024) caution that JULO’s credit scoring system may exhibit algorithmic bias, potentially resulting in discrimination against certain demographic groups. This observation is consistent with broader criticisms of behavioral data–driven AI models, which may violate principles of fairness if not properly managed (Chen et al., 2023).

A 2024 report by *DailySocial* highlighted several user complaints concerning opaque rejection decisions made by JULO’s AI-driven credit scoring system. An internal review revealed that the model’s training data—heavily dependent on digital footprint metrics—had inadvertently disadvantaged potential borrowers from regions with lower levels of digital literacy. This case illustrates a real-world ethical challenge of algorithmic bias in conventional fintech, where the pursuit of efficiency can unintentionally reinforce existing social disparities

if not carefully managed (Nuka and Ogunola (2024).

Profile and Context of AI Implementation in Islamic Fintech (ALAMI)

ALAMI Sharia is a licensed sharia peer-to-peer lending platform supervised by the Financial Services Authority (*Otoritas Jasa Keuangan / OJK*) and overseen by an official Sharia Supervisory Board (*Dewan Pengawas Syariah / DPS*) under the National Sharia Board – Indonesian Ulema Council (*Dewan Syariah Nasional – Majelis Ulama Indonesia / DSN–MUI*). The company focuses on providing financing for micro, small, and medium enterprises (MSMEs) through Sharia contract-based schemes such as *murabahah*, *wakalah*, and *ijarah*. As a Sharia fintech institution, ALAMI is required not only to pursue business profitability but also to ensure that all operations comply fully with Sharia principles (Fitria, 2025).

In implementing Artificial Intelligence (AI) and Machine Learning (ML) technologies, ALAMI integrates Sharia values into every layer of its business operations. One of the primary applications lies in its interest-free credit scoring system. ALAMI employs a machine learning model that leverages alternative data—such as transaction histories, system usage behaviors, and invoice records—to assess financing eligibility. The model is specifically designed to avoid *riba* (usury) by eliminating interest and instead applying profit-sharing mechanisms or sales margins consistent with the *murabahah* principle. This approach aligns with the principle of justice (*al-'adl*) within *Maqasid al-Shariah* (Salman, 2023).

Furthermore, ALAMI has developed a digital Sharia audit system that enables real-time monitoring of operational compliance with Islamic principles. This system utilizes an automated dashboard accessible to the Sharia Supervisory Board (*Dewan Pengawas Syariah, DPS*) for monitoring transactions, contracts, and fund flows. This feature not only enhances supervisory efficiency but also ensures transparency (*al-shafāfiyyah*) and accountability as fundamental components of Sharia governance (Sauri, 2023). In this context, AI functions as a tool that supports the realization of *halalan ṭayyiban* values in every transaction.

ALAMI has also integrated *Maqasid al-Shariah* principles into its AI algorithms. These algorithms are designed not only to optimize profitability but also to incorporate the concept of *maslahah* (social benefit) for the wider community. For instance, when assessing financing eligibility, the system evaluates not only economic indicators but also the social impact of the financed business—such as job creation and contributions to society. This approach reflects the practical application of *ḥifẓ al-māl* (protection of wealth) and *ḥifẓ al-nafs* (protection of life) within the *Maqasid al-Shariah* framework (Laldin, 2013).

However, the implementation of AI in Sharia fintech platforms such as ALAMI presents several challenges. The primary challenge lies in aligning AI algorithms with the dynamic and contextual nature of Sharia principles. For instance, determining profit margins in a *murabahah* contract must be conducted fairly and remain free from *gharar* (uncertainty). Although AI systems can process data objectively, defining algorithmic parameters that comply with DSN–MUI *fatwas* requires in-depth interpretation and guidance from Sharia scholars (Rahmi et al., 2024). Furthermore, the use of non-financial data in credit scoring carries the risk of bias if not managed in accordance with the principles of justice (*al-'adl*).

Technical constraints have also emerged in the development of the digital Sharia audit system. Although the dashboard technology facilitates supervision, not all members of

the Sharia Supervisory Board (DPS) possess sufficient technical knowledge of AI. This situation necessitates continuous training and close collaboration between the technology team and the Sharia board (Sauri, 2023).

Recognized by the (OJK, 2024) in a regulatory report, ALAMI implemented an innovative digital Sharia audit dashboard. This system enables the Sharia Supervisory Board (DPS) to monitor transactions, contract types, and fund flows in real time, thereby ensuring continuous compliance with Islamic principles. This practical application exemplifies a successful socio-technical integration, in which technology is leveraged not merely for profit but to enhance religious governance, transparency, and trust.

Comparative Analysis Based on the TOE Framework

Technological Aspect

Technologically, both fintech companies demonstrate advanced AI and ML implementation, albeit with different areas of emphasis. JULO, as a conventional fintech platform, employs machine learning algorithms for credit scoring based on non-traditional behavioral data—such as smartphone usage patterns, digital transaction histories, and social media activities (JULO, 2023). This approach facilitates more inclusive credit assessments for unbanked populations. In contrast, ALAMI Sharia applies similar techniques but incorporates additional Sharia filters to ensure that the data utilized are free from *riba* (usury) and *gharar* (excessive uncertainty). ALAMI has developed an alternative scoring model that integrates Sharia-related variables, including contract type, halal business track record, and community recommendations (OJK, 2024). In terms of technological complexity, JULO appears more aggressive in adopting generative AI applications such as NLP-based chatbots, whereas ALAMI adopts a more cautious approach, prioritizing algorithmic transparency and interpretability to comply with Sharia principles.

Organizational Aspect

Organizationally, JULO has established a comprehensive technology team structure dominated by data scientists and AI engineers with extensive experience in the global fintech industry. The company makes substantial investments in AI training and maintains collaborations with technology startups (OJK, 2024). In contrast, ALAMI Sharia has formed a multidisciplinary team consisting not only of technology professionals but also of Sharia officers and Islamic economics scholars responsible for ensuring system compliance with DSN–MUI *fatwas*. ALAMI's AI development strategy is more incremental, involving the Sharia Supervisory Board (DPS) at every stage of technological decision-making (OJK, 2024). This distinction indicates that organizational readiness is determined not only by technical capability but also by the depth of understanding of Sharia values that constitute the organization's operational foundation.

Environmental Aspect

The external environment significantly influences the patterns of AI adoption in both fintech companies. JULO operates under relatively flexible regulations that emphasize consumer protection and system stability (POJK No. 13/2018). Market support is also strong, with growing investor interest in AI-driven fintech solutions. However, persistent challenges such as data security and algorithmic bias remain major concerns (Khan et al.,

2025). In contrast, ALAMI Sharia operates within a more complex regulatory environment, as it must comply with two layers of oversight: general fintech regulations issued by the OJK and Sharia-specific regulations established by the DSN–MUI. Although the Sharia fintech market is expanding rapidly—accounting for approximately 15% of the total national fintech market—the primary challenges include the absence of specific Sharia technical standards for AI and the limited availability of professionals proficient in both technological and Sharia domains (Hassan, M. K., 2022) Support from the OJK through the Sharia regulatory sandbox has become a key driver in ALAMI’s AI development efforts.

Table 2. Comparative Implementation of AI/ML in JULO (Conventional) and ALAMI (Sharia)

Aspect	JULO (Conventional)	ALAMI (Sharia)
Total active users (2023)	2,000,000 (JULO Annual Report 2023)	5,000 MSME borrowers (ALAMI report 2023)
Total disbursement (2023)	IDR 5 trillion (JULO 2023)	IDR 1.2 trillion (OJK, 2024)
Core AI uses	Alt. credit scoring; fraud detection; NLP chatbot	Sharia-compliant scoring; digital Sharia audit; NLP edukasi
Primary KPI (example)	Approval time: <10 minutes; Ops cost –40%	% Financing to MSME; compliance audit events
Major ethical risk	Algorithmic bias, privacy	Interpretive fatwa alignment, transparency
Total active users (2023)	2,000,000 (JULO Annual Report 2023)	5,000 MSME borrowers (ALAMI report 2023)

Source: Compiled from JULO (2023), OJK (2024), and Daily Social (2024).

Analysis Based on Socio-Technical Systems Theory

The Socio-Technical Systems Theory emphasizes the importance of maintaining a balance between the technical system—represented by AI technologies—and the social system, which encompasses values, culture, and regulatory structures, in the implementation of digital innovations. Within the context of Indonesia’s fintech industry, this analytical perspective reveals an intriguing interplay between technological sophistication and societal readiness.

In the case of conventional fintech JULO, the implementation of AI for behavioral data-based credit scoring demonstrates a strong alignment between the technical and social systems. This technology has expanded access to financial services for unbanked populations that have historically faced barriers to formal financial inclusion (Adewuyi et al., 2023). However, the collection of user behavioral data—such as smartphone usage patterns and digital activities—raises concerns regarding privacy and algorithmic transparency. A study by Binns et al. (2018) suggests that black-box AI systems can generate algorithmic biases, potentially resulting in discriminatory outcomes. Public responses to this technology are

divided: on one hand, there is widespread appreciation for its accessibility and convenience, while on the other, skepticism persists regarding the use and protection of personal data.

Meanwhile, ALAMI Sharia faces additional complexity in aligning its AI-driven technical systems with Sharia values. The implementation of automated scoring that incorporates Sharia eligibility criteria demonstrates an innovative effort to integrate technology with Islamic principles. However, challenges arise in ensuring that every algorithmic decision remains compliant with the *fatwas* issued by the National Sharia Board (DSN–MUI), particularly concerning the avoidance of *riba* (usury) and *gharar* (excessive uncertainty). (Shaikh, 2023) emphasizes that the integration of AI and Sharia requires a holistic approach that involves not only technical considerations but also a profound understanding of *fiqh al-mu‘amalab* (Islamic commercial jurisprudence). Public responses to AI in Sharia fintech are generally positive, provided that the technology is perceived to reinforce the values of justice and transparency in accordance with *Maqasid al-Shariah* (the higher objectives of Sharia).

The social impact of AI implementation in both fintech models also reveals notable distinctions. JULO focuses on expanding financial access through a data-driven approach, contributing primarily to a quantitative increase in financial inclusion. In contrast, ALAMI emphasizes equitable and Sharia-compliant financing, thereby supporting the sustainable empowerment of micro, small, and medium enterprises (MSMEs). Khan et al. (2025) observe that the effectiveness of financial technology is strongly influenced by its alignment with local values and community culture.

Table 3. Ethical Implications and Mitigation Strategies

Fintech Model	Primary Ethical Risks	Observed/Proposed Mitigation Strategies
Conventional (JULO)	<ul style="list-style-type: none"> a. Algorithmic bias leading to discrimination. b. Lack of transparency in decision-making. c. Extensive use of personal behavioral data. 	<ul style="list-style-type: none"> a. Implementing bias detection and fairness audits (Chen et al., 2023). b. Developing explainable AI (XAI) models. c. Adherence to evolving data protection regulations.
Sharia (ALAMI)	<ul style="list-style-type: none"> a. Ensuring substantive Sharia compliance beyond technicality. b. Interpretability of AI decisions for the Sharia Board. c. Balancing profit motives with <i>maslahah</i> (public benefit). 	<ul style="list-style-type: none"> a. Digital Sharia audit dashboards for real-time monitoring. b. Involving the Sharia Supervisory Board (DPS) from the design stage. c. Integrating <i>maqasid al-shariah</i> parameters into algorithms.

Source: Analysis based on Khan et al. (2025) and Shaikh (2023).

Evaluation Based on Maqasid al-Shariah (Specifically for ALAMI)

The implementation of Artificial Intelligence (AI) and Machine Learning (ML) at

ALAMI Sharia is evaluated through the lens of *Maqasid al-Shariah* to assess its compliance with Islamic legal and ethical principles. This evaluation focuses on several key dimensions: *hifz al-māl* (protection of wealth), *hifz al-nafs* (protection of life and dignity), *al-‘adl* (justice), transparency (*al-shafāfiyyah*), the avoidance of *gharar* (excessive uncertainty), and the promotion of *maslahah* (public benefit).

First, with regard to *hifz al-māl* (the protection of wealth), ALAMI utilizes AI within its alternative credit scoring system, which leverages non-traditional data such as MSME transaction histories, platform usage behaviors, and invoice records to assess financing eligibility. This approach not only enhances the accuracy of risk assessment but also safeguards the assets of both the institution and its customers through the early detection of potential defaults (Afriyie, et al., 2023). Furthermore, the ML-based fraud detection system identifies transaction anomalies in real time, thereby reducing the risk of financial loss.

Second, with respect to *hifz al-nafs* (the protection of life and dignity), ALAMI implements an NLP-based chatbot that not only addresses technical inquiries but also provides education on Sharia-compliant contracts and financial products. This feature safeguards the reputation of both users and the institution by ensuring that all information delivered remains consistent with Sharia principles (Akhlaq & Asif, 2024). In addition, the digital Sharia audit system developed by ALAMI enables the Sharia Supervisory Board (DPS) to conduct real-time monitoring, thereby preventing operational deviations that could potentially harm the institution’s credibility.

Third, the principle of *al-adl* (justice) is manifested through algorithms specifically designed to minimize bias. ALAMI employs diverse and representative datasets in training its ML models, thereby reducing the risk of discrimination against potential borrowers from particular demographic groups (Shaikh, 2023). The eligibility assessment process is based on business performance and financial capacity rather than subjective factors, thereby fostering procedural justice in access to financing.

Fourth, the principles of transparency (*al-shafāfiyyah*) and the avoidance of *gharar* (excessive uncertainty) are upheld through a Sharia dashboard accessible to the Sharia Supervisory Board (DPS) and other relevant stakeholders. Each AI-driven financing decision is accompanied by a traceable audit trail, ensuring that no “black box” exists within the decision-making process (OJK, 2024). Furthermore, the contracts utilized on the ALAMI platform—such as *murābahah* (cost-plus sale) and *ijārah* (leasing)—are standardized and clearly explained to users, thereby eliminating elements of *gharar* and reinforcing user trust.

Overall, the integration of AI within ALAMI’s operations contributes to the realization of *maslahah* (public benefit) by expanding financial access for MSMEs that have traditionally faced difficulties in obtaining financing from conventional banks. In 2023, ALAMI successfully disbursed financing amounting to IDR 1.2 trillion to more than 5,000 MSMEs across Indonesia (OJK, 2024). The efficiency generated through AI also reduces operational costs, thereby enabling the provision of more competitive profit margins in line with the Islamic principle of social justice.

Table 4. Operationalization of Maqasid

Maqasid Principle	Operational Indicator (Example)	Data Source/Metric
Hifzh al-mal (protect wealth)	Default rate, fraud detection success rate	Company reports, ops dashboards
Hifzh al-nafs (protect life/reputation)	User complaints, accuracy of customer support answers	Customer service logs
Al- 'adl (justice)	Disparate impact measures across demographics	Model fairness tests
Transparency (al-shaff)	% Decisions with explain ability / audit logs	Xai outputs, dps audit logs
Maslahah (public benefit)	% Financing to msms, employment created	Company reports, survey

Key Findings and Implications

Significant Similarities and Differences in AI Implementation

Based on a comparative analysis of JULO (conventional fintech) and ALAMI Sharia (Sharia fintech), it is evident that both companies share key similarities in utilizing AI and ML to enhance operational efficiency and broaden financial inclusion. Both employ alternative credit scoring technologies, machine learning–based fraud detection systems, and Natural Language Processing (NLP)–enabled chatbot services to improve user experience (DailySocial, 2024; OJK, 2024). However, a fundamental distinction lies in the value-based orientation and regulatory framework underlying their technological implementation. JULO operates with greater flexibility in adopting AI without the constraints of Sharia principles, whereas ALAMI Sharia is required to align every technological process with the objectives of *Maqasid al-Shariah*, particularly emphasizing transparency, justice, and the avoidance of *riba* (usury) (Billah, 2024).

Strengths and Weaknesses of Each Approach

The approach adopted by JULO demonstrates notable strengths in terms of innovation speed and flexibility in data-driven decision-making. Its AI technology is capable of analyzing user behavioral data in real time, thereby accelerating both the credit scoring and interest rate determination processes (Afriyie J. , et al., 2023). However, this approach also presents certain weaknesses, particularly the risks of algorithmic bias and insufficient consideration of local ethical and cultural values. Conversely, ALAMI Sharia excels in fostering user trust through the rigorous integration of Sharia principles, as evidenced by the presence of a Sharia Supervisory Board (DPS) and a comprehensive digital audit system (Rahmatika et al., 2024). Nonetheless, its primary limitation lies in the complexity of implementation, which requires harmonizing technological mechanisms with Islamic legal frameworks—potentially slowing the pace of innovation.

Implications for Inclusive and Sharia Fintech Development in Indonesia

These findings carry significant implications for the development of an inclusive and sustainable fintech ecosystem in Indonesia. First, a dedicated regulatory framework is required to govern the use of AI in Sharia fintech, including clear guidelines on algorithmic

fairness and transparency that are consistent with Sharia principles (Asyiqin et al., 2024). Second, collaboration among technology experts, regulators, and religious scholars must be strengthened to ensure that AI innovation is not only efficient but also ethical and aligned with local cultural and moral values. Third, enhancing consumer education in both digital and Sharia literacy is essential to enable society to utilize this technology wisely and responsibly. Therefore, the integration of AI into Sharia fintech can not only advance financial inclusion but also serve as a model for developing sustainable and equitable technological innovation in Indonesia.

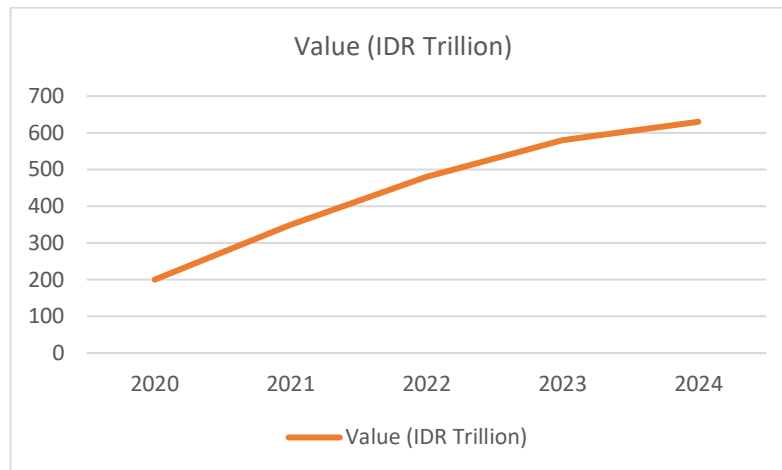


Figure 2. Fintech Lending Transaction Value in Indonesia (2020-2024)
Data Source: Otoritas Jasa Keuangan (OJK, 2024), Statista (2024).

Figure 2 shows the consistent growth in Indonesia's fintech lending transaction value, projected to reach IDR 630 trillion in 2024, which underscores the sector's rapid expansion and provides a strong impetus for AI adoption to enhance scalability and risk management.

Strategic Recommendations

Based on the research findings concerning the implementation of Artificial Intelligence (AI) and Machine Learning (ML) in both conventional and Sharia fintech in Indonesia, several strategic recommendations can be formulated for key stakeholders.

For Regulators: Development of Sharia AI Guidelines

Regulatory authorities such as the Financial Services Authority (OJK) and the National Sharia Board (DSN–MUI) should develop specific guidelines governing the application of Artificial Intelligence (AI) in Sharia-compliant finance. These guidelines should encompass key aspects such as algorithmic transparency, Sharia accountability, and data protection, all of which must align with the principles of *Maqasid al-Shariah*. As highlighted by Sarwar (2024), the regulatory framework must ensure that AI algorithms are free from elements of *gharar* (prohibited uncertainty) and avoid *riba*-based practices. The framework should also establish mechanisms for real-time digital Sharia audits by adopting supervisory dashboard models similar to those implemented by ALAMI Sharia. An adaptive regulatory

approach will promote responsible innovation while preserving the integrity of Sharia principles.

For Industry: Technologist-Sharia Collaboration in System Development

Sharia fintech industry players are encouraged to establish multidisciplinary teams comprising technology experts, Sharia practitioners, and AI ethics specialists from the initial stages of system design. Such collaboration is essential to ensure that credit scoring and risk assessment algorithms are not only efficient but also fair, transparent, and free from biases that contradict Islamic ethical values. As demonstrated by Adinugraha et al. (2025), embedding Sharia compliance in the early stages of the product development cycle can prevent algorithmic inconsistencies with DSN–MUI *fatwas*. Companies may adopt an *Agile–Sharia* framework that enables rapid iteration while maintaining adherence to Sharia principles. Within the fintech industry, this highlights the importance of structured and effective collaboration between data scientists and Sharia scholars, offering a concrete model for Agile–Sharia development. Ultimately, these measures are essential for cultivating a fintech ecosystem in Indonesia that is not only technologically advanced and inclusive but also ethically grounded and firmly aligned with Sharia principles—thereby contributing significant strategic value to the national financial landscape.

For Academia: Development of AI Ethics Research in Sharia Finance

Academics are encouraged to advance research in the field of AI ethics and Sharia finance, particularly concerning algorithmic fairness, bias in training datasets, and the interpretation of *Maqasid al-Shariah* within the context of digital technology. Future studies may focus on developing an *AI–Islamic Governance* framework that integrates global AI ethics standards—such as the OECD AI Principles—with Sharia values. As discussed in Ramadhan et al. (2024), an interdisciplinary approach that combines computer science, Islamic jurisprudence, and technology ethics will enrich both academic literature and professional practice. Collaboration among academia, industry, and regulatory bodies is likewise essential to ensure the relevance and applicability of research findings. The present study also offers substantial practical value: for regulators, particularly the OJK and DSN–MUI, it provides foundational insights for the development of specialized Sharia-compliant AI governance guidelines emphasizing algorithmic transparency, digital Sharia audit mechanisms, and procedural fairness.

This study establishes its novelty by presenting one of the first comparative analyses of Artificial Intelligence (AI) implementation in both conventional and Sharia fintech through an integrated framework that combines the Technology–Organization–Environment (TOE) model, Socio-Technical Systems Theory, and *Maqasid al-Shariah*. It addresses a significant gap in the existing literature, which has predominantly focused on technical efficiency while overlooking the essential normative and ethical dimensions embedded within value-based systems such as Islamic finance. By doing so, this research makes an academic contribution to the growing discourse on AI ethics in finance by offering a contextualized and multidisciplinary analytical model that can be adapted and applied to future studies on technology adoption within religiously or ethically grounded economic systems.

Conclusion

This study examined the adoption of Artificial Intelligence and Machine Learning in Indonesia's financial industry by comparing a conventional fintech platform represented by JULO and a Sharia compliant fintech platform represented by ALAMI. The findings indicate that although both institutions utilize AI to enhance operational efficiency and decision making, their implementations are shaped by distinct value orientations. Conventional fintech prioritizes speed scalability and performance efficiency while Sharia fintech integrates ethical and religious principles such as justice transparency and the avoidance of *riba* into its technological processes. These differences demonstrate that AI adoption in fintech is not value neutral but is influenced by institutional identity and normative commitments.

Furthermore the study shows that regulatory and governance structures play a significant role in shaping AI utilization. Sharia fintech operates within a more complex framework that combines financial regulation with Sharia oversight which affects how AI systems are designed monitored and evaluated. Ethical considerations emerge as a central concern in both models with conventional fintech facing challenges related to transparency data governance and fairness while Sharia fintech emphasizes alignment with the objectives of *Maqasid al Shariah*. Overall this study contributes to a deeper understanding of AI governance in fintech by highlighting the importance of integrating technological innovation with ethical responsibility and institutional values in the development of sustainable digital financial ecosystems in Indonesia.

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