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A Systematic Review of Digital Green Waqf: Integrating Technology and Sustainability in Islamic Endowment

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Abstract

This study aims to systematically examine the development of the literature on Digital Green Waqf, defined as the integration of digital technology and sustainability principles in waqf management. The study employed a Systematic Literature Review (SLR) method guided by PRISMA 2020, covering publications from 2010 to 2024 retrieved from six international databases: Scopus, Web of Science, Google Scholar, ScienceDirect, JSTOR, and EconBiz. Of the 2,847 records initially identified, 73 articles met the inclusion criteria and were analyzed using bibliometric and thematic approaches. The findings indicate that research on Digital Green Waqf has increased significantly, particularly during the 2020–2024 period, with Malaysia and Indonesia emerging as the leading contributors. Dominant themes include the digitalization of waqf administration, crowdfunding platforms, blockchain technology, artificial intelligence (AI), and the utilization of waqf for renewable energy, environmental conservation, and food security. Blockchain was identified as the most promising technology for enhancing transparency, accountability, and public trust in waqf institutions. However, the implementation of Digital Green Waqf continues to face several challenges, including regulatory uncertainty, low digital literacy, infrastructural limitations, and the absence of global standardization. Based on the synthesis of findings, this study proposes the Integrative Digital Green Waqf Model (MIDGW), which consists of four principal pillars: technological infrastructure, Shariah governance, environmental sustainability, and inclusive social impact. The model is expected to serve as a conceptual framework for the development of a more transparent, adaptive, and sustainable modern waqf system.

Keywords: Digital Green Waqf; Blockchain; Sustainable Waqf; Islamic Social Finance

Introduction

Waqf, as an instrument of Islamic social finance, has a long historical tradition in supporting the socio-economic development of Muslim communities worldwide. Traditionally, waqf has been administered through

physical asset-based mechanisms such as land, buildings, and real estate, with their benefits allocated for public welfare. However, over time, waqf institutions have encountered various structural challenges that constrain managerial effectiveness, particularly limited transparency and accountability. Ongoing global digital transformation presents new opportunities to modernize waqf governance in ways that are more efficient, transparent, and inclusive. Previous studies indicate that the adoption of digital technologies in waqf management can strengthen public trust while expanding fundraising outreach (Mohd Noor et al., 2020).

The growth of Shariah-compliant financial technology (fintech) has accelerated the emergence of digital waqf, enabling online donations and digital asset management. Digital waqf platforms provide broader access for donors (waqif) without geographical or temporal constraints. This innovation reflects the adaptation of Islamic financial institutions to the dynamics of the Fourth Industrial Revolution, in which physical and digital systems are increasingly interconnected. Several Muslim-majority countries, including Indonesia, Malaysia, and Bangladesh, have begun developing digital waqf ecosystems as part of their national Islamic finance strategies. As noted by Atan and Johari (2017), the digitalization of waqf can significantly reduce conventional administrative barriers that have long limited waqf fundraising potential.

The concept of Green Waqf represents a contemporary innovation that integrates environmental sustainability principles into the management of waqf assets. Green Waqf is designed to support the Sustainable Development Goals (SDGs) by channeling waqf resources into environmentally responsible projects. These initiatives may include waqf orchards, renewable energy facilities, green buildings, and water resource management financed through Islamic endowment. The integration of waqf with environmental sustainability introduces a new paradigm in Islamic social finance that responds to the global ecological crisis. Hasan and Siraj (2016) argue that waqf possesses substantial potential as a sustainable development instrument capable of bridging Islamic ethical philosophy with contemporary environmental needs.

Blockchain technology has been identified as one of the most promising solutions to longstanding problems of transparency and trust in waqf management. Blockchain systems enable decentralized, immutable, and publicly verifiable recording of waqf transactions. This technology can reduce the risks of corruption, fund misappropriation, and administrative errors, which have often hindered waqf development. Several waqf institutions in Malaysia and the United Arab Emirates have begun exploring blockchain applications to improve accountability in waqf fund administration. Mohsin et al. (2020) contend that integrating blockchain into waqf systems can create a digital trust ecosystem that encourages broader participation from the global Muslim community.

Despite its substantial promise, digital waqf implementation continues to face regulatory, technical, and socio-cultural barriers. In many Muslim

countries, waqf legal frameworks have not yet fully accommodated digital instruments, creating uncertainty for digital waqf platform operators. In addition, digital literacy gaps among Muslim communities—particularly in rural areas and developing economies—limit the effective reach of technology-based waqf platforms. The absence of technical standardization across digital waqf platforms also constrains system interoperability and cross-institutional data integration. As emphasized by Shaikh et al. (2017), technology-based waqf development must carefully consider the socio-economic context of target communities in order to be effective.

Environmental sustainability has become an urgent global agenda, particularly following the adoption of the Paris Agreement in 2015 and the United Nations 2030 Agenda for Sustainable Development. Within this context, Islamic finance can play a strategic role in financing the transition toward a green economy through instruments such as green sukuk and environmental waqf. Shariah principles that prohibit excessive exploitation of natural resources are closely aligned with sustainability values at the core of environmentally responsible development. Green Waqf thus represents a practical manifestation of the synergy between Islamic values and global commitments to ecological sustainability. Khalil et al. (2019) argue that waqf-based Islamic financial instruments can serve as catalysts for low-carbon development financing in Muslim-majority developing countries.

Systematic review methodology has become increasingly prominent in Islamic finance research as a means of comprehensively mapping the development of academic literature. This approach enables researchers to identify knowledge gaps, emerging trends, and future research directions in a structured manner. In the context of digital waqf and Green Waqf, a systematic review is particularly relevant because this field remains relatively new and its literature is dispersed across multiple disciplines. A rigorous synthesis of existing studies can generate a more holistic understanding of the progress, challenges, and opportunities associated with integrating technology and sustainability into waqf. According to Tranfield et al. (2003), systematic reviews offer methodological advantages over conventional narrative reviews because they employ transparent and replicable search and selection protocols.

The global expansion of Islamic Social Finance (ISF) reflects growing awareness of the potential of Islamic finance to promote social welfare and sustainable development. Waqf, zakat, sadaqah, and qard hasan constitute the main pillars of ISF, complementing one another in building a value-based social protection system. The digitalization of ISF—particularly waqf—is increasingly viewed as essential for improving efficiency, transparency, and social impact. Multilateral development institutions such as the Islamic Development Bank (IsDB) have initiated programs to integrate digital technologies into ISF management. Kahf (1998) further emphasizes that revitalizing waqf through institutional innovation, including technological

adoption, is a prerequisite for maximizing its contribution to Muslim socio-economic development.

Global waqf assets are estimated to be worth trillions of dollars, yet much of this potential remains underutilized due to inefficient management practices. In Indonesia, which is often regarded as having one of the world's largest waqf potentials, waqf land reportedly covers approximately 420,000 hectares, much of which is still managed traditionally. Similar conditions can be found in other Muslim countries across South Asia, Africa, and the Middle East, where productive waqf assets remain far below their optimal potential. The digitalization of waqf management is increasingly considered a strategic solution for mobilizing idle waqf resources into productive development instruments. As argued by Magda Ismail Abdel Mohsin (2013), revitalizing stagnant waqf assets through innovative mechanisms is an urgent necessity for economic advancement in the Muslim world.

The Internet of Things (IoT) and artificial intelligence (AI) are two transformative technologies that are beginning to be applied innovatively in waqf asset management. IoT enables real-time monitoring of physical waqf assets such as buildings, agricultural land, and renewable energy infrastructure. Meanwhile, AI can be used for predictive analytics, resource allocation optimization, and anomaly detection in waqf portfolio management. The combination of IoT and AI with digital waqf platforms has the potential to create intelligent, adaptive, and impact-oriented waqf management systems. Ahmed (2021) notes that the use of smart technologies in waqf administration can significantly improve operational efficiency while strengthening the accountability of waqf managers (nazhir).

Waqf-based crowdfunding has become one of the most visible manifestations of digital waqf, successfully mobilizing funds from millions of contributors worldwide. Platforms such as Wakaf Selangor Muamalat (Malaysia), Wakaf Al-Azhar (Indonesia), and eSedekah demonstrate the viability of crowdfunding models in the digital era. This model enables wider public participation, including millennials and Generation Z, who were previously less engaged in conventional waqf practices. Gamification, digital storytelling, and social media integration have become important drivers of youth engagement in digital waqf programs. Abdi et al. (2020) suggest that crowdfunding-based waqf platforms have transformed perceptions of waqf from a traditional institution into a dynamic and inclusive philanthropic movement.

The principle of maqasid al-shariah—the protection of religion, life, intellect, lineage, and wealth—provides a philosophical foundation for the development of sustainability-oriented Green Waqf. Environmental preservation (hifz al-bi'ah) is increasingly recognized by many contemporary scholars as an additional dimension of maqasid highly relevant to today's ecological crisis. Accordingly, Green Waqf is not merely a financial innovation, but also an expression of religious responsibility toward environmental stewardship as a trust from Allah SWT. This spiritual dimension distinguishes

Green Waqf from conventional green finance instruments such as green bonds and ESG investing. Dusuki and Abdullah (2007) affirm that the maqasid framework offers strong theological justification for environmentally and socially oriented Islamic financial instruments.

One of the greatest challenges in developing Digital Green Waqf is the need for a governance framework capable of integrating Shariah compliance with modern management standards. Good governance requires transparency, accountability, stakeholder participation, and regulatory compliance to be achieved simultaneously. Weak governance among many conventional waqf administrators has been a major factor undermining public confidence in waqf institutions. Digital transformation offers opportunities to modernize waqf governance through technologies such as smart contracts, blockchain auditing, and digital reporting dashboards. As argued by Laldin and Furqani (2016), governance reform must proceed in parallel with technological innovation if digital waqf transformation is to generate optimal and sustainable outcomes.

The use of renewable energy as a form of Green Waqf has attracted considerable attention in contemporary waqf literature. Solar waqf panels, waqf wind turbines, and waqf biogas facilities are concrete examples of how sustainability and Islamic philanthropy can be combined. These renewable energy waqf assets may generate recurring income that can be distributed sustainably to mauquf alaih (beneficiaries). This model aligns the long-term philanthropic objectives of waqf with tangible environmental benefits through carbon reduction and lower dependence on fossil fuels. Ali et al. (2021) found that solar waqf projects in Malaysia are financially viable while also contributing positively to reducing energy poverty in target communities.

Low levels of Islamic financial literacy in many Muslim countries remain a significant barrier to the widespread adoption of digital waqf platforms. Many prospective donors still have limited understanding of digital waqf concepts, operational mechanisms, and how technology can ensure transaction security and Shariah legitimacy. Educational programs and digital literacy initiatives integrated with waqf awareness campaigns are therefore essential to increase public participation in technology-based waqf platforms. Religious scholars, community leaders, and social media influencers can play strategic roles in promoting digital waqf to wider segments of society. Shafii et al. (2019) maintain that improving Islamic financial literacy, including understanding of waqf, is a key prerequisite for public participation in an increasingly digital Islamic financial ecosystem.

Smart contract systems built on Ethereum and other blockchain platforms have demonstrated considerable potential to automate the distribution of waqf benefits in a transparent and efficient manner. Smart contracts can encode predetermined conditions for the allocation of waqf proceeds and execute them automatically without continuous human intervention, thereby reducing the risks of misuse and delays in distribution. This technology also enables the tokenization of waqf assets, whereby the

value of waqf properties can be divided into digital tokens to facilitate portfolio management and broader participation. Nevertheless, the implementation of smart contracts in waqf remains subject to Shariah compliance concerns, as not all digital contractual mechanisms are automatically recognized as valid under Islamic jurisprudence. Muneeza et al. (2018) analyzed several Shariah issues arising from blockchain adoption in waqf management and concluded that specific religious rulings are required to govern these technical dimensions.

Research on the social impact assessment of digital waqf programs remains relatively underdeveloped within the broader Islamic finance literature. Comprehensive impact measurement is necessary to evaluate the effectiveness of digital waqf platforms in achieving their intended social development objectives. Conventional philanthropic tools such as Social Return on Investment (SROI) may offer useful foundations, but they need to be adapted to reflect Islamic ethical and spiritual dimensions. The development of impact indicators that are sensitive to Shariah values would strengthen the evidence base available to policymakers and digital waqf practitioners. Hassan and Biancone (2017) proposed a holistic evaluation framework for Islamic finance projects that combines quantitative and qualitative indicators in assessing both social and spiritual outcomes.

A supportive regulatory framework for digital waqf innovation is one of the most important enabling factors for the growth of the Digital Green Waqf ecosystem. Several countries, such as Malaysia through the Department of Waqf, Zakat and Hajj (JAWHAR), and Indonesia through the Indonesian Waqf Board (BWI), have begun developing regulations that accommodate digital waqf activities. However, coordination among ministries and regulatory agencies remains a challenge in establishing a comprehensive and coherent governance framework. Consumer protection, data security, and dispute resolution mechanisms must also be explicitly regulated to sustain public trust in digital waqf platforms. Razak et al. (2019) highlighted the importance of collaboration among religious authorities, financial regulators, and technology experts in designing adaptive and comprehensive digital waqf regulations.

The growing popularity of cash waqf among contemporary Muslim societies provides an important foundation for the development of digital waqf. Cash waqf allows individuals to contribute to waqf assets without requiring ownership of land or other high-value property. The transformation of cash waqf into digital formats through mobile platforms and electronic wallets substantially lowers entry barriers for prospective donors. Integrating digital cash waqf with Islamic banking products and Shariah-compliant investment accounts also creates opportunities for a more interconnected Islamic financial ecosystem. Shukor et al. (2019) found that ease of platform use and trust in the system are two of the main factors encouraging participation in digital cash waqf programs.

The role of international organizations such as the Islamic Development Bank (IsDB), ISESCO, and IICPSD in promoting global standards for digital waqf management is highly significant. Harmonization of Shariah and technical standards for cross-border digital waqf platforms would facilitate international collaboration and enhance the credibility of these instruments in global markets. Through various initiatives, IsDB has supported productive waqf projects that integrate technology and sustainability across member countries. South-South cooperation among Muslim-majority nations in sharing best practices on digital waqf should also be strengthened to accelerate global adoption. As recommended by Obaidullah (2016), a dedicated multilateral forum is needed to discuss standard harmonization and policy coordination for cross-border digital waqf ecosystems.

The gender dimension of digital waqf has begun to receive increasing attention alongside broader concerns regarding women's financial inclusion in Islamic finance ecosystems. Women, who have historically been underrepresented in the management and leadership of waqf institutions, may now participate more actively through digital platforms. Digital waqf platforms designed with women's needs and preferences in mind can significantly enhance participation from this segment of society. Gender-responsive digital waqf approaches may also include programs addressing women-specific issues such as maternal health, girls' education, and women's economic empowerment. Huda et al. (2022) emphasized the considerable potential of digital waqf platforms to promote Muslim women's financial inclusion, provided that platform design addresses the cultural and technological barriers women may face.

The application of artificial intelligence (AI) and machine learning in assessing the needs of mauquf alaih (beneficiaries) has the potential to improve the precision and effectiveness of waqf benefit distribution. AI algorithms can analyze socio-economic data of beneficiaries to optimize resource allocation and ensure that support reaches the most relevant recipients. Natural Language Processing (NLP) technologies may also be employed to process feedback and complaints from beneficiaries in multiple languages automatically. In addition, AI can strengthen system integrity by detecting fraud and financial anomalies within digital waqf platforms. According to Zainudin et al. (2020), AI adoption in Islamic financial institutions, including waqf administration, remains at an early stage and requires significant investment in data infrastructure and human capital.

The development of Green Waqf to support food security is one of the most relevant applications in light of the current global food crisis. Agricultural waqf land managed with modern precision farming technologies can generate sustainable food production for vulnerable communities. Urban farm waqf models in cities offer innovative solutions that combine community empowerment, food resilience, and environmental stewardship. The digitalization of agricultural waqf land management through drone monitoring, IoT soil sensors, and smart irrigation systems can substantially

increase productivity and resource efficiency. Ibrahim and Abubakar (2021) demonstrated that integrating modern agricultural technologies into waqf land management in several Sub-Saharan African countries significantly improved food security for local Muslim communities.

Collaboration between conventional Islamic financial institutions—particularly Islamic banks—and digital waqf platforms is a rapidly emerging trend with significant potential. Islamic banks can serve as institutional nazhir by managing digital waqf funds under high standards of professionalism, governance, and regulatory compliance. Bundled products linking Islamic savings accounts with digital waqf programs can make participation in waqf easier as part of everyday financial practice. Such collaboration also creates opportunities for Islamic banks to expand their customer base while enhancing the social impact of their overall operations. Hamber and Haneef (2017) argued that synergy between Islamic banking institutions and waqf organizations is a key strategy for building a strong and sustainable Islamic social finance ecosystem.

This study seeks to conduct a comprehensive systematic review of the Digital Green Waqf literature in order to identify research trends, knowledge gaps, and future scholarly agendas. The urgency of this review is heightened by the fact that the convergence of digital technology, environmental sustainability, and Islamic finance has rarely been examined systematically within a single integrated analytical framework. The findings are expected to make theoretical contributions to the development of a conceptual framework for Digital Green Waqf while also generating practical implications for policymakers and practitioners. Furthermore, this review is expected to encourage more rigorous research standards in the field of technology- and sustainability-driven waqf innovation at the global level. As emphasized by Wronka-Pospiech (2016), systematic literature reviews in social finance serve not only as knowledge syntheses but also as roadmaps for future institutional innovation and public policy development.

Methods

This study employed a Systematic Literature Review (SLR) approach guided by the PRISMA framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). This approach was selected because it enables the systematic, transparent, and replicable identification, evaluation, and synthesis of relevant prior studies. An SLR was considered the most appropriate method for examining the development of Digital Green Waqf, a multidisciplinary field encompassing digital technology, environmental sustainability, and Islamic law. Unlike a narrative review, this method applies a rigorous research protocol with clearly defined inclusion and exclusion criteria. In addition, the study combined quantitative bibliometric analysis with qualitative thematic analysis in order to provide a comprehensive overview of global research developments in Digital Green Waqf.

This study was designed to address four main research questions. First, how has research on Digital Green Waqf evolved during the period 2010–2024? Second, what types of digital technologies have been implemented in waqf management, and how have they affected efficiency and transparency? Third, how have environmental sustainability principles been integrated into waqf institutions through digital approaches? Fourth, what challenges, barriers, and opportunities characterize the implementation of Digital Green Waqf across different countries? These research questions served as the foundation for the processes of data collection, article selection, and analysis.

The literature search was conducted systematically across six internationally recognized databases: Scopus, Web of Science, Google Scholar, ScienceDirect, JSTOR, and EconBiz. The search period was limited to January 2010 through December 2024, as this timeframe corresponds with the rapid expansion of digital technologies such as blockchain, fintech, and the Internet of Things, which began to be adopted within the Islamic finance sector. Search strings were developed using Boolean operators (AND, OR, and NOT), combining terms related to waqf, digitalization, and environmental sustainability. Additional keywords included derivative terms such as e-waqf, cash waqf, waqf crowdfunding, green sukuk waqf, and smart waqf, together with other relevant expressions. To complement the database search, a snowballing technique was also employed by reviewing the reference lists of eligible studies.

Article screening was conducted based on predefined inclusion and exclusion criteria. Eligible publications included peer-reviewed journal articles, conference proceedings, dissertations, and official institutional reports published in English, Indonesian, Arabic, or Malay between 2010 and 2024. Studies were required to address topics related to digital waqf, waqf technology, green waqf, waqf sustainability, Islamic fintech, or waqf governance. In contrast, opinion pieces, editorials, news articles, blogs, and non-peer-reviewed literature were excluded. Studies unrelated to waqf, technology, or sustainability, as well as documents without accessible full-text versions, were also omitted from the analysis.

The article selection process followed the PRISMA 2020 flow procedure. During the identification stage, a total of 2,847 records were retrieved from all databases. After duplicate removal, 1,943 records remained for title and abstract screening. Of these, 1,621 records were excluded due to lack of relevance. The remaining 322 articles then underwent full-text eligibility assessment conducted independently by two reviewers. At this stage, 249 studies were excluded because of topic mismatch, weak methodology, unverifiable data, or content duplication. Ultimately, 73 articles met all eligibility criteria and were included in the qualitative synthesis.

The quality of the selected studies was assessed using the Mixed Methods Appraisal Tool (MMAT), 2018 version. Evaluation was based on five principal criteria: clarity of research objectives, appropriateness of methodological design, representativeness of data, validity of measurement,

and relevance of findings to the research questions. Studies scoring below 60% were excluded from the final analysis. The appraisal process was conducted independently by two reviewers, with a high level of inter-rater agreement indicated by a Cohen's Kappa coefficient of 0.84, demonstrating strong reliability. Subsequently, data were extracted using a standardized form containing article identity, research design, technologies discussed, sustainability dimensions, principal findings, and policy recommendations. Data analysis was conducted through inductive thematic analysis using NVivo 14 to identify themes, subthemes, and cross-study patterns. In addition, a bibliometric analysis was performed using VOSviewer version 1.6.20 to map co-citation networks, co-authorship relationships, and dominant research clusters.

The analytical framework of this study consisted of three interconnected layers. First, descriptive bibliometric analysis was employed to examine the temporal, geographical, and thematic distribution of the literature. Second, thematic analysis was used to identify core concepts and relationships among variables. Third, synthesis analysis was undertaken to develop an integrative conceptual model of Digital Green Waqf as the study's principal theoretical contribution. During the synthesis stage, the TCCM framework (Theory, Context, Characteristics, and Methodology) was applied to ensure a more systematic and comprehensive structure for the literature review.

Results and Discussion

Based on the systematic screening process of 2,847 records identified from multiple international databases, this study ultimately selected 73 articles that met the eligibility criteria for further analysis. These studies were published between 2010 and 2024 and originated from 31 countries, thereby providing a global perspective on the development of Digital Green Waqf research. Most of the selected publications were indexed in Scopus, followed by Web of Science and Google Scholar, indicating that this topic has increasingly attracted serious attention within internationally recognized academic literature. Bibliometric analysis revealed that research on Digital Green Waqf has grown rapidly over time. During the 2010–2014 period, only four eligible studies were identified. This number increased to 21 articles in 2015–2019, before rising sharply to 48 articles in 2020–2024. This surge coincided with the acceleration of global digital transformation following the COVID-19 pandemic, as well as growing international commitment to sustainability agendas through the Sustainable Development Goals (SDGs). Geographically, Malaysia emerged as the leading contributor to the literature, followed by Indonesia and several Middle Eastern countries, including Saudi Arabia, Kuwait, and the United Arab Emirates. These findings suggest that Muslim-majority countries have become the primary drivers of digital waqf innovation.

From a thematic perspective, the analysis showed that the digitalization of waqf management was the most prominent topic, appearing in more than half of the reviewed studies. This digitalization includes asset administration systems, online fundraising platforms, and technology-based monitoring and reporting systems. Numerous studies reported that digital platforms improved operational efficiency, reduced administrative costs, and expanded public participation as waqif (waqf donors). Waqf crowdfunding models were also found to be particularly effective in engaging small-scale donors who previously had limited access to conventional waqf mechanisms. Another dominant theme was the application of blockchain technology in waqf governance. Blockchain was widely considered capable of addressing longstanding institutional challenges, including lack of transparency, slow transaction verification, and weak accountability in asset management. Its core characteristics—immutability, decentralization, and support for smart contracts—were viewed as highly consistent with the Islamic principle of amanah (trustworthiness). The reviewed studies indicated that blockchain implementation could significantly enhance public trust while substantially accelerating transaction verification processes. However, adoption remains constrained by regulatory uncertainty, limited human capital, and relatively high implementation costs.

In the environmental sustainability dimension, the study found that the concept of Green Waqf has emerged as an innovative mechanism linking Islamic philanthropy with the global ecological agenda. Green Waqf refers to the use of waqf assets to support environmental conservation, renewable energy, circular economy initiatives, and climate adaptation efforts. Three major models were identified in the literature. First, Environmental Asset Waqf, involving the endowment of ecological assets such as forests and conservation land. Second, Green Revenue Waqf, where returns generated from waqf investments are allocated to green projects. Third, Hybrid Green-Digital Waqf, which utilizes digital technology and IoT sensors to monitor environmental impact in real time. The literature suggests that Green Waqf has significant potential to contribute to multiple SDG targets, particularly those related to clean energy, sustainable cities, climate action, and the protection of terrestrial and marine ecosystems.

Although still at an early stage, a growing number of studies have also explored the use of Artificial Intelligence (AI) and big data analytics within the waqf ecosystem. AI applications include predicting waqf asset values, detecting potential fraud, improving donor experience through service personalization, and optimizing the distribution of benefits to recipients. Several studies demonstrated that machine learning models achieved high accuracy in waqf asset valuation, while sentiment analysis using Natural Language Processing (NLP) was effective in measuring public perceptions of waqf institutions and their relationship with participation rates. Regulatory and Shariah compliance issues represented one of the most widely discussed themes across the literature. Most studies concluded that digital waqf is

fundamentally permissible under Islamic law, provided that the essential pillars of waqf are fulfilled: a legitimate waqif, a clearly defined waqf asset, identified beneficiaries, and a valid contractual declaration. Nevertheless, debate continues regarding the legal status of digital assets such as tokens and cryptocurrencies as permissible waqf objects. In addition, the absence of global standards for Shariah supervision and digital waqf governance remains a major challenge for cross-border implementation.

Based on the synthesis of all findings, this study proposes the Integrative Digital Green Waqf Model (MIDGW) as a new conceptual framework. The model consists of four main pillars: technological infrastructure, Islamic governance, environmental sustainability, and inclusive social impact. The technological pillar includes blockchain, digital platforms, AI, and IoT. The Islamic governance pillar ensures that all processes remain Shariah-compliant through digital auditing and supervision by Shariah boards. The sustainability pillar directs waqf benefits toward global environmental objectives, while the social impact pillar ensures that digital transformation does not exclude vulnerable communities with limited access to technology.

Critically, the findings demonstrate that Digital Green Waqf holds substantial transformational potential. Digital technology broadens participation, strengthens institutional accountability, and creates new synergies between religious values and environmental responsibility. However, implementation continues to face serious barriers, including digital infrastructure gaps, cybersecurity threats, limited technological capacity among nazhir (waqf managers), and fragmented regulations across Muslim countries. Therefore, the successful development of Digital Green Waqf requires an ecosystem approach involving regulatory reform, human capital development, technological investment, and public education implemented simultaneously.

Conclusion

This study concludes that Digital Green Waqf is a rapidly expanding field with significant strategic potential for transforming Islamic social finance in the digital era. Blockchain appears to be the most promising technology for enhancing transparency and public trust, while the integration of sustainability principles positions waqf as an important instrument for supporting sustainable development. Nevertheless, multidimensional challenges—including legal certainty, institutional readiness, and global standardization—remain unresolved. The principal contribution of this study lies in the development of the Integrative Digital Green Waqf Model (MIDGW), which unifies the perspectives of Islamic social finance, digital transformation, sustainability, and Islamic governance within a single conceptual framework. This model is expected to serve as a reference point for academics, practitioners, and policymakers seeking to develop a modern

waqf system that is more inclusive, accountable, and sustainable. Several limitations should be acknowledged. First, some relevant studies published in local languages may not have been captured. Second, the search period was limited to publications up to 2024. Third, methodological heterogeneity among the reviewed studies prevented the application of quantitative meta-analysis. Accordingly, future research is encouraged to examine the long-term impact of blockchain waqf implementation, compare regulatory frameworks across countries, develop environmental impact metrics for Green Waqf, and investigate public acceptance of AI in waqf management from the perspective of Islamic ethics.

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