

When Algorithms Govern Solidarity: A *Fiqh muamalah* Perspective on Ethical *Takaful* in the Age of Artificial Intelligence

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ABSTRACT

Background: The growing use of artificial intelligence (AI) in Islamic financial services raises a critical ethical question: can *takaful* remain faithful to its foundations of *taawun* (mutual solidarity) when risk-sharing decisions are increasingly made by algorithms rather than morally accountable individuals? **Objective:** This study examines whether AI integration in underwriting, risk scoring, and claims management challenges the ethical coherence of *takaful* from the perspective of *fiqh muamalah* and *maqasid* Sharia. **Methodology:** Using a normative-conceptual approach, the research draws upon Islamic legal principles and contemporary AI ethics to analyze how algorithmic governance reshapes accountability within *takaful* institutions. **Results:** The analysis reveals that AI redistributes decision authority in ways that create opacity, bias, and accountability gaps, and risks shifting ethical responsibility away from human agents who bear *taklif*. **Conclusion:** *Takaful* can remain ethically sound only if accountable human moral agency remains central to its governance structure. The study proposes an Ethical Thresholds Framework to guide AI adoption, emphasizing transparency, human oversight, and strengthened Sharia governance in digital *takaful* systems. **Implication:** Regulators, Sharia supervisory boards, and *takaful* operators should require explainable, fair, auditable, and human-supervised AI systems to preserve accountability, *taawun*, and the ethical legitimacy of digital *takaful*.

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1. Introduction

Takaful is fundamentally conceived as a moral and solidarity-based contract rooted in the principles of *taawun* (mutual cooperation), *tabarru* (voluntary contribution), and shared responsibility, rather than merely an Islamic substitute for conventional insurance [1], [2]. Classical and contemporary *fiqh muamalah* scholarship emphasizes that *takaful* derives its ethical legitimacy not only from contractual permissibility, but also from the preservation of justice (*adl*), transparency (*bayan*), and collective welfare in accordance with the objectives of Islamic law *maqasid* Sharia [3], [4], [5]. As such, *takaful* operates as a value-laden institution in which moral intent, ethical judgment, and human accountability are central, extending beyond formal legal compliance [6].

In recent years, *takaful*, alongside other segments of Islamic finance, has increasingly integrated artificial intelligence (AI) into a broader digital transformation agenda. AI-driven applications are now widely used in customer interaction, service automation, and operational decision support, reflecting institutional priorities toward efficiency, scalability, and data-driven governance [7]. This trend indicates that artificial intelligence is no longer peripheral but increasingly embedded in the everyday functioning of Islamic financial institutions.

This technological trajectory is no longer confined to front-end services but is extending into core operational domains such as underwriting support, risk assessment, pricing mechanisms, and claims management within *takaful* operations [8]. While these developments promise consistency and cost efficiency, they also signal a structural transformation in how risk-sharing decisions, traditionally grounded in human judgment and ethical discretion, are formulated and executed.

This transformation marks a shift from human moral judgment, historically exercised by underwriters, claims assessors, and Sharia governance actors, toward algorithmic decision-making processes characterized by opaque computational logic [9]. Unlike human agents, algorithms do not possess moral intentionality, ethical accountability, or legal responsibility *taklif* within Islamic legal thought [10]. Consequently, the growing reliance on AI raises a critical ethical question: can *takaful* remain ethically Islamic when algorithmic systems increasingly displace moral agency in risk-sharing decisions?

Existing scholarship offers no satisfactory answer to this question. Studies on AI in Islamic finance largely frame artificial intelligence as a value-neutral efficiency tool, emphasizing technological adoption, operational performance, customer acceptance, and cost reduction [11], [12]. Conversely, *takaful* scholarship remains predominantly focused on contractual validity, Sharia compliance, and institutional governance, often assuming that ethical integrity follows automatically from correct legal design [2], [13]. Meanwhile, the broader literature on AI ethics has extensively examined algorithmic bias, opacity, accountability, and epistemic injustice, yet remains largely disconnected from Islamic moral philosophy and *fiqh*-based ethical reasoning [9], [10].

Taken together, these observations reveal a critical theoretical gap. Islamic finance studies do not sufficiently interrogate how artificial intelligence reshapes moral agency within *takaful* operations, while contemporary AI ethics literature remains detached from religiously grounded ethical systems. As a result, the ethical implications of moral agency displacement in AI-driven *takaful* remain under-theorized.

Addressing this gap, the present study offers a normative re-examination of *takaful* in the age of artificial intelligence from the perspective of *fiqh muamalah*. It examines how AI-driven decision-making disrupts traditional modes of ethical judgment and accountability exercised by human actors and analyzes the consequences of delegating risk-sharing decisions to systems that lack moral agency (*taklif*). Building on this analysis, the paper proposes a *fiqh muamalah*-based ethical governance framework to guide the responsible, ethically coherent integration of AI within *takaful* institutions.

This study contributes to the literature by extending *takaful* scholarship beyond its conventional focus on legal compliance and institutional design, introducing moral agency as a central analytical lens for evaluating AI-driven risk governance. By bridging Islamic moral philosophy, *fiqh muamalah*, and contemporary AI ethics, it advances the broader discourse on religious ethics in the age of artificial intelligence and articulates pathways for preserving *taawun*, justice, and accountability in algorithmically mediated institutions.

2. Literature Review

2.1 *Takaful and Fiqh muamalah*: Legal and Ethical Foundation

Takaful has been extensively discussed within the framework of *fiqh muamalah* as a cooperative risk-sharing arrangement that is fundamentally distinct from conventional insurance. Classical and contemporary scholars conceptualize *takaful* through a set of interrelated contractual structures, most notably *tabarru* (voluntary donation), *wakalah* (agency), and *mudharabah* (profit-sharing). In this arrangement, participants mutually contribute to a risk pool based on *tabarru*, thereby transforming individual risk exposure into collective responsibility. At the same time, the *takaful* operator manages the fund either as an agent (*wakil*) or as an entrepreneur (*mudarib*), depending on the contractual model adopted [14], [15], [16].

A central theme in the *takaful* literature is the distinction between risk sharing and risk transfer. Unlike conventional insurance, which transfers risk from the insured to the insurer in exchange for a premium, *takaful* is structured to distribute risk collectively among participants. This collective arrangement is widely regarded as both the legal and ethical foundation of *takaful*, ensuring compliance with the prohibitions of *riba*, *gharar*, and *maysir* while promoting fairness and mutual assistance (*taawun*) among members [14], [17].

These principles position *takaful* as a solidarity-based risk-sharing institution grounded in cooperation, shared responsibility, and collective welfare [18]. Rather than functioning merely as a financial arrangement, *takaful* is socially embedded as a moral institution in which risk sharing reflects a normative ethical commitment to mutual assistance and social protection. This ethical orientation reinforces *takaful*'s character as a system of solidarity rather than a purely commercial contract [19].

In parallel, *takaful* scholarship frequently situates these contractual mechanisms within the broader objectives of Islamic law (*maqasid Sharia*). Scholars argue that *takaful* contributes to the protection of wealth (*hifz al-mal*), social welfare, and financial inclusion, thereby aligning insurance practices with Islamic ethical imperatives [3], [20]. From this perspective, Sharia compliance is not limited to formal contractual validity but is understood as a means of advancing justice (*adl*), transparency (*bayan*), and collective well-being (*maslahah*).

Despite the richness of this literature, ethical analysis within *takaful* studies has largely remained anchored in legal compliance and institutional design. Ethics is frequently approached as an implicit outcome of valid contracts and proper governance structures, rather than as a dynamic moral practice exercised by accountable human actors. Consequently, existing *takaful* scholarship has devoted comparatively less attention to how ethical responsibility is enacted in decision-making processes, particularly amid technological transformation. This gap becomes especially salient in the context of artificial intelligence, where decision-making authority may shift from human agents to algorithmic systems. As such, while *fiqh muamalah* provides a robust legal and ethical foundation for *takaful*, further conceptual work is needed to examine how these ethical principles operate when moral judgment is mediated, or potentially displaced, by automated decision-making.

2.2 Artificial Intelligence in Islamic Finance and *Takaful*

The integration of artificial intelligence (AI) within Islamic finance, including *takaful*, has accelerated as part of broader digital transformation initiatives aimed at improving operational efficiency, regulatory compliance, and service delivery. Existing studies document the application of AI across key operational domains, including underwriting support, risk assessment, pricing mechanisms, and process automation. Through predictive analytics and real-time data processing, AI is increasingly used to enhance risk identification and management while supporting compliance with Sharia principles, including the prohibition of *riba*, *gharar*, and *maysir*. AI-based systems have also been shown to strengthen Sharia audit processes by improving speed, accuracy, and consistency [21].

Beyond core operational functions, AI has been shown to enhance customer engagement, financial inclusion, and service personalization in Islamic finance through applications such as automated advisory tools, fraud detection, and AI-driven customer interfaces, including chatbots in *takaful* services [11], [22], [23]. Collectively, this literature frames AI as a neutral, efficiency-enhancing instrument that strengthens institutional performance, inclusion, and sustainability within Sharia-compliant financial systems.

2.3 Religious Ethics, Moral Agency, and Algorithmic Decision-Making

Algorithmic decision-making (ADM) involves a structural transfer of decisional authority from human actors to computational systems, raising fundamental concerns about human agency and autonomy. This transfer has prompted ongoing debates regarding the moral status of artificial intelligence and whether AI systems can meaningfully function as moral agents [24]. While some scholars argue that AI lacks the reflexive autonomy and intentionality required for genuine moral agency, others conceptualize AI as a form of “quasi-moral agent” capable of simulating ethical judgments without possessing consciousness or moral accountability [25].

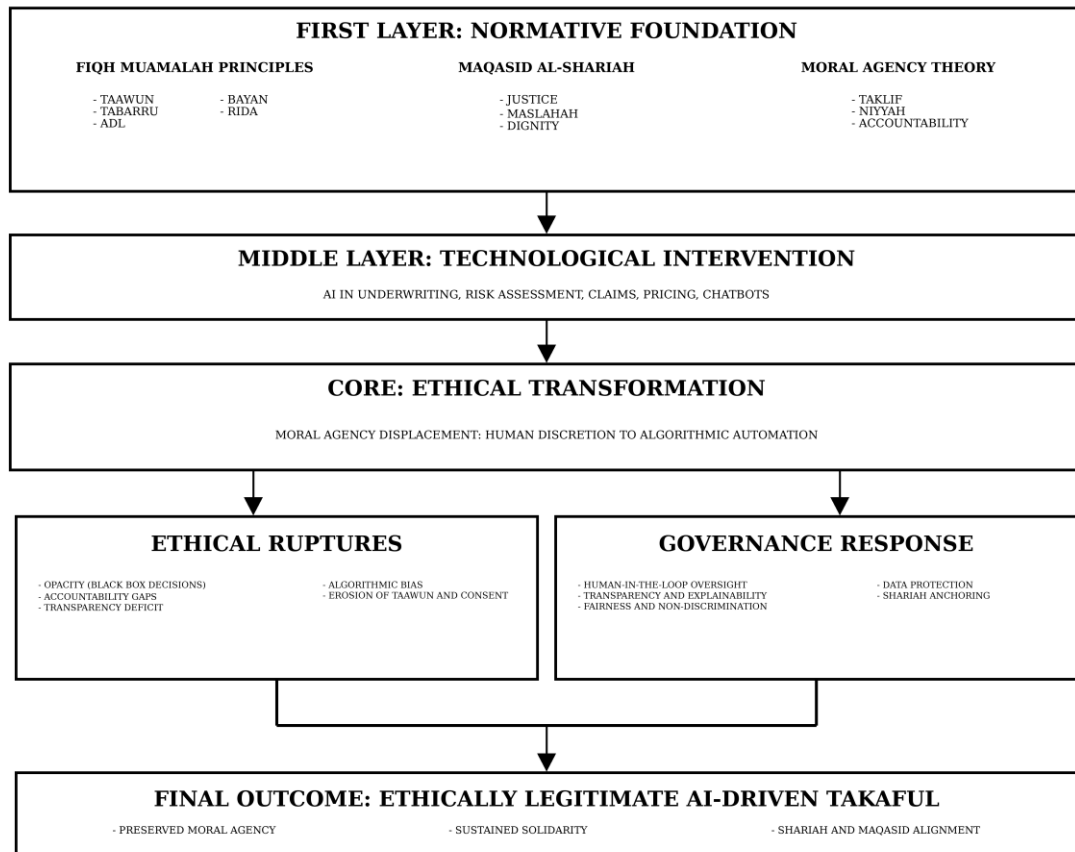
Within this debate, religious ethics offers a normative perspective that emphasizes moral responsibility, human dignity, and justice in economic and technological decision-making. Religious traditions underscore the centrality of ethical accountability and moral regulation, providing foundational principles that can inform the governance of algorithmic systems and ensure that technological innovation remains aligned with human values [26]. These insights are particularly relevant in contexts where automated decisions directly affect rights, obligations, and distributive outcomes.

At the operational level, algorithmic decision-making systems are frequently associated with challenges related to bias, fairness, and unequal treatment, which may disproportionately affect vulnerable or minority groups [27]. Concerns regarding opacity further complicate accountability, as the logic underpinning algorithmic decisions is often inaccessible to affected individuals. Consequently, ethical frameworks increasingly emphasize the need for transparency, explainability, and sustained human oversight to preserve moral agency and ensure that AI systems support, rather than replace, human ethical judgment [28].

Despite the growing sophistication of AI ethics discourse, these debates remain largely grounded in secular ethical frameworks. The integration of Islamic moral philosophy and religiously grounded concepts of moral agency into discussions of algorithmic decision-making remains notably underexplored, leaving a critical gap in the ethical evaluation of AI within Islamic institutional contexts [10], [29], [30].

2.4 Conceptual Framework

Building on the reviewed literature, this study develops a conceptual framework to explain how integrating artificial intelligence (AI) into *takaful* operations reshapes moral agency and ethical accountability within a Sharia-based risk-sharing system. Rather than treating AI as a neutral efficiency-enhancing tool, the framework positions AI as a normatively consequential intervention that interacts with, and potentially disrupts, the ethical foundations of *takaful*.



Source: Authors' Elaboration.

Fig.1. Ethical governance framework for AI-driven *takaful*.

As illustrated in [Figure 1](#), the framework is structured across four interrelated layers. The first layer establishes the normative foundation of *takaful*, drawing on three complementary sources: *fiqh muamalah* principles (taawun, tabarru, 'adl, bayan, and rida), *maqasid* Sharia (justice, maslahah, and human dignity), and moral agency theory (taklif, niyyah, and accountability). Together, these elements define the ethical baseline within which *takaful* operates as a moral institution grounded in collective responsibility and accountable human judgment.

The second layer captures the point of technological intervention, where AI is increasingly embedded in underwriting, risk assessment, pricing, claims processing, and customer interaction. At this stage, AI functions as an operational mechanism that alters how decisions are generated and executed within *takaful* institutions.

The core layer of the framework identifies the central ethical transformation examined in this study: the displacement of moral agency from human discretion to algorithmic automation. This shift represents the paper's key analytical concern, as decision authority shifts away from morally accountable human actors toward computational systems that lack ethical intentionality and responsibility.

The fourth layer distinguishes between the ethical consequences and institutional responses arising from this transformation. On the one hand, algorithmic mediation generates ethical ruptures, including opacity, accountability gaps, algorithmic bias, and the erosion of *taawun* and meaningful consent. On the other hand, the framework outlines the governance responses required to restore ethical legitimacy, including human-in-the-loop oversight, transparency and explainability, fairness and non-discrimination, data protection, and explicit Sharia anchoring.

The framework culminates in the intended normative outcome: ethically legitimate AI-driven *takaful*, characterized by the preservation of human moral agency, sustained solidarity, and alignment with Sharia and the *maqasid* Sharia. By integrating normative foundations, technological intervention, ethical disruption, and governance responses, the framework guides the subsequent analysis.

2.5 Synthesis and Research Gap

Taken together, the existing literature points to a clear yet unresolved analytical gap at the intersection of *takaful*, artificial intelligence, and religious ethics. Scholarship on *takaful* within the framework of *fiqh muamalah* has established a strong legal and ethical foundation rooted in principles of *taawun*, shared responsibility, and moral accountability. However, this body of work largely presumes that ethical integrity follows naturally from valid contractual structures and institutional governance arrangements, without closely examining how ethical responsibility is enacted in practice [2], [5].

At the same time, research on artificial intelligence in Islamic finance has predominantly approached AI as a neutral, efficiency-enhancing tool. Existing studies emphasize automation, operational performance, customer engagement, and financial inclusion, while giving comparatively limited attention to questions of moral responsibility or ethical transformation within Islamic financial institutions [7], [11], [12].

In parallel, the broader literature on algorithmic decision-making and AI ethics has devoted substantial attention to issues such as moral agency, accountability, opacity, and fairness. However, these discussions remain largely grounded in secular ethical frameworks and are seldom connected to Islamic moral philosophy or *fiqh*-based ethical reasoning [9], [10]. As a result, several interrelated ethical questions remain insufficiently explored in the context of *takaful*: how moral agency is reconfigured when decision-making authority shifts from human actors to algorithms; how the principle of *taawun* may be weakened when predictive and potentially exclusionary scoring systems mediate solidarity-based risk sharing; and how ethical accountability can be sustained in AI-driven *takaful* operations where responsibility is dispersed across automated processes.

The absence of a systematic *fiqh muamalah*-based examination of these issues constitutes the core research gap this study addresses. By integrating Islamic legal ethics with contemporary debates on algorithmic governance, this paper seeks to develop an ethical framework capable of critically assessing and guiding the use of artificial intelligence in *takaful* beyond considerations of efficiency and formal Sharia compliance.

3. Method

3.1 Research Method

This study adopts a normative-conceptual qualitative research design grounded in *fiqh muamalah* analysis and interdisciplinary ethical inquiry. Rather than employing empirical modeling or statistical testing, the research seeks to address a foundational normative question concerning the ethical implications of artificial intelligence within *takaful* institutions, specifically how AI reshapes moral agency, ethical responsibility, and risk governance.

Normative legal research is particularly appropriate when the objective is to evaluate coherence between emerging practices and established ethical-legal principles, especially in Islamic jurisprudence, where moral reasoning and normative judgment are central to legal interpretation [31], [32], [29]. This approach enables the study to assess not merely whether AI applications are operationally efficient or legally permissible, but whether they remain ethically aligned with the moral foundations of Islamic insurance.

3.2 Analytical Framework

The analysis is structured around an integrated ethical framework consisting of three interrelated components. First, the study draws upon *fiqh muamalah* principles governing contractual relations and ethical conduct in Islamic finance, including *taawun* (mutual cooperation), *tabarru* (voluntary contribution), justice (*adl*), transparency (*bayan*), informed consent (*rida*), and moral accountability (*taklif*). These principles serve as the normative baseline for evaluating ethical responsibility within *takaful* contracts [2], [5], [32].

Second, the framework incorporates *maqasid* Sharia as an evaluative lens to assess whether AI-driven practices in *takaful* continue to serve the higher objectives of Islamic law, particularly the preservation of justice, public welfare (*maslahah*), and ethical responsibility in economic transactions [3], [33]. This *maqasid*-oriented perspective allows the analysis to move beyond formal legality toward substantive ethical outcomes.

Third, the study integrates moral agency theory drawn from both religious ethics and contemporary AI ethics literature. Within Islamic ethical thought, moral agency is inseparable from intention (*niyyah*), responsibility, and accountability before God and society [6]. In contrast, the AI ethics literature highlights that algorithmic systems lack intentionality and moral responsibility, raising concerns about accountability gaps, opacity, and epistemic injustice in automated decision-making [9], [10]. This integration enables a critical examination of how algorithmic mediation alters the locus of ethical judgment in *takaful* operations.

3.3 Data Sources and Analytical Procedure

The study relies on qualitative textual sources drawn from three main bodies of literature. First, classical and contemporary *fiqh* literature is examined to establish the ethical and legal foundations of *takaful* within Islamic jurisprudence, particularly concerning moral responsibility, contractual ethics, and risk sharing [31], [32].

Second, the analysis engages with scholarly works on *takaful* and Islamic finance, including studies on governance structures, Sharia compliance, risk-sharing mechanisms, and the adoption of financial technologies. This literature provides insight into how *takaful* is currently conceptualized and operationalized within modern Islamic financial institutions [2], [7], [13].

Third, the study draws on AI ethics and algorithmic governance literature, particularly works on moral agency, accountability, transparency, and epistemic injustice in automated systems. These sources are used to critically assess how ethical responsibility is redistributed when algorithms mediate decision-making authority [9], [10], [24]. By synthesizing these bodies of literature, the study develops a normative ethical evaluation of artificial intelligence in *takaful* that bridges Islamic legal ethics and contemporary debates on algorithmic decision-making.

4. Results and Discussion

4.1 Ethical Foundations of *Takaful* Revisited

The ethical foundations of *takaful* are rooted in *fiqh muamalah* principles that fundamentally distinguish it from conventional insurance and define its normative character. Derived from *al-*

kafalah (mutual guarantee), *takaful* is grounded in *taawun* (mutual cooperation) and *tabarru* (voluntary contribution), emphasizing collective responsibility, solidarity, and reciprocal risk sharing among participants [34].

Within *fiqh muamalah*, *takaful* is not merely a technical risk-management arrangement but a moral contract oriented toward mutual protection rather than profit maximization. Participants contribute to a common pool with the ethical understanding that losses are borne collectively, in contrast to conventional insurance, which operates on a risk-transfer model by shifting risk from the insured to the insurer [35]. This risk-sharing structure embeds ethical intent and solidarity at the core of *takaful* operations.

The moral distinctiveness of *takaful* is further reinforced through adherence to Sharia principles, including the prohibition of *riba* (interest), *gharar* (excessive uncertainty), and *maysir* (gambling). Investments made with *takaful* funds must also comply with Sharia requirements, ensuring that financial activities remain ethically sound and socially responsible [19]. These constraints serve not merely as legal formalities but also as safeguards of justice, fairness, and moral integrity in economic transactions.

Sharia governance plays a critical role in safeguarding these ethical foundations by ensuring that operational practices remain aligned with Islamic legal norms, thereby enhancing institutional credibility and public trust [36]. However, from a *fiqh muamalah* perspective, ethical integrity cannot be reduced to structural compliance alone. It presupposes the presence of human moral agency, where ethical judgment, intention (*niyyah*), and accountability (*taklif*) are exercised by identifiable human actors.

Accordingly, this analysis establishes a normative baseline for evaluating *takaful* operations. *Takaful* ethically requires: (i) collective risk sharing grounded in *taawun* and *tabarru*; (ii) transparency and fairness in decision-making; (iii) Sharia-compliant investment and operational conduct; and (iv) accountable human moral agents responsible for ethical judgment.

Human moral agency is therefore central to the ethical architecture of *takaful*. While algorithmic systems may assist decision-making, they lack sentience, moral understanding, and responsibility, and thus cannot bear ethical accountability in their own right [37], [38]. Algorithms may influence outcomes and shape choices, but moral responsibility ultimately remains with human agents who design, deploy, and oversee such systems [39]. Even emerging AI ethics frameworks continue to rely on human oversight to define and enforce moral standards, as algorithmic systems cannot provide meaningful moral justifications for their decisions [40], [41].

This normative baseline constitutes the first analytical result of the study and provides the ethical standard against which the implications of AI-driven decision-making in *takaful* are assessed. Its significance becomes particularly salient as algorithmic systems increasingly mediate *takaful* decision-making.

4.2 AI and the Transformation of Risk Governance

Building on this normative baseline, the study examines how artificial intelligence reshapes risk governance within *takaful* operations. While *takaful* is ethically grounded in human moral agency and collective responsibility, the integration of AI introduces a structural shift in how risk-related decisions are generated and exercised.

Artificial intelligence is increasingly deployed across core operational domains of *takaful*, including underwriting, risk assessment, pricing, and claims management. Through predictive analytics and machine learning, AI systems enhance precision in risk evaluation, enable real-time fraud detection, and support regulatory compliance by processing large volumes of data quickly and consistently [11], [42].

AI also plays a growing role in front-end services. AI-driven chatbots and automated interfaces are widely adopted to improve customer interaction, responsiveness, and service personalization. Empirical studies show that such applications enhance customer satisfaction while improving operational efficiency through automation and real-time data processing [43], [44], thereby reinforcing AI's appeal as a scalable, cost-efficient solution.

Beyond efficiency gains, however, AI signals a deeper transformation in risk governance. Decision-making processes traditionally exercised through human discretion, particularly in underwriting judgments, eligibility determinations, and claims assessments, are increasingly mediated by algorithmic scoring systems. These systems translate complex social and financial conditions into computational outputs, shifting authority from deliberative human judgment to automated decision logic.

The key analytical finding is that AI does not merely assist decision-making in *takaful* but actively reallocates decision authority away from morally accountable human actors toward computational systems. Risk governance is thus reconfigured from a human-centered ethical practice into a computational process driven by predictive models and probabilistic optimization. This shift marks a transition from discretion to computation, embedding ethical judgment within technical systems rather than exercising it explicitly through accountable human agents.

This transformation lays the groundwork for the ethical tensions examined in the subsequent section. When algorithmic systems increasingly determine outcomes affecting participants' rights, obligations, and access to mutual protection, fundamental questions arise regarding moral agency, accountability, and the preservation of *takaful*'s solidaristic ethos.

4.3 Discussion

4.3.1 Ethical Accountability and Governance Challenges in AI-Driven *Takaful*

The increasing adoption of artificial intelligence in *takaful* introduces ethical accountability and governance challenges that extend beyond technical efficiency. A primary concern lies in the opacity of algorithmic decision-making. Many AI systems function as "black boxes," limiting stakeholders' ability to understand how underwriting decisions, risk scores, or claims outcomes are produced. This opacity creates accountability gaps, especially when errors, disputes, or unintended discriminatory outcomes arise [45]. In *takaful*, where transparency (*bayan*) and informed consent (*rida*) are ethical imperatives, such opacity poses a serious governance challenge.

Closely related is the problem of algorithmic bias. AI systems trained on historical or unrepresentative data may reproduce or amplify existing inequalities, resulting in unfair risk assessments, exclusionary pricing, or unequal treatment of participants [46]. Within *takaful*, this risk is particularly acute, as biased decision-making may undermine *taawun* by privileging actuarial optimization over solidaristic inclusion.

Regulatory complexity further complicates this ethical landscape. AI governance remains fragmented and evolving, and existing financial regulations often do not fully address the ethical implications of AI-mediated decision-making in *takaful* operations [45]. Compliance thus becomes challenging when algorithmic systems blur lines of responsibility among developers, operators, and institutions.

These challenges underscore the need for robust ethical governance frameworks that balance innovation with moral responsibility. Such frameworks must embed fairness, accountability, and meaningful human oversight to ensure that AI supports, rather than replaces, ethical judgment [47]. Without explicit safeguards, efficiency-driven AI deployment risks diluting ethical accountability while remaining formally compliant.

4.3.2 Implications for *Fiqh muamalah* and Islamic Legal Ethics

The ethical tensions revealed by AI integration in *takaful* extend beyond Islamic insurance and raise deeper questions for *fiqh muamalah* regarding moral responsibility and accountability in algorithmically mediated decision-making. Classical *fiqh muamalah* presumes that economic transactions are conducted by morally accountable human agents (*mukallaf*) endowed with intention (*niyyah*), discretion, and responsibility. Ethical integrity, therefore, derives not only from valid contracts but from human moral agency exercised within institutional structures [31], [32].

When substantive decisions (such as eligibility, contribution levels, or claims outcomes) are determined by opaque algorithms, this foundational assumption is disrupted. Ethical evaluation cannot be confined to contractual permissibility or formal Sharia compliance. It must also address how decisions are made, who exercises moral judgment, and where responsibility ultimately lies. In this context, *maqasid* Sharia provides an essential moral compass, as justice (*adl*), public welfare (*maslahah*), and moral accountability cannot be presumed when opacity, bias, or accountability gaps undermine equitable treatment [3], [48], [29].

For Islamic financial institutions, these findings suggest that existing governance models require reassessment. Traditional Sharia governance has focused on product approval and structural compliance, often assuming ethical integrity follows automatically. AI-driven systems introduce new moral risks that demand expanded oversight of algorithmic design, implementation, and use, ensuring that AI remains subject to human moral supervision rather than acting as a substitute for it [5], [47], [49].

The implications extend to scholars and regulators. As financial technologies evolve, AI must be engaged not as a neutral efficiency tool, but as a normatively consequential force reshaping ethical relations in economic life. Regulators face the challenge of developing adaptive frameworks that address algorithmic accountability without stifling innovation [45]. In this sense, AI-driven *takaful* functions as a broader warning signal for Islamic economic institutions, where preserving ethical identity requires reaffirming human moral agency as non-negotiable.

4.3.3 Reconstructing Ethical Boundaries for AI Use in *Takaful*

Building on the ethical tensions identified earlier, this subsection translates normative concerns into a set of ethical boundaries that can guide the responsible use of artificial intelligence in *takaful* operations. Rather than rejecting AI outright, the proposed Ethical Thresholds Framework clarifies the conditions under which AI integration can remain ethically legitimate within a *fiqh muamalah* perspective.

Table 1 summarizes these thresholds by linking core *fiqh* principles to specific AI-related ethical risks and corresponding governance requirements. The framework positions ethical governance not as an obstacle to innovation, but as a necessary structure for ensuring that technological tools remain aligned with *takaful*'s moral foundations. First, AI applications in *takaful* must remain substantively anchored in Sharia principles, including the prohibitions of *riba*, *gharar*, and *maysir*. Compliance should be understood not merely as technical conformity, but as a commitment to preserving justice, fairness, and collective welfare [34]. Second, AI systems must respect human dignity and uphold justice. Discriminatory outcomes or exclusionary risk assessments are fundamentally inconsistent with the principles of *taawun* and shared responsibility, a concern echoed in international AI ethics frameworks emphasizing non-discrimination and human-centered design [50]. Third, transparency constitutes a critical ethical threshold. The legitimacy of *takaful* contracts depends on meaningful consent (*rida*) and clarity (*bayan*), both of which are undermined by opaque "black-box" models. AI systems should therefore enable explainability and establish clear accountability for decisions that affect participants' rights and obligations [51]. Fourth, data privacy

and confidentiality must be safeguarded as core ethical obligations. Given the central place of privacy in Islamic legal thought, AI-driven *takaful* systems must implement robust data protection measures to prevent misuse of personal information and to protect human dignity [52]. Taken together, these ethical thresholds translate abstract ethical ruptures (such as moral agency displacement and accountability gaps) into actionable governance principles. They demonstrate that the ethical risks associated with AI are not unavoidable byproducts of innovation but challenges that can be addressed through deliberate institutional design and ethical oversight.

Table 1. Ethical Thresholds for AI Governance in *Takaful* Based on *Fiqh muamalah*.

Dimension	<i>Fiqh muamalah</i> / Ethical Basis	AI-Related Ethical Risk	Governance Requirement
Moral Agency	Taklif, Niyyah, Human Accountability	Displacement of human judgment by algorithmic automation	Human-in-the-loop decision-making; clear attribution of responsibility
Transparency	Bayan, Riḍa (Informed Consent)	Black-box decision-making; opacity	Explainable AI; disclosure of decision logic
Justice & Fairness	‘Adl, Maslahah	Algorithmic bias; exclusionary risk scoring	Fairness audits; non-discrimination safeguards
Solidarity	<i>Taawun, Tabarru</i>	Erosion of mutual assistance through actuarial optimization	Inclusion-oriented risk governance
Data Ethics	Protection of Dignity (Karamah)	Privacy breaches; misuse of personal data	Robust data protection and confidentiality controls
Sharia Integrity	<i>Maqasid</i> Sharia	Formal compliance without ethical substance	Expanded Sharia oversight of algorithmic systems

Source: Authors’ Elaboration

4.3.4 Opportunities for Ethical Improvement and Governance Enhancement

Addressing ethical challenges in AI-driven *takaful* requires sustained institutional reform. Enhancing transparency and auditability is essential for restoring accountability, enabling Sharia boards and regulators to exercise meaningful oversight through documented decision logic and auditable outcomes [45], [53].

Mitigating algorithmic bias similarly requires continuous monitoring and corrective mechanisms. Proposals such as decentralized governance models using blockchain may enhance traceability and transparency, though only as complements to ethical oversight within Sharia governance structures [46].

At the regulatory level, adaptive governance arrangements are needed to keep pace with technological change. This demands closer collaboration among policymakers, AI developers, Sharia scholars, and *takaful* operators to integrate ethical considerations throughout system design and implementation [47], [54]. Ethical governance should thus be viewed as an ongoing process rather than a one-time compliance exercise [55].

In sum, AI-driven *takaful* faces substantial ethical challenges related to transparency, bias, regulatory adequacy, and moral responsibility. Addressing these challenges requires governance mechanisms that preserve human accountability while engaging constructively with innovation. Ultimately, the ethical thresholds proposed here function not merely as safeguards, but as

mechanisms for preserving human moral agency (*taklif*) as the ethical core of *takaful*, ensuring that AI remains a tool under accountable human judgment rather than a substitute for it.

4.3.5 Toward a Maqasid-Driven ESG Framework for Ethical AI Governance

The ethical challenges introduced by artificial intelligence in *takaful* governance cannot be adequately addressed through technical safeguards or isolated compliance measures alone. Instead, they call for a broader normative reorientation, one that aligns technological innovation with the higher objectives of Islamic law (*maqasid sharia*) and the growing expectations of ethical and sustainable finance.

Recent scholarship has therefore proposed a *maqasid*-driven integration of Environmental, Social, and Governance (ESG) principles within *takaful* operations. Rather than treating ESG as a secular or market-driven framework, this approach embeds sustainability within Islamic moral objectives such as justice (*adl*), public welfare (*maslahah*), and stewardship (*khilafah*). By grounding ESG integration in *maqasid* Sharia, *takaful* institutions are encouraged to view sustainability not as an external reporting obligation, but as an ethical extension of their foundational commitment to solidarity and social responsibility [56].

From a governance perspective, this framework carries important policy implications. It offers a normative lens for evaluating emerging technologies (including AI) beyond efficiency metrics alone. AI systems in *takaful* should not be assessed solely on cost reduction or predictive accuracy, but also on whether they advance social inclusion, distributive justice, and environmental responsibility. In this sense, *maqasid*-driven ESG functions as a bridge between Islamic ethical reasoning and contemporary governance standards, enabling *takaful* institutions to articulate their ethical distinctiveness in a technologically mediated financial environment.

Complementing this normative orientation, recent work has introduced a Sustainability Performance Index specifically designed for *takaful* operators. This index evaluates performance across economic, social, environmental, and religious dimensions, offering a more holistic measure of sustainability that captures both financial viability and ethical impact [57]. The inclusion of religious and ethical indicators distinguishes this model from conventional sustainability metrics and reinforces *takaful* governance's accountability to Islamic moral objectives alongside market expectations.

The policy relevance of such sustainability metrics lies in their ability to translate abstract ethical commitments into measurable governance outcomes. For regulators and Sharia supervisory boards, these indices provide tools to assess whether technological adoption (including AI-driven decision-making) remains aligned with *maqasid* Sharia. For institutions, they offer structured mechanisms to identify ethical gaps, particularly where automation risks marginalizing vulnerable participants or weakening the principle of *taawun*.

Taken together, *maqasid*-driven ESG integration and sustainability performance metrics highlight a central implication of this study: ethical governance in *takaful* must evolve in tandem with technological innovation. As AI becomes increasingly embedded in risk assessment and operational decision-making, governance frameworks must shift their focus from narrow compliance to value-oriented evaluation. Embedding *maqasid* Sharia within ESG and sustainability metrics thus provides a practical yet ethically grounded pathway for ensuring that *takaful* remains faithful to its moral identity while engaging responsibly with emerging technologies.

5. Conclusion

This study set out to answer a question that sits at the heart of contemporary Islamic finance: can *takaful* retain its ethical character as an Islamic institution when algorithmic systems are increasingly taking over the moral decisions that once belonged to human beings? The answer this analysis offers, grounded in *fiqh muamalah*, is that the real challenge AI poses to *takaful* is not a technical one. It is moral and institutional. *Takaful* was built on the premise that ethical judgment, intention (*niyyah*), and responsibility (*taklif*) belong to identifiable human actors. When algorithms begin to replace human judgment rather than serve it, what is put at risk is not merely regulatory compliance; it is the ethical soul of the institution, regardless of whether Sharia formalities are observed on paper. What this study contributes, then, is the argument that ethical integrity in *takaful* cannot be rescued by technical fixes or efficiency benchmarks alone. It depends on keeping accountable human oversight at the center of how AI is governed within these institutions. The Ethical Thresholds Framework developed here gives that argument practical form, anchoring it in five conditions that any ethically legitimate use of AI in *takaful* must satisfy: transparency, fairness, data protection, Sharia grounding, and genuine human-in-the-loop oversight.

These findings have consequences that extend beyond the academy. Regulators and Sharia supervisory bodies can no longer treat product-level compliance as sufficient. Algorithmic systems demand a different kind of scrutiny, one that asks whether decisions can be explained, whether responsibility can be traced, and whether meaningful human oversight is actually built into the process rather than merely assumed. *Takaful* operators, for their part, need to stop treating AI as a neutral tool and start treating it as something that carries ethical weight of its own; something that must be evaluated at every stage from design through deployment. There is also a broader social dimension that should not be overlooked. Left unchecked, algorithmic risk-scoring tends to privilege actuarial efficiency over solidarity and inclusion, quietly eroding the spirit of *taawun* that makes *takaful* more than just another insurance product. *Maqasid*-driven ESG integration and sustainability metrics offer one promising route for embedding ethical accountability into these institutional structures in a way that is both principled and practicable.

What artificial intelligence ultimately threatens is not the legal standing of *takaful* but its identity. This study has argued that the way to protect that identity, in an age increasingly shaped by algorithmic logic, is to bring *fiqh muamalah* and *maqasid* Sharia back to the center of how risk-sharing is governed. Being a normative and conceptual inquiry, this study does not examine specific AI systems currently in use by *takaful* operators, and that is where future research needs to go: into the field, across jurisdictions, tracing how algorithmic decision-making actually shapes participant outcomes, trust, and perceptions of fairness, and building the indicators that would allow moral agency to be meaningfully tracked within ESG and sustainability frameworks. That work will need Islamic jurists, AI ethicists, and regulators at the same table; and the sooner, the better.

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