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Exploring Digital Green Waqf through Systematic Literature Review: Toward Sustainable Islamic Finance

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ABSTRACT

Digital transformation and the growing urgency for environmental sustainability have driven innovation within Islamic finance, including the revitalization of the waqf institution. The concept of Digital Green Waqf emerges as a convergence of waqf digitalization, environmental sustainability principles, and maqasid shariah (the objectives of Islamic law). However, comprehensive understanding and empirical exploration of this concept remain limited. This study aims to explore the concept of Digital Green Waqf through a systematic literature review (SLR) to identify research trends, implementation models, benefits, challenges, and research gaps within the context of sustainable Islamic finance. The SLR was conducted across six major academic databases—Scopus, Web of Science, IEEE Xplore, Google Scholar, ProQuest, and Emerald Insight—covering publications from 2015 to 2024. Out of 156 identified articles, 32 met the inclusion criteria and were analyzed using thematic analysis, content analysis, and gap analysis approaches. The literature analysis identified four main models of Digital Green Waqf: Crowdfunding platforms for green projects, Blockchain-based carbon credit waqf, AI-powered sustainable waqf management, and Digital twin technology for monitoring green waqf assets. Digitalization of waqf has been shown to improve accessibility by up to 300%, transparency by 85%, and management efficiency by 45–60%. Meanwhile, green waqf initiatives have contributed to a 35% reduction in carbon emissions and a 40–60% increase in community income. However, only 28% of the reviewed articles explicitly addressed the integration of digitalization and environmental sustainability, indicating that this area is still emerging. The main challenges identified include the digital divide, limited regulatory frameworks, human resource capacity, and trust issues in digital platforms. The findings suggest that Digital Green Waqf represents an innovative frontier in Islamic finance, offering transformative potential for mobilizing community resources toward sustainable development. The proposed conceptual framework integrates shariah principles, digital technologies, and sustainability principles into four interrelated layers: foundation, enablers, implementation, and outcomes. Future research should focus on empirical studies, longitudinal impact assessments, behavioral analyses, and the development of regulatory frameworks that support sustainable innovation within the Digital Green Waqf ecosystem.

Keywords: *Digital Waqf, Green Waqf, Islamic Finance, Sustainability, Blockchain, Financial Technology, ESG, Systematic Literature Review*

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INTRODUCTION

The advancement of digital technology today presents tremendous opportunities to optimize Islamic financial instruments—particularly waqf—in supporting sustainable development. Digital Green Waqf is an innovative concept that combines the principles of green waqf with digital technology to strengthen the role of waqf in achieving environmental and social sustainability goals. This concept responds to modern challenges such as climate change and environmental degradation through an approach aligned with both sharia values and contemporary technology (Saputra, 2025a).

As an Islamic financial instrument, waqf has significant potential to finance environmentally and socially friendly projects. In the context of green waqf, waqf assets are allocated for purposes that promote environmental preservation, such as reforestation, renewable energy, and waste management. The digitalization of waqf management is a key strategy to enhance effectiveness, transparency, and wakif (donor) engagement in its implementation (Hermala et al., 2024).

Recent studies by Saputra (2025a) reveal that digital green waqf remains largely conceptual, facing substantial challenges in areas such as regulation, digital literacy among wakif, and collaboration among key stakeholders—government, nazhir institutions, and technology providers. This situation underscores the need for systematic research to map the evolution of studies and identify the gaps that must be bridged to realize the implementation of digital green waqf. A systematic approach to digital waqf management allows integration between traditional waqf processes and digital crowdfunding platforms, expanding funding capacity and outreach to a broader audience. This model is expected to significantly strengthen the social and economic sustainability of beneficiary communities (Saputra, 2025b).

The green waqf framework was developed in response to the growing need for Islamic financial instruments that support climate change adaptation and low-carbon energy transitions in accordance with Maqasid al-Shariah. This instrument combines the concepts of productive waqf and sustainable finance through digital technology to promote reforestation and the sustainable management of natural resources (BWI, 2022).

Research by Mahsun et al. (2022) emphasizes that green waqf management must be accompanied by good governance and the integration of environmental perspectives within the balanced scorecard framework to maximize the productivity of waqf assets and ensure sustainable benefit distribution. Such an approach can address regulatory gaps and managerial capacity limitations within waqf institutions.

The implementation of digital green waqf also opens new avenues for innovation in Islamic philanthropy, including the development of digital platforms that enable wakif to easily participate and monitor waqf fund utilization. These innovative approaches are expected to enhance public trust in waqf management while expanding its social and environmental impact (Alfarisi & Huda, 2023). Furthermore, integrating green waqf through digital crowdfunding platforms can generate significant positive social impacts for recipient communities—particularly in sustainable infrastructure development and community economic empowerment. This approach also targets younger generations as potential wakif, leveraging their higher levels of digital literacy (Saputra, 2025b).

Despite its strong potential and relevance in strengthening sustainable Islamic finance, digital green waqf still requires extensive research to develop effective operational models and supportive regulations. A scientific understanding through a systematic literature review is essential to map research trends, identify challenges, and uncover opportunities for further development (Saputra, 2025a).

This study aims to systematically review current literature on digital green waqf, focusing on the integration of digital technology and sustainability principles within Islamic financial instruments. The findings are expected to contribute to the development of a comprehensive digital green waqf framework and offer policy recommendations that encourage effective and efficient implementation.

Prior Studies

1. Sukaina et.al(2022). Various stakeholders are increasingly required to innovate in the field of renewable energy to ensure a sustainable future. One promising innovation involves the utilization of the tamanu plant (Calophyllum inophyllum), which has multiple benefits. The tamanu plant not only helps reduce carbon emissions but can also be processed into cosmetic and medicinal products, creating opportunities for sustainable business development. However, building an industry around tamanu requires substantial capital, highlighting the need for effective financing models. One potential solution is green waqf financing in the form of cash waqf, enhanced through blockchain technology. Blockchain enables secure and transparent data management, ensuring the integrity of transactions and project accountability. This study introduces an innovative application called "Tamanoo", which leverages blockchain to support the financing of the tamanu industry. Using a qualitative descriptive approach and literature review, the research explores how Tamanoo connects key stakeholders — the waqif (donors), mauquf 'alaih (beneficiaries), and the government — in a collaborative ecosystem. Tamanoo functions as a mobile platform that links donors directly with sustainable tamanu-based industries. Through crowdfunding mechanisms, waqf funds are allocated to support various sectors, including tamanu plantations, pharmaceuticals, and biofuel production. The implementation process includes several stages: prototype design and evaluation, fundraising campaigns, outreach to industry players and donors, and finally, commercialization and large-scale deployment. By utilizing Tamanoo, individuals can more easily participate in waqf activities while contributing directly to economic recovery and environmental sustainability, creating a meaningful bridge between Islamic finance, green industry, and digital innovation.
2. Wulansari & Rahmawati (2025). Rongkop is a karst region characterized by frequent droughts and limited access to clean water. This condition creates a negative multiplier effect on various aspects of life — including social, economic, and ecological dimensions. Although several initiatives have been planned to address these issues, their implementation has often been hindered by funding constraints. To overcome this challenge, the concept of green waqf has emerged as a potential solution, focusing on financing environmentally friendly projects that promote sustainability. The purpose of this study is to analyze the implementation strategy of green waqf as a means to accelerate funding for eco-friendly initiatives. This strategy is developed by modifying the futuristic stages outlined in the Green Waqf Framework published by BWI (Badan Wakaf Indonesia) and partner institutions. The research employs a descriptive qualitative approach, with data collected through interviews, observations, and literature reviews. The data analysis follows the Miles and Huberman model, which involves four main stages: data collection, reduction, presentation, and conclusion drawing with verification. The findings reveal that Rongkop's population is predominantly Muslim; however, there is still very limited awareness or understanding of the concept of green waqf among the community. Therefore, the proposed implementation strategy includes several progressive stages: Preconditional Stage – Building

awareness and literacy about green waqf within the community, Consolidation Stage – Strengthening collaboration among key elements and stakeholders involved, Project Development Stage – Launching pilot projects and conducting regular impact assessments, and Mainstreaming Stage – Expanding and disseminating successful project models to other regions and institutions. Through the systematic implementation of green waqf, it is expected that environmental challenges and climate change issues in various regions can be addressed more inclusively and sustainably, integrating community participation with Islamic financial principles.

3. Hasan & Wigati(2024). This study proposes a green waqf model aimed at achieving sustainable waste management. It adopts a descriptive qualitative approach, utilizing secondary data from books and academic articles. Data were collected through a literature review and analyzed using content analysis to organize, interpret, and draw conclusions from existing findings. The proposed green waqf model consists of five main stages: Cash Waqf Transfer: The waqif (donor) contributes cash waqf to a nazir (waqf institution), Human Capital Development: The nazir allocates waqf funds to establish and manage training centers equipped with modern waste management technologies,Skills Training: Through these training centers, nazirs provide capacity-building programs that enhance the technical skills and knowledge of the mauquf ‘alaih (beneficiaries), Employment and Productivity: After completing the training, beneficiaries are expected to gain employment or engage in productive waste management activities, contributing to economic and environmental sustainability, and Monitoring and Evaluation: Continuous evaluation is conducted to assess the effectiveness of the program and ensure long-term improvement. This green waqf model not only fosters economic growth but also aligns with the United Nations Sustainable Development Goals (SDGs) by creating job opportunities, reducing poverty, and promoting environmental stewardship. As communities begin to experience tangible benefits, it is anticipated that others will be inspired to adopt the same model, thereby amplifying its positive social and environmental impact at the grassroots level. However, since this research is conceptual and literature-based, the model has not yet been implemented. Future work is needed to refine and design detailed mechanisms for real-world application. The implementation may face challenges such as differences in regional infrastructure, varying capacities of waqf institutions (nazirs), and potential cultural or behavioral barriers. Overall, the proposed green waqf model provides a promising framework to enhance both economic empowerment and environmental sustainability, integrating Islamic finance principles with modern waste management solutions.
4. Taufik & Shofawati(2025). Green Waqf refers to the utilization of waqf assets to promote environmental sustainability while simultaneously generating social and economic benefits. Its successful implementation largely depends on public awareness and willingness to participate—particularly among students, who tend to have a strong concern for environmental issues. This study examines the factors influencing the intention of Islamic Economics students at Airlangga University to contribute to green waqf. The research model is based on the Theory of Planned Behavior (TPB), incorporating the variables Attitude, Subjective Norms, and Perceived Behavioral Control. In addition, Knowledge and Religiosity are identified as antecedent variables that shape students’ attitudes. Using a quantitative approach, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) for data analysis. Data were collected through questionnaires distributed to 145 respondents, yielding a valid sample of 127 Islamic Economics students. The findings reveal that Knowledge and

Religiosity both have a significant positive effect on Attitude. Similarly, Subjective Norms and Perceived Behavioral Control significantly influence Green Waqf Intention. However, Attitude itself does not have a significant direct effect on students' intention to participate in green waqf. Based on these results, it is recommended to strengthen strategies that enhance students' engagement with green waqf. This can be achieved through educational initiatives on social media, the involvement of influential public figures or environmental ambassadors, and the promotion of student participation in green waqf-related programs or campaigns. Such efforts can help nurture a stronger culture of sustainability and social responsibility among young Muslims.

5. Indirwan et.al (2025). This study examines the factors influencing the intention to donate to green waqf among environmentally conscious Muslims in Indonesia. The key variables investigated include green waqf literacy, subjective norms, and access to information media, with attitude serving as a mediating variable. The research is grounded in the Theory of Planned Behavior (TPB), which explains how attitudes, social influence, and perceived control shape individual intentions and behaviors. Using a quantitative research design, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) for data analysis, with a minimum sample size of 60 respondents selected through purposive sampling based on three specific criteria. The data were analyzed using SmartPLS version 4. This research contributes to the growing body of literature on Islamic social finance by examining the mediating role of attitude in the relationships between green waqf literacy, subjective norms, and information media access on individuals' intention to donate to green waqf. The focus on environmentally conscious Muslims highlights how environmental awareness and ethical responsibility can influence participation in green waqf initiatives aimed at sustainability and ecological preservation. The findings reveal that attitude and subjective norms have a significant positive influence on the intention to donate to green waqf. Notably, subjective norms exert both direct and indirect effects through attitude, emphasizing the strong role of social influence and community encouragement in shaping donation behavior. Conversely, green waqf literacy and access to information media, although showing positive relationships, have no significant direct or indirect effects on donation intention through attitude. Overall, the study underscores that social motivation and personal disposition play a more dominant role than knowledge or media exposure in encouraging green waqf participation. These insights can help waqf institutions and policymakers design more effective awareness campaigns and engagement strategies that leverage social influence and value-based communication to promote sustainable philanthropic behavior.
6. Hatimah et.al (2023). This study explores the intersection between the green economy and green waqf opportunities through digital assets. The main objective is to understand how collaboration between green economic principles and waqf practices can be enhanced by leveraging digital technologies and assets. Using an exploratory research approach, this study seeks to capture emerging phenomena related to the management of digital waqf assets, an area that remains relatively new and underexplored. The findings indicate that digital waqf practices have begun to emerge—such as the waqf of software or digital applications—but these initiatives have not yet been formally recognized as pure digital waqf due to the absence of clear governance frameworks and standardized management systems. The study highlights the need for structured governance mechanisms and accessible technical systems to ensure that digital waqf assets can be managed transparently and efficiently. Moreover, it

emphasizes the importance of developing dedicated literature and research to support the theoretical and practical foundations of digital waqf asset management. The research findings suggest that managing digital waqf assets represents a new frontier in Islamic philanthropy, offering significant potential to support the green economy and sustainable development. However, this innovation also introduces complex challenges, including regulatory uncertainty, digital ownership verification, and technological literacy among stakeholders. Addressing these challenges through continuous research and adaptive governance is crucial to unlocking the full potential of digital green waqf in fostering environmental and social sustainability.

7. Othman et.al (2025). Green Waqf presents a transformative mechanism for advancing the Sustainable Development Goals (SDGs) by integrating environmental sustainability with Islamic philanthropic principles. This study analyzes the potential of Green Waqf to address critical ecological challenges such as biodiversity loss, resource depletion, and climate change, while simultaneously promoting community empowerment and socio-economic inclusion. The findings reveal that Green Waqf can play a pivotal role in supporting initiatives such as afforestation, renewable energy development, and sustainable urban infrastructure. By aligning environmental stewardship with the ethical and spiritual dimensions of Islamic finance, Green Waqf bridges the gap between faith-based giving and global sustainability efforts. Furthermore, the study highlights innovative funding mechanisms—including the use of green sukuk, digital platforms, and blockchain-based transparency systems—that can enhance financial sustainability, accountability, and public trust in Green Waqf projects. Green Waqf is therefore positioned as a strategic instrument for integrating environmental conservation with socio-economic development, offering a holistic pathway toward sustainable progress. The study concludes with policy recommendations emphasizing the need to strengthen legal, financial, and governance frameworks to institutionalize Green Waqf practices and ensure their long-term impact on environmental and social well-being.
8. Fikri & Andrean (2023). This study aims to describe a green waqf-based financing model utilizing a Sharia crowdfunding platform to support the sustainable development of the Tamanu industry in Indonesia. The Tamanu industry represents a sustainable, agro-based sector centered on the utilization of the Tamanu plant (Calophyllum inophyllum), which can be developed across several industries, including plantation, biofuel, pharmaceutical, and cosmetic production. This research adopts a descriptive qualitative approach, employing a literature review of relevant studies and sources. As a developmental study, it seeks to formulate a conceptual model that addresses the key challenge of identifying innovative funding mechanisms for advancing the Tamanu industry in Indonesia. The study finds that a green waqf-based financing model, integrated with a Sharia-compliant crowdfunding platform, offers a viable solution for financing the growth of the sustainable Tamanu industry. This model leverages the principles of Islamic philanthropy and ethical finance to mobilize community-based funding for environmentally responsible industrial development. By implementing this model, the potential of waqf assets can be more effectively optimized to promote economic empowerment and environmental sustainability. The model fosters collaboration between the waqf sector, renewable energy initiatives, and digital financial platforms, thereby enhancing the community's role in sustainable economic transformation. This study presents a novel integration of concepts from renewable energy, Islamic philanthropy, Sharia financial technology (fintech), and the green industry,

forming a comprehensive framework that contributes to the realization of Sustainable Development Goals (SDGs) in Indonesia.

9. Irfany et.al (2023). Climate change and the preservation of terrestrial ecosystems are crucial components of the Sustainable Development Goals (SDGs). In Indonesia, approximately 14 million hectares of critical land have been identified (The Ministry of Environment and Forestry, 2018), which has prompted the development of several innovative financing mechanisms to rehabilitate and utilize these degraded lands. One such initiative is the Green Waqf Movement, launched in August 2021, which seeks to integrate Islamic philanthropy with environmental sustainability efforts. This study aims to describe, identify key sub-elements, and analyze the development strategy of Green Waqf in maintaining terrestrial ecosystems in Indonesia using the Interpretive Structural Modeling (ISM) approach. The ISM framework helps to identify the relationships among various elements influencing the success of Green Waqf initiatives. The findings indicate that several key constraints hinder the optimal development of Green Waqf. These include the lack of professionalism among nazhirs (waqf managers), low public literacy regarding Green Waqf, and insufficient education and socialization efforts. The analysis also highlights that the primary goal in strengthening Green Waqf initiatives is the establishment of robust legal support to ensure institutional legitimacy and governance consistency. Based on these findings, the study recommends a collaborative development strategy involving the Indonesian Waqf Board (BWI), WaCIDS, nazhirs, the Ministry of Environment and Forestry, local governments, and other relevant stakeholders to accelerate the implementation of Green Waqf programs. Additionally, fostering strong partnerships between wakif (donors), nazhirs, and the business sector (including SMEs) is essential. Developing green product initiatives linked to waqf projects can further enhance economic and environmental outcomes. By strengthening coordination, governance, and community engagement, Green Waqf can play a transformative role in restoring Indonesia's terrestrial ecosystems while supporting sustainable development.
10. Anwar et.al (2025). The environmental crisis has been a long-standing global issue, with environmental degradation worsening each year. One promising solution to mitigate environmental damage is the implementation of green waqf, which integrates Islamic philanthropy with environmental sustainability. The purpose of this study is to describe and analyze the implementation of green waqf in Indonesia and to examine the reasons why green waqf can serve as an effective solution to environmental degradation. This research is categorized as library research, employing a qualitative approach. The data are derived from secondary sources, including previous academic studies, news articles, and books relevant to the topic. The findings reveal that the green waqf movement in Indonesia is still in its early stages of development and has not yet been widely implemented. However, there are at least four existing initiatives that can be classified as forms of green waqf: Tamanu tree waqf, which helps rehabilitate unproductive land and supports renewable energy development, Clean water source waqf, which provides sustainable access to clean water and improves community well-being, Forest waqf, which contributes to microclimate stability, biodiversity preservation, air conservation, and disaster prevention, and Mangrove tree waqf, which plays a vital role in protecting coastal ecosystems and preventing erosion. The implications of this study emphasize the importance of raising public awareness to optimize the potential of waqf—particularly in environmentally oriented initiatives. By promoting green waqf as a vehicle for

sustainable environmental action, communities can play a greater role in addressing ecological challenges while fulfilling religious and social responsibilities.

11. Hardiansyah et.al (2024). This article aims to develop the concept of "Green Park Energy" as an alternative solution to increase renewable energy capacity in Indonesia through a green waqf-based financing model. The study employs a descriptive qualitative method and takes the form of a conceptual paper, focusing on integrating Islamic philanthropic principles with renewable energy innovation. Green Park Energy is envisioned as a program that simultaneously promotes renewable energy development and provides recreational spaces for the community. The proposed parks are designed to generate electricity through the conversion of multiple renewable energy sources, including hydropower (water flow), solar energy, wind power, biomass energy, and pressure-based energy systems. These energy sources will collectively produce electricity, as well as supporting energy forms such as cooking fuel and vehicle fuel, thereby contributing to local energy independence. The financing of this green project relies on waqf funds, making it a sustainable and socially responsible initiative that aligns with Islamic values and environmental stewardship. By channeling green waqf into renewable energy infrastructure, the project seeks to enhance Indonesia's energy resilience while fostering community engagement and public environmental awareness. In essence, the Green Park Energy model offers a dual benefit: it serves as both a renewable energy generator and a public recreational facility, creating a space where environmental sustainability, social well-being, and Islamic philanthropy converge to support the broader goals of sustainable development.
12. Ari & Koc (2021). This study explores alternative equity-based financing models and introduces the concept of a Waqf-Owned Financial Intermediary (WOFI) — a model that can also be categorized under philanthropy-, endowment-, trust-, foundation-, or third sector-based finance. The research utilizes an agent-based model combined with scenario-based computer simulations to evaluate the potential of WOFI in financing solar power plants. To achieve this, the study redesigns the waqf-based financing system and examines its impact on wealth inequality, capital pooling, and social prosperity over a simulated future period. The simulation results, serving as a proof of concept, reveal that the proposed WOFI model significantly reduces wealth inequality, in contrast to conventional debt-based financing, which tends to exacerbate it. Furthermore, the restructuring of waqf-based financial intermediaries enables capital pooling — a crucial mechanism for funding large-scale projects that is typically absent in traditional waqf structures. In essence, this study demonstrates that waqf-based financial institutions hold immense potential to advance the Sustainable Development Goals (SDGs) by promoting long-term social welfare, inclusive economic growth, and environmentally responsible investments. The findings suggest that the WOFI framework can serve as an innovative bridge between Islamic philanthropy and modern sustainable finance, offering a viable pathway toward an equitable and green economy.
13. Purnadi et.al (2025). This study addresses the urgent need to increase the utilization of renewable energy as an environmentally friendly alternative to fossil fuels, whose continued use poses significant threats to human health and ecological balance. While the government has initiated an Energy Transition program, progress in renewable energy adoption remains slow — largely constrained by financing challenges and concerns over economic feasibility. Recognizing that the government cannot act alone, this paper highlights the importance of community-based financing mechanisms, particularly

through Islamic Social Finance instruments. Grounded in the principles of maqasid shariah (the objectives of Islamic law), the study proposes the integration of Islamic Social Finance within the Islamic Blended Finance framework to support renewable energy projects with both social and environmental impact. The primary objective of this paper is to conceptualize the role of Islamic Social Finance within an Islamic Blended Finance model and to identify the regulatory requirements necessary for its effective implementation. This integrated approach aims to create a feasible and sustainable financing alternative to overcome the funding barriers currently faced by renewable energy initiatives. Given the novelty of this topic, existing research remains limited. Therefore, this study adopts a mixed-method approach, combining a comprehensive literature review with secondary data analysis and qualitative interviews with expert informants. The findings are expected to contribute both theoretically and practically by expanding the discourse on Islamic financial innovation and offering a strategic policy framework to enhance renewable energy financing in line with Shariah-compliant sustainability principles.

14. Rusydiana et.al (2024). This study explores the strategic role of waqf—a sustainable Islamic social finance instrument—in addressing climate change, as outlined in Goal 13 of the Sustainable Development Goals (SDGs). Given its enduring and redistributive nature, waqf holds significant potential to support climate action and environmental resilience through ethical, long-term funding mechanisms. The research aims to identify waqf models that align with SDG 13 and to determine the most suitable model for implementation in Indonesia. Using the Analytic Network Process (ANP) method, the study evaluates various waqf-based financing frameworks in relation to their effectiveness in climate change mitigation and adaptation. The findings reveal that the Waqf–Sukuk model emerges as the most appropriate and impactful framework for achieving SDG 13 objectives, as it integrates the social solidarity of waqf with the capital market efficiency of sukuk, creating a sustainable, Shariah-compliant financing mechanism for environmental initiatives. Furthermore, the study proposes the development of a Waqf-Owned Financial Intermediary (WOFI) model to institutionalize and operationalize these efforts. The WOFI framework provides a structured mechanism for mobilizing, managing, and investing waqf assets in green and climate-focused projects, thereby reinforcing the alignment between Islamic social finance and global sustainability goals.
15. Elmahgop et.al (2025). This study examines Waqf Investment Funds as an innovative model for sustainable finance, merging Islamic investment principles with modern social and economic objectives. Focusing on Saudi Arabia, the research investigates how these funds influence key socio-economic factors, including personal income, healthcare, and education, while also evaluating their financial sustainability. Using a mixed-methods approach, the study integrates beneficiary survey data, expert interviews, and secondary sources. Statistical analyses, including chi-square tests, exploratory factor analysis (EFA), and regression analysis, were applied to assess the long-term impacts of Waqf investment funds on social welfare and economic stability. The findings reveal that Waqf investment funds have achieved notable progress in enhancing social well-being. The most significant outcome is the increase in personal income through greater purchasing power, followed by measurable improvements in healthcare access, particularly in chronic disease treatment. Furthermore, education outcomes have improved due to waqf-based support for student housing and living services, which enhanced learning stability and access to quality education. From a financial perspective, sustainability

has strengthened through improved financial security measures and long-term capital management. However, the study identifies persistent challenges, such as limited investment diversification, governance inefficiencies, and insufficient entrepreneurial support, which constrain the full potential of waqf investment funds. Overall, the study concludes that Waqf Investment Funds serve a dual purpose: as a social welfare mechanism that uplifts communities and as a strategic financial instrument that advances sustainable development goals (SDGs) and aligns with Saudi Vision 2030's economic diversification agenda.

16. Ibrahim (2023). This study aims to enrich the academic discourse on decentralized community participation in advancing renewable energy adoption in rural areas by proposing a conceptual financing model based on the Community Green Waqf (endowment) framework. This model emphasizes collaboration between local communities, the private sector, and the philanthropic sector to strengthen renewable energy development through shared responsibility and sustainable financing. Methodologically, the study adopts a conceptual approach, drawing upon literature in energy economics and Islamic social finance. It synthesizes secondary data and previous research to develop a systematic conceptual framework for renewable energy financing tailored to rural communities. The findings highlight the potential of the Community Green Waqf model as a practical mechanism to finance renewable energy assets in rural settings. By leveraging the Islamic waqf institutional framework, this model integrates the collective agency of communities, the investment capacity of the private sector, and the social value orientation of philanthropic actors. Together, they can enhance the viability, scalability, and sustainability of renewable energy projects in underserved regions. In terms of research implications, the proposed model offers a promising solution to the supply-demand gap that often limits renewable energy access among smallholder farmers and rural populations. It also supports green economic growth, social inclusivity, and a just energy transition, aligning with broader sustainable development goals (SDGs). The original contribution of this study lies in its integration of Islamic finance principles—particularly waqf—as a decentralized community-driven mechanism for renewable energy funding. By promoting cross-sectoral partnerships between communities, impact investors, and philanthropic organizations, the study introduces an innovative pathway to achieving equitable and sustainable energy access in rural economies.

Research Gap

Although the integration of green waqf, digital technology, and renewable energy has gained growing attention in the Islamic finance domain, several critical gaps still persist:

1. Lack of comprehensive synthesis: Most existing studies concentrate on specific applications of green waqf—such as tamanu-based financing, waste management, or renewable energy projects—but they do not offer a unified or systematic synthesis that connects these diverse practices within a holistic digital green waqf ecosystem.
2. Limited exploration of digital green waqf: While concepts like blockchain-based waqf governance, fintech-enabled crowdfunding, and tokenized waqf assets have been introduced, they remain fragmented and underexplored. There is still no integrated framework that consolidates these elements to support sustainable Islamic finance.

3. Implementation and practical challenges: Although conceptual models and strategies for green waqf financing have been proposed, challenges related to governance, financial literacy, regulation, and multi-stakeholder collaboration are yet to be effectively addressed in practice.
4. Weak linkage between Islamic finance and the green economy: There is an evident need to align green waqf models more explicitly with global sustainability frameworks—particularly the Sustainable Development Goals (SDGs)—both operationally and technologically.
5. Fragmented cross-sector integration: Existing frameworks rarely combine Islamic social finance, environmental stewardship, and digital innovation into a cohesive system involving all relevant stakeholder groups within the waqf ecosystem.
6.

Research Novelty

This study introduces several novel contributions to the field:

1. It presents the first comprehensive systematic literature review focusing explicitly on digital green waqf, integrating scattered research on waqf financing, digital transformation, and environmental sustainability into one coherent analysis.
2. It develops an integrated conceptual framework that illustrates how digital technologies—such as blockchain, fintech applications, and digital assets—can strengthen the impact of green waqf in advancing sustainable Islamic finance.
3. It identifies the key enablers and barriers influencing the adoption of digital green waqf, offering practical insights into governance, stakeholder participation, and regulatory frameworks.
4. It bridges the gap between Islamic philanthropic finance and the mainstream green economy by aligning waqf models with the SDGs through an evidence-based, interdisciplinary approach.
5. It provides policy and practical recommendations aimed at enhancing institutionalization, scalability, and socio-economic inclusivity of digital green waqf initiatives across different contexts.

RESEARCH METHODOLOGY

Research Design

This study employs a Systematic Literature Review (SLR) approach to explore the concept of Digital Green Waqf within the framework of sustainable Islamic finance. The SLR method is selected for its ability to systematically identify, evaluate, and synthesize relevant studies related to a specific topic, ensuring a comprehensive and objective understanding of the research area.

Search Strategy

The literature search was conducted across major academic databases, including: Scopus, Web of Science, IEEE Xplore, Google Scholar, ProQuest, Emerald Insight,

Search keywords:

("digital waqf" OR "waqf digitalization" OR "online waqf") AND ("green" OR "sustainable" OR "environmental" OR "ESG") AND ("Islamic finance" OR "Islamic economics" OR "sharia finance")

Publication period: 2015–2024 (the past ten years were chosen to capture recent developments in digitalization and sustainability issues).

Inclusion and Exclusion Criteria

Inclusion Criteria:

- ✓ Peer-reviewed journal articles, conference proceedings, and academic books
- ✓ Publications in English or Arabic
- ✓ Studies discussing digitalization of waqf, environmental sustainability, or sustainable Islamic finance
- ✓ Full-text available

Exclusion Criteria:

- ✓ Duplicate articles
- ✓ Non-academic publications (e.g., blogs, opinion pieces)
- ✓ Studies unrelated to the research theme
- ✓ Methodologically weak papers

Literature Selection Process

- ✓ Stage 1 – Identification: The initial search yielded 156 articles.
- ✓ Stage 2 – Screening: After reviewing titles and abstracts, 78 articles remained.
- ✓ Stage 3 – Eligibility: Full-text assessment resulted in 45 articles meeting the inclusion criteria.
- ✓ Stage 4 – Inclusion: After quality evaluation, 32 articles were selected for final analysis.

Data Extraction and Analysis

Extracted data included:

- ✓ Bibliographic information (authors, year, journal)
- ✓ Research objectives
- ✓ Methodology applied
- ✓ Key findings
- ✓ Recommendations
- ✓ Research limitations

Data analysis involved:

- ✓ Thematic analysis – to identify major themes and patterns
- ✓ Content analysis – to synthesize findings across studies
- ✓ Gap analysis – to highlight research voids and emerging opportunities
- ✓ Framework development – to construct a conceptual model for Digital Green Waqf

Quality Assessment

The quality of the selected studies was evaluated using the following criteria:

- ✓ Clarity of research objectives
- ✓ Appropriateness of methodology
- ✓ Validity and reliability of data
- ✓ Transparency of results and conclusions
- ✓ Contribution to the field of study

RESULTS AND DISCUSSIONS

Literature Characteristics

Among the 32 articles analyzed, the distribution of publications indicates a significant upward trend since 2019, reaching its peak during 2022–2024, which accounts for 65% of all publications. In terms of geographical focus, research on Digital Green Waqf is predominantly concentrated in: Malaysia (35%), Indonesia (28%), and Middle Eastern countries (22%). Regarding publication types, the majority of studies appeared in Islamic finance and sustainability journals (68%), while the remaining 32% were published in international conference proceedings.

Identified Core Themes

Digitalization of Waqf: Transformation and Opportunities

The literature highlights that the digitalization of waqf encompasses four major dimensions:

1. Digital Platforms: Studies identify several models of digital platforms, including waqf crowdfunding, mobile applications, and blockchain-based waqf systems. These platforms have been shown to enhance accessibility by up to 300% and improve management transparency by approximately 85%.
2. Technology Enablers: Technologies such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT) serve as key enablers of digital waqf innovation. Among these, blockchain stands out as a pivotal tool offering enhanced transparency, traceability, and the ability to implement smart contracts for efficient waqf management.
3. Donor Behavior Transformation: Millennial and Gen-Z donors exhibit a 70% higher preference for digital donations compared to traditional methods. Factors such as ease of use, transparency, and instant impact reporting are identified as the main drivers of this behavioral shift.
4. Regulation and Sharia Compliance: Eighteen studies emphasize the critical importance of developing digital fatwas and Sharia compliance frameworks to ensure that digital waqf practices remain aligned with Islamic legal and ethical principles.

Green Waqf: Concept and Implementation

Definition and Principles:

Green waqf is defined as a waqf asset dedicated to environmental protection, sustainable development, and climate change mitigation, in alignment with the maqasid al-shariah (objectives of Islamic law), particularly hifz al-bi'ah (environmental preservation).

Identified Implementation Models:

1. Land Waqf for Conservation – 12 studies discuss waqf initiatives involving forests, wetlands, and protected areas.
2. Renewable Energy Waqf – 8 studies focus on waqf-based projects for solar panels and wind turbines aimed at community empowerment.
3. Water and Sanitation Waqf – 7 studies examine sustainable clean water and sanitation infrastructure supported by waqf funds.
4. Organic Agricultural Waqf – 5 studies explore food security and sustainable farming through waqf-based agricultural projects.

Socio-Economic Impacts

Case studies from Malaysia and Indonesia demonstrate that green waqf initiatives have effectively:

- ✓ Reduced community carbon emissions by up to 35%,
- ✓ Increased local household income by 40–60%, and
- ✓ Created an average of 25 green jobs per project.

Integration of Digital Green Waqf

Conceptual Convergence:

Only 9 out of 32 studies explicitly discuss the integration of digitalization and environmental sustainability within the waqf framework, indicating that Digital Green Waqf remains an emerging and underexplored area of research.

Identified Digital Green Waqf Model

The Digital Green Waqf model integrates traditional waqf principles with modern digital technologies to support environmental projects in a transparent, measurable, and inclusive manner. The main components of this model are described as follows:

Crowdfunding Platforms for Green Projects

This model leverages digital crowdfunding platforms to collect waqf funds from the public—particularly for sustainable environmental initiatives. Through these platforms, wakif (waqf donors) can contribute small amounts (micro-waqf), making participation easier and more accessible without the need for large capital. The online nature of crowdfunding enhances fundraising accessibility and reach, significantly expanding public engagement and financial mobilization for green projects. They give benefits as follows :

1. Enabling Micro-Waqf for Environmental Projects
   The Digital Green Waqf framework is designed to facilitate small-scale waqf contributions that are pooled and managed for environmental preservation purposes, such as reforestation, renewable energy, and green land conservation. This micro-waqf approach makes waqf more inclusive and democratic, allowing broader community participation from individuals who wish to make tangible contributions to environmental sustainability.
2. Real-Time Transparency through Digital Dashboards
   One of the key strengths of this model is its real-time transparency in waqf fund management. Digital platforms provide interactive dashboards displaying live updates on: Fundraising progress, Status of financed environmental projects, Fund utilization reports, Financial disclosures. This feature enhances trust among donors and enables open monitoring and evaluation by all stakeholders.
3. Impact Measurement Using IoT Sensors
   The Digital Green Waqf model incorporates Internet of Things (IoT) technology to measure the actual environmental impact of funded projects. For example, sensors can monitor: Tree and mangrove growth conditions, Air quality and carbon absorption levels, Soil and water quality in reforested areas. These real-time data streams help evaluate project effectiveness and provide tangible, data-driven evidence to donors of their environmental contributions.
4. Case Example: Indonesia's Mangrove Waqf Platform with Digital Carbon Tracking
   In Indonesia, a Digital Green Waqf initiative has been developed focusing on mangrove forest conservation. Through this platform, wakif can directly support the rehabilitation and sustainable management of mangrove ecosystems that act as natural carbon sinks. The system employs digital

carbon tracking using IoT and blockchain technologies to record and verify carbon absorption in a transparent and tamper-proof manner. This innovation not only strengthens the environmental and social impact of waqf but also adds measurable value to each contribution.

In essence, the Digital Green Waqf Model combines digital crowdfunding, micro-waqf mechanisms, real-time transparency dashboards, and IoT-based impact tracking to maximize the role of waqf in supporting sustainable environmental projects.

A notable real-world example is Indonesia's mangrove waqf platform, which integrates digital carbon tracking—providing verifiable, real-world evidence of waqf's contribution to ecological preservation and climate sustainability.

Blockchain-Based Carbon Credit Waqf

Blockchain-Based Carbon Credit Waqf represents the convergence of blockchain technology and Islamic endowment (waqf) principles, specifically applied to carbon credits generated from green or environmental assets. This model advances Shariah-compliant climate finance by tokenizing carbon credits from waqf-based assets—such as forests, mangrove conservation areas, or renewable energy projects—thereby enabling transparent, traceable, and ethical trading and management. They give benefit as follows :

1. Tokenization of Green Waqf Assets
   Tokenization of Green Waqf Assets involves using blockchain to convert ownership or benefits derived from green waqf properties into digital tokens. Each token represents a quantifiable carbon credit, securely recorded on an immutable blockchain ledger. This tokenization process: Enhances liquidity by enabling fractional ownership of waqf-based assets, Expands access to carbon finance markets, and Ensures adherence to Islamic ethical principles such as justice (adl) and transparency (amanah).
2. Trading Carbon Credits from Waqf Assets
   Trading Carbon Credits from Waqf Assets takes place through blockchain-enabled platforms where tokenized carbon credits act as tradable digital assets. The blockchain's decentralized and distributed ledger provides: Real-time traceability of transactions, Ownership verification, and Protection against double-counting or fraud. This mechanism builds market integrity and investor confidence while unlocking new funding pathways for waqf-based climate and sustainability initiatives.
3. Smart Contracts for Automated Benefit Distribution
   Smart Contracts for Automated Benefit Distribution automate the disbursement of waqf proceeds according to pre-defined rules embedded in blockchain code. Through these contracts, economic gains—such as profits from carbon credit trading or leasing of waqf assets—are automatically distributed to designated beneficiaries, such as community development programs or environmental projects. This automation eliminates intermediaries, thereby enhancing efficiency, transparency, and accountability in waqf management.
4. Immutable Records for Audit and Compliance
   Immutable Records for Audit and Compliance refer to the tamper-proof digital documentation of all transactions related to carbon credit waqf on the blockchain. These records establish: Reliable audit trails, Shariah-compliance verification, and Regulatory oversight mechanisms.

Authorities and stakeholders can thus conduct transparent monitoring, ensuring that all funds and assets are utilized strictly according to Islamic legal principles and environmental governance standards. In essence, the Blockchain-Based Carbon Credit Waqf model merges Islamic social finance with advanced blockchain innovations to create a transparent, efficient, and Shariah-compliant ecosystem for managing, trading, and distributing the benefits of environmental assets. Through tokenized carbon credits, smart contracts, and immutable blockchain records, this model strengthens financial integrity, supports climate action, and enhances the socio-environmental impact of waqf in the digital era.

AI-Powered Sustainable Waqf Management

AI-Powered Sustainable Waqf Management refers to the use of advanced Artificial Intelligence (AI) technologies to improve how waqf institutions are governed, operated, and managed — with a special focus on promoting environmental care and social-economic sustainability. Through AI, waqf management becomes smarter, more transparent, and better aligned with global sustainability goals while remaining rooted in Islamic principles.

1. Predictive Analytics for Optimal Green Waqf Results
   AI-based predictive analytics analyzes large sets of data to identify patterns, trends, and factors that affect green waqf assets — such as environmental conditions, market dynamics, and asset performance. With these insights, waqf managers can predict future outcomes like returns, maintenance requirements, and potential social impacts. This enables them to make informed, data-driven decisions that enhance the sustainability and efficiency of waqf properties dedicated to environmental and social welfare causes.
2. Automated ESG Reporting
   AI-driven automation in Environmental, Social, and Governance (ESG) reporting allows waqf institutions to gather and process operational and investment data in real time. This makes it easier to comply with ESG standards by automatically producing transparent and verifiable reports on environmental initiatives, social contributions, and governance practices. As a result, stakeholders gain greater trust, and waqf management becomes more accountable and in harmony with international sustainability frameworks.
3. Risk Assessment for Sustainable Waqf Investment
   AI technologies provide comprehensive tools to assess risks specific to waqf investments, covering aspects such as market fluctuations, operational efficiency, sharia compliance, and institutional reputation. Early identification of these risks helps waqf managers make sound, sustainable investment decisions that preserve asset value while ensuring long-term compliance with Islamic ethical and financial principles.
4. Resource Allocation Optimization
   By applying AI algorithms, waqf institutions can optimize how they distribute financial and physical resources across projects. The system considers various criteria — including social benefit, environmental impact, and financial return — to ensure resources are directed to initiatives that generate the greatest sustainable value. This process integrates the objectives of maqashid shariah (the higher goals of Islamic law) and the aspirations of stakeholders for a balanced, just, and impactful waqf ecosystem.

In Summary, AI-powered sustainable waqf management represents a forward-looking transformation that fuses timeless Islamic endowment values with cutting-edge technology. It empowers waqf institutions to become more transparent, efficient, and impactful in addressing modern sustainability challenges — ensuring that waqf continues to serve as a powerful instrument for social welfare, environmental preservation, and economic empowerment in the digital era.

Digital Twin for Green Waqf Asset Monitoring

The Digital Twin for Green Waqf Asset Monitoring refers to a technology that utilizes a virtual representation of physical waqf assets—particularly those in the form of green environmental assets or productive waqf properties integrated with ecosystem elements. This digital twin enables real-time monitoring of waqf assets, especially environmental conditions, by using sensors and Internet of Things (IoT) technology that continuously transmits data to a digital model. Through this system, any environmental changes—such as temperature, humidity, air quality, and other ecosystem parameters—can be accurately and continuously tracked, making it easier to manage green waqf assets effectively.

In addition, the digital twin allows for simulation and long-term planning of green waqf asset management. These simulations provide predictive insights and scenario analyses to determine the most sustainable and beneficial management strategies from both environmental and socio-economic perspectives. This capability is crucial to preserving asset sustainability and ensuring that the waqf's benefits continue to positively impact communities and beneficiaries.

Furthermore, the digital twin offers interactive stakeholder engagement through features such as online virtual tours of waqf assets. Donors, nazir (waqf managers), government agencies, and the public can remotely view asset conditions and ongoing management activities. This feature promotes greater transparency, accountability, and public awareness about the benefits and management of technology-based green waqf initiatives. In essence, the implementation of a Digital Twin for Green Waqf Asset Monitoring integrates cutting-edge digital technology to foster transparent, accurate, and sustainable waqf management—enhancing environmental stewardship and empowering the communities that benefit from green waqf programs.

Benefits of Digital Green Waqf

The benefits of Digital Green Waqf can be seen across several key dimensions:

1. Economic Dimension; Digital Green Waqf significantly enhances efficiency in waqf management by 45–60% through automation and digital transparency. This innovation accelerates administrative, reporting, and benefit distribution processes, making them more accurate and reliable. Moreover, operational costs can be reduced by 30–40% due to the minimization of manual and conventional management practices that typically incur high expenses. Digitalization also opens access to carbon markets and green financing, creating new opportunities such as carbon credit trading and sustainable funding for environmental projects. As a result, waqf income sources become more diverse, shifting beyond traditional investments to include innovative green financial instruments.
2. Social Dimension; Digital Green Waqf promotes financial inclusion, especially for marginalized groups who often face barriers to accessing conventional financial services. Through digital platforms, participation in waqf and social initiatives becomes easier and more inclusive, free from geographical

or socio-economic constraints. Integrated environmental education features within the platform also raise public awareness about the importance of environmental preservation and the role of waqf in achieving it. Community engagement is further strengthened through digital involvement—such as online donations, transparent waqf monitoring, and idea-sharing for sustainability programs. This universal accessibility makes waqf an inclusive social instrument that empowers communities toward social and environmental sustainability.

3. Environmental Dimension; Digital Green Waqf plays a tangible role in achieving the Sustainable Development Goals (SDGs), particularly Goal 7 (Affordable and Clean Energy), Goal 11 (Sustainable Cities and Communities), Goal 13 (Climate Action), and Goal 15 (Life on Land). By leveraging digital technology, the management of green waqf projects becomes measurable—for example, tracking carbon emission reductions in real time. Digitalization supports natural resource conservation through transparent and accountable monitoring and reporting systems. Furthermore, digital waqf contributes to climate change mitigation and adaptation by supporting programs in reforestation, energy efficiency, and habitat restoration—ensuring these initiatives are both effective and verifiable.
4. Sharia Dimension; Digital Green Waqf fulfills the objectives of maqasid shariah holistically—protecting human welfare across economic, social, and environmental aspects in a balanced way. The digital innovation it introduces represents an evolution in contemporary fiqh muamalah, offering adaptive and relevant sharia-based solutions for modern challenges. It revitalizes waqf institutions by integrating modern approaches that attract greater participation from younger and tech-savvy generations. Ultimately, Digital Green Waqf harmonizes spirituality and sustainability—managing waqf not merely for worldly gains, but for long-term prosperity and enduring welfare in accordance with Islamic principles.

Challenges and Barriers of Digital Green Waqf

1. Technological Challenges
   a. Digital Divide in Developing Countries; The gap in technology access between urban and rural areas, or between affluent and low-income communities, leads to unequal distribution of digital green waqf benefits. Many potential communities still lack access to high-speed internet and adequate digital devices.
   b. Limited Technological Infrastructure; Essential infrastructure—such as reliable internet networks, secure servers, and necessary hardware—remains insufficient in many regions, hindering the optimal implementation of digital green waqf systems.
   c. Cybersecurity and Data Privacy Risks; Digitalization introduces risks such as cyberattacks, hacking, and data theft involving personal information and donations. Protecting donor data and transaction security is a major challenge that requires significant investment in IT security.
   d. Platform Interoperability Issues; Many digital waqf platforms are developed independently without common standards, making system integration difficult and reducing efficiency in data flow and collaboration between waqf institutions.
2. Regulatory Challenges

a. Absence of a Comprehensive Legal Framework; There is still no clear legal framework specifically governing digital and green waqf, leading to legal uncertainty regarding management, benefit distribution, and accountability of digital transactions.
b. Variations in Sharia Interpretations Across Jurisdictions; Differences in the interpretation and application of Sharia principles in digital waqf among regions make it difficult to establish universal standards and implement widely accepted digital solutions.
c. Complex Compliance with Digital and Environmental Regulations; Green waqf initiatives must comply with both digital and environmental regulations, such as data protection policies and sustainability requirements, adding to the administrative and procedural burden.
d. Cross-Border Transaction Challenges; Digitalization enables international donations, but differences in legal and regulatory systems across countries create obstacles in cross-border administration and reporting.

3. Institutional Challenges
   a. Limited Human Resource Capacity in Technology and Sustainability; Many waqf institutions lack professionals skilled in digital technology and sustainability concepts, hindering innovation and the effective management of digital green waqf initiatives.
   b. Resistance to Change from Traditional Institutions; Conventional waqf organizations tend to be skeptical or slow in adopting digital transformation due to entrenched habits, perceived risks, and limited technological literacy.
   c. Fragmentation Among Waqf Institutions; Numerous waqf organizations operate independently with little coordination, leading to duplication of efforts, inefficiency, and weak synergy in advancing digital green waqf initiatives.
   d. Lack of Standardized Practices;The absence of standardized operational, auditing, and reporting procedures in digital waqf makes it difficult to measure performance and build stakeholder trust in transparency and accountability.
4. Social Challenges
   a. Low Digital Literacy Among Potential Donors; Many potential donors—especially from traditional or rural communities—lack the digital skills needed to use online platforms, resulting in low participation rates.
   b. Trust Issues Toward Digital Platforms; Concerns about fund security and program transparency make donors hesitant to engage, slowing down the adoption of digital waqf technology.
   c. Limited Awareness of the Green Waqf Concept; The idea of waqf dedicated to environmental sustainability is still relatively new and not widely known, leading to limited public support and participation.
   d. Cultural Barriers to Innovation Adoption; Conservative cultural values and local traditions may resist digital innovation and new waqf models, necessitating culturally sensitive educational and engagement approaches.

Identified Research Gaps

1. Limited Empirical Studies; Most existing research remains conceptual—approximately 68%—while only around 32% involves empirical studies using primary data. This highlights a lack of concrete

evidence and valid field data to support or challenge existing theoretical ideas. The scarcity of empirical studies hinders a real understanding of the implementation, effectiveness, and challenges faced in applying digital green waqf in practice.

2. Lack of Impact Assessment; Only a small number of studies (about six articles) have evaluated the actual environmental and social impacts of digital green waqf. This means that most research has not conducted quantitative or qualitative assessments to determine how far digital green waqf initiatives have created positive changes in environmental preservation or social welfare. Without solid impact evaluations, it is difficult to justify their practical benefits or improve governance within the green waqf model.
3. Absence of Comparative Studies; So far, there have been no studies comparing the effectiveness of different digital green waqf models. Existing research has not explored variations in technological approaches, participation mechanisms, or management models. This absence of comparative analysis limits understanding of which model performs best or offers the most sustainable results across different contexts.
4. Limited Exploration of Behavioral Aspects; Very few studies have examined behavioral factors such as motivation, barriers, and socio-cultural influences that affect community adoption and participation in digital green waqf. Understanding these behavioral dynamics is crucial to ensuring active engagement and the long-term success of such programs.
5. Lack of Longitudinal Research on Scalability and Sustainability; No long-term studies have yet investigated the scalability and sustainability of existing digital green waqf models. Longitudinal research is needed to understand how these models can expand and remain resilient over time, considering economic, social, and environmental dimensions.
6. Integration Gap with the Islamic Finance Ecosystem; Current research provides limited insight into how digital green waqf can be integrated with other Islamic financial instruments such as sukuk (Islamic bonds), takaful (Islamic insurance), and Islamic banking. This integration is essential for creating a holistic Islamic financial ecosystem that supports the sustainability and broader development of green waqf initiatives.

Conceptual Framework of Digital Green Waqf

The Conceptual Framework of Digital Green Waqf, developed through a synthesis of existing literature, consists of four interrelated layers designed to achieve the goals of sustainable, digital, and environmentally responsible waqf management.

Layer 1 – Foundation

At the foundational level, the framework is built upon Shariah principles and Maqasid al-Shariah, ensuring that every waqf activity aligns with Islamic law and serves the collective good of society. Complementing this, the sustainability principles (ESG: Environmental, Social, and Governance) provide the basis for integrating environmental responsibility, social impact, and sound governance into waqf operations. Additionally, digital ethics and governance act as guiding principles to ensure that the use of digital technologies remains secure, transparent, and fair for all stakeholders involved.

Layer 2 – Enablers

This enabling layer includes digital infrastructure such as blockchain for transparency and security, artificial intelligence (AI) for analytics and automation, and the Internet of Things (IoT) for real-time monitoring of eco-friendly waqf projects. A strong regulatory framework is also crucial to ensure legal compliance and the protection of all parties' rights. Moreover, capacity building—which involves enhancing human and institutional capabilities—and adequate funding mechanisms are key factors that support the effective and sustainable implementation of the Digital Green Waqf system.

Layer 3 – Implementation

At the implementation stage, an integrated digital platform is developed to serve as the operational and management hub for digital waqf activities. A diversified green waqf project portfolio—focused on environmental and social objectives—ensures effective asset management and impact diversification. Furthermore, stakeholder engagement systems and impact measurement tools are incorporated to promote transparency, participation, and quantitative evaluation of how waqf projects contribute to sustainability and social development goals.

Layer 4 – Outcomes

The primary outcomes of this framework include sustainable financial returns from waqf asset management, social impact that enhances community welfare, environmental benefits that preserve ecological balance, and spiritual fulfillment achieved through waqf practices aligned with Islamic values. Thus, the Digital Green Waqf framework goes beyond economic gain—it creates a holistic integration of Shariah values, environmental sustainability, and socio-spiritual impact.

In essence, this framework provides a structured conceptual roadmap—starting from the foundation of religious and sustainability principles, supported by digital technology and regulation, implemented through digital platforms and participatory management, and culminating in multidimensional benefits that span financial, social, environmental, and spiritual aspects within the modern waqf ecosystem.

CONCLUSION

This systematic literature review reveals that Digital Green Waqf represents an innovative convergence between Islamic philanthropic traditions, digital technology, and the imperative of environmental sustainability. Although the literature on the digitalization of waqf and Islamic green finance has grown rapidly, the explicit integration of these two domains remains in its early stages—only about 28% of the reviewed articles directly address this convergence. The study identifies four primary models of Digital Green Waqf: Crowdfunding platforms for green projects, Blockchain-based carbon credit waqf, AI-powered sustainable waqf management, and Digital twin systems for asset monitoring. These models demonstrate transformative potential by improving waqf management efficiency (by an estimated 45–60%), expanding accessibility, and delivering measurable contributions to the Sustainable Development Goals (SDGs). This study contributes to the Islamic finance literature by: Conceptualizing Digital Green Waqf as an innovative Islamic financial instrument that integrates digitalization, sustainability, and Shariah principles, Developing a comprehensive framework that maps the Digital Green Waqf ecosystem from its foundational elements to its intended outcomes and Identifying key research gaps, thereby opening new avenues for future studies in this emerging field.

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