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# Issues and Challenges of Artificial Intelligence (AI) in Islamic Economic Development: Towards a Maqasid-Oriented Governance Framework

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**Abstract**−Artificial intelligence (AI) is spreading rapidly across Islamic banking, wealth management and zakat institutions, yet existing studies examine it sector by sector and rarely explain how algorithmic systems collide with core Shariah rules. In particular, the literature asserts but does not demonstrate that AI can generate gharar (prohibited contractual uncertainty), and it offers little explanation of why conventional AI governance is insufficient for Islamic institutions. This study addresses these gaps through an integrative literature review of 19 peer-reviewed sources published between 2019 and 2026, with a contextual focus on Malaysia and Indonesia, analysed thematically through the maqasid al-shariah framework. AI is found to be applied in four domains, namely Shariah compliance and governance, Islamic banking services, Islamic wealth management and Islamic social finance, and to face six clusters of challenges, of which algorithmic opacity and gharar is the most Shariah-specific. The study makes three theoretical contributions. First, it conceptualises algorithmic gharar and identifies five technical mechanisms, namely adaptive re-pricing, black-box decision rules, automated asset screening, probabilistic generative outputs and data asymmetry, through which AI can introduce uncertainty into the price, subject matter or consent of a contract, and it assesses them against the classical conditions of impermissible gharar. Second, it explains the inadequacy of conventional governance as an intersection gap: responsible-AI frameworks manage outcome risk but not contract validity, while Shariah governance reviews static products but not adaptive models. Third, it proposes a five-layer maqasid-oriented AI governance framework with a phased implementation roadmap for regulators and Shariah authorities in Malaysia and Indonesia.

**Keywords:** Artificial Intelligence (AI); Algorithmic Gharar; Maqasid Al-Shariah; AI Governance; Islamic Economics

## 1. INTRODUCTION

The Islamic economy has expanded well beyond its origins in Islamic banking to encompass Islamic capital markets, *takaful*, Islamic social finance such as zakat and waqf, and a growing halal industry. At the same time, the fourth industrial revolution has placed artificial intelligence (AI) at the centre of economic transformation. AI, broadly understood as computational systems that perform tasks normally requiring human intelligence such as learning, reasoning, prediction and natural language understanding, is reshaping how financial services are designed, delivered and supervised (Dwivedi et al., 2021). In commercial banking, AI is already used for credit assessment, customer service, fraud detection and investment advice (Königstorfer & Thalmann, 2020), and it has been linked to improvements in digital financial inclusion through better risk detection and a reduction in information asymmetry (Mhlanga, 2020). For Islamic economic institutions, which carry an explicit mandate to promote justice, social welfare and the fair circulation of wealth, these capabilities appear particularly promising.

Digital payment transactions also represent an important aspect of digital transformation in Islamic finance. From an Islamic finance perspective, the use of digital payment technologies highlights the importance of examining how technological innovation can support financial transactions while remaining consistent with Islamic financial principles (Shuib et al., 2024). The intersection between financial technology (fintech) and Islamic finance has attracted growing scholarly attention over the past several years. Early studies framed fintech as a means for Islamic finance to overcome constraints of scale, cost and outreach (Alam et al., 2019; Mohamed & Ali, 2019), and as a strategic response to the disruptions created by the COVID-19 pandemic (Hassan et al., 2020). Literature reviews from this period concluded that research on fintech in Islamic finance was still at an early stage and was dominated by conceptual discussion, particularly around blockchain and digital payments (Hasan et al., 2020; Rabbani et al., 2020). More recently, attention has shifted specifically to AI. Khan and Rabbani (2021) proposed an AI and natural language processing (NLP) based chatbot to serve Islamic banking customers, while a Scopus-based mapping by Azwar et al. (2025) shows that publications on AI and Islamic finance have risen noticeably since around 2020 and now cover technical, ethical, legal and Shariah-compliance perspectives.

Despite this momentum, the adoption of AI in the Islamic economy is not merely a technical upgrade. Islamic economic activity must comply with Shariah rules that prohibit *riba* (interest), *gharar* (excessive uncertainty) and *maysir* (gambling), and it must ultimately serve the *maqasid al-shariah*, the higher objectives of Islamic law concerning the protection of faith, life, intellect, posterity and wealth (Chapra, 2008). The Qur'an states the basic distinction between lawful trade and *riba*, and it requires that wealth be exchanged only through fair dealing based on genuine mutual consent: "*But Allah has permitted trade and has forbidden interest*" (Qur'an, al-Baqarah 2:275).

AI systems, however, often operate as opaque "black boxes", rely on large volumes of personal data and may reproduce historical biases. These characteristics raise questions about whether automated decisions can be explained to Shariah boards, whether contractual terms generated or priced by algorithms contain *gharar*, and whether data-driven

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efficiency is achieved at the expense of fairness and privacy. Global studies of AI ethics show broad convergence on principles such as transparency, justice and fairness, non-maleficence, responsibility and privacy (Jobin et al., 2019), but they also warn that principles alone cannot guarantee ethical AI without concrete mechanisms for implementation and accountability (Mittelstadt, 2019).

The clash between conventional AI and Islamic commercial law is, however, more fundamental than a general concern with ethics. The Prophet (peace be upon him) prohibited the sale involving *gharar* (Sahih Muslim, Hadith 1513), and classical jurists accordingly required that the price, the subject matter and the essential terms of a commutative contract be known (*ma'lum*) to both parties when the contract is concluded (Al-Saati, 2003; El-Gamal, 2006). Mainstream machine learning rests on a different epistemic premise. A model is judged acceptable when it is accurate on average, even if no one can state why it produced a particular output (Burrell, 2016; Rudin, 2019), and many models are designed to keep learning after deployment, so that the rule which maps data to decisions changes over time (Lu et al., 2019). Three points of conflict follow. Opacity collides with the requirement that the contract terms be known; adaptivity collides with the requirement that those terms be fixed at the moment of contracting; and probabilistic outputs, particularly from generative models that can produce fluent but incorrect statements (Ji et al., 2023), collide with the duty to give the counterparty an accurate representation of what is being sold. When such systems price a financing facility, select assets for an investment mandate or explain a product to a customer, these conflicts move from the level of ethics to the level of contract validity.

Conventional AI governance does not resolve this conflict because it was designed to answer a different question. Malaysia's National Guidelines on AI Governance and Ethics (Ministry of Science, Technology and Innovation [MOSTI], 2024), the discussion paper on AI in the Malaysian financial sector (Bank Negara Malaysia [BNM], 2025) and the AI governance guideline for Indonesian banking (Otoritas Jasa Keuangan [OJK], 2025) are organised around principles such as fairness, accountability, transparency, explainability, reliability and security, and they calibrate explainability to the materiality of each use case. These are risk-management standards: they ask whether the outcomes of a model are acceptable, not whether the contract produced with its help is valid. The BNM discussion paper, for example, does not refer to Shariah committees or Shariah compliance. Shariah governance, for its part, was built for the ex-ante approval of human-designed products whose structure is fixed at the time of approval (BNM, 2019), and it has no established procedure for systems whose behaviour changes after approval. The problem, therefore, is not that either governance tradition fails within its own domain, but that each fails at the point where they meet: responsible-AI governance is blind to contract validity, and Shariah governance is blind to algorithmic behaviour. Because this intersection is precisely where AI creates its most distinctive risks for Islamic institutions, conventional governance cannot simply be transplanted into the Islamic economy.

Several recent studies have begun to address these questions from an Islamic perspective, although they differ in scope and emphasis. Syahmi et al. (2026) evaluate AI in Islamic finance through the lens of *maqasid al-shariah* and propose a *maqasid*-based evaluation framework, while Wahab and Mahdiya (2025) develop a conceptual model of AI-driven Shariah governance that combines the Technology Acceptance Model, institutional theory and *maqasid al-shariah*. Sehak et al. (2026) examine the Malaysian context and highlight algorithmic *gharar*, data security, a shortage of Shariah-compliant AI expertise and the absence of specific legal guidelines. In the Malaysian context, research on the use of artificial intelligence in Islamic entrepreneurship in Kedah has also highlighted the relevance of examining the opportunities and challenges associated with AI adoption in Islamic business activities (Abd Muin et al., 2025). This perspective complements existing research on AI in Islamic finance by extending the discussion to the entrepreneurial dimension of the Islamic economy.

In Islamic social finance, Setiawan and Buchori (2025) and Wahab et al. (2026) discuss the use of AI in zakat institutions, whereas Bawana et al. (2025) assess the feasibility of Islamic banking robo-advisors in Indonesia. Empirically, Ihyani et al. (2025) find that AI adoption has not yet produced a significant effect on the profitability of Indonesian Islamic commercial banks. These studies tend to concentrate on a single sector, a single country or a single theoretical lens, and none of them systematically consolidates the issues and challenges of AI across the broader Islamic economy.

This gap matters because policymakers, regulators and Islamic financial institutions in countries such as Malaysia and Indonesia are making decisions about AI investment and regulation now, and they need an integrated picture of where AI adds value and where it introduces new Shariah, ethical and institutional risks. Two further gaps are evident. First, although several studies name *gharar* as a risk of AI (Sehak et al., 2026; Syahmi et al., 2026), none explains the technical mechanisms through which an algorithm can generate it or tests those mechanisms against the classical conditions under which *gharar* invalidates a contract. Second, existing frameworks describe what AI governance should value but not how regulators should implement it. Without such a synthesis, AI adoption risks being driven by technological fashion rather than by the objectives that distinguish Islamic economics from conventional economics. Accordingly, this study addresses three research questions: first, in which areas AI is being applied in Islamic economic development; second, what issues and challenges accompany this application, and through which mechanisms AI can generate *gharar*; and third, how AI governance in the Islamic economy can be structured and implemented to address these challenges. To answer them, the study conducts an integrative literature review of recent studies and analyses the findings thematically through the *maqasid al-shariah* framework.

The state of the art of this study lies in its cross-sectoral synthesis, which brings together evidence from Islamic banking, Islamic wealth management and Islamic social finance within one analytical frame, and in its explicit link

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between the technical behaviour of AI systems and the classical doctrine of *gharar*. The study makes three theoretical contributions. First, it conceptualises algorithmic *gharar* as uncertainty that arises when the price, subject matter or terms of a contract are determined by a computational process whose rule is neither fixed nor knowable to the contracting parties and the Shariah authority, and it identifies five mechanisms through which this occurs. Second, it explains the inadequacy of conventional governance through the notion of an intersection gap between responsible-AI governance and Shariah governance. Third, it proposes a five-layer *maqasid*-oriented AI governance framework and translates it into a phased implementation roadmap for regulators and Shariah authorities in Malaysia and Indonesia, together with testable propositions for future empirical work.

## 2. RESEARCH METHOD

### 2.1 Basic Research Framework

This study is qualitative research that uses a library research design in the form of an integrative literature review. An integrative review is appropriate when a topic is emerging and the literature is spread across disciplines, because it allows the researcher to critically combine conceptual and empirical studies in order to generate new frameworks and perspectives (Snyder, 2019). The research is document-based; it therefore involves no human respondents, and the unit of analysis is the published study. The research location is not a physical site but the scholarly literature on the Islamic economy, with a contextual focus on Southeast Asia, particularly Malaysia and Indonesia, which are among the most active jurisdictions in both Islamic finance practice and research on AI in Islamic finance.

Because the study is exploratory and qualitative, it does not test statistical hypotheses. Instead, it is guided by two working propositions derived from the literature. The first proposition states that AI is applied across multiple domains of the Islamic economy rather than only in Islamic banking. The second proposition states that the challenges of AI in the Islamic economy include not only the technical and ethical risks found in conventional finance but also issues that are specific to Shariah compliance and to the *maqasid al-shariah*. The principal concepts, which function as the variables of the study, are the application domains of AI, the issues and challenges of AI adoption, and the dimensions of *maqasid al-shariah* affected by them.

The thinking framework of the study is presented in Figure 1. Two inputs, namely AI technologies (machine learning, NLP, chatbots, robo-advisory and predictive analytics) and the domains of the Islamic economy, meet at the point of AI adoption. Adoption produces opportunities in the form of concrete applications and, at the same time, generates issues and challenges. Both are evaluated against the five dimensions of *maqasid al-shariah* (Chapra, 2008), and this evaluation leads to the governance framework proposed in the discussion section.

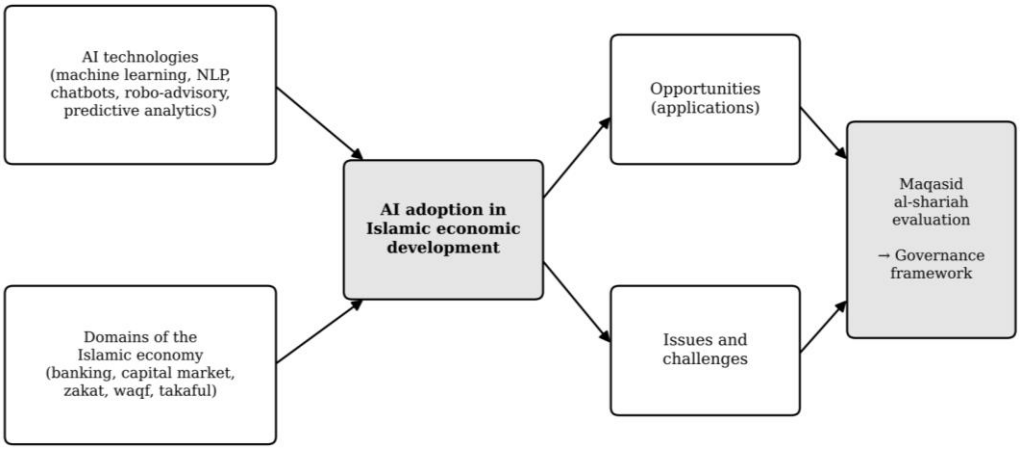



**Figure 1.** Research Framework

### 2.2 Research Stages

The review was carried out in five stages, and the reporting of the selection process draws on the principles of the PRISMA 2020 statement in so far as they apply to an integrative review (Page et al., 2021). In the first stage, the research questions were formulated and the search terms were defined. The terms “artificial intelligence”, “machine learning”, “chatbot” and “robo-advisor” were combined with “Islamic finance”, “Islamic banking”, “Islamic economics”, “Shariah compliance”, “zakat” and “waqf”. In the second stage, searches were run in Google Scholar, in Scopus-indexed journals, in the Garuda portal of Indonesian scholarly publications and in the open-access journal systems of Malaysian and Indonesian universities.

In the third stage, the retrieved items were screened against explicit eligibility criteria. Sources were included when they were published between 2019 and 2026, were peer-reviewed journal articles, conference proceedings or scholarly books, were written in English, and either addressed AI or closely related digital technology in an Islamic economic context or addressed AI ethics and governance in finance at a level relevant to the research questions. News items, opinion

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pieces without scholarly review and items whose abstract or full text could not be verified were excluded. In the fourth stage, data were extracted from each included source into a structured matrix that recorded the authors, year, country context, research method, application domain, reported opportunities and reported challenges. In the fifth stage, the extracted data were synthesised thematically, as explained in Section 2.3.

The final corpus consisted of 19 sources: 14 that deal directly with AI or fintech in the Islamic economy and five that deal with AI, ethics and finance in general and provide the comparative benchmark. The classical framework of *maqasid al-shariah* by Chapra (2008) served as the evaluative lens rather than as a data source. The core studies on the Islamic economy are summarised in Table 1.

**Table 1.** Summary of Core Studies Reviewed

| Author (Year) | Context and Approach | Key Finding Relevant to This Study |
|---|---|---|
| Alam et al. (2019) | Global; scholarly book | Digitalisation can extend the reach of Islamic finance but disrupts existing business models. |
| Mohamed & Ali (2019) | Global; scholarly book | Blockchain and fintech form the base of a new Islamic digital economy. |
| Hasan et al. (2020) | Global; literature review | Research on fintech in Islamic finance is early-stage and mainly conceptual. |
| Hassan et al. (2020) | Global; conceptual | Fintech is a strategic response for Islamic finance after COVID-19. |
| Rabbani et al. (2020) | Global; literature review | Fintech and blockchain offer efficiency gains for Islamic finance. |
| Khan & Rabbani (2021) | Islamic banking; system design | An AI and NLP chatbot can serve Islamic banking customer queries. |
| Azwar et al. (2025) | Global; PRISMA mapping (Scopus) | AI and Islamic finance publications have risen noticeably since about 2020. |
| Bawana et al. (2025) | Indonesia and Malaysia; qualitative | Robo-advisor feasibility depends on regulation, Shariah governance, technology and acceptance. |
| Ihyani et al. (2025) | Indonesia; bank panel data 2021–2024 | AI adoption has no significant effect on return on assets yet. |
| Setiawan & Buchori (2025) | Indonesia; interviews and review | AI supports zakat forecasting, segmentation, mapping and fraud detection. |
| Wahab & Mahdiya (2025) | Global; conceptual model | AI-driven Shariah governance requires acceptance, institutional compliance and maqasid goals. |
| Sehak et al. (2026) | Malaysia; qualitative document analysis | Challenges include algorithmic gharar, data security, skills and legal gaps. |
| Syahmi et al. (2026) | Global; maqasid-based analysis | AI can serve maqasid but privacy, data misuse and opacity must be addressed. |
| Wahab et al. (2026) | Zakat; conceptual (TOE, maqasid) | Technology readiness, capacity, external pressure and legitimacy shape AI adoption. |

In addition to the coded corpus, a supplementary set of technical, empirical and regulatory sources was consulted at the interpretation stage. These included studies of machine-learning opacity, concept drift and generative-model errors, bank-level evidence on the returns to AI, classical analyses of *gharar*, and the AI governance instruments issued by authorities in Malaysia and Indonesia. They were used to explain and test the themes, in particular the mechanisms of algorithmic *gharar* and the evidence on economic returns, rather than to generate them, so the thematic structure reported in Section 3 rests on the 19 core sources.

### 2.3 Data Analysis Technique

The data were analysed using thematic analysis following the six phases described by Braun and Clarke (2006): familiarisation with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Coding combined deductive and inductive logic. Deductive codes were derived from the five dimensions of *maqasid al-shariah* (Chapra, 2008) and from the AI ethics principles identified by Jobin et al. (2019), while inductive codes emerged from the data, for example "algorithmic *gharar*", "Shariah and technology talent" and "return on AI investment". Codes relating to applications were grouped into application domains, and codes relating to problems were grouped into clusters of challenges, each of which was then mapped to the *maqasid* dimension it most directly affects.

Several steps were taken to strengthen the trustworthiness of the analysis. Source triangulation was achieved by drawing on journals, proceedings and books from different countries and disciplines. An audit trail was maintained through the extraction matrix, which links every theme back to the sources that support it. Finally, the resulting themes

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were compared with the conclusions of earlier reviews (Azwar et al., 2025; Hasan et al., 2020) in order to check that they were consistent with, or deliberately extended, the existing body of knowledge.

## 3. RESULTS AND DISCUSSION

The analysis produced three sets of results that correspond to the research questions. The first set describes the domains in which AI is applied in Islamic economic development. The second set describes six clusters of issues and challenges, analyses the technical mechanisms through which AI can generate *gharar* and maps each cluster to the dimensions of *maqasid al-shariah*. The third set relates the findings to the working propositions and to previous studies, proposes a governance framework and translates it into an implementation roadmap for regulators.

### 3.1 Applications of AI in Islamic Economic Development

The first finding is that AI is applied across at least four domains of the Islamic economy, supported by cross-cutting uses in risk and fraud management, as summarised in Table 2. This confirms the first working proposition that AI is not confined to Islamic banking.

**Table 2.** Application Domains of AI in the Islamic Economy

| Domain | Typical AI Applications | Supporting Studies |
|---|---|---|
| Shariah compliance and governance | Automated screening of products and contracts, compliance monitoring, support for Shariah review and audit | Sehak et al. (2026); Syahmi et al. (2026); Wahab & Mahdiya (2025) |
| Islamic banking services | NLP chatbots, customer personalisation, AI-assisted credit scoring and financing decisions | Khan & Rabbani (2021); Königstorfer & Thalmann (2020); Syahmi et al. (2026) |
| Islamic wealth management | Robo-advisors with Shariah screening of portfolios | Bawana et al. (2025); Syahmi et al. (2026) |
| Islamic social finance | Zakat collection forecasting, donor segmentation, beneficiary mapping, distribution reporting, chatbot services | Setiawan & Buchori (2025); Wahab et al. (2026); Azwar et al. (2025) |
| Cross-cutting: risk, fraud and inclusion | Fraud and anomaly detection, risk modelling, wider access to finance for underserved groups | Mhlanga (2020); Setiawan & Buchori (2025); Syahmi et al. (2026) |

In Shariah compliance and governance, AI is used to support tasks that have traditionally depended on the manual work of Shariah officers. These include screening financial products and contract documents against Shariah parameters, monitoring transactions for compliance breaches and assisting Shariah review and audit functions. Sehak et al. (2026) report that, in Malaysia, AI is seen as a means to strengthen Shariah compliance and risk management, while Wahab and Mahdiya (2025) argue that AI-driven Shariah governance can become a core infrastructure of Islamic finance in a global regulatory environment, provided that it is embedded in institutional rules and *maqasid*-based objectives. The value of AI here lies in its ability to process large volumes of documents consistently, allowing scarce Shariah expertise to concentrate on judgement rather than on routine checking.

In Islamic banking services, the most visible applications are conversational agents and data-driven decision support. Khan and Rabbani (2021) demonstrate how an NLP-based chatbot can answer customer queries about Islamic banking products, a function that also has an educational dimension because many customers are unfamiliar with Islamic contracts such as *murabahah* or *ijarah*. AI-assisted credit scoring and financing decisions, which are widespread in conventional banking (Königstorfer & Thalmann, 2020), are also discussed in the Islamic context as tools that could widen access to financing and improve risk management (Syahmi et al., 2026).

In Islamic wealth management, robo-advisors combine automated portfolio construction with Shariah screening of securities. Bawana et al. (2025) show that, in Indonesia, institutional commitment and market potential exist, but feasibility depends on regulatory preparedness, Shariah governance, technological readiness and customer acceptance. Malaysia, with a clearer regulatory and Shariah governance framework, is described as a regional benchmark. This finding suggests that the same AI application can have very different prospects in different Muslim-majority jurisdictions, depending on the surrounding institutions.

In Islamic social finance, AI is applied to the collection and distribution of zakat and to the management of other social funds. Setiawan and Buchori (2025) identify a range of uses in zakat institutions, including donation forecasting, donor segmentation, beneficiary mapping, chatbot services for donors, distribution reporting and the detection of anomalies and fraud. Wahab et al. (2026) frame AI as a socio-technical system rather than a neutral tool, and argue that its adoption in zakat governance depends on technology readiness, internal institutional capacity, external pressure and legitimacy in the eyes of stakeholders. Azwar et al. (2025) likewise identify automated social fund management as one of the main promises of AI in Islamic finance. This domain is particularly significant from a *maqasid* perspective because zakat is directly linked to the protection of life and wealth of the poor and to the fair distribution of resources.

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Across all four domains, AI is also used for fraud and anomaly detection, risk modelling and the extension of services to underserved groups. These cross-cutting uses mirror the conventional literature, in which AI is associated with improved risk detection and greater digital financial inclusion (Mhlanga, 2020). For Islamic institutions, however, inclusion is not only a commercial objective but also an expression of the *maqasid* goal of protecting and circulating wealth, which gives these applications an additional normative justification.

### 3.2 Issues and Challenges of AI Adoption

The second finding is that the adoption of AI in the Islamic economy faces six clusters of issues and challenges. Some of them are shared with conventional finance, while others arise specifically from the requirements of Shariah. Each cluster is described below.

#### 3.2.1 Algorithmic Opacity and Gharar

Many AI models, particularly those based on deep learning, produce outputs that cannot easily be explained in terms that humans understand. In conventional finance, this opacity is mainly a problem of accountability and consumer protection. In Islamic finance, it also raises a substantive Shariah issue. If the pricing, eligibility or terms of a contract are determined by a model whose logic is unknown to the contracting parties and to the Shariah board, the transaction may contain a form of uncertainty that resembles *gharar*. Sehak et al. (2026) explicitly identify "*gharar* in algorithms" as a challenge in Malaysia, and Syahmi et al. (2026) list algorithmic opacity among the problems that must be addressed for AI to serve *maqasid al-shariah*. Bawana et al. (2025) similarly point to the transparency of Shariah-compliant algorithms as an obstacle to robo-advisor adoption in Indonesia. The challenge, therefore, is not only to make models explainable in a technical sense but to make them explainable enough for a Shariah board to issue an informed opinion. The Qur'anic principle of *tabayyun* emphasises the importance of verifying information before acting upon it (Qur'an, 49:6). In the context of AI, this principle supports the need to verify AI-generated outputs and ensure that automated recommendations concerning Islamic financial products and Shariah compliance are reviewed against reliable evidence and appropriate expertise.

Because the claim that algorithms generate *gharar* is easily asserted but rarely demonstrated, the mechanisms involved were analysed by linking the technical behaviour of AI systems to the loci of *gharar* recognised in classical doctrine, namely the price or consideration, the subject matter, and the knowledge and consent of the parties (Al-Saati, 2003; El-Gamal, 2006). Five mechanisms were identified, as summarised in Table 4.

**Table 4.** Mechanisms through which AI Systems Can Generate Gharar

| AI Mechanism | How Uncertainty Arises | Locus of Gharar | Illustrative Case |
|---|---|---|---|
| M1. Adaptive re-pricing (concept drift, continuous learning) | The rule that maps customer data to price changes after the contract is concluded | Consideration (*thaman*): price not fixed or knowable at contracting | Ijarah rental or takaful contribution reset by a self-updating model without a fixed formula, cap or floor |
| M2. Black-box decision rules (complex non-linear models) | Neither the customer nor the Shariah committee can identify the factors behind an output | Basis of terms and verification of Shariah validity | Financing approval or pricing model that may embed interest-based benchmarks |
| M3. Automated asset screening and rebalancing | Classifiers change portfolio holdings; borderline securities may be misclassified | Subject matter (*mahal*) of the investment mandate; purification amount | Robo-advisor rebalances into a security wrongly classified as Shariah-compliant |
| M4. Probabilistic generative outputs (LLM chatbots) | Non-deterministic answers; fluent but incorrect statements | Knowledge and consent (*rida*); overlaps with *tadlis* | Chatbot misstates the profit rate or structure of a *murabahah* product |
| M5. Data and information asymmetry (alternative data) | The institution prices on signals that the customer cannot observe | Asymmetric uncertainty; justice (*'adl*) | Similar customers receive different financing rates for opaque reasons |

*Source*: Authors' analysis based on Al-Saati (2003), El-Gamal (2006), Burrell (2016), Lu et al. (2019), Ji et al. (2023) and Fuster et al. (2022).

The first mechanism, adaptive re-pricing, is the most direct. When a contract allows a future rental, profit rate or takaful contribution to be reset by a model that continues to learn, the rule that determines the consideration is not fixed at the time of contracting and may change in ways that neither party can foresee, because the statistical relationships on which the model was trained drift over time (Lu et al., 2019). This is uncertainty in the consideration itself. The second mechanism arises from the opacity of complex models, which Burrell (2016) attributes to corporate secrecy, the technical illiteracy of those affected, and the scale and complexity of the models themselves. A Shariah committee that cannot see which variables drive a financing or pricing decision cannot confirm that interest-based benchmarks or *riba*-like penalties are not embedded in it, so the uncertainty concerns the Shariah validity of the transaction as much as its terms. The third

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mechanism concerns automated portfolio construction, in which screening classifiers and rebalancing rules continuously change the assets held under an investment mandate; the misclassification of a borderline security leaves the investor uncertain both about what is owned and about how much income must be purified. The fourth mechanism arises from generative chatbots, whose non-deterministic outputs can misstate profit rates or product structures before a contract is concluded (Ji et al., 2023), thereby undermining the knowledge on which valid consent (*rida*) depends; this overlaps with the prohibition of misrepresentation (*tadlis*). The fifth mechanism is the asymmetry created when institutions price customers using alternative data and behavioural signals that customers cannot observe, which can produce systematically different terms for similar customers (Fuster et al., 2022).

Not every form of algorithmic uncertainty, however, constitutes prohibited *gharar*. Classical doctrine treats *gharar* as invalidating only when it is excessive (*fahish*), occurs in a commutative contract (*mu'awadat*), affects the principal object of the contract rather than an ancillary element, and is not justified by a genuine need (*hajah*) (Al-Saati, 2003). Applying these conditions, the first and third mechanisms are the most likely to cross the threshold because they affect the price or subject matter of commutative contracts. The second and fourth mechanisms mainly impair the verification of compliance and the quality of consent, while the fifth is primarily a question of justice (*'adl*). This analysis yields a practical conclusion. Shariah governance does not need to understand every parameter of a model, but it must control the contract-binding interface, that is, the point at which a model output becomes a binding price, asset selection or contractual representation. At that interface, the governing formula, its caps and floors, and the factors on which it relies should be fixed, disclosed and approved, while the model may inform the terms but should not unilaterally determine them.

### 3.2.2 Data Privacy and Security

AI systems depend on large amounts of data, much of which is personal and financial. The reviewed studies consistently treat privacy violations, data misuse and cybersecurity as major risks (Sehak et al., 2026; Syahmi et al., 2026). From an Islamic perspective, the protection of personal information is connected to the protection of dignity and honour (*hifz al-'ird*) and of wealth (*hifz al-mal*), and the unauthorised use of data can be viewed as a breach of trust (*amanah*). In zakat institutions, the issue is especially sensitive because beneficiary data concern vulnerable households (Setiawan & Buchori, 2025). The challenge for Islamic institutions is to build data practices that are lawful, consent-based and secure, and that limit the collection of data to what is necessary for a legitimate purpose. The Prophetic maxim *la darar wa la dirar* (there should be neither harm nor reciprocating harm) (Sunan Ibn Majah, Hadith 2340) provides an ethical basis for preventing harm arising from AI adoption. This principle supports the implementation of appropriate safeguards to protect personal data, prevent misuse of information, and reduce risks to users of Islamic economic services.

### 3.2.3 Algorithmic Bias and Fairness

AI models learn from historical data and may therefore reproduce or amplify existing patterns of exclusion. A credit scoring model trained on data from customers who already have formal employment and credit histories, for example, may systematically disadvantage micro-entrepreneurs, women or rural households, which are precisely the groups that Islamic social and commercial finance aims to reach. Fairness and justice appear among the most frequently cited principles in global AI ethics guidelines (Jobin et al., 2019), and in Islamic economics justice (*'adl*) is a foundational value rather than an optional principle (Chapra, 2008). Syahmi et al. (2026) argue that AI can support fairer wealth distribution, but this outcome is not automatic. Without deliberate testing for bias, AI could undermine the inclusion goals that justify its use in the first place. The Qur'an commands justice and excellence in conduct (Qur'an, 16:90), making *'adl* a relevant ethical principle for assessing AI-based decisions. AI systems used in Islamic economic institutions should therefore be evaluated for potential bias and discriminatory outcomes to ensure fair treatment and equitable access to financial and social services.

Empirical evidence from conventional credit markets shows that this risk is real. Fuster et al. (2022) find that, in the United States mortgage market, more flexible machine-learning credit models improve overall predictive accuracy but distribute the gains unequally, with Black and Hispanic borrowers disproportionately less likely to benefit. Comparable evidence for Islamic financial institutions is not yet available, which is itself a gap that the reviewed literature has not addressed and which makes ex-ante bias testing all the more important.

### 3.2.4 Regulatory and Shariah Governance Gaps

The reviewed literature repeatedly notes the absence of specific legal and Shariah guidelines for AI in Islamic finance. Sehak et al. (2026) report missing legal guidelines in Malaysia, Bawana et al. (2025) identify regulatory alignment as an obstacle in Indonesia, and Azwar et al. (2025) emphasise that scholars, regulators and Shariah governance bodies must ensure that AI adoption remains consistent with *fiqh mu'amalat*. Existing Shariah governance frameworks were designed for products and contracts approved by human decision-makers, not for systems that learn and change over time. Questions therefore arise about who is responsible when an AI system makes a non-compliant decision, how often models must be reviewed by the Shariah committee and whether AI-generated outputs can be the subject of a *fatwa*. Mittelstadt (2019) warns that high-level principles do not translate into ethical practice without such concrete governance mechanisms, and this warning applies equally to the Islamic economy.

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### 3.2.5 Shortage of Hybrid Shariah and Technology Expertise

Effective governance of AI in the Islamic economy requires people who understand both Islamic commercial jurisprudence and data science. Such hybrid expertise is scarce. Sehak et al. (2026) identify the shortage of Shariah-compliant AI expertise as a key challenge, and Wahab et al. (2026) highlight internal institutional capacity as a determinant of successful AI adoption in zakat institutions. Shariah scholars may find it difficult to evaluate a machine learning model, while data scientists may not recognise the Shariah implications of their design choices. This gap weakens the communication between Shariah boards and technology teams and increases the risk that Shariah review becomes a formality rather than a substantive check.

### 3.2.6 Infrastructure Limitations and Uncertain Returns

The final cluster concerns the economic and infrastructural conditions for AI adoption. Many Islamic financial institutions and most zakat and waqf bodies are small relative to conventional banks, and they may lack the data infrastructure, computing resources and budgets needed for advanced AI. Bawana et al. (2025) note uneven technological capacity in Indonesia, and Wahab et al. (2026) treat technology readiness as a key factor in adoption. The evidence on financial returns is mixed and points to an important role for scale and time. Ihyani et al. (2025) find that AI adoption among 12 Indonesian Islamic commercial banks over 2021–2024 has no significant effect on return on assets. In a sample of 26 Islamic and conventional banks in 11 countries of the Middle East, North Africa and Southeast Asia over 2020–2024, Meero (2025) finds that each additional fintech and AI component raised operating costs by about 0.8% while improving profitability by only about 0.03%, although adoption improved stability, with Islamic banks gaining more in resilience than in efficiency. By contrast, Li et al. (2026) report a significant positive effect of AI adoption on the return on assets of Chinese listed banks, but the effect for large banks is more than twice that for small and medium-sized banks. Outside banking, Babina et al. (2024) find that the growth benefits of AI investment are concentrated among larger firms, and Brynjolfsson et al. (2021) explain why measured returns to general-purpose technologies often lag behind investment, since complementary intangible investments must be built first. Taken together, these studies suggest that the absence of short-term profitability gains in Indonesian Islamic banks is consistent with an early-stage, scale-dependent pattern rather than evidence that AI does not pay. For the relatively small institutions of the Islamic economy, this strengthens the case for shared infrastructure and for evaluating AI against a broader set of outcomes than short-term profit, including service quality, stability, inclusion and compliance.

### 3.3 Mapping the Challenges to Maqasid al-Shariah

To connect the challenges to the normative foundations of Islamic economics, each cluster was mapped to the dimensions of *maqasid al-shariah* it affects and to a recommended institutional response, as shown in Table 3. Because such a mapping is inherently interpretive, two explicit rules were applied to reduce subjectivity. A dimension was coded as primary (P) when the challenge directly compromises the object that the dimension protects, as defined by Chapra (2008), for example when uncertainty in contract terms directly threatens the property of the parties. A dimension was coded as secondary (S) when the effect operates indirectly, through the consequences of the challenge. The corpus sources supporting each cluster are also reported, so that readers can trace each assignment through the audit trail and judge the strength of the underlying evidence. The mapping shows that the challenges are not evenly distributed: the protection of wealth (*hifz al-mal*) is affected by almost every cluster, while the protection of faith (*hifz al-din*) is most directly affected by gaps in Shariah governance, through the risk that transactions believed to be Shariah-compliant are in fact not. The evidence base is strongest for governance gaps and thinnest for algorithmic bias and hybrid expertise, which indicates where further empirical research is most needed. The Prophetic teaching that every person is a guardian and is accountable for their responsibilities (Sahih al-Bukhari, Hadith 7138; Sahih Muslim, Hadith 1829) reinforces the importance of human accountability in AI governance. Accordingly, the proposed framework assigns clear responsibilities to institutional management and Shariah committees for overseeing AI systems, reviewing consequential decisions, and addressing risks of non-compliance or harm.

**Table 3.** Mapping of AI Challenges to Maqasid al-Shariah and Recommended Responses

| Challenge | Corpus Evidence (n) | Maqasid Dimension (P = primary; S = secondary) | Recommended Response |
|---|---|---|---|
| Algorithmic opacity and gharar | Sehak et al. (2026); Syahmi et al. (2026); Bawana et al. (2025) (n = 3) | P: wealth (hifz al-mal); S: faith (hifz al-din) | Fixed and approved formula at the contract-binding interface; Shariah-sufficient explainability; disclosure of key decision factors |
| Data privacy and security | Sehak et al. (2026); Syahmi et al. (2026); Setiawan & Buchori (2025) (n = 3) | P: dignity (hifz al-'ird); S: wealth (hifz al-mal) | Consent-based data use, data minimisation and strong cybersecurity controls |

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| Challenge | Corpus Evidence (n) | Maqasid Dimension (P = primary; S = secondary) | Recommended Response |
|---|---|---|---|
| Algorithmic bias and fairness | Syahmi et al. (2026); Jobin et al. (2019) (n = 2) | P: wealth (hifz al-mal); S: life (hifz al-nafs) | Regular bias testing, inclusion metrics and human review of adverse decisions |
| Regulatory and Shariah governance gaps | Sehak et al. (2026); Bawana et al. (2025); Azwar et al. (2025); Wahab & Mahdiya (2025); Mittelstadt (2019) (n = 5) | P: faith (hifz al-din); S: wealth (hifz al-mal) | Regulator guidance on AI; Shariah committee mandate over AI; algorithm-specific Shariah audit |
| Shortage of hybrid expertise | Sehak et al. (2026); Wahab et al. (2026) (n = 2) | P: intellect (hifz al-'aql); S: faith (hifz al-din) | Joint training of Shariah scholars and data scientists; interdisciplinary curricula |
| Infrastructure and uncertain returns | Bawana et al. (2025); Wahab et al. (2026); Ihyani et al. (2025) (n = 3) | P: wealth (hifz al-mal); S: posterity (hifz al-nasl) | Shared infrastructure, phased adoption and maqasid-based performance indicators |

### 3.4 Discussion

The findings support both working propositions of this study. In line with the first proposition, AI is applied across Shariah governance, banking services, wealth management and social finance, rather than in Islamic banking alone. This extends the earlier picture of the field, in which Hasan et al. (2020) and Rabbani et al. (2020) found fintech research in Islamic finance to be concentrated on blockchain and payments and to be largely conceptual. The present synthesis shows that, by 2025–2026, the literature has moved towards specific AI applications and includes the first empirical tests of their effect, such as the bank-level analysis by Ihyani et al. (2025). This shift is consistent with the rise in publications reported by Azwar et al. (2025).

In line with the second proposition, the challenges identified include both generic and Shariah-specific elements. Privacy, bias, opacity and weak governance are well documented in the general AI and finance literature (Dwivedi et al., 2021; Jobin et al., 2019; Mittelstadt, 2019). In the Islamic economy, however, the same problems acquire an additional layer of meaning. Opacity becomes a question of *gharar*, bias becomes a question of *'adl*, and data misuse becomes a question of *amanah*. This is the main point on which this study differs from conventional analyses of AI in banking such as Königstorfer and Thalmann (2020): in the Islamic economy, a technically sound and profitable AI system can still be unacceptable if it fails to meet Shariah requirements or works against the *maqasid*.

Compared with previous Islamic studies, this review confirms the specific challenges reported by Sehak et al. (2026) for Malaysia and by Bawana et al. (2025) for Indonesia, but it shows that these challenges are not country-specific. Similar concerns about governance, capacity and legitimacy appear in the zakat sector (Setiawan & Buchori, 2025; Wahab et al., 2026) and in global conceptual analyses (Syahmi et al., 2026; Wahab & Mahdiya, 2025). The challenges therefore appear to be structural features of AI adoption in the Islamic economy rather than local implementation problems. At the same time, the comparison between Indonesia and Malaysia by Bawana et al. (2025) indicates that a clearer regulatory and Shariah governance framework can substantially reduce these barriers, which suggests that the challenges are manageable through institutional design.

The mixed evidence on economic returns deserves particular attention. The null result reported by Ihyani et al. (2025) for Indonesian Islamic banks, read alongside the cost-heavy early phase reported by Meero (2025) and the scale-dependent positive effects reported by Li et al. (2026), cautions against expectations that AI will deliver rapid financial gains, especially for smaller institutions. It supports the argument that AI in the Islamic economy should be judged by a wider set of outcomes. A *maqasid*-based evaluation, as proposed by Syahmi et al. (2026), allows institutions to account for benefits such as financial inclusion, fair distribution, stability and improved compliance that are not captured by return on assets.

Building on these findings, this study proposes a five-layer, *maqasid*-oriented AI governance framework, shown in Figure 2. The first layer is the Shariah foundation, consisting of the *maqasid al-shariah*, the prohibitions of *riba*, *gharar* and *maysir*, and relevant *fatwa* and resolutions, including rulings on contract terms determined by algorithms. The second layer establishes governance and accountability, giving the board and the Shariah committee explicit oversight of material AI systems and assigning a named human owner to every automated decision. The third layer concerns data stewardship and translates the protection of wealth and dignity into consent-based, minimal and secure data practices. The fourth layer provides model assurance through explainability sufficient for Shariah review, control of the contract-binding interface identified in Section 3.2.1, bias and fairness testing, and Shariah audit of algorithms. The fifth layer measures outcomes using *maqasid*-based indicators such as inclusion, fair distribution and the protection of wealth. A continuous feedback loop links outcomes back to the foundation, so that evidence of harm or non-compliance leads to revision of the system. For each layer, Figure 2 identifies the accountable party and a verifiable output, so that compliance with the framework can be observed and audited rather than merely asserted.

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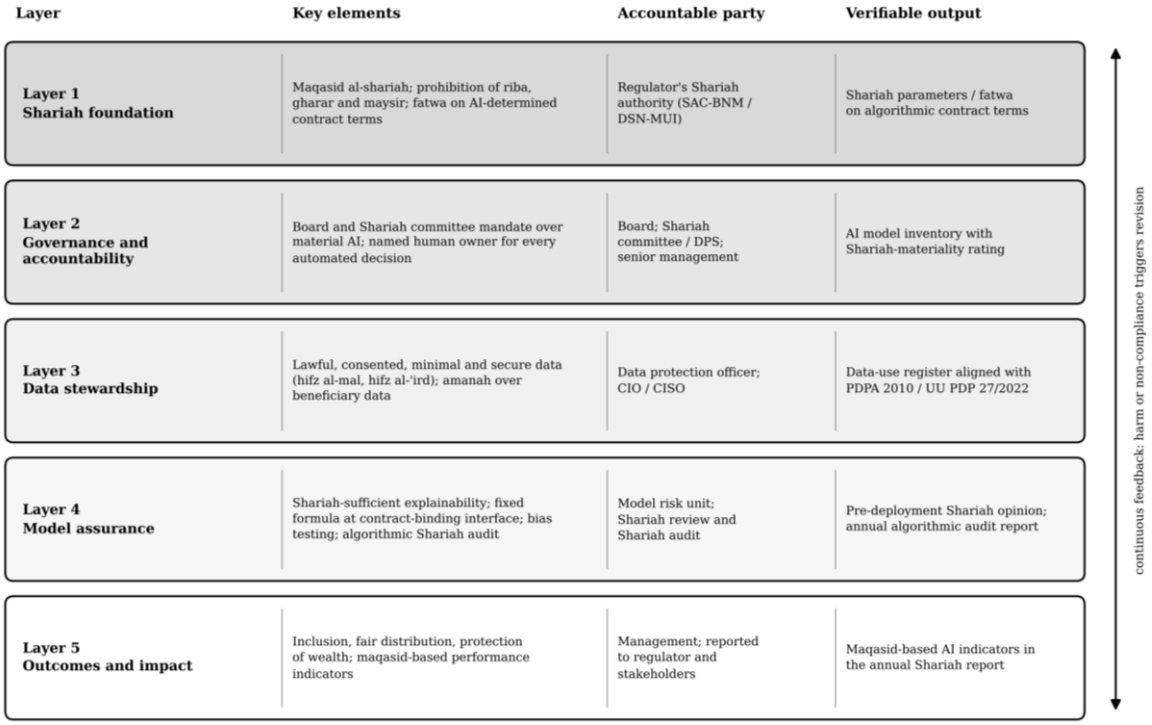



**Figure 2.** Proposed Maqasid-Oriented AI Governance Framework with Accountable Parties and Verifiable Outputs

The framework differs from earlier proposals in two ways. First, unlike the conceptual model of Wahab and Mahdiya (2025), which focuses on the conditions for adoption, it focuses on the life cycle of an AI system after adoption, from data to outcomes. Second, unlike general AI ethics guidelines, which Mittelstadt (2019) criticises for remaining at the level of principles, it links each principle to an identifiable institutional function and a verifiable output. The framework is nevertheless conceptual and has not yet been validated empirically. To make it testable, three propositions are advanced. Proposition 1 (P1): institutions that fix and approve the formula at the contract-binding interface will record fewer Shariah non-compliance events arising from AI. Proposition 2 (P2): a formal Shariah committee mandate over material AI systems will be associated with more substantive, rather than merely formal, Shariah review of those systems. Proposition 3 (P3): institutions that report *maqasid*-based indicators will evaluate AI investments over a longer horizon than those that rely on return on assets alone.

### 3.5 Implementation Roadmap for Regulators in Malaysia and Indonesia

To move from a conceptual framework to concrete action, the layers of Figure 2 were translated into a phased roadmap for the two jurisdictions that form the contextual focus of this study, as shown in Table 5. The roadmap builds on instruments that already exist rather than proposing new institutions. In Malaysia, these include the Islamic Financial Services Act 2013, the Shariah Governance Policy Document (BNM, 2019), the BNM discussion paper on AI (BNM, 2025), the national AIGE guidelines (MOSTI, 2024) and the Personal Data Protection Act 2010. In Indonesia, they include the OJK guideline on AI governance in banking (OJK, 2025), the *fatwa* authority of the National Shariah Board (DSN-MUI), the supervisory role of the Shariah Supervisory Board (DPS) in each Islamic financial institution, and Law No. 27 of 2022 on Personal Data Protection.

**Table 5.** Phased Implementation Roadmap for Malaysia and Indonesia

| Phase and Framework Layer | Malaysia | Indonesia |
|---|---|---|
| Phase 1 (0–12 months): Shariah foundation and governance (Layers 1–2) | Resolution of the Shariah Advisory Council of BNM on AI-determined contract terms, requiring the pricing formula, caps and floors to be fixed and approved at contracting; Shariah requirements incorporated when BNM finalises its AI policy following the 2025 discussion paper; clarification that material AI models fall within the Shariah committee's oversight under the Shariah Governance Policy Document | DSN-MUI *fatwa* on the use of AI in Islamic financial transactions; OJK supplement to its 2025 AI governance guideline for Islamic banks requiring a DPS opinion before material AI models are deployed; inclusion of Shariah expertise in the bank AI committees encouraged by OJK |

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| Phase and Framework Layer | Malaysia | Indonesia |
|---|---|---|
| Phase 2 (1–2 years): data stewardship and model assurance (Layers 3–4) | Mandatory AI model inventory with a Shariah-materiality rating; algorithm-specific Shariah review and audit integrated into the existing Shariah audit function; data practices aligned with the PDPA 2010; pilots through the BNM regulatory sandbox | AI model inventory reported to OJK; DPS-led algorithmic Shariah review; data practices aligned with Law No. 27/2022; pilots through the OJK sandbox, including AI tools for BAZNAS and other zakat institutions |
| Phase 3 (2–3 years): capacity and outcomes (Layer 5) | Joint certification of Shariah–AI competence through universities and professional bodies; *maqasid*-based AI indicators in annual Shariah reports; shared data and AI infrastructure for state zakat and waqf bodies | Shariah–AI competence standards for DPS members and *amil*; *maqasid*-based AI indicators in Islamic bank and BAZNAS reporting; shared infrastructure for Islamic rural banks (BPRS) and smaller zakat institutions |
| Ongoing: feedback and review | Reporting of AI-related Shariah non-compliance events to BNM; periodic thematic reviews and policy revision | Reporting of AI-related Shariah non-compliance events to OJK and DSN-MUI; periodic review of the *fatwa* and guideline |

*Note*: The roadmap is indicative. Timelines would need to be aligned with each authority's consultation and rule-making cycle.

The sequencing reflects a simple logic. Shariah parameters and mandates must be settled first, because data and model controls cannot be audited against standards that do not yet exist, and outcome measurement comes last because it requires stable systems and reporting channels. Although the roadmap is indicative rather than prescriptive, it shows that the framework can be implemented largely by extending existing instruments, which lowers the cost of adoption for regulators and for the relatively small institutions of the Islamic social finance sector.

## 4. CONCLUSION

This study set out to identify where AI is applied in Islamic economic development, what challenges accompany its adoption and how its governance can be structured. Based on an integrative review of 19 sources analysed through the *maqasid al-shariah* framework, it finds that AI is applied across four domains of the Islamic economy and faces six clusters of challenges. Its main contribution, however, lies beyond this typology. The study shows that algorithmic *gharar* is not a loose analogy but arises through identifiable mechanisms, of which adaptive re-pricing and automated asset screening are the most likely to meet the classical conditions of prohibited *gharar*. It also explains why conventional governance is insufficient: responsible-AI frameworks manage outcome risk but not contract validity, while Shariah governance reviews static products but not adaptive models. Several policy implications follow. First, Shariah authorities such as the Shariah Advisory Council of Bank Negara Malaysia and DSN-MUI should issue rulings that require the formula determining any AI-generated price or asset selection to be fixed, disclosed and approved at the contract-binding interface. Second, BNM and OJK should integrate Shariah requirements into their emerging AI governance instruments, so that material AI models in Islamic institutions fall explicitly within the oversight of Shariah committees and DPS. Third, Islamic financial institutions should maintain AI model inventories with a Shariah-materiality rating and extend Shariah audit to algorithms. Fourth, because the returns to AI appear to depend on scale and time, regulators and zakat authorities should support shared infrastructure and evaluate AI with *maqasid*-based indicators rather than short-term profitability alone. Table 5 sets out how these measures can be sequenced over three years. The study has several limitations. It relies on published literature rather than primary data, the core corpus is limited to English-language sources and is weighted towards Malaysia and Indonesia, the mapping of challenges to *maqasid* dimensions remains interpretive despite the explicit coding rules, and the rapidly changing nature of AI means that some findings may date quickly. The proposed framework and roadmap are conceptual and have not yet been tested. Future research should validate them through Delphi studies with Shariah scholars, regulators and data scientists, test propositions P1 to P3 through case studies and surveys of Islamic financial institutions and zakat bodies, extend the analysis to other regions such as the Gulf Cooperation Council countries, and develop measurable *maqasid*-based indicators for AI systems. Ultimately, the use of artificial intelligence in Islamic economic development should be guided by the principles of justice (*'adl*) and excellence (*ihsan*), as emphasised in the Qur'an (16:90), so that technological advancement is evaluated not only by its economic benefits but also by its consistency with Islamic ethical principles and the objectives of *maqasid al-shariah*.

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