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Maqasid al-Shariah-Based Governance Framework for Artificial Intelligence in Islamic Financial Institutions: Balancing Innovation and Sharia Compliance with an Applied Study of International Experiences

إطار حوكمة للذكاء الاصطناعي في المؤسسات المالية الإسلامية مبني على مقاصد الشريعة يجمع بين الابتكار والامتثال الشرعي: مع دراسة تطبيقية لتجارب دولية

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Abstract:

The world is seeing a profound transition propelled by artificial intelligence technology, positioning Islamic financial institutions at a pivotal crossroads. These institutions confront a complex dilemma: they must adopt innovation to sustain competitiveness while complying with Sharia values that characterize their identity. This study tackles the existing legislative and regulatory deficiency by providing a "Hybrid Governance Framework" that amalgamates worldwide technical standards with the paramount aims of Islamic law (Maqasid al-Shariah): the protection of religion, life, intellect, wealth, and lineage. The study utilizes a descriptive methodology for its conceptual framework, an analytical technique for risk evaluation, and investigates innovative international models from Malaysia, the UAE, Indonesia, and Saudi Arabia. The study indicates that effective governance necessitates a shift from "post-implementation oversight" to "embedded compliance" within algorithms, thus ensuring openness and fairness in financial decisions.

Keywords: Artificial Intelligence; Maqasid Governance; Islamic Finance; Algorithmic Risks; Sharia Compliance.

JEL Classification Codes: G21, G28, O33, Z12

ملخص:

يشهد العالم تحولا جذريا تقوده تقنيات الذكاء الاصطناعي، مما يضع المؤسسات المالية الإسلامية أمام تحد يتمثل في ضرورة تبني الابتكار لضمان التنافسية، والالتزام بالضوابط الشرعية التي تشكل هويتها، تهدف هذه الدراسة إلى معالجة الفجوة التشريعية والتنظيمية الحالية من خلال اقتراح "إطار حوكمة هجين" يدمج المعايير التقنية العالمية مع المقاصد الشرعية الكبرى (حفظ الدين، النفس، العقل، المال، والنسل)، اعتمدت الدراسة المنهج الوصفي لتأصيل المفاهيم، والمنهج التحليلي لتقييم المخاطر، مع استقراء نماذج دولية رائدة (ماليزيا، الإمارات، إندونيسيا، والمملكة العربية السعودية)، وخلصت الدراسة إلى أن الحوكمة الفعالة تتطلب الانتقال من "الرقابة اللاحقة" إلى "الامتثال المدمج" داخل الخوارزميات، لضمان شفافية القرارات المالية وعدالتها.

كلمات مفتاحية: الذكاء الاصطناعي، الحوكمة المقاصدية، المالية الإسلامية، المخاطر الخوارزمية، الامتثال الشرعي.

تصنيفات JEL: G21، G28، O33، Z12

INTRODUCTION:

The world is undergoing an unparalleled digital revolution, with artificial intelligence serving as the principal catalyst for banking innovation, encompassing big data analysis, risk assessment, and automated investment decisions. The Islamic finance sector has experienced significant expansion, with global assets estimated at over $3.88 trillion in 2024, expanding at an annual rate of 14.9%, and anticipated to reach $7.5 trillion by 2028. Islamic banking comprises approximately 71.6% of total industry assets, with notable regional concentration in GCC nations (53.1%) and Southeast Asia (21.9%).

This technological advancement poses a dual challenge for Islamic banking organizations. It provides the potential to decrease expenses, boost client accessibility, and augment operational effectiveness. Conversely, it prompts significant Sharia-related inquiries on the compatibility of "algorithms" with Islamic law, as well as concerns pertaining to gharar (uncertainty), jahalah (ignorance), and equity in transactions. The complexities of these difficulties in Islamic finance arise from the dual supervisory requirements: compliance with conventional regulatory standards and obedience to Sharia decisions.

Study problem

The core research issue arises from three converging areas: fast advancements in AI, distinct Islamic financial needs based on Sharia, and the lack of robust governance structures to handle this convergence. The primary inquiry is **how to establish a governance framework for artificial intelligence within Islamic financial institutions that reconciles the demands of technological innovation with Sharia compliance, in alignment with the overarching purposes of Islamic law.** The subsequent sub-questions pertain to this inquiry:

What is the operational role of AI in Islamic finance, and what problems does its integration present?

In what manner do the objectives of Sharia provide a foundational reference for the regulation of AI ethics?

What are the Sharia-compliant and technical dangers that arise from the lack of effective governance of AI systems?

What is the suggested framework for AI governance in Islamic financial institutions?

Objectives of the study

This study seeks to establish a complete governance framework for the application of AI in Islamic financial institutions, harmonizing technological innovation with Sharia compliance mandates. The explicit aims are

1. To examine the functional uses of AI in Islamic banking and identify the Sharia-compliant problems linked to its integration.
2. To establish the Maqasid al-Shariah (objectives of Islamic law) as a fundamental reference for AI ethics and governance inside Islamic finance.
3. To evaluate the Sharia-compliant and technical hazards stemming from insufficient AI governance frameworks.
4. To provide a pragmatic governance framework that harmonizes algorithmic efficiency with ethical accountability in accordance with Islamic values. The importance of research This research is significant due to its theoretical and practical contributions.

From a theoretical standpoint, it enhances the current literature on Islamic finance by presenting a Maqasid-based framework for AI governance, a domain that is mostly unexamined. It further

enriches the overarching dialogue on ethical AI by offering an alternate normative framework based on Islamic jurisprudence.

The report offers policymakers, regulators, Sharia supervisory boards, and Islamic financial institutions a structured model to facilitate the responsible implementation of AI technologies.

This research promotes sustainable innovation by tackling concerns related to algorithmic transparency, fairness, accountability, and Sharia compliance, thereby maintaining the ethical integrity of Islamic banking.

Methodology of Study

This study utilizes a pragmatic, application-focused methodology that integrates analytical and comparative techniques. This study investigates real-world AI applications in Islamic financial institutions in Malaysia, the UAE, Saudi Arabia, and Indonesia, focusing on implemented systems such as credit scoring algorithms, robo-advisory platforms, and automated Sharia screening tools. Data sources encompass regulatory frameworks from AAOIFI and IFSB, institutional implementation reports, and Sharia board determinations regarding algorithmic applications. This study systematically evaluates real-world AI governance practices and their conformity with Maqasid al-Shariah, developing a pragmatic framework that addresses the operational challenges encountered by Islamic banks, thus ensuring relevance beyond theoretical models.

previous studies

Numerous research studies have examined the convergence of artificial intelligence, financial governance, and Islamic finance; however, none has provided a comprehensive governance framework based on Maqasid.

Zulkifli and Kassim (2021) conducted a study that examined the application of fintech and AI in Islamic banking practices. Their analysis underscored the efficiency improvements realized via automation while stressing that current regulatory frameworks inadequately handle Sharia-related issues, including gharar, insufficient openness, and the opacity of automated decisions. However, their research primarily focused on operational efficiency and did not propose a comprehensive governance framework.

A significant addition is the research conducted by **Hasan, Ali, and Noor (2022)**, which examined ethical AI through an Islamic lens. The authors contended that Islamic ethical principles—such as justice, openness, and accountability—can enhance traditional AI ethics frameworks. While their work provided valuable theoretical insights, it primarily focused on conceptual aspects and did not successfully transform these principles into a workable institutional governance framework.

Rabbani et al. (2023) conducted the third pertinent study, examining the regulatory obstacles of digital transformation in Islamic finance. They emphasized the need for regulatory sandboxes that comply with Sharia and flexible legal frameworks. Their research, while addressing governance challenges, did not explicitly incorporate Maqasid al-Shariah as a fundamental framework for AI legislation.

This research enhances the existing literature by introducing a structured and practical Maqasid-based governance framework that amalgamates Sharia objectives, technical controls, and institutional monitoring mechanisms into a unified model.

1- Conceptual Foundation of AI in Islamic Finance

Artificial intelligence has emerged as a crucial component in the advancement of financial operations, requiring robust supervision, particularly within Islamic financial institutions. In the absence of established standards, the AAOIFI and IFSB frameworks serve as principal references for comprehending problems and constructing governance appropriate for this technological advancement.

1-1 The Nature of Financial AI

Artificial intelligence signifies a true transformation in the financial industry, characterized by the application of sophisticated algorithms and statistical models to analyze extensive data sets and extract patterns for autonomous or semi-autonomous financial decision-making and investment recommendations. (Financial Stability Board, 2017, p. 05) Artificial intelligence has radically altered the operations of financial institutions, with algorithms increasingly overseeing investment portfolios valued in the billions, evaluating creditworthiness, and identifying money laundering with greater precision than humans. (OECD, 2021, p. 18)

Artificial intelligence has facilitated a significant advancement in data analysis and investment decision-making, enhancing efficiency and enabling financial institutions to improve assessment accuracy and oversight, thereby obtaining superior performance relative to conventional approaches. Essential applications comprise

1-1-1 Machine Learning:

Employed to construct consumer default prediction models with superior accuracy compared to conventional models. These models depend on the analysis of historical financial behavior patterns, encompassing payment records, banking transactions, and demographic data to assess the likelihood of payment default (Dey & Kassim, 2025, p. 335). In the Islamic context, these strategies can be utilized to evaluate funding candidates for murabaha or musharaka, assuring equitable treatment of consumers without reliance on unjust criteria.

1-1-2 Natural Language Processing (NLP):

This technique is employed in various domains, including

- **Chatbots:** (Khan & Rabbani, 2020, pp. 65-77) To deliver preliminary consultations on Sharia-compliant products and address consumer inquiries around the clock in alignment with Islamic banking standards.
- **Market Sentiment Analysis:** Analyzing news and social media platforms to facilitate informed investment decisions. (Hamadou, 2024, p. 139)
- **Sharia Contract Review:** (Khan, Ali , & Shah, 2021) NLP systems may analyze financial contracts to verify their compliance with Sharia law by identifying banned conditions.

1-1-3 Computer Vision and Biometric Recognition:

These technologies are utilized in electronic "Know Your Customer" (e-KYC) services via facial recognition and biometric verification, enabling account creation while maintaining security and asset protection.

1-1-4 Predictive Analytics:

Employed in risk management and preliminary fraud detection, where intelligent algorithms may scrutinize thousands of transactions per second to identify anomalous patterns that may signify money laundering or illicit transactions. (Kshetri, 2021, p. 762)

1.2 The Specificity of "Governance" in Islamic Financial Institutions

Corporate governance seeks to safeguard shareholder rights and promote openness and accountability, but governance in Islamic organizations incorporates a contractual and value-oriented aspect known as "Sharia governance." (Wajdi Dusuki, 2008, p. 156) The Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) defines Sharia governance as "a collection of institutional and organizational frameworks designed to guarantee effective and independent Sharia oversight over all operations of the Islamic financial institution."

The Islamic Financial Services Board (IFSB) characterizes the Sharia governance system as "a collection of institutional and organizational frameworks through which Islamic financial institutions guarantee effective and independent Sharia oversight concerning the issuance of pertinent Sharia rulings, the dissemination of information related to these rulings to relevant parties, internal Sharia review to ensure adherence to Sharia rulings, and an annual Sharia audit to verify that the internal Sharia review has been conducted appropriately."

In the era of artificial intelligence, governance encompasses "algorithmic governance," which ensures that the programming code overseeing financial transactions is devoid of concealed biases and refrains from executing Sharia-prohibited activities (IFSB, 2009, p. 3) (such as short selling or interest-based transactions) at speeds surpassing human oversight capabilities. This requires the establishment of new oversight mechanisms suitable for the nature and velocity of automated choices.

1.3 International Standards Framework for Islamic Finance Governance

Two principal organizations are engaged in the formulation of international standards for Islamic finance:

1-3-1 AAOIFI (Accounting and Auditing Organization for Islamic Financial Institutions): Established in 1991 in Bahrain, it has promulgated more than 100 standards pertaining to accounting, auditing, governance, ethics, and Sharia. Its guidelines are implemented wholly or partially in over 45 countries. (AAOIFI, 2024)

1-3-2 IFSB (Islamic Financial Services Board): Established in 2002 in Kuala Lumpur, emphasizing prudential standards and guiding principles, including disclosure, solvency, and capital sufficiency. (IFSB I. , 2024)

In October 2018, the two organizations executed a memorandum of understanding to collaborate on the development of a universal Sharia governance framework (RSGF), marking a significant advancement toward the harmonization of global standards. Nonetheless, neither body has promulgated a definitive standard on AI governance, resulting in a legislative void that necessitates immediate attention.

2- Maqasid Approach to Regulating AI (Theoretical Framework)

The aims of Sharia—preserving religion, life, intelligence, lineage, and wealth—serve as the

paramount standard for governing innovations and assessing verdicts. Imam al-Shatibi asserted in "Al-Muwafaqat" that "the implementation of Islamic law serves the interests of individuals in both this world and the hereafter." (Al-Shatibi, 1997, p. 9) In the realm of AI, these objectives establish a thorough ethical framework for the evaluation and regulation of technology applications.

2-1 Preservation of Religion (Standards Compliance)

This purpose necessitates guaranteeing that intelligent systems are devoid of restrictions at all operating phases. In automated investment, algorithms must be configured with stringent "Sharia filters" that automatically disqualify enterprises involved in alcohol (Al-Ayyadi, 2020, p. 85), gambling, or surpassing Sharia-compliant debt ratios.

Applications in practice encompass:

2-1-1 Automated Sharia Stock Screening: The Malaysian Securities Commission employs a dual screening approach, which encompasses business activity criteria (prohibited activities must not surpass 5% of total income) and financial ratio criteria (interest-bearing debt must not exceed 33% of total assets) (Securities Commission Malaysia, 2024). This system expedites stock screening based on activity and financial ratio criteria, guaranteeing precise and objective Sharia classification.

2-1-2 Digital Investment Platforms: Platforms such as Wahed Invest and StashAway Shariah provide Sharia-compliant investment portfolios that are exclusively managed by sophisticated algorithms under constant Sharia supervision, hence augmenting investment assurance.

2-1-3 Smart Sharia Contracts: Smart contracts can be implemented on blockchain platforms to autonomously execute murabaha, ijara, (Tan & Teo, 2025, p. 9) and musharaka contracts, assuring adherence to Sharia principles and circumstances, hence facilitating accurate automatic execution with prompt Sharia compliance.

Mandatory controls encompass:

• Performing ex-ante Sharia audits on all algorithms before deployment

• Integrating Sharia knowledge repositories into AI systems

• Guaranteeing ongoing upgrades of Sharia filters in accordance with resolutions from sanctioned fatwa authorities.

2-2 Wealth Preservation (Efficiency and Risk Mitigation)

In Islam, wealth constitutes the cornerstone of existence and the foundation of duty. Preserving it necessitates its development through lawful methods and safeguarding it from depletion and waste. (Al-Zarqa, 2004, p. 312) AI facilitates the attainment of this purpose in two dimensions:

2-2-1 Development Component:

- Enhancing resource allocation efficiency with predictive analytics to find lucrative investment possibilities.
- Minimizing operating expenses by systematic process automation, wherein AI systems may evaluate finance requests within minutes rather than days. (Hasan & Hassan, 2020, p. 802)
- Enhancing client experience and augmenting financial inclusion with round-the-clock digital services.

2-2-2 Protection Aspect:

- Proactive fraud detection employing deep learning algorithms to analyze transaction trends in real-time.
- Anti-money laundering using sophisticated monitoring systems implemented by Islamic banks such as Dubai Islamic Bank and Abu Dhabi Islamic Bank.
- Credit management of risks via default prediction models mitigates possible damages.

Challenges persist in guaranteeing that credit evaluation systems do not engage in unjust discrimination against clients, thus contravening the ideal of justice inherent in Islamic financial transactions.

2-3 Preservation of Intellect (Transparency and Eradication of Ignorance)

Islam venerates the intellect and forbids anything that obscures or corrupts it, specifically prohibiting gharar (uncertainty that leads to conflict) in financial dealings. The core issue with AI resides in "black box models" that generate outcomes without elucidating the rationale or reasoning behind them. (Rudin, 2019, pp. 206-215)

The Sharia concern is that, from a maqasid standpoint, financial transactions impacting individual rights cannot be founded on arcane, undisclosed algorithms, as this represents excessive gharar. A funding request that is denied without a comprehensible explanation to the customer contravenes the principle of clarification as articulated in the Quranic verse number (138:Al-Imran).

The solution is **Explainable AI (XAI)**, a critical research domain in computer science that seeks to enhance the transparency and comprehensibility of AI models while maintaining predictive accuracy. (Arrieta, 2020, p. 96)

The principal techniques of Explainable Artificial Intelligence (XAI) encompass: (Molnar, 2022, p. 62)

- **SHAP (SHapley Additive exPlanations):** Assesses the contribution of each variable to the ultimate choice.
- **LIME (Local Interpretable Model-agnostic Explanations):** Delivers localized elucidations for model determinations.
- **Attention Mechanisms:** In neural networks, they indicate the elements on which the model concentrates.

XAI approaches in Islamic finance correspond with the idea of "bayyinah," which mandates clarity and transparency in transactions. Islamic financial institutions must implement these strategies to facilitate comprehension of decision-making rationales (such as funding rejections, murabaha pricing, risk classification, etc.) for clients and Sharia auditors.

2-4 Preservation Safeguarding of Existence and Dignity (Data Privacy)

The sanctity of private life is safeguarded by Sharia, which forbids espionage, slander, and infringements on privacy, as stated by Allah in Surath (Al-Hujurat: 12).

Artificial intelligence depends on the aggregation of extensive data concerning individual behaviors, financial practices, and preferences.

Maqasid regulations for data protection encompass:

- **Specific Purpose Principle:** Data shall be utilized solely for the purpose for which it was gathered, adhering to the principle "Muslims are bound by their conditions."
- **Permission Principle:** Data may not be disseminated to third parties without specific authorization from the client.
- **The Non-Harm Principle prohibits** the use of data for blackmail or exploitation of clients, adhering to the maxim "no harm and no reciprocating harm."
- **Trustworthiness Principle:** Data is seen as a trust that requires safeguarding against breaches and leaks.

  Applications in practice encompass:

  - Implementing federated learning methodologies enables AI model training without the necessity of transmitting data beyond user devices. (Yang, 2019, pp. 16-17)
  - Implementing privacy by design principles in all artificial intelligence systems. (Al-Bouti, 1998, p. 210)
  - Adhering to international data protection regulations such as the European GDPR and the Saudi Personal Data Protection System.

2-5 Justice (Mitigating Algorithmic Bias)

Justice is an unequivocal principle in Islam and the cornerstone of financial dealings. Research has demonstrated that AI algorithms can acquire "bias" from historical data, resulting in biased outcomes.

Categories of Algorithmic Bias: (Mehrabi, 2021, p. 23)

- **Historical Bias:** The phenomenon whereby historical data embodies previous societal discrimination, such as the denial of financing to citizens in specific regions.
- **Representation Bias:** The insufficient representation of certain groups in training data.
- **Selection Bias:** The collection of data from non-representative sources.

A study conducted in the United States indicated that credit assessment algorithms disproportionately reject minority applications at a rate 40-80% greater than that of comparable applications from white individuals, despite equivalent financial criteria.
Islamic regulations encompass: (Securities Commission Malaysia, 2024)

- Data auditing to eliminate discriminating characteristics prior to system integration (data debiasing).
- Executing regular assessments of algorithmic fairness.
- Guaranteeing equitable representation of all demographics in training data.
- Implementing the principle of "multi-dimensional fairness" while taking into account specific client situations.

3- Risk Assessment Pertaining to AI Utilization

The rapid proliferation of AI in Islamic financial institutions gives rise to a series of intricate dangers that necessitate thorough examination. This chapter examines the principal Sharia, technological, and institutional obstacles to guaranteeing secure deployment aligned with Sharia objectives.

3-1 Risks Associated with Sharia Compliance

Risks of non-compliance are one of the most significant issues for Islamic financial organizations in the utilization of AI, including:

3-1-1 Incorrect Contract Characterization Risk:

Smart contracts may perform automated buying and selling transactions that may not adhere to the principles of Sharia contracts. For instance:

In currency and gold exchange (sarf), quick possession is mandated by Sharia, which smart contracts may not guarantee.

- In a murabaha sale, the bank is required to possess the commodity prior to selling it to the customer; nevertheless, algorithms may facilitate the transaction before ownership is established.
- In musharaka, the profit percentage, rather than the number, must be delineated, and algorithms may mischaracterize this specification. (Shubeir, 2018, p. 156)

3-1-2 Misleading Automated Fatwa: Customers depending on unqualified chatbots for financial fatwas may inadvertently engage in prohibited activities. A fatwa in Islamic finance necessitates: (Al-Quaradawi, 2008, pp. 45-67)

- Profound comprehension of the subject of investigation.
- Consciousness of the surrounding context and conditions.
- Capacity to evaluate jurisprudential perspectives.
- Evaluation of repercussions and results

The integration of these capabilities into contemporary AI systems is challenging, requiring validation of the knowledge base by Sharia scholars and the referral of intricate inquiries to qualified muftis.

3-1-3 Unsynchronized Updates: Sharia rules may evolve due to new interpretations or changing circumstances; yet, algorithms may persist in applying outdated judgments if not regularly updated.

3-2 Technical and Ethical Risks

3-2-1 Algorithmic Bias: As previously noted, algorithms may perpetuate historical prejudice against specific groups in credit allocation or service pricing, contravening the principles of Islamic justice.

3-2-2 Legal Liability: In the event that a "robo-advisor" incurs significant losses to a customer's portfolio owing to an algorithmic malfunction, the issue of accountability for reimbursement emerges—should it be the developer, the bank, or the technology provider? Islamic jurisprudence adheres to the principle that "the direct actor is liable even if unintentional," necessitating: (Bello & Buang, 2019, p. 12)

- Accurate liability assessment in contractual agreements.
- Implementing compensation systems for instances of algorithmic inaccuracies.
- Mandating takaful insurance for AI-related risks.

3-2-3 Privacy Violation: AI systems may gather sensitive client data without their comprehensive understanding of its utilization, so infringing upon Sharia-protected privacy.

3-3 Financial Stability Risks

3-3-1 Herding Behavior: An overdependence on analogous algorithms in the market can result in synchronized collective actions during crises. Should the majority of algorithms execute concurrent selling choices, a swift market collapse may ensue.

3-3-2 Systemic Risk: The Financial Stability Board (FSB) cautions that extensive reliance on a few technology providers may engender systemic vulnerability within the global financial system.

3-3-3 Excessive Volatility: High-frequency trading algorithms can induce abrupt price movements within brief intervals, undermining the financial stability concept pursued by Islamic banking. (Kirilenko, 2017, p. 988)

3-4 Data Governance Risks Three to four risks associated with data governance

- **Data Quality:** Inaccurate or inadequate data can result in erroneous choices.
- **Data Security:** Financial institutions encounter escalating cyber assaults.
- **Data Sovereignty:** Challenges emerge over the geographic location of data storage and processing, particularly with the introduction of cloud computing.

4- International Models and Experiences

Examining worldwide models offers a significant practical reference for comprehending the application of AI in Islamic banking under regulatory frameworks and varied contexts.

4.1 Malaysian Experience: Leadership in Automated Sharia Compliance Screening

Malaysia is at the forefront of Islamic financial technology, effectively integrating a robust regulatory framework with advanced technologies to improve Sharia compliance.

4-1-1 The Digital Assets Framework (2019), established by the Malaysian Securities Commission, delineates a thorough regulatory structure for digital assets (Securities Commission Malaysia, 2019), outlining licensing and compliance obligations for platforms within this sector.

4-1-2 Automated Sharia Screening System (i-Shariah): This pioneering innovation is the first of its type in the Islamic world, evaluating financial data for more than 900 companies listed on the Kuala Lumpur Stock Exchange. The technology computes financial measures pertinent to Sharia rulings[1] -such as the interest-bearing debt ratio, forbidden liquidity, and impermissible income- to generate an automated rule that excludes non-compliant enterprises and updates the Sharia list biannually.

Table (1): Outcomes of Digital Transformation:

Indicator	Before System	After System	Improvement Rate
Sharia Screening Duration	3-4 weeks	2-3 hours	97%
Classification Accuracy	65%	88%	35%
Operational Costs	High	Low	60% reduction
Companies Covered	600	Over 900	50% increase

Source: Prepared by the researchers based on the Malaysian Securities Commission reports for the year 2024.

This digital transformation has yielded significant outcomes, particularly in decreasing the duration of Sharia compliance from weeks to hours, enhancing categorization accuracy by 35%, and lowering operational costs by around 60% (Sain, 2023, pp. 52-53). This is illustrated in the table above. To foster innovation, Malaysia has facilitated these initiatives by creating the **Fintech Sandbox**, which offers a secure experimental setting for companies to evaluate their solutions under direct oversight, with specific advantages conferred to Sharia-compliant

[1] Business activity criterion: Exclude companies whose prohibited activities exceed 5% of total income, and financial ratios criterion: Exclude companies whose interest-bearing debts exceed 33% of total assets.

applications.

The Malaysian example exemplifies a successful integration of technical advancement and Sharia compliance, serving as a significant reference for nations aiming to modernize their Islamic banking systems.

4.2 UAE Experience: Artificial Intelligence Strategy 2031

The UAE is rapidly advancing its status as a worldwide AI hub via the **AI Strategy 2031**, which is prominently seen in the Islamic banking sector.

4-2-1 Dubai Islamic Bank (DIB): Established as an innovative paradigm implementing:

- Advanced e-KYC technology facilitates remote account establishment within minutes with facial recognition and biometric authentication.
- The "Jawaher" platform utilizes AI to provide tailored Sharia-compliant investment suggestions.
- Advanced anti-fraud system overseeing more than 2 million transactions every day.

4-2-2 Abu Dhabi Islamic Bank (ADIB): Implemented comprehensive intelligent solutions comprising (Dubai Islamic Bank, 2024, pp. 34-42)

- Digital adviser "Fatima" robot addresses client inquiries in Arabic and English, with a 76% first-attempt resolution rate.
- Machine learning-based credit risk assessment system.
- Robotic Process Automation (RPA) encompasses over 75% of back-office functions, enhancing productivity by 320% and diminishing human errors by 94%.

4-2-3 The UAE Central Bank has established a digital governance framework that encompasses regulations pertaining to artificial intelligence, including requirements for periodic audits, obligatory reporting to the Central Bank, and fines for non-compliance.

4.3 Saudi Arabia's Experience: Vision 2030 and Digital Transformation

As part of Saudi Vision 2030, the Kingdom is undergoing significant digital change in the finance and banking industry, with AI emerging as a crucial pillar. (Saudi Central Bank, 2024)

4-3-1 Al Rajhi Bank: Made significant investments beyond 500 million riyals from 2020 to 2024 to facilitate digital transformation, culminating in the development of the "Al Rajhi Digital" platform, which provides comprehensive financial services powered by AI.

4-3-2 Saudi National Bank: "Tamweeli" technology improves the assessment of personal finance requests with increased accuracy and efficiency, while the "Nabdh" chatbot provides round-the-clock client care.

4-3-3 Unified Sharia Board: The Kingdom established a unified Sharia board for the financial industry, focusing on:

- Evaluating algorithms and guaranteeing compliance with regulations.
- Authorization of digital items.
- Ongoing updates.
- Instruction and leadership.

4.4 Indonesian Experience: The Most Promising Market for Digital Islamic Finance

Indonesia has rapid expansion in digital Islamic banking, exemplified by the accomplishments of **Bank Syariah Indonesia (BSI)**: (Hamadou, 2024, p. 122)

- Digital intelligent assistant robot "Amira."
- Intelligent system assessing consumer financial conduct.
- Comprehensive digital platform for Islamic banking services.

The Indonesian Financial Services Authority **(OJK)** has promulgated specific legislation for digital innovation in Islamic financial institutions, including new digital financial services, commercial banks, and cybersecurity protocols.

4.5 British Experience in a Non-Islamic Context

The United Kingdom is one of the leading Western nations methodically incorporating Islamic banking, striving to assimilate it into its financial system to bolster its status as a global center for this industry.

4-5-1 Al Rayan Bank: The inaugural Islamic bank in the United Kingdom to secure a full banking license, facilitating extensive Sharia-compliant financial services through: (Al Rayan Bank, 2024, pp. 18-22)

- Digital Transformation: Implementing AI in Real Estate Financing Evaluation.
- Automated Sharia compliance: Creating a computerized system to guarantee that activities and products adhere to Sharia regulations.

4-5-2 Regulatory Aspect: The UK implements a principle of regulatory equality between Islamic and conventional banks under the supervision of the Financial Conduct Authority (FCA), while offering regulatory flexibility that enables Islamic institutions to tailor their operations to specific Sharia requirements.

Table (2): Comparative Analysis of International Models:

Criterion	Malaysia	Saudi Arabia	UAE	Indonesia	Britain
Regulatory Framework	Advanced & Integrated	Under Development	Advanced	Emerging	Advanced with Flexibility
Automated Sharia Screening	Very Advanced	Medium	Medium	Emerging	Limited
Regulatory Sandbox	Existing & Effective	Existing	Existing	Existing	Existing
XAI Standards	Under Development	Limited	Limited	Limited	Limited
Data Protection	Advanced (PDPA)	Advanced (PDPL)	Advanced	Medium	Advanced (UK GDPR)

Source: Prepared by the researchers following an extensive examination of global models.

Table 02 delineates the disparities in the maturity of AI regulatory frameworks across prominent nations, indicating that Malaysia and the UAE are advanced, while Saudi Arabia is in the developmental stage. An examination of the five international models demonstrated distinct variations in methodologies and priorities, while exhibiting shared commitments to Sharia compliance and the advancement of technical innovation. Malaysia has established itself as a leader in automated Sharia compliance and sophisticated regulatory frameworks, but the

UAE has set itself apart through extensive institutional applications and substantial investment. Saudi Arabia showcased a distinctive type of Sharia unification, Indonesia exhibited considerable market potential, and Britain validated the feasibility of Islamic finance inside a Western framework.

5-Proposed Framework for Artificial Intelligence Governance in Islamic Finance

A proposed paradigm for AI governance in Islamic financial institutions, incorporating Sharia, technical, and ethical dimensions, is provided based on prior theoretical analysis and applied research.

5-1 Fundamental Framework Principles

The framework is founded on six essential concepts taken from the aims of Sharia.

5-1-1 Compliance by Design Principle: Incorporating Sharia controls throughout the system design phase instead of as an afterthought, embedding Sharia regulations within algorithms from the outset. This principle delineates the aim of safeguarding religion.

5-1-2 Principle of Transparency and Explanation: Implementing Explainable AI (XAI) models in all decisions impacting customer rights. This principle is intimately associated with the preservation of intellect and the principle of accountability.

5-1-3 Algorithmic Fairness Principle: Guaranteeing non-discrimination among customers based on unjust criteria, accompanied by regular assessments to validate this. This idea aims to safeguard life.

5-1-4 Accountability Principle: Explicit delineation of roles within the automated decision-making process, encompassing developers, operators, and the institution.

5-1-5 Privacy Principle: (Solove, 2020, p. 42) Pertains to the preservation of life (dignity and concealment) In the domain of artificial intelligence, this idea entails surpassing legal compliance for data protection by encompassing the safeguarding of data utilization, regulating surveillance intelligence methods, and ensuring that personal information is utilized solely within allowed legitimate transactions.

5-1-6 The Human Oversight Principle mandates a human-centered approach to AI, assuring a last point of human intervention in oversight, particularly for high-stakes choices, to prevent irreversible harm and to facilitate the reevaluation of new Sharia rulings.

5-2 Suggested Organizational Framework

Establishing a cohesive institutional framework that connects Sharia requirements with technical capabilities is crucial. This paradigm is founded on three principal organizations engaged in functional integration:

5-2-1 Digital and Sharia Governance Committee: A dedicated committee functioning as an intermediary between IT administration and the Sharia Supervisory Board, consisting of: (IFSB I. , 2023, pp. 25-30)

- Member of the Sharia Supervisory Board specializing in the jurisprudence of contemporary financial transactions.
- Chief Information Officer or representative.
- Expert in data science and artificial intelligence.

- Representative of risk management.
- Compliance Management Representative.

Responsibilities of the Committee:

- Pre-ethical and Sharia assessment.
- Design supervision.
- Overseeing algorithmic fairness assessments.
- Evaluating deviation reports.
- Formulating strategic proposals.

5-2-2 Technical Sharia Audit Unit: This unit serves as the executive branch of proactive oversight, consisting of "technical Sharia auditors" proficient in both programming languages and finance. Responsibilities encompass:

- Algorithmic Sharia compliance assessment.
- Evaluating model outputs.
- Compiling technical Sharia compliance reports

5-2-3 External Advisory Council: Offers essential flexibility and contemporary competence by incorporating unbiased and independent viewpoints, consisting of specialists in:

- Sophisticated artificial intelligence applications.
- Digital ethics and international norms.
- Modern Islamic financial jurisprudence.

Table (3): Analytical Significance of Proposed Organizations:

Organizational Entity	Strategic Function in Governance Framework
Committee of Digital and Sharia Governance	Serves as the strategic integration center that converts theoretical Sharia principles into quantifiable, implementable policy by leveraging its multidisciplinary composition of Sharia, technological, and supervisory skills.
Technical Sharia Audit Division	Represents the executive branch of proactive supervision by qualifying specialized personnel adept at evaluating programming codes from a Sharia perspective, shifting oversight from a documentary to an algorithmic level.
External Advisory Council	Facilitates knowledge and practice advancements by engaging impartial and independent experts, mitigates institutional insularity, and bolsters credibility and transparency with external stakeholders.

Source: Prepared by the researcher utilizing the preceding information.

5-3 Governance Lifecycle Framework

The suggested paradigm delineates the AI governance process into three interconnected phases, ensuring thorough control from design to ongoing operation.

Phase One: Foundational Phase (Pre-Implementation):

Procedure	Detailed Description	Responsible Party
Data Sources Audit	Verifying the legitimacy of data sources used and freedom from systematic biases or Sharia-prohibited information.	Unit for Technical Sharia Auditing
Assessment of Sharia Compliance Risks	Identifying and categorizing potential non-compliance risks and formulating suitable mitigation strategies.	Committee on Digital and Sharia Governance

Procedure	Detailed Description	Responsible Party
Testing in the Test Environment	Executing the algorithm in a secure simulation environment (Sandbox) to identify faults and discrepancies prior to actual deployment.	Technical Development Team
Preliminary Sharia Assessment	Securing formal endorsement from the Sharia Supervisory Board about the proposed methodology and methods.	Sharia Supervisory Committee
Evaluation of Algorithmic Fairness	Executing meticulous evaluations to guarantee the elimination of discriminatory biases in the decision-making process.	Unit for Technical Sharia Auditing

Phase Two: Operational Supervision (During Execution):

Procedure	Detailed Description	Frequency of Implementation
Ongoing Real-time Supervision	Consistently overseeing system outputs for prompt identification of any discrepancies from established requirements	Uninterrupted
Implementing Transparency Mechanisms	Comprehensive documenting of rationales and justifications for significant decisions, guaranteeing clarity and assessability.	For every action of significant consequence
Human Intervention Mechanisms	Initiating manual intervention processes in extraordinary circumstances necessitating human evaluation.	As required
Revising Sharia Regulations	Evaluating and revising integrated filters and Sharia regulations in accordance with new fatwas and interpretations.	Every three months

Phase Three: Evaluative Oversight (Post-Operation):

Procedure	Detailed Description	Frequency of Implementation
Thorough Algorithmic Sharia Assessment	Thorough evaluation of all system outputs and extensive analysis of compliance levels	Annually
Quantitative Assessment of Performance	Assessing key performance metrics pertaining to compliance and operational efficiency	Every three months
Evaluation of Customer Complaints	Comprehensive examination of grievances concerning intelligent system determinations and deriving insights gained.	Monthly Continuous Enhancement
Ongoing Enhancement	Formulating and refining models informed by comments and insights derived from practical experience.	Uninterrupted

5-4 Sharia and Key Performance Indicators (KPIs)

Assessing governance success necessitates the use of a thorough array of quantitative and qualitative indicators that encompass all aspects of compliance and efficiency.

Initially: Indicators of Sharia Compliance:

- **Sharia Compliance Accuracy Rate**: The proportion of decisions adhering to Sharia rules relative to the total decisions rendered (Target: >99%)
- **Sharia Exceptions Rate:** The quantity of cases necessitating human involvement due to uncertainties regarding Sharia (Target: <1%)
- **Sharia Update Interval:** Duration between the issuance of a new fatwa and system update (Target: <7 days) (Hassan & Nor, 2024, p. 88)

Second: Indicators of Fairness:

- **Demographic Parity Rate:** Assessing disparities in financing decisions among various groups (Target: <5%)
- **Equal Opportunity Rate:** The approval rate for applications among comparably qualified groups (Target: >95%) (Verma & Rubin, 2018, pp. 4-5)

Third: Indicators of Transparency:

- **Percentage of Explainable Decisions:** Proportion of decisions that include clear and comprehensible explanations (Target: 100% for significant decisions)
- **Customer Satisfaction Level Regarding Clarity:** Results from the customer satisfaction survey on decision clarity (Target: >80%) (Ribeiro, Singh, & Guestrin, 2016, p. 1139)

Fourth: Indicators of Operational Efficiency:

- **Average Processing Time:** Duration required for automated decision-making following the receipt of the request.
- **Automation Rate:** The proportion of fully automated operations relative to the overall operational processes.
- **Cost Per Transaction:** Average operational expenditure for processing each transaction.

Fifth: Indicators of Cybersecurity and Data Protection:

- **Security Incident Rate:** The quantity of successful breach attempts or documented security incidents.
- **Data Protection Standards Compliance Percentage:** Degree of adherence to international and local norms.

5-5 Practical Implementation Strategies

The implementation of the framework is suggested to follow a phased plan spanning three years:

Initial: Foundational Phase (Year One): Concentrates on developing institutional capabilities and requisite infrastructure.

- Establishing an institutional framework.
- Developing a regulatory framework.
- Enhancing human capacities.
- Evaluating the current situation

Second: Pilot Implementation Phase (Year Two): Evaluates framework efficacy in a constrained setting.

- Choosing a pilot project.
- Assessment and evaluation.
- Alteration and enhancement.

Third: Generalization and Sustainability Phase (Year Three and Beyond): Disseminates effective methods extensively.

- Institutional proliferation.
- Perpetual advancement.
- Dissemination of knowledge.

This proposed framework asserts that effective AI governance in Islamic financial institutions requires an organic integration of three critical dimensions: the Sharia dimension, which regulates practices in alignment with overarching objectives; the regulatory dimension, which establishes the institutional and supervisory framework; and the technical dimension, which translates principles into practical applications. Thus, a resilient and adaptable governance framework may be developed to suit various local and regional circumstances, enabling the responsible and sustainable deployment of smart technology in alignment with Islamic finance goals.

Conclusion:

This study determined that artificial intelligence serves as a double-edged sword for Islamic finance; it is an essential requirement for survival and competitiveness in the digital transformation era, yet it poses legal and ethical dangers necessitating regulatory oversight and effective governance. The research yielded the subsequent conclusions:

- The principal Sharia objectives establish an extensive ethical framework for governing artificial intelligence applications, with each objective articulated into quantifiable and implementable practical guidelines.
- The hazards associated with artificial intelligence encompass legal risks (misinterpretation, erroneous fatwas), ethical risks (bias, privacy infringements), and financial risks (financial stability, legal accountability).
- International experiences in Malaysia, the UAE, Saudi Arabia, and Indonesia provide diverse models for utilization, with Malaysia particularly distinguished in automated Sharia compliance.
- Effective governance necessitates the shift from "post-control" to "embedded compliance" in algorithms.
- Goal-oriented governance serves not as a limitation on innovation but as a safeguard that guarantees the survival of the Islamic financial sector and the confidence of its clientele.

Recommendations:

At the level of international organizations:

1. The imperative for the AAOIFI and IFSB to promulgate a standard particularly addressing the "Governance of Artificial Intelligence and Big Data in Islamic Financial Institutions."
2. Establishing a collaborative working committee between the two entities to formulate comprehensive recommendations for technical Sharia compliance.
3. Establishing a platform for the exchange of best practices among Islamic financial institutions worldwide.

At the level of national regulatory agencies:

1. Establishing regulatory directives pertaining to artificial intelligence within the financial industry.
2. Establishing experimental frameworks for Sharia-compliant inventions.
3. Mandating prior authorization for high-risk AI systems.

Within the realm of Islamic financial institutions:

1. Investing in the training of a technical Sharia auditor proficient in both programming and finance.
2. Formulate specialist committees for digital and Sharia government.
3. Implementing a holistic governance framework that encompasses legal, technical, and ethical aspects.
4. Perform regular Sharia audits on all artificial intelligence systems.

From a technological perspective:

1. Embracing the notion of "transparency first" and eschewing closed models in critical financial choices.
2. Creating specific explainable artificial intelligence technologies for Islamic banking.
3. Establishing cohesive Sharia-compliant databases for integration into AI systems.

In the realms of study and academia:

1. Promoting interdisciplinary collaboration between Sharia scholars and data technologists.
2. Formulating an "Islamic Artificial Intelligence Code of Ethics.
"3. Developing specialized academic curricula in "Islamic digital finance."
4. Funding research to create automated Sharia-compliant instruments.

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