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MORALITY BEFORE KNOWLEDGE

Digital crowdfunding for waqf-based forest carbon projects: A model for strengthening inclusive and sustainable Islamic green finance

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ABSTRACT

Background: The transition toward a green economy has intensified the demand for sustainable and ethically grounded financing models to support forest conservation and climate mitigation, particularly in countries with high deforestation pressure such as Indonesia. While voluntary carbon markets provide a mechanism to value ecosystem services, their financing structures remain dominated by conventional approaches and have rarely incorporated Islamic social finance instruments. This study aims to assess the feasibility of integrating waqf-based forest conservation with Sharia-compliant digital crowdfunding and voluntary carbon trading to support environmental sustainability and community empowerment. **Method:** This study employs a qualitative exploratory approach using semi-structured interviews with nine key stakeholders, including waqf managers, Sharia regulators, forestry practitioners, Islamic finance professionals, and green finance academics. Data were collected purposively and analyzed through thematic analysis to identify patterns related to opportunities, challenges, and model feasibility. **Findings:** The findings indicate that waqf-based forest projects hold strong potential across social, economic, and ecological dimensions by enabling community participation, generating diversified income from non-timber forest products and carbon credits, and contributing to carbon sequestration and biodiversity conservation. Sharia-compliant crowdfunding enhances inclusivity and transparency in waqf fundraising; however, its effectiveness depends on regulatory clarity, institutional capacity of waqf managers, digital literacy, and public trust. Major challenges include regulatory fragmentation, the absence of specific Sharia guidance on carbon-related assets, and financial risks arising from high upfront costs and uncertain carbon revenues. The results demonstrate consistency between the proposed model and the principles of sustainable development and Islamic objectives emphasizing public benefit and environmental stewardship. **Conclusion:** The study concludes that the integrated model is feasible for phased implementation under clear regulatory, institutional, and Sharia governance frameworks. **Novelty/Originality of this article:** This article contributes a novel Islamic green finance framework by empirically validating an integrated model that links waqf forest financing, Sharia-compliant crowdfunding, and voluntary carbon markets.

KEYWORDS: waqf forest; sharia crowdfunding; carbon.

1. Introduction

The global transition toward a green economy has become an urgent priority in response to the escalating climate crisis, which increasingly threatens ecological

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sustainability and human well-being. As the country with the third-largest tropical forest area in the world, Indonesia plays a strategic role in global carbon sequestration and climate mitigation efforts (Basuki et al., 2022). Nevertheless, deforestation in Indonesia remains substantial. According to the Ministry of Forestry, Indonesia lost approximately 175.4 thousand hectares of forest in 2024 after accounting for reforestation efforts, from a total gross deforestation of 216.2 thousand hectares (Ministry of Forestry of the Republic of Indonesia, 2025). This persistent rate of forest loss indicates that existing conservation and protection initiatives have not yet achieved optimal effectiveness.

Beyond its ecological function, the forestry sector carries significant socio-economic importance in Indonesia. Forest-based activities sustain millions of rural households, including smallholder farmers, customary (adat) communities, and informal workers, through timber, agroforestry, and non-timber forest products. Smallholder forest systems can provide meaningful income and financial buffers; however, limited market access, weak bargaining power, and liquidity constraints often drive premature harvesting and short-term extraction that undermine sustainability (Stewart et al., 2021). Evaluations of social forestry and community-based management reforms further show uneven welfare outcomes, as administrative barriers, institutional fragmentation, and elite capture constrain equitable participation and conservation effectiveness (Rochmayanto et al., 2023; Sirimorok et al., 2024). Persistent land tenure disputes and unclear benefit-sharing also create property-rights uncertainty, discouraging long-term investment in conservation and carbon initiatives (Gunawan et al., 2024). Consequently, deforestation pressures remain closely linked to poverty, land conflicts, and underinvestment, highlighting the need for inclusive financing mechanisms that align ecological protection with community empowerment.

In parallel, the forestry sector has become a central pillar in carbon trading mechanisms, particularly within the voluntary carbon market. The launch of the Indonesian Carbon Exchange (IDX Carbon) in 2023 marked a significant policy milestone in establishing a domestic carbon market infrastructure aligned with Indonesia's Net Zero Emission 2060 commitment (Indonesia Financial Services Authority, 2023). By the first quarter of 2025, domestic carbon trading through IDX Carbon reached 690,675 tons of CO_2e, surpassing the total traded volume during 2023–2024 and attracting 111 registered market participants (Asean Exchanges, 2025). Despite this positive momentum, carbon prices in Indonesia remain relatively low, averaging around USD 3.66 per ton of CO_2e, substantially below prices observed in neighboring countries (ICAP, 2024). This price disparity reflects structural challenges in market depth, demand certainty, and financing mechanisms for land-based carbon projects (Fig. 1).

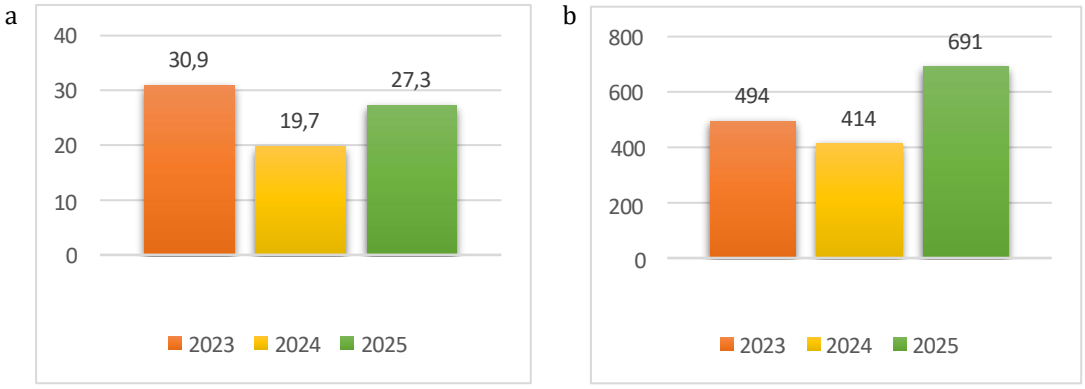

Fig. 1. Carbon exchange trading: (a) value levels; (b) volume
(Asean Exchanges, 2025; ICAP, 2024)

Financing for carbon mitigation projects, particularly those based on land use and forestry, continues to rely heavily on donor funding or conventional investment schemes (Wibowo, 2025). Alternative financing instruments rooted in Islamic values, such

as waqf (Islamic endowment), remain marginally involved in climate mitigation initiatives. This marginalization is notable given that waqf has historically and theoretically functioned as a highly relevant Islamic financial instrument for supporting sustainable development (Rianti & Munawar, 2024). As highlighted by Usman & Faruqi (2024), Murat Çizakça emphasized that *waqf* served as the backbone of public financing during the Ottoman era, supporting sectors ranging from education to social infrastructure. Similarly, Aziz (2022) argues that productive waqf plays a critical role in wealth redistribution and long-term social resilience.

Indonesia possesses substantial untapped waqf potential. Reports by the Indonesian Waqf Board (BWI) estimate that national waqf assets could reach approximately IDR 180 trillion annually, yet their utilization remains far below this potential (Indonesian Waqf Board, 2023). At the same time, academic literature on productive waqf and Islamic financial technology has expanded in recent years. (Fitriani & Taufiq, 2023), for instance, examine the integration of crowdfunding technology to enhance public participation in cash waqf. Tutun (2025) analyzes regulatory dynamics and implementation challenges within voluntary carbon markets prior to the establishment of a formal carbon exchange. However, despite these advances, existing studies largely treat waqf, Islamic crowdfunding, and carbon markets as separate domains. To date, no comprehensive study has systematically integrated waqf-based forests, Sharia-compliant crowdfunding, and carbon trading into a unified and operational financing model.

From an Islamic ethical and legal perspective, environmental protection is deeply embedded in the objectives of Islamic law (*maqasid al-shari'ah*), particularly through the principle of *hifz al-bi'ah* (protection of the environment). The Qur'anic injunction prohibiting environmental destruction after its restoration (Qur'an 7:56) and the Prophetic tradition that regards tree planting as an ongoing charity (*sadaqah jariyah*) (HR. Muslim no. 1552) establish a strong normative foundation for ecological stewardship. Classical scholars such as al-Qurtubi interpret environmental preservation as an expression of *tawhid*-based responsibility, while contemporary scholarship increasingly interprets maqāṣid al-shari'ah as providing an ethical and legal foundation for environmental protection within sustainable development frameworks (Nurholis, 2025). This perspective is further reinforced by Fatwa MUI No. 41/2014, which obligates Muslims to protect the environment and avoid wasteful and destructive practices (Indonesian Council of Ulama, 2014). Empirical studies also demonstrate that Islamic narratives significantly influence pro-environmental behavior in Muslim communities (Hidayat, 2023; Indrajati et al., 2023). Nevertheless, most of these approaches remain normative or educational and have not yet been translated into concrete Islamic economic instruments for environmental financing.

Within this context, waqf-based forests emerge as a promising form of productive waqf. Defined as the endowment of forest land managed sustainably for long-term public benefit, waqf forest aligns conservation objectives with socio-economic empowerment (Nugraha et al., 2022; Sirait, 2024). While initiatives such as UNDP–BWI's Green Waqf framework have introduced this concept, scholarly exploration of *waqf* forest, particularly in relation to carbon trading, remains limited. Previous studies have explored digital innovations such as blockchain-based green waqf (Sukaina et al., 2022) and conceptual links between waqf and green economy frameworks (Mardani, 2023). The most closely related study by Ali et al. (2025) proposes business schemes for carbon projects in waqf forests but identifies persistent barriers, including certification costs, limited land availability, and the absence of specific Sharia guidance on carbon credits.

Sharia-compliant crowdfunding offers a potential mechanism to operationalize waqf forest financing in an inclusive and participatory manner. Crowdfunding enables the mobilization of funds from a broad base of contributors through digital platforms, structured under Sharia principles that prohibit *riba*, *gharar*, and *maysir*, and utilize contracts such as waqf, *qardh*, *mudarabah*, and *musharakah* (Ardiana & Baidhowi, 2025; Zaenurrosyid et al., 2021). Empirical evidence suggests that integrating crowdfunding with waqf can expand access to socially beneficial projects, including environmental conservation (Sudi, 2025). In Indonesia, the legal foundation for Sharia-compliant

crowdfunding is provided by DSN-MUI Fatwa No. 117/DSN-MUI/II/2018, which regulates technology-based fundraising in accordance with Islamic principles.

To assess the sustainability and feasibility of such an integrated model, this study draws upon two complementary theoretical frameworks: the Triple Bottom Line (TBL) and contemporary *maqasid al-shari'ah*. The Triple Bottom Line framework emphasizes the interdependence of economic viability (profit), social equity (people), and environmental integrity (planet) as core dimensions of sustainable development, originating from Elkington's framework and widely recognized in sustainability literature (Tseng et al., 2020). Meanwhile, contemporary *maqasid* scholarship expands Islamic legal objectives to include environmental protection as an essential dimension of public welfare (Fad, 2021; Tohari & Kholish, 2020). Together, these frameworks provide a holistic lens for evaluating waqf-based forest carbon projects as instruments of Islamic green finance.

Against this backdrop, this study addresses a critical gap at the intersection of Islamic social finance and climate finance. Although Indonesia has established a domestic carbon trading infrastructure and possesses substantial waqf potential, financing mechanisms for forest-based carbon projects remain fragmented, conventional, and insufficiently inclusive. Accordingly, this research seeks to examine how waqf forests, Sharia-compliant crowdfunding, and voluntary carbon markets can be systematically integrated, what technical, regulatory, social, and Sharia-related constraints hinder implementation, and to what extent such a model can enhance both environmental conservation and community welfare. Using a qualitative exploratory design based on semi-structured interviews with nazir, Islamic crowdfunding practitioners, carbon market experts, and regulators, followed by thematic analysis, the study provides an in-depth understanding of stakeholder perceptions, institutional readiness, and implementation challenges. Rather than pursuing statistical generalization, the research offers a conceptual and empirical foundation for policy innovation and future development of inclusive Islamic green finance instruments for forest carbon initiatives.

2. Methods

2.1 Research approach and design

This study employs a qualitative exploratory approach to examine the potential, challenges, and feasibility of integrating waqf-based forest financing with Sharia-compliant crowdfunding mechanisms within voluntary carbon markets in Indonesia. A qualitative approach is considered appropriate given the novelty and interdisciplinary nature of the research topic, which lies at the intersection of Islamic social finance, environmental sustainability, digital financial technology, and carbon market governance. These domains involve complex institutional arrangements, normative considerations, and stakeholder interactions that cannot be adequately captured through quantitative techniques.

The research adopts a descriptive–exploratory design aimed at developing an initial and contextually grounded understanding of an emerging financing model. Rather than testing hypotheses or establishing causal relationships, the study seeks to generate analytical insights into how key stakeholders perceive the integration of waqf forest, crowdfunding, and carbon trading, and how such integration may operate in practice. The study emphasizes analytical generalization by linking empirical findings to established theoretical frameworks, rather than statistical generalization. The research was conducted between May and July 2025. This period covered the preparation of interview instruments, informant recruitment, data collection, transcription, and qualitative data analysis. Interviews were conducted flexibly, both online (via Zoom) and offline, depending on informant availability.

2.2 Conceptual framework and analytical orientation

This study is based on a conceptual framework integrating the Triple Bottom Line (TBL) approach with the principles of maqasid al-shari'ah, particularly the principle of hifz al-bi'ah (environmental protection). The TBL framework highlights the interconnection between three key dimensions: economic sustainability (profit), social equity (people), and environmental integrity (planet). These dimensions guide the analysis of waqf forests as a productive form of Islamic endowment that generates value across these three areas.

Waqf forests contribute to environmental sustainability by supporting carbon sequestration, social equity through local community participation, and economic value by generating revenue from carbon credits. The role of Sharia-compliant crowdfunding is crucial in mobilizing public support for these long-term projects. By using crowdfunding, the study seeks to bridge financing gaps, ensuring that funds are raised transparently and aligned with Islamic financial principles. The voluntary carbon market is the platform through which the environmental benefits of the forest are monetized, providing financial returns that sustain its management.

This conceptual orientation shapes the interview guide and coding strategy used for data analysis. The study examines the findings in relation to the economic, social, and environmental dimensions of TBL and assesses their alignment with the overarching goals of maqasid al-shari'ah. In summary, the framework serves as the foundational guide for analyzing how waqf forests, through Sharia-compliant crowdfunding and the voluntary carbon market, can contribute to sustainable development, benefiting both the environment and society while adhering to Islamic principles of justice and stewardship.

2.3 Data type and data collection method

The study relies on primary qualitative data obtained through semi-structured interviews. This method was selected to allow systematic exploration of predefined themes while maintaining flexibility for informants to elaborate on issues based on their professional experience. Semi-structured interviews are particularly suitable for exploratory research where emerging practices and institutional arrangements are still evolving.

An interview guideline was developed prior to data collection and organized around three core themes: the perceived potential of waqf forest as a financing mechanism for carbon projects; implementation challenges, including technical, regulatory, institutional, social, and Sharia-related barriers; and the feasibility and internal coherence of an integrated financing model combining waqf, crowdfunding, and voluntary carbon markets. Open-ended questions were used to encourage reflective responses, with follow-up probes applied when clarification or deeper explanation was required.

2.4 Informant selection and research context

Informants were selected using purposive sampling based on their relevance, expertise, and direct involvement in areas related to waqf management, Islamic financial technology, forestry-based carbon projects, or regulatory oversight. This sampling strategy aligns with qualitative research objectives that prioritize information-rich cases over representativeness. The informants represented several key stakeholder groups: *nazir* or representatives of waqf management institutions; practitioners from Sharia-compliant crowdfunding platforms; carbon market practitioners and environmental project developers; and regulators or policy experts associated with Islamic finance, forestry governance, or carbon trading.

The inclusion of diverse stakeholder groups enabled source triangulation and facilitated a multidimensional understanding of the institutional ecosystem surrounding waqf forest–based carbon financing. Indonesia was selected as the research context due to its substantial forest resources, developing domestic carbon market infrastructure, and

significant untapped waqf potential. These characteristics make Indonesia a relevant and critical setting for examining the feasibility of Islamic green finance innovations.

2.5 Data collection procedure

Data collection was carried out over a six-week period. Prior to each interview, informants were provided with a clear explanation of the study's objectives and the voluntary nature of participation. Informed consent was obtained for audio recording and data use. Interviews generally lasted between 30 and 50 minutes, depending on the informant's role and depth of discussion.

All interviews were digitally recorded and transcribed verbatim to ensure accuracy and completeness. Transcription was conducted shortly after each session to preserve contextual familiarity. Field notes and reflexive memos were also maintained to document non-verbal cues, contextual observations, and preliminary analytical impressions. The data collection process was iterative, with insights from early interviews informing subsequent questioning. Recruitment continued until thematic saturation was achieved, indicated by the absence of new substantive themes emerging from additional interviews. To enhance interpretive accuracy, several participants were contacted for member checking, allowing clarification and confirmation of key statements.

2.6 Data analysis technique

Data analysis was conducted using thematic analysis supported by NVivo 15 qualitative data analysis software. Thematic analysis was selected due to its flexibility and suitability for identifying patterns across qualitative data. NVivo facilitated systematic coding, transparent data management, and efficient comparison across interviews.

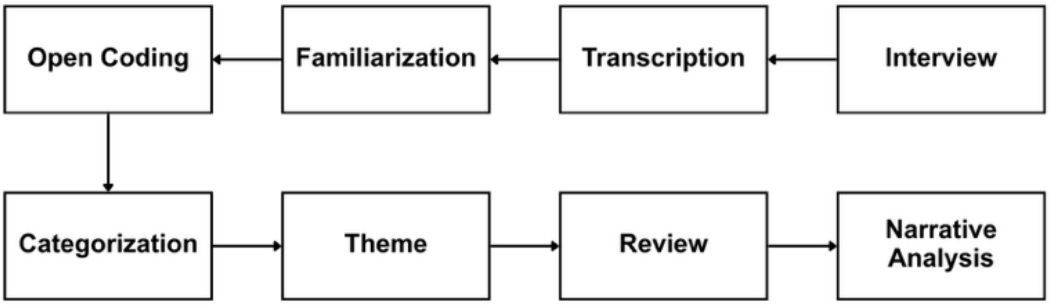

Fig. 2 Data processing flow

First, data familiarization was achieved through repeated reading of transcripts and listening to recordings. Second, open coding was conducted inductively to identify meaningful text segments related to financing mechanisms, governance arrangements, Sharia compliance, and stakeholder perceptions. Third, related codes were grouped through axial coding into broader conceptual categories, such as perceived benefits, regulatory barriers, institutional readiness, and ethical considerations. Finally, selective coding was applied to integrate categories into overarching themes aligned with the study's conceptual framework (Triple Bottom Line and maqasid al-shari'ah).

To strengthen analytical reliability, an inter-coder verification process was conducted in which a second researcher independently reviewed a subset of transcripts and coding structures. Discrepancies were discussed until consensus was reached. An audit trail documenting coding decisions, theme development, and analytical reflections was maintained to ensure methodological transparency. This structured approach enabled both inductive theme emergence and deductive linkage to theory, thereby enhancing analytical rigor.

2.7 Trustworthiness and ethical considerations

Several strategies were employed to ensure the trustworthiness of the findings, following established qualitative research criteria of credibility, dependability, confirmability, and transferability. Credibility was strengthened through source triangulation by engaging diverse stakeholder groups and through member checking to validate interpretations with participants. Dependability was supported by systematic documentation of procedures and the use of qualitative analysis software to maintain consistent coding. Confirmability was enhanced through reflexive journaling and the maintenance of an audit trail, which minimized subjective influence on interpretation. Transferability was addressed by providing rich contextual descriptions of the research setting in Indonesia.

Potential researcher bias was mitigated through reflexive awareness, peer debriefing, and the inclusion of divergent or contradictory perspectives in the analysis. These steps helped ensure that findings reflected participants' views rather than researcher preconceptions. Ethical considerations were observed throughout the research process. Participation was voluntary, confidentiality and anonymity were assured, and identifiable information was removed from transcripts. All data were securely stored and used solely for academic purposes.

2.8 Methodological scope and limitations

This study adopts an exploratory qualitative design aimed at generating contextual and conceptual insights rather than statistical generalization. Accordingly, the findings are based on stakeholder perceptions and experiences and should be interpreted as analytical generalizations rather than universally representative conclusions. The reliance on semi-structured interviews may introduce subjective bias, although triangulation, member checking, and systematic coding were applied to enhance credibility.

The study does not include quantitative verification of financial feasibility or environmental performance. Technical assessments such as carbon sequestration measurement, credit certification, or return–risk analysis are beyond the scope of this research. Moreover, the Indonesian context, while relevant due to its substantial forest and waqf potential, may limit transferability to other jurisdictions with different regulatory and institutional settings. Future studies are encouraged to employ quantitative or mixed-method approaches, pilot implementations, and cross-country comparisons to empirically validate the proposed model and evaluate its scalability and economic–environmental impacts.

3. Results and Discussion

3.1 Overview of the study and the proposed operational integration model

This study explores how waqf (Islamic endowment) can be mobilized, managed, and converted into measurable environmental and socio-economic benefits through an integrated model of waqf-based forest carbon projects financed via Sharia-compliant crowdfunding and linked to voluntary carbon market mechanisms in Indonesia. The study positions this integration as a practical pathway for inclusive Islamic green finance, combining philanthropic capital formation (waqf), digital participation and transparency through crowdfunding, and monetization of verified environmental outcomes via carbon credits.

Empirically, the model is grounded in qualitative evidence from semi-structured interviews with nine key informants representing forestry/environmental funding practitioners, *nazir* (waqf managers) and waqf forest foundations, national and regional Sharia authorities, academics/observers in green finance, Sharia fintech and crowdfunding practitioners, Islamic capital market professionals, and strategy and digital transformation

consultants. This multi-stakeholder coverage provides a comprehensive perspective on both the normative–Sharia legitimacy and the operational–market feasibility of the proposed model.

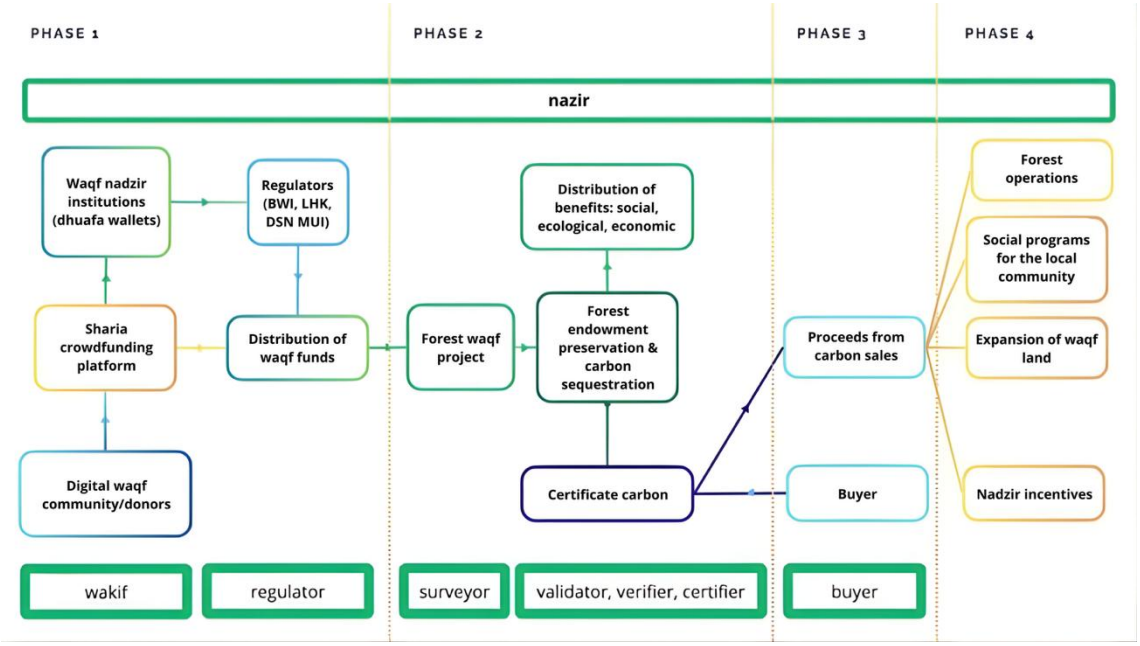

Fig. 3. The integration of forest waqf with sharia crowdfunding-based carbon trading schemes (Ali et al., 2025)

Synthesizing stakeholder insights, the study outlines an operational chain consisting of four interlinked phases (Fig. 3): waqf fundraising through Sharia-compliant crowdfunding; project implementation and forest–carbon management; monetization through carbon credit sale; and benefit distribution and project scaling. This four-phase structure is informed by the value chain logic commonly used in voluntary carbon projects (Kreibich & Hermwille, 2021), complemented by widely recognized project-cycle frameworks such as the UN-REDD Project Cycle Manual. The phases also align with the governance logic of productive waqf management under Indonesian institutional guidance and practice (Indonesian Waqf Board, 2020).

Table 1. Basis for Determining the Phase

Phase	Foundation or Potential Reference
Phase 1: Fundraising	1) The concept of productive waqf (Indonesian Waqf Agency Regulation Number 1 of 2020) 2) Sharia crowdfunding
Phase 2: Project Implementation	1) Voluntary carbon project mechanisms 2) UN-REDD Project Cycle Manual
Phase 3: Monetization	1) Carbon Trading Mechanism 2) Corporate offset mechanisms in ESG
Phase 4: Benefit Distribution	1) Sustainable waqf management

(Ali et al., 2025; Gold Standard Foundation, 2020; Indonesian Waqf Board, 2020; Kreibich & Hermwille, 2021; Wetterberg et al., 2024)

In terms of Sharia fundraising infrastructure, Phase 1 adopts the principles and governance logic of Sharia crowdfunding (Fahmi et al., 2025). Meanwhile, Phase 3 incorporates widely used voluntary carbon market frameworks and certification standards (Gold Standard Foundation, 2020) and recognizes that corporate offset decisions are increasingly intertwined with ESG strategies and disclosure expectations (Wetterberg et al., 2024). Finally, Phase 4 reflects sustainable waqf distribution practices and the legal constraints on *nazir* remuneration, which is capped at a maximum 10% under Indonesian Waqf Law and operational guidance (Indonesian Waqf Board, 2020). For a concise overview

of each phase and its corresponding regulatory or technical reference, please refer to Table 1.

3.2 Results of each phase

3.2.1 Phase 1 (fundraising and mobilization of waqf forest funds)

Stakeholders consistently considered Sharia-compliant crowdfunding as the most feasible mechanism to mobilize waqf for forest-carbon initiatives at scale. In this phase, the public (wakif) channels contributions through a digital crowdfunding platform. The platform is expected to serve as a transparent intermediary that ensures Sharia compliance, facilitates broad participation, and provides consistent reporting to donors. Consistent with Sharia crowdfunding governance, informants emphasized that the platform's legitimacy depends on transparent disclosure, accountability, and a clear separation between fundraising facilitation and asset stewardship (Fahmi et al., 2025).

Across interviews, respondents stressed that the *nazir* remains the primary entity responsible for managing the endowed asset and implementing the project, both legally and morally. Consequently, this fundraising stage is also strongly connected to institutional oversight and Sharia governance. Informants repeatedly mentioned the importance of aligning fundraising and governance with the principles outlined in Indonesia's productive waqf regulatory framework, including BWI guidance and relevant regulations (Indonesian Waqf Board, 2020). The role of Sharia authorities is also viewed as essential for maintaining public trust and preventing reputational risk, especially in a novel domain combining endowments and carbon trading.

From a sustainability lens, Phase 1 shapes the "social participation" dimension of the model because crowdfunding enables inclusive access for donors who may not have direct connections to land-based projects. Informants highlighted that crowdfunding can attract participation from urban communities and diaspora donors, provided the platform communicates the project clearly and demonstrates credible progress. This aligns with evidence that digital mechanisms can broaden civic participation and connect donors to conservation initiatives beyond geographic limitations (Maisyarah & Hadi, 2024).

3.2.2 Phase 2 (project implementation, forest management, and carbon MRV readiness)

In Phase 2, the collected waqf funds are deployed into real-sector conservation and restoration activities, such as land acquisition or designation, tree planting, and ongoing forest maintenance. Stakeholders underlined that this stage is central to environmental integrity, carbon credits can only be issued if emission reductions or sequestration outcomes are credible and verifiable. Informants consistently emphasized the need to follow recognized voluntary carbon project cycles, including third-party validation and verification. This is consistent with the broader value-chain perspective in voluntary carbon markets described by Kreibich & Hermwille (2021), as well as standard project-cycle guidance in frameworks such as the UN-REDD Project Cycle Manual. Under this stage, stakeholders repeatedly stressed that technical actors, surveyors, validators, verifiers, and certifiers, should be engaged to ensure that carbon outcomes are measurable and accepted by market participants.

A recurring issue is institutional readiness, particularly the capability of *nazir* to manage complex carbon projects. Stakeholders argued that forest-carbon projects require multidisciplinary competence, forestry management, carbon accounting, stakeholder engagement, and Sharia governance, beyond conventional waqf administration. Institutional challenges in waqf governance include limited coordination between central and regional bodies, weak human resource capacity, low transparency, and suboptimal regulatory support, which hinder productive waqf development and require institutional reform (Aulia Dewi et al., 2025). Consequently, stakeholders recommended structured

capacity-building and partnerships with experienced carbon project developers and certifiers to ensure accountability and performance.

3.2.3 Phase 3 (monetization and sale of carbon credits)

Phase 3 concerns the conversion of verified environmental performance into monetizable carbon assets, typically through the issuance and sale of carbon credits. Stakeholders described this process as primarily B2B, where credits are sold to corporations seeking to offset emissions. Informants emphasized that the legitimacy of monetization hinges on the credibility of certification and the market standard used. In this regard, references to recognized frameworks in the voluntary market, such as standards and methodologies associated with the Gold Standard ecosystem, are considered relevant to ensuring trust in the issued credits (Gold Standard Foundation, 2020).

Importantly, stakeholders interpreted monetization not merely as revenue generation, but as a mechanism to sustain long-term conservation. They noted that corporate offsets are increasingly shaped by ESG commitments and disclosure pressures, meaning buyers are more likely to seek credits that are transparent, credible, and defensible in reporting (Wetterberg et al., 2024). This implies that waqf forest carbon projects can potentially compete in voluntary markets by emphasizing governance credibility, transparency, and community benefit, provided that certification and reporting are robust. However, stakeholders also acknowledged market realities: carbon prices and demand can fluctuate, and credit revenue may be delayed. Therefore, monetization was framed as a key opportunity but also a risk factor that must be managed through careful project design, MRV rigor, and diversified benefit strategies.

3.2.4 Phase 4 (benefit distribution, waqf sustainability, and project scaling)

Phase 4 concerns how revenues and benefits are distributed, while preserving the endowed asset and ensuring long-term sustainability. Stakeholders emphasized that benefit distribution must follow waqf governance principles: a portion should fund operational costs and long-term forest maintenance, while the remaining benefits should be allocated to community empowerment programs (e.g., education, health, livelihood training, and local economic development). This aligns with sustainable waqf management principles promoted by national guidance and practice (Indonesian Waqf Board, 2020).

In terms of governance constraints, stakeholders highlighted the legal rule that *nazir* may receive a maximum of 10% as remuneration. This is consistent with Indonesia's Waqf Law (Law No. 41 of 2004) and reinforced through operational guidance (Indonesian Waqf Board, 2020). Stakeholders argued that clear and transparent allocation rules are essential for maintaining donor trust, avoiding moral hazard, and ensuring that the social and environmental objectives remain central. A further insight is that Phase 4 provides the logic for scaling: surplus benefits can be reinvested to expand waqf forest land, replicate the project in other sites, or strengthen supporting infrastructure (capacity building, monitoring, digital reporting). Stakeholders thus framed the model as potentially self-reinforcing, provided the earlier phases achieve credible MRV and stable revenue flows.

3.3 Thematic findings on opportunities

3.3.1 Social, economic, and ecological value

Stakeholders identified strong potential for waqf forest carbon projects across three value dimensions. Socially, informants emphasized community empowerment through participation in forest management, planting activities, and non-timber forest product initiatives. This resonates with the argument that environmental waqf can strengthen social inclusion and long-term sustainability financing, especially when communities become active participants rather than passive beneficiaries (Setyorini et al., 2020).

Economically, stakeholders highlighted two sources of value: non-timber forest products (e.g., honey and outputs from multi-purpose tree species) and carbon credit sales as an additional revenue stream. This supports the understanding of productive waqf as a long-term social asset capable of generating sustained economic benefits while preserving the endowed capital (Indonesian Waqf Board, 2020). Ecologically, stakeholders viewed the model as a practical response to deforestation and degraded land degradation. Forest conservation contributes to carbon sequestration, biodiversity protection, and landscape restoration. Informants linked this to broader climate objectives and emphasized that environmental benefits must be made visible through credible monitoring and reporting to sustain stakeholder confidence and market acceptance.

3.3.2 Digital crowdfunding as an inclusion and trust infrastructure

Sharia-compliant crowdfunding was consistently framed as a crucial enabler for inclusion and transparency. Stakeholders argued that digital platforms can broaden participation, especially among youth and diaspora donors, and can institutionalize routine reporting that strengthens credibility. This aligns with empirical findings showing that digital mechanisms can expand public engagement in environmental and social causes (Maisyarah & Hadi, 2024).

Moreover, stakeholders emphasized that younger demographics show significant enthusiasm toward environment-oriented Islamic social finance and crowdfunding initiatives, particularly when initiatives demonstrate clear impact pathways and transparency. This is consistent with research indicating high youth interest in environmental social investment through Sharia crowdfunding (Yetti & Syafei, 2025). Likewise, the finding that crowdfunding-based waqf platforms can shape positive perceptions and strengthen public engagement reflects prior evidence on productive waqf crowdfunding effects (Diniyah, 2021).

3.4 Thematic findings on challenges

3.4.1 Regulatory and sharia uncertainty

A dominant challenge identified is the lack of an explicit regulatory framework that directly integrates waqf governance with carbon trading operations. Stakeholders argued that, without legal clarity, actors may hesitate due to reputational and compliance risks. They stressed the importance of harmonization between relevant authorities to establish clear guidance for institutional roles, reporting, and accountability across phases.

3.4.2 Digital divide and technology readiness

Stakeholders also highlighted unequal access to digital infrastructure and uneven public digital literacy, particularly in rural areas close to forest sites. This constraint may limit the inclusiveness of crowdfunding mechanisms and weaken community participation if not addressed. This challenge aligns with the “digital divide” discussion in Sharia fintech literature, where unequal access and literacy reduce effective inclusion (Sagita & Giri, 2023). Stakeholders therefore recommended hybrid engagement strategies (online + offline) and targeted education to ensure that digital fundraising does not detach projects from local beneficiaries.

3.4.3 Institutional capacity and governance of nazir

Institutional capacity of *nazir* emerged as a critical feasibility condition. Stakeholders argued that carbon projects require professional governance, specialized skill sets, and robust accountability systems. This concern parallels broader regional challenges in productive waqf governance, where weak institutional capacity and limited adaptation to

modern digital and governance systems remain persistent obstacles (Aulia Dewi et al., 2025). Strengthening *nazir* capacity, through training, partnerships, and improved governance, was therefore identified as necessary for ensuring project credibility and sustainability.

3.5 Model validation and feasibility

Overall, stakeholders considered the model feasible and potentially transformative, but not "plug-and-play." They emphasized feasibility conditions related to land suitability, financial risk and market volatility, governance boundaries, and credible certification and reporting. First, stakeholders cautioned that not all land is suitable for forest carbon projects. Severely degraded post-mining land may require substantial rehabilitation investment and may yield uncertain carbon outcomes. This is consistent with evidence that project success strongly depends on baseline land condition and ecosystem carrying capacity (Faradika et al., 2024). Stakeholders thus recommended prioritizing land with feasible restoration pathways and integrating livelihood-based strategies to support community engagement.

Second, stakeholders raised concerns about cost–revenue mismatch: upfront costs for restoration and certification can be high while carbon revenues may be delayed and uncertain. This concern is reinforced by broader observations that carbon markets in developing countries may face volatility and structural instability (UNCTAD, 2025). As a result, stakeholders recommended diversification beyond carbon revenue, through non-timber forest products and phased financing, so that projects remain financially sustainable even under low-price or delayed-credit scenarios.

Third, stakeholders stressed that governance boundaries must remain clear: crowdfunding platforms should facilitate fundraising and transparency, while *nazir* retains authority and accountability over asset management and implementation. This is essential for legal alignment with Law No. 41 of 2004 and for maintaining donor trust. Finally, stakeholders emphasized that Phase 3 monetization depends heavily on recognized standards and credible market acceptance, aligning with voluntary carbon market mechanisms (Gold Standard Foundation, 2020) and corporate offset practices increasingly shaped by ESG requirements (Wetterberg et al., 2024).

3.6 Comparative perspective with other islamic finance innovations

To situate the proposed waqf forest–crowdfunding–carbon trading model within global debates on Islamic sustainable finance, it can be compared with other Islamic finance innovations that have been used to support sustainability outcomes. First, the experience of green sukuk in Indonesia and elsewhere shows that Islamic capital markets can mobilize large-scale funding for climate-related projects, yet such instruments are typically issuance-heavy and institutionally centralized, which may limit grassroots participation and direct community linkage (Liu & Lai, 2021). Second, climate-oriented Islamic finance discussions increasingly emphasize traceability and accountability to avoid "impact claims" that are hard to verify, an issue your model directly addresses through MRV-based carbon certification combined with waqf governance and platform transparency (Raeni et al., 2022). Third, innovations like Islamic crowdfunding models demonstrate strong potential for widening access and participation, but most applications remain focused on MSME or social causes rather than nature-based climate assets; your study extends this stream by applying Islamic crowdfunding logic to forest-carbon project financing (Abdeldayem & Aldulaimi, 2023). Finally, state-linked waqf instruments such as Cash Waqf Linked Sukuk (CWLS) illustrate the growing sophistication of Islamic social finance, but they remain largely intermediated and policy-driven; by contrast, the proposed model offers a more site-linked, community-facing pathway while still requiring robust governance to address trust and professionalism concerns observed in CWLS implementation (Ryandono et al., 2025).

4. Conclusions

This study examined the feasibility of integrating waqf-based forest conservation, Sharia-compliant crowdfunding, and voluntary carbon markets as an inclusive Islamic green finance mechanism in Indonesia. Based on interviews with key stakeholders, the findings indicate that the proposed model is both conceptually sound and operationally promising, provided that institutional readiness and regulatory support are strengthened.

Waqf forests were found to generate multidimensional benefits: social value through community participation and livelihood support, economic value through diversified income sources including carbon credits, and ecological value through restoration and carbon sequestration. Sharia-compliant crowdfunding plays a critical enabling role by broadening participation, enhancing transparency, and mobilizing public trust through digital reporting. Together, these mechanisms align Islamic ethical objectives with measurable environmental outcomes.

However, several constraints must be addressed, including fragmented regulations between waqf governance and carbon trading, limited managerial and technical capacity among nazir, uneven digital literacy, and the absence of specific Sharia guidance on carbon-related assets. Financial risks associated with certification costs and market volatility further highlight the need for diversified revenue strategies.

Accordingly, policymakers are encouraged to harmonize regulatory frameworks and develop Sharia rulings on carbon assets, while practitioners should strengthen governance capacity, digital competencies, and partnerships with certified carbon developers. Future research may employ quantitative or comparative approaches to assess scalability and long-term impact. Overall, this study contributes a practical and community-centered financing pathway that bridges Islamic social finance with climate mitigation efforts and expands the toolkit of sustainable Islamic finance.

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Data Availability Statement

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Conflicts of Interest

The authors declare no conflict of interest.

Declaration of Generative AI Use

During the preparation of this work, the author(s) used DeepL to assist in language translation and improving clarity of expression. After using this tool, the author(s) reviewed, revised, and edited the content as needed and took full responsibility for the accuracy, interpretation, and integrity of the publication.

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