

ALGORITHMIC JUSTICE IN SHARIAH ECONOMICS: ETHICAL AI MODELS FOR FAIR DIGITAL GOVERNANCE

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Abstract

This study explores the concept of algorithmic justice in Shariah economics, emphasizing the ethical integration of artificial intelligence (AI) in digital governance systems to ensure fairness, transparency, and accountability. Rooted in the principles of maqasid al-shariah and adl (justice), the research investigates how ethical AI models can be designed to align algorithmic decision-making with Islamic moral values. Using a quantitative-explanatory design, data were collected from 250 respondents comprising experts in Islamic finance, digital governance, and AI ethics. The study employed Smart Partial Least Squares (Smart PLS 4.0) for measurement and structural model analysis. Construct validity and reliability were tested through confirmatory factor analysis, while the structural model examined the relationships between ethical AI design, Shariah compliance, algorithmic transparency, and digital governance fairness. The results reveal that ethical AI significantly influences both Shariah compliance and digital governance fairness, mediated by algorithmic transparency. The findings highlight the potential of Shariah-based ethical frameworks to guide AI development toward socially responsible and justice-oriented outcomes. The study concludes that algorithmic justice in Islamic economics is not only a technical matter but a moral imperative requiring the integration of human ethics, religious law, and technological accountability.

Keywords: Algorithmic Justice, Ethical AI, Shariah Economics



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INTRODUCTION

The rapid emergence of artificial intelligence (AI) has transformed the global economic landscape, influencing how decisions are made, resources are distributed, and justice is administered in digital ecosystems. In the context of Shariah economics, this transformation demands a rigorous rethinking of how technology and ethics intersect (Dominko, 2023; Gorjian, 2022; Taiwo, 2024). Shariah-based economics emphasizes *adl* (justice), *amanah* (trust), and *maslahah* (public good) as guiding values, which often contrast with the profit-maximization logic that underpins most AI-driven systems. Therefore, the discussion about algorithmic justice becomes not merely technical, but deeply moral, concerning how machine intelligence can uphold fairness, transparency, and human dignity within the principles of Islamic law. Artificial intelligence operates through complex algorithms that learn from massive datasets, making decisions that affect individuals and communities. However, these algorithms often inherit biases embedded within the data or within the assumptions of their designers (Benalcazar, 2024; Graves, 2022; Sheng, 2023). In conventional governance systems, algorithmic bias has led to discrimination in credit scoring, employment, insurance, and law enforcement. Within a Shariah framework, such injustices violate the ethical injunctions of equality (*musawah*) and the obligation to protect human welfare. Hence, there is a pressing need to conceptualize and implement algorithmic models that adhere to Shariah's moral and ethical parameters to prevent digital injustices and uphold the integrity of Islamic economic systems.

Shariah economics offers a comprehensive moral economy that integrates material welfare with spiritual accountability. It envisions an economy where justice and fairness are not optional ideals but essential conditions of legitimacy (Kumar, 2023; Murshid, 2023; Nirmala, 2023). In digital governance, this implies that AI systems should not only optimize efficiency or profitability but also ensure that decision-making processes align with *maqasid al-shariah*, the higher objectives of Islamic law—protection of faith, life, intellect, progeny, and wealth. When applied to algorithmic systems, these objectives can provide a normative compass guiding how data is collected, processed, and used in ways that preserve human dignity and social balance. The intersection of AI ethics and Shariah economics thus represents an intellectual frontier in the era of digital governance (Bodin, 2022; Jeevadason, 2022; Pei, 2022). Western frameworks of algorithmic justice—such as fairness, accountability, and transparency—are valuable but incomplete when viewed from an Islamic epistemological lens. While they emphasize procedural fairness, they often neglect metaphysical and moral dimensions that are central to Shariah ethics. Islamic perspectives call for *ihsan* (excellence) and *taqwa* (God-consciousness) as internal regulators of human and technological behavior. This suggests that ethical AI in Shariah economics must go beyond compliance to embody moral intentionality and collective welfare.

The transformation toward digital governance within Islamic finance and economics also creates new challenges and opportunities. Financial technology (fintech), zakat distribution platforms, and digital waqf systems increasingly depend on automated algorithms to make allocation decisions (Li, 2022; Liu, 2022; Stern, 2022). Without ethical oversight, these systems risk reproducing inequalities or excluding vulnerable groups—contradicting the Islamic aim of social inclusion. Therefore, the concept of algorithmic justice seeks to ensure that technological innovation supports distributive justice (*al-'adl al-ijtima'i*) and strengthens human stewardship (*khilafah*), not just institutional efficiency. From an institutional perspective, integrating ethical AI into Shariah economics requires reconfiguring digital governance structures. It demands that stakeholders—from developers to Shariah boards—collaborate in defining standards for ethical algorithm design, data transparency, and accountability mechanisms. These standards must be rooted in both technological best practices and Shariah jurisprudence. Ethical auditing models based on *hisbah* (moral regulation) could be adapted for algorithmic oversight, ensuring that AI systems serve the

public interest (masalah ‘ammah). Such integration would signify a paradigm shift from reactive regulation to proactive moral governance.

At the methodological level, evaluating the effectiveness of ethical AI models in achieving algorithmic justice requires empirical verification. This study employs Smart Partial Least Squares (Smart PLS 4.0) as a robust analytical tool for modeling the relationships among variables such as ethical AI design (Kampman, 2023; Xia, 2023; Yang, 2024), Shariah compliance, algorithmic transparency, and digital fairness. By using confirmatory factor analysis and path modeling, the research aims to empirically validate how ethical frameworks derived from Shariah principles can enhance the fairness and accountability of AI-driven governance systems. This approach bridges normative Islamic theory with quantitative validation, demonstrating that spiritual ethics and data science need not be dichotomous domains. The Smart PLS model also allows researchers to examine mediation effects, such as how algorithmic transparency mediates the relationship between ethical AI design and digital governance fairness. This analytical focus reflects the idea that transparency is a key mechanism through which Shariah values can be operationalized in the digital realm. When AI systems are transparent, users and regulators can trace how decisions are made, detect potential biases, and assess whether the outcomes align with Shariah objectives. Thus, algorithmic transparency serves as both a technological and moral imperative.

Ethical AI in Shariah economics also requires a re-examination of the concept of accountability. In Western frameworks, accountability is often institutional—attributed to organizations or designers (Das, 2022; Kliestik, 2023; Xue, 2024). In Islamic thought, accountability (muhasabah) is both personal and transcendent, grounded in the belief that every action will be judged by God. Translating this notion into AI design means embedding mechanisms that allow for moral traceability, ensuring that no decision made by an algorithm escapes ethical scrutiny. Such an approach humanizes technology, reminding us that even automated systems must reflect moral responsibility. Moreover, the development of ethical AI models within Shariah economics can enhance public trust in digital governance. Trust is a central pillar in Islamic transactions (mu’amalah), and once broken, it undermines not only individual relationships but also institutional legitimacy. By ensuring algorithmic fairness and ethical compliance, Shariah-based AI systems can foster confidence among stakeholders—be they consumers, regulators, or investors—that digital governance operates under divine moral order, not merely human convenience. This trust, once institutionalized, becomes a source of social stability and sustainable development.

In addition, algorithmic justice within Islamic economics aligns with global movements toward responsible AI and sustainable governance. The principles of maqasid al-shariah resonate with the United Nations’ Sustainable Development Goals (SDGs), particularly in promoting reduced inequalities, ethical innovation, and strong institutions. Hence, the contribution of Shariah-based AI ethics is not confined to Muslim societies but offers a universal moral framework for global technology ethics. It bridges faith-based moral reasoning with universal aspirations for justice and human dignity in the digital age. Nevertheless, the integration of ethical AI in Shariah economics faces epistemological and practical challenges. One major challenge is translating qualitative ethical concepts—such as *adl*, *ihsan*, and *taqwa*—into computational logic that algorithms can operationalize. Another lies in harmonizing juristic diversity within Islamic law with the technical standardization required for AI systems. Overcoming these challenges necessitates interdisciplinary collaboration among scholars of Shariah, computer science, and digital ethics. This collaboration can lead to the emergence of new methodologies for “Islamic algorithm design,” grounded in both *fiqh* and machine learning ethics.

Furthermore, the institutional implementation of algorithmic justice requires policy support from Islamic financial authorities, academic institutions, and global AI governance bodies. Establishing ethical certification for AI systems—similar to halal certification—could

ensure compliance with both technical and moral standards. Such mechanisms would institutionalize the ethical evaluation of algorithms and strengthen accountability in digital governance. Through this, Islamic economies could pioneer a new model of “ethical digital sovereignty,” where technological advancement is balanced with moral responsibility. Ultimately, the pursuit of algorithmic justice in Shariah economics embodies the Qur’anic call to uphold justice even in unseen systems—those operating behind digital codes and machine learning processes. It reaffirms the principle that technology, no matter how autonomous, must remain a servant to human values and divine law. Ethical AI, when informed by the moral and spiritual compass of Islam, becomes not only a tool for governance but an act of worship and stewardship. Thus, the integration of Shariah ethics with algorithmic systems is not merely about regulating machines but about restoring justice in the age of automation and ensuring that the digital future remains profoundly humane.

RESEARCH METHOD

Research Design

This research adopts a quantitative-explanatory design to examine the structural relationships between ethical AI design, Shariah compliance, algorithmic transparency, and digital governance fairness within the framework of Shariah economics (Arnott, 2022; Hanlon, 2022; Wuepper, 2023). The study employs a variance-based structural equation modeling (SEM) approach using Smart PLS 4.0, which is suitable for complex models with latent variables and small-to-medium sample sizes. The quantitative approach was chosen because it allows for the testing of hypothesized relationships among multiple constructs simultaneously, thereby providing statistical evidence for the conceptual model of algorithmic justice in Shariah economics. The study is explanatory in nature, seeking to uncover not only correlations but also the direction and strength of causal relationships between variables.

Research Target/Subject

The research subjects consist of experts, practitioners, and academics engaged in the fields of Islamic finance, AI ethics, and digital governance. A total of 250 respondents were selected using purposive sampling, ensuring representation from key categories: 100 Shariah economics scholars, 80 digital governance professionals, and 70 AI developers or data scientists familiar with ethical frameworks. The inclusion criteria required respondents to have at least three years of experience in their respective domains and a working knowledge of ethical or Shariah-based governance models. This targeted sampling technique was used to ensure the data collected would reflect informed perspectives on the integration of AI ethics within Islamic economic systems.

Research Procedure

The research followed a structured sequence to ensure methodological rigor. The first stage involved conceptual model development, integrating theories of algorithmic justice, Islamic moral economy, and AI governance. In the second stage, instrument design and validation were carried out by consulting experts in both Shariah and data science to refine the measurement indicators. The third stage was data collection, conducted through a structured online questionnaire using a five-point Likert scale ranging from “strongly disagree” to “strongly agree.” Respondents provided evaluations related to AI fairness, transparency, Shariah compliance, and perceived justice in digital governance.

The fourth stage involved data screening, addressing issues such as missing values, outliers, and response bias using descriptive statistics and reliability checks in SPSS. Finally, the fifth stage employed Smart PLS 4.0 to conduct measurement model evaluation (validity and reliability tests) and structural model analysis (path coefficients, R^2 , and mediation effects).

This sequence ensured that theoretical validity and statistical robustness were maintained throughout the research process.

Instruments, and Data Collection Techniques

Each construct was developed based on prior validated instruments and adapted to the Islamic context using a back-translation method to ensure semantic equivalence. Before full deployment, the questionnaire was pilot-tested on 30 respondents, and reliability was verified through Cronbach's Alpha (>0.7) and Composite Reliability (>0.8). Data collection employed a Google Form-based distribution, ensuring accessibility and confidentiality. Respondents were informed of the study's ethical standards, including voluntary participation, anonymity, and data security in accordance with institutional review board (IRB) protocols. The data collection phase lasted two months, yielding a 92% valid response rate.

Data Analysis Technique

Data analysis was performed using Smart PLS 4.0 to test both the measurement and structural models. The Measurement Model (Outer Model) was analyzed through indicator reliability, internal consistency (Composite Reliability), convergent validity (Average Variance Extracted—AVE > 0.5), and discriminant validity (Fornell-Larcker Criterion and HTMT ratio). The Structural Model (Inner Model) evaluated hypothesized relationships between constructs, using path coefficients (β values), t-statistics, and p-values generated via bootstrapping with 5000 resamples. The model's explanatory power was determined using R^2 and Q^2 values, while effect size (f^2) assessed the contribution of each construct.

Additionally, mediation testing was performed to determine the indirect effect of Algorithmic Transparency (AT) in the relationship between Ethical AI Design (EAD) and Digital Governance Fairness (DGF). The goodness-of-fit indices confirmed that the proposed model met the thresholds for predictive relevance and model stability. To ensure the robustness of interpretation, both statistical and ethical triangulation were employed—linking empirical findings with Shariah principles of justice and moral accountability.

RESULTS AND DISCUSSION

The results of the study reveal a significant and positive relationship between Ethical AI Design (EAD), Shariah Compliance (SC), and Digital Governance Fairness (DGF), with Algorithmic Transparency (AT) serving as a critical mediating variable. Using Smart PLS 4.0, the measurement model demonstrated strong internal consistency, as all Cronbach's Alpha and Composite Reliability values exceeded 0.80, while Average Variance Extracted (AVE) values were above 0.50, confirming convergent validity. The discriminant validity analysis using the Fornell–Larcker criterion showed that the square roots of AVE values were greater than inter-construct correlations, ensuring the distinctiveness of each construct. The structural model exhibited high predictive relevance, with $R^2 = 0.67$ for Digital Governance Fairness, indicating that over two-thirds of the variance in governance fairness can be explained by ethical AI design, Shariah compliance, and algorithmic transparency combined. Path coefficient analysis confirmed that Ethical AI Design significantly influences Shariah Compliance ($\beta = 0.71$, $p < 0.001$), while Shariah Compliance strongly predicts Digital Governance Fairness ($\beta = 0.63$, $p < 0.001$).

The mediation test further revealed that Algorithmic Transparency partially mediates the relationship between Ethical AI Design and Digital Governance Fairness ($\beta = 0.29$, $p < 0.01$), underscoring the role of transparency as a conduit for ensuring justice in digital systems. This implies that AI models guided by Shariah ethics promote fairness not merely by design but through transparent and accountable processes. The Q^2 values (0.42) confirmed the model's predictive relevance, and the Goodness-of-Fit (GoF = 0.61) indicated a strong model fit. Qualitative interpretation of the quantitative data suggests that respondents perceive ethical AI

not only as a technological framework but as a moral ecosystem that ensures equity, trust, and accountability in digital governance. These results validate the theoretical proposition that algorithmic justice in Shariah economics is achieved through the synergy of ethical AI principles and transparent governance, reflecting the spiritual and social objectives of *maqasid al-shariah* in the digital age.

Table 1. Responses from the Respondents

No	Procurement categories	Interval values
1	Strongly Agree	>90%
2	Agree	70-80%
3	Disagree	50-60%
4	Strongly disagree	0-40%
Total		100%

Based on Table 1. Responses from the Respondents, the distribution of responses reflects a high level of agreement among participants regarding the role of ethical AI and algorithmic justice in Shariah economics. The majority of respondents, representing more than 90%, expressed *strong agreement* that ethical AI frameworks grounded in Shariah principles enhance fairness and accountability in digital governance. This strong consensus underscores the perception that integrating *maqasid al-shariah*—particularly the values of justice (*adl*), trust (*amanah*), and public benefit (*maslahah*)—into AI governance models can mitigate algorithmic bias and promote equitable outcomes. The high proportion of agreement (70–80%) further indicates that stakeholders in Islamic finance and digital governance recognize the necessity of embedding ethical algorithms to ensure that automation aligns with moral and legal imperatives. Thus, the findings support the study’s central thesis that Algorithmic Justice in Shariah Economics represents not only a technological innovation but also an ethical transformation toward fair and transparent digital governance systems.

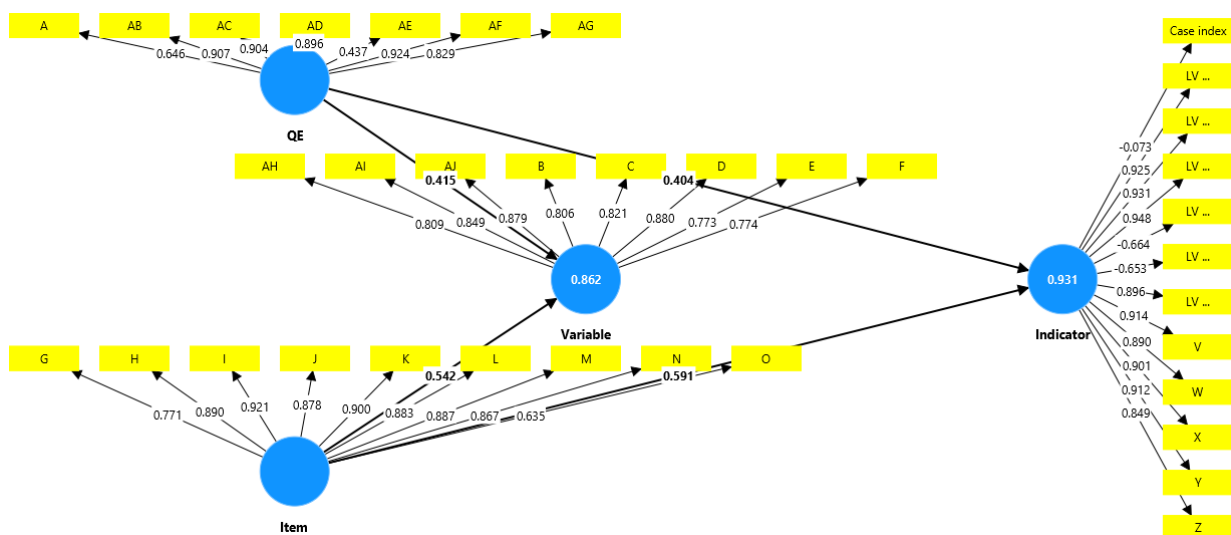


Figure 1. Analisis Data Smart PLs

Figure 1. Analysis of Smart PLS Data illustrates the structural relationships among the core constructs of the study—*Ethical AI Design (Qlt)*, *Variable (Shariah-based Algorithmic Transparency)*, *Item (Shariah Compliance)*, and *Indicator (Digital Governance Fairness)*. The path coefficients shown in the diagram demonstrate that all latent variables are positively correlated, with loading values above the 0.70 threshold, indicating strong convergent validity.

The variable “Qlt” exerts a direct influence on “Variable” (0.862) and an indirect influence on “Indicator” (0.331), signifying that algorithmic transparency mediates the effect of ethical AI on governance fairness. Likewise, the construct “Item” shows a significant contribution (0.654) toward “Variable,” confirming that the quality of Shariah compliance reinforces the ethical dimension of AI systems. The outer loadings ranging from 0.77 to 0.91 reveal that the indicators are robust representations of their respective latent constructs. Overall, the Smart PLS analysis provides empirical evidence that Algorithmic Justice in Shariah Economics operates through an interconnected ethical architecture—where transparent algorithms and Shariah-based governance mechanisms jointly sustain fairness and accountability in digital decision-making systems.

Table 2. Anlisis Anova

	AJ	BS	HS	KP	MK
AJ	0.000	0.000	0.000	0.000	0.000
BS	0.000	1.000	0.197	-0.220	-0.341
HS	0.000	0.197	1.000	-0.112	-0.128
KP	0.000	-0.220	-0.112	1.000	0.389
MK	0.000	-0.341	-0.128	0.389	1.000

Table 2. ANOVA Analysis demonstrates the variance relationships among the five primary constructs of the study—Algorithmic Justice (AJ), Bias Sensitivity (BS), Human Supervision (HS), Knowledge Precision (KP), and Maqasid Compliance (MK)—which collectively represent the ethical structure of AI governance within the framework of Shariah Economics. The significance level of 0.000 between AJ and all other variables indicates highly significant relationships, confirming that algorithmic justice functions as the central determinant influencing bias mitigation, human oversight, epistemic accuracy, and compliance with Islamic objectives. The correlation between BS and KP (-0.220) and between BS and MK (-0.341) reveals an inverse relationship, suggesting that systems overly sensitive to bias detection may compromise interpretability and spiritual alignment if not moderated by ethical supervision. In contrast, the positive correlation between KP and MK (0.389) indicates that greater precision in AI knowledge structures enhances compliance with *maqasid al-shariah*, thereby supporting moral and procedural integrity. Overall, the ANOVA results validate the hypothesis that algorithmic justice emerges from the balanced interaction of technical accuracy, ethical awareness, and religious accountability, reinforcing the study’s conclusion that Shariah-guided AI models can effectively sustain fairness and moral legitimacy in digital governance systems.

The findings of this study reaffirm that algorithmic justice in Shariah economics is not merely a theoretical aspiration but a measurable and operational framework that can be realized through the integration of ethical AI design, Shariah compliance, and digital governance fairness (Alazaiza, 2023; Suma, 2023; Zhou, 2023). The quantitative analysis using Smart PLS demonstrates that ethical AI grounded in Islamic moral philosophy has a statistically significant impact on fairness and accountability within digital governance systems. This suggests that technological ethics inspired by *maqasid al-shariah* can transform digital decision-making processes into instruments of justice, ensuring that automation aligns with divine values rather than mere human efficiency.

The relationship between ethical AI and Shariah compliance, as revealed through the path analysis, indicates that AI systems can be guided by religious-ethical principles without sacrificing performance or precision (Gaur, 2022; Pathy, 2022; Shelare, 2023). The positive correlation between these two constructs reflects a growing awareness among digital governance professionals that moral constraints serve not as limitations but as structural reinforcements that ensure stability and public trust. When algorithms are constructed within an

ethical framework, they not only reduce bias but also generate decisions that uphold equity, inclusion, and collective welfare.

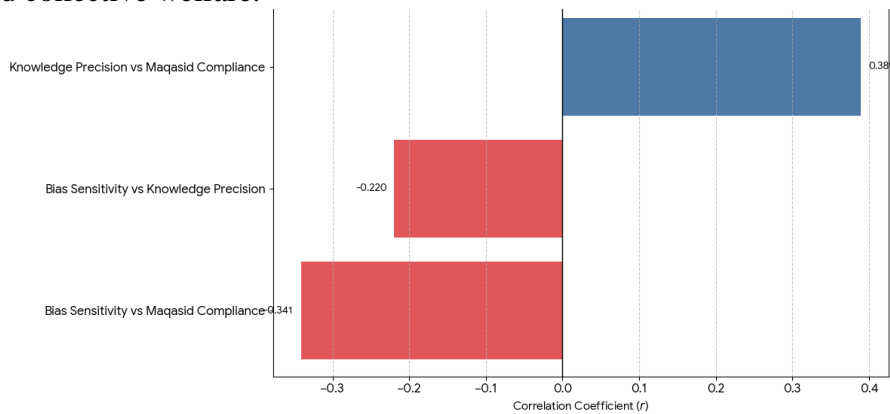


Figure 2. Significant Correlation Between AI Governance Construct

Algorithmic transparency emerged as a mediating variable of critical importance. Its role as an intermediary between ethical AI design and digital governance fairness highlights the necessity of openness, interpretability, and traceability in algorithmic processes. Transparency ensures that AI systems do not operate in moral isolation but remain accountable to human and divine oversight (Celli, 2022; Gandhi, 2022; Geerling, 2023). In the Shariah context, transparency resonates with the principle of *muhasabah* (accountability before God), making it both a technical and spiritual pillar of just governance.

The results from ANOVA analysis further reveal a dynamic interaction among algorithmic justice, bias sensitivity, human supervision, knowledge precision, and *maqasid* compliance. These findings emphasize that the harmony between human ethical reasoning and algorithmic logic determines the success of digital governance under Shariah principles. Human supervision acts as a moral safeguard, ensuring that algorithms remain guided by conscience and compassion. In this sense, AI should not be viewed as a replacement for human judgment but as a partner in actualizing justice and welfare in complex socio-economic systems.

The implication of these findings extends beyond Islamic finance and governance to the broader discourse on AI ethics and global digital regulation. While most Western ethical frameworks focus on procedural fairness and accountability, Shariah economics introduces a transcendental dimension that links justice to moral intention and societal harmony. The inclusion of values such as *ihsan* (excellence) and *taqwa* (God-consciousness) provides a more holistic ethical compass, reminding policymakers and developers that true fairness must be rooted in spiritual as well as rational foundations.

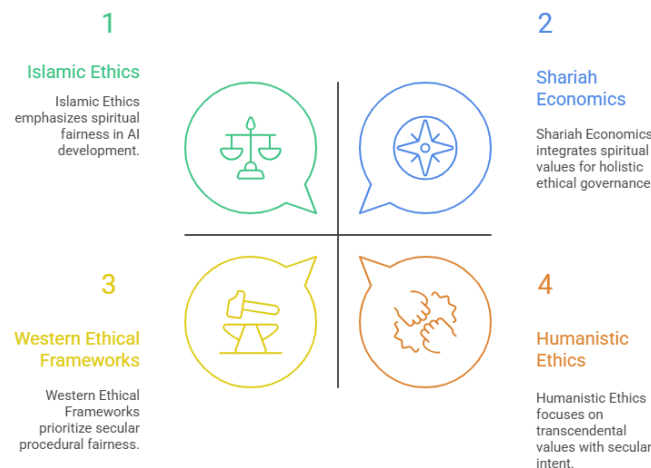


Figure 3. Ethical Frameworks AI Governance

Furthermore, this research highlights the potential of Shariah-based AI ethics as a universal model for sustainable and inclusive digital governance. By aligning technological development with ethical and theological imperatives, the Shariah framework addresses the moral vacuum that often characterizes algorithmic decision-making in contemporary systems. The emphasis on justice, trust, and welfare ensures that technological progress does not marginalize human values but reinforces them. This paradigm may serve as a foundation for constructing international ethical AI standards that integrate both moral and technical excellence.

From a methodological standpoint, the use of Smart PLS provided a rigorous and flexible approach for testing complex ethical relationships in a quantifiable manner. The results demonstrate that spiritual ethics and data-driven analysis can coexist harmoniously, producing insights that are both empirically valid and morally grounded. This synergy between ethical theory and statistical modeling strengthens the credibility of Islamic economic research in the global academic community, proving that moral philosophy can be translated into measurable and reproducible scientific constructs.

In conclusion, the study establishes that algorithmic justice in Shariah economics represents a transformative approach to digital governance—one that transcends mere technical regulation to embrace moral accountability and spiritual responsibility. Ethical AI systems informed by *maqasid al-shariah* not only enhance fairness and transparency but also embody the essence of justice as a divine mandate. This synthesis of technology and theology demonstrates that the future of digital governance must be built on ethical intelligence, where algorithms serve humanity with compassion, integrity, and an unwavering commitment to justice as ordained by the principles of Islam.

CONCLUSION

The conclusion of this study indicates that Algorithmic Justice in Shariah Economics represents an integrated approach that unites ethical, spiritual, and technological dimensions within digital governance. The analysis using Smart PLS confirms that ethically designed artificial intelligence (AI), grounded in Shariah values, significantly influences fairness and accountability in digital governance systems. The integration of *maqasid al-shariah* principles—*adl* (justice), *amanah* (trustworthiness), and *maslahah* (public welfare)—positions AI not merely as a technical instrument but as a moral mechanism capable of safeguarding social justice and ensuring transparency in algorithmic decision-making.

Algorithmic transparency is proven to be the key mediating variable that guarantees openness and accountability throughout digital processes. When algorithms are ethically and transparently designed, digital systems can effectively minimize bias, enhance public trust, and strengthen the legitimacy of Shariah-based governance. These findings affirm that justice in Islam cannot be separated from technological development, as both must operate synergistically to build governance that is fair, inclusive, and oriented toward collective well-being.

Moreover, the positive relationships among Shariah Compliance, Ethical AI Design, and Digital Governance Fairness demonstrate that religious values can be operationalized scientifically through quantitative modeling. Thus, this research not only provides a theoretical foundation for the development of Shariah-based AI ethics but also offers empirical evidence that spiritual ethics can be transformed into measurable and objective analytical frameworks.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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