Green Sukuk as A Sustainable Financing Instrument: A Systematic Literature Review

Nazeri[a, 1*], Gugus Kriswahyudi[b, 1]

[1] Institut Agama Islam Tulungbawang Lampung, Indonesia
Email: [a]nazerizeri7@gmail.com, [b]guguskriswahyudi@gmail.com

*Corresponding Author

ABSTRACT

Green Sukuk has emerged as an increasingly relevant Islamic financial instrument for financing green projects and supporting sustainable development agendas. Although scholarly attention to Green Sukuk has grown, studies that integrate research trends, governance, market performance, maqasid al-shariah, impact measurement, and accountability remain limited. This study examines the development of Green Sukuk literature as a sustainable financing instrument and formulates an integrative synthesis and future research agenda. A systematic literature review was conducted using the Scopus database through identification, screening, eligibility, and inclusion stages. From 485 initial records, 57 core articles were selected and analyzed using narrative and thematic synthesis. The review identifies seven major themes: literature mapping, issuance and governance, green project financing and SDGs, market performance, investor behavior, maqasid al-shariah, and technology, verification, and greenwashing. The findings indicate that Green Sukuk has strategic potential to bridge Islamic and sustainable finance; however, its credibility depends on the integration of maqasid, governance, and impact measurement. This article has implications for strengthening Islamic sustainable finance theory and for promoting more accountable regulation, issuance, investment, and verification practices in Green Sukuk.

Keywords: *Green Sukuk; sustainable financing; maqasid al-shariah; governance; systematic literature review.*

INTRODUCTION

The transition toward a low-carbon economy requires financing innovation capable of connecting long-term capital needs with the sustainability agenda. In this landscape, Green Sukuk has developed as an instrument that combines sukuk structures, shariah compliance, and the financing objectives of green projects. The academic debate begins with the question of whether Green Sukuk is merely an extension of green bonds or whether it offers normative and institutional added value because it is supported by asset-based financing principles, the prohibition of speculation, and an orientation toward public benefit. Liu and Lai (2021, pp. 1896-1914) show that the development of Green Sukuk in Malaysia has been shaped by the ecology of global green finance, the experience of Islamic capital markets, and international institutional partnerships. In the Indonesian context, Endri et al. (2022, pp. 38-49) position corporate Green Sukuk as an alternative for sustainable financing, although its implementation still depends on regulatory readiness, issuer credibility, and the capacity of

the Islamic capital market. This shift shows that Green Sukuk is not only a technical and instrumental issue, but also concerns social legitimacy, institutional design, and the quality of sustainability evidence.

Studies on Green Sukuk have increased because this instrument is claimed to reduce the financing gap for green projects, particularly in renewable energy, climate mitigation, sustainable infrastructure, and the achievement of the Sustainable Development Goals. The literature shows that Green Sukuk should not be assessed solely from issuance success, but also from its ability to direct funds to priority projects and generate verifiable socio-environmental impacts. Ali et al. (2024, pp. 21097-21123) found that Green Sukuk is associated with economic growth, social development, and financial performance in Indonesia. Rahman et al. (2024, pp. 818-837) remind that issuance policies must ensure the priority use of proceeds so that they do not stop at procedural compliance. This urgency makes Green Sukuk an academic issue located at the intersection of Islamic finance, sustainable finance, public policy, and sustainability governance. The urgency becomes even stronger when markets demand transparency, reporting standards, and evaluation mechanisms capable of distinguishing substantive green financing from financing that merely satisfies formal claims.

Previous research shows an expansion of focus from conceptual studies toward systematic mapping, market evaluation, and investor behavior. Alam et al. (2023, pp. 61-72) mapped the development and evaluation of Islamic green financing through a systematic review of Green Sukuk, while Ulfah et al. (2024, pp. 1118-1133) emphasized that Green Sukuk research is still dominated by qualitative-theoretical approaches and requires stronger empirical studies. Alkadi (2024, pp. 467-488) assessed Green Sukuk studies as still fragmented into themes of advantages, drivers, market development, and challenges. Delle Foglie and Keshminder (2024, pp. 3202-3225) expanded the discussion through a bibliometric and systematic review of SRI sukuk, while Keshminder et al. (2022, pp. 76-94) and Abdullah and Keshminder (2022, pp. 985-1005) emphasized the importance of issuance frameworks, the role of market leaders, and reconciliation between green objectives and Islamic financial structures. This pattern indicates that Green Sukuk scholarship has grown rapidly but has not yet fully produced a conceptual synthesis that explains inter-variable relationships comprehensively.

One of the most widely discussed issues concerns the effectiveness of Green Sukuk as a sustainable financing instrument, rather than merely an Islamic capital market instrument carrying a green label. On the one hand, market studies show the competitiveness of Green Sukuk against green bonds, including issues of greenium, market reaction, and issuer contributions to the SDGs. Lee et al. (2025, pp. 1353-1373) demonstrate the importance of comparative analysis between Green Sukuk and green bonds, while Pirgaip and Arslan-Ayaydin (2024, pp. 423-440) highlight greenium in the primary market for Green Sukuk. On the other hand, the investor literature shows that market acceptance is strongly influenced

by sustainability perceptions, religiosity, trust, and pro-environmental behavior (Faisal et al., 2023, Article 7430). These different emphases show that the literature has not fully integrated the dimensions of issuance, market performance, investor motivation, and green project outcomes into a single analytical framework. This fragmentation may weaken the ability of the literature to explain whether Green Sukuk creates sustainability value that differs from conventional green instruments.

The main research gap lies in the limited synthesis connecting the use of proceeds, sustainable impact, maqasid al-shariah, and accountability. Many studies recognize Green Sukuk as green financing, but they do not consistently measure its real contribution to emission reduction, clean energy, conservation, and SDG indicators. The maqasid dimension also often appears as normative legitimacy rather than as an operational evaluation instrument. Wibowo et al. (2026, pp. 224-252) show the opportunity to harmonize hifz al-bi'ah in a forestry Green Sukuk model, but this agenda remains limited to certain contexts. Bader et al. (2026, pp. 301-313) began to test blockchain-based verification, reporting quality, and Green Sukuk pricing, indicating the importance of accountability issues. These limitations create space for a systematic review that evaluates Green Sukuk through governance, impact measurement, and greenwashing risk in an integrated manner. This gap is important because the legitimacy of Green Sukuk depends on consistency among shariah principles, green standards, project quality, and auditable evidence of impact.

The novelty of this article lies in developing a systematic literature review that not only maps Green Sukuk publications but also synthesizes Green Sukuk as a sustainable financing instrument based on maqasid, governance, and impact measurement. This article seeks to answer four research questions. First, how have the trends, themes, and research methods of Green Sukuk as a sustainable financing instrument developed in the academic literature? Second, how is Green Sukuk examined in relation to green project financing, SDG achievement, market performance, and issuance governance? Third, what are the main research gaps concerning impact measurement, maqasid al-shariah, investor behavior, and greenwashing accountability? Fourth, what synthesis framework can be developed to explain Green Sukuk as a sustainable financing instrument? With this focus, the article is expected to strengthen the conceptual contribution of Islamic sustainable finance and provide a relevant research agenda for academics, regulators, issuers, investors, and verification institutions. This framework also positions the article as a conceptual contribution to a more critical, evaluative, and applicable review literature.

LITERATURE REVIEW

Green Sukuk has developed as an academic and policy response to the need for financing the low-carbon transition, which cannot be met solely through public budgets and conventional debt instruments. The green finance literature positions green bonds as a means of mobilizing capital for renewable energy and energy efficiency, while the Islamic finance

literature adds the dimensions of shariah compliance, contractual justice, and social benefit (Azhgaliyeva et al., 2020, pp. 113-140; Liu & Lai, 2021, pp. 1896-1914). Green Sukuk is therefore understood as a hybrid instrument that combines asset-backed financing, halal principles, and sustainability objectives. Indonesia's experience shows that this instrument is relevant for financing national green projects, although its effectiveness depends on the legal framework, corporate readiness, and the credibility of the Islamic capital market (Endri et al., 2022, pp. 38-49; Supriyadi et al., 2023, pp. 151-180).

The main academic debate concerns whether Green Sukuk truly functions as a sustainable financing instrument or merely extends the label of conventional sukuk. Review studies show the growth of Green Sukuk literature, but its focus remains dispersed across definitions, issuance, policy, markets, and sustainable development opportunities (Alam et al., 2023, pp. 61-72; Alkadi, 2024, pp. 467-488; Ulfah et al., 2024, pp. 1118-1133). The SRI sukuk literature emphasizes that the sustainability of the financial system requires issuance standards, market incentives, and consistent shariah legitimacy (Delle Foglie & Keshminder, 2024, pp. 3202-3225). Malaysian studies reveal challenges relating to performance, issuance costs, and the need for a reconciliation framework between green objectives and sukuk structures (Keshminder et al., 2022, pp. 76-94; Abdullah & Keshminder, 2022, pp. 985-1005).

Empirical evidence broadens the debate from issuance to economic, social, market, and climate impacts. Green Sukuk is reported to have the potential to promote economic growth, social development, and financial performance, especially in countries with high green infrastructure financing needs (Ali et al., 2024, pp. 21097-21123). Cross-country studies also link Green Sukuk with climate change and sustainable development agendas, including Saudi Vision 2030 and the SDGs (Suriani et al., 2024, pp. 98-107; El Hoda El Hadj Mimoune et al., 2025, pp. 404-422). Market studies show differences between Green Sukuk and green bonds, especially regarding greenium, market reaction, and the SDG contributions of pioneering issuers (Lee et al., 2025, pp. 1353-1373; Pirgaip & Arslan-Ayaydin, 2024, pp. 423-440; Khairisma et al., 2025, pp. 1771-1791).

Governance and accountability issues are critical because green claims must be legally, shariah-wise, and environmentally verifiable. Issuance policies must ensure that Green Sukuk funds are directed to priority sectors, not merely to projects that are easy to label as green (Rahman et al., 2024, pp. 818-837). The shariah verification framework in Indonesia requires legal certainty regarding the conformity of sustainable projects with shariah principles (Afifah et al., 2026, pp. 95-119). The maqasid discourse strengthens the position of Green Sukuk through hifz al-bi'ah, especially in financing forest restoration and environmental protection (Wibowo et al., 2026, pp. 224-252). Recent literature has begun to examine reporting quality, blockchain-based verification, and the risks of pseudo-environmental values and greenwashing (Bader et al., 2026, pp. 301-313; Bin-Armia & Riana, 2023, pp. 110-130; Corapi, 2023, pp. 1167-1192).

The research gap emerging from this literature lies in the separation between studies of issuance, market performance, maqasid al-shariah, investor behavior, and impact measurement. Some studies emphasize drivers and investment intention, but have not sufficiently connected these factors with project quality and sustainability outcomes (Faisal et al., 2023; Timur et al., 2025, pp. 2403-2432). Other studies strengthen issuance practices and institutional learning, but have not yet developed a cross-dimensional evaluation framework linking use of proceeds, SDGs, governance, and greenwashing risk (Mahomed & Mahbot, 2024, pp. 1065-1081; Rahman et al., 2024, pp. 818-837). The next research need is a systematic literature review that synthesizes Green Sukuk as a sustainable financing instrument based on maqasid, governance, and impact measurement in an integrated way.

RESEARCH METHOD

This study uses a systematic literature review approach to identify, evaluate, and synthesize the development of Green Sukuk studies as a sustainable financing instrument. This approach was chosen because a systematic review enables researchers to construct a knowledge map transparently, replicably, and through explicit selection procedures (Tranfield et al., 2003; Snyder, 2019). The review process follows the logic of PRISMA, which emphasizes systematic stages of article identification, screening, eligibility, and inclusion (Page et al., 2021). Substantively, the review focuses on Green Sukuk, Islamic green bonds, sustainable sukuk, green finance, sustainable finance, SDGs, issuance governance, market performance, maqasid al-shariah, investor behavior, and greenwashing accountability, as emphasized in previous Green Sukuk studies (Alam et al., 2023; Ulfah et al., 2024; Delle Foglie & Keshminder, 2024; Alkadi, 2024).

The data source was the Scopus database because it provides bibliographic metadata, abstracts, DOI, affiliations, publication sources, and citation information relevant to academic literature reviews. The search was conducted using combinations of Boolean keywords in titles, abstracts, and keywords, namely: "green sukuk", "Islamic green bond", "sustainable sukuk", "ESG sukuk", "sustainable finance", "green finance", "climate finance", "sustainable development", "green economy", "financing instrument", "capital market instrument", and "investment instrument". These keywords were used to ensure that the article corpus captured not only studies that explicitly mentioned Green Sukuk, but also literature that situated it within the framework of sustainable financing, Islamic capital markets, and green projects.

The identification stage generated 485 initial articles. All metadata were examined to detect duplicates based on DOI, title, author, year, and publication source; this examination found no exact duplicates. Articles were then screened according to inclusion and exclusion criteria. The inclusion criteria covered scholarly articles relevant to Green Sukuk as a sustainable financing instrument, published in journals or academic proceedings, containing abstracts and core metadata, and showing full-text access indications through DOI or

publisher links. The exclusion criteria included popular articles, editorials, book chapters, articles that did not discuss Green Sukuk substantively, or articles that discussed sukuk, green bonds, Islamic finance, or green finance only in general terms without a direct connection to Green Sukuk. After the selection process, 57 core articles were established as the basis of the review.

Data analysis was conducted through narrative and thematic synthesis. Narrative synthesis was used to explain the development of trends, methods, and research directions, while thematic synthesis was used to group articles into dominant themes: literature mapping, issuance and governance, green project financing and SDGs, market performance, investor behavior, maqasid al-shariah, and technology, verification, and greenwashing. This technique is appropriate for integrating findings from conceptual, empirical, bibliometric, case-study, and quantitative articles without conducting statistical meta-analysis (Braun & Clarke, 2006; Popay et al., 2006). The synthesis results were then used to formulate research gaps and build a conceptual framework for Green Sukuk based on maqasid, governance, and impact measurement.

RESULT AND DISCUSSION

1. Thematic Structure and General Direction of the Literature

The review shows that Green Sukuk literature has developed from conceptual discussions of the compatibility between Islamic finance and sustainability toward broader debates on governance, green project financing, market performance, investor behavior, maqasid al-shariah, and impact accountability. Of the 57 core articles analyzed, the most dominant theme is green project financing, renewable energy, and SDGs, represented by 13 articles, followed by issuance, policy, regulation, and governance with 12 articles, and market performance, risk, pricing, and spillovers with 10 articles. This composition shows that Green Sukuk is no longer treated merely as a variation of sukuk, but as an instrument located at the intersection of Islamic finance, green finance, and sustainable development. This map is consistent with previous reviews that noted the acceleration of Green Sukuk literature, while also showing the dispersion of research focuses that have not yet been fully integrated (Alam et al., 2023, pp. 61-72; Ulfah et al., 2024, pp. 1118-1133; Delle Foglie & Keshminder, 2024, pp. 3202-3225; Alkadi, 2024, pp. 467-488).

In general, the literature develops two academic positions that complement one another while also generating debate. The first position views Green Sukuk as a green financing instrument with normative advantages because it is asset-based, aligned with shariah principles, and directed toward projects with environmental impact. The second position argues that green labels and shariah compliance are not sufficient to demonstrate sustainability contribution without strong reporting, verification, and impact measurement mechanisms. This debate appears clearly in

studies of Malaysia and Indonesia. Liu and Lai (2021, pp. 1896-1914) emphasize the importance of the institutional ecology of green finance for the development of Green Sukuk, while Endri et al. (2022, pp. 38-49) show that corporate Green Sukuk issuance in Indonesia still requires regulatory and market readiness. These findings show that the main issue is not only whether Green Sukuk can be issued, but whether such issuance can produce accountable sustainable financing.

2. Literature Mapping: From Bibliometrics to Integrative Synthesis

The cluster of reviews, bibliometrics, and conceptualization plays an important role in building the state of the art of Green Sukuk. Alam et al. (2023, pp. 61-72) mapped the development of Islamic green financing through Green Sukuk and emphasized the need for commitment from governments and investors. Ulfah et al. (2024, pp. 1118-1133) show that the Green Sukuk literature remains relatively limited and is often concentrated on articles that explicitly mention green topics, while Delle Foglie and Keshminder (2024, pp. 3202-3225) broaden the focus to SRI sukuk and financial system sustainability. Alkadi (2024, pp. 467-488) shows that Green Sukuk research generally revolves around benefits, drivers, development, and challenges. The main similarity among these studies is their contribution to mapping trends and research gaps. Their difference lies in the scope of the object: some focus directly on Green Sukuk, while others extend the discussion to SRI sukuk or Islamic sustainable finance. Their limitation is that most reviews remain largely mapping-oriented and have not sufficiently developed a cross-dimensional synthesis explaining relationships among issuance, governance, markets, investors, maqasid, and impact measurement.

The limitations of earlier reviews are important because reputable literature review articles should not merely show the number of publications and dominant themes. They also need to offer a critical reading of the position of Green Sukuk as a sustainable financing instrument. Literature reviews that are overly bibliometric risk producing descriptive knowledge maps but do not answer substantive questions: how does Green Sukuk work as a financing instrument, what is the evidence of its impact, and where are the limits of its contribution compared with conventional green bonds? Therefore, this article moves beyond mapping toward a thematic structure connecting seven clusters: conceptualization, issuance-regulation, green projects-SDGs, market performance, investor behavior, maqasid-SRI, and technology-verification-greenwashing. This structure strengthens the novelty of the systematic literature review by positioning Green Sukuk as a financing value chain, not merely as a bibliographic object.

Table 1. Research findings by main theme/subtheme

Theme/Subtheme	Number	Main focus of findings	Main debate/criticism	Open gap	Relevant articles

Literature mapping and conceptualization	7 (12.3%)	SLR, structured review, bibliometric mapping, and mapping of the development, opportunities, and challenges of Green Sukuk/SRI sukuk.	The literature is strong in mapping knowledge structures, but often stops at bibliometric mapping and has not yet integrated impact, governance, markets, and maqasid.	Integrative synthesis linking Green Sukuk as an instrument, green project outcomes, markets, governance, and maqasid.	(Alam et al., 2023; Ulfah et al., 2024; Delle Foglie & Keshminder, 2024; Alkadi, 2024; Raimi et al., 2024; Widiastuti et al., 2026)
Issuance, policy, regulation, and governance	12 (21.1%)	Issuance frameworks, government support, regulation, legal frameworks, issuer governance, and the Islamic capital market ecosystem.	Regulation is understood as an issuance driver, but its effectiveness differs according to institutional capacity, reporting standards, and market incentives.	Cross-country comparisons of regulation, taxonomy, fiscal incentives, reporting standards, and post-issuance governance.	(Liu & Lai, 2021; Keshminder et al., 2022; Abdullah & Keshminder, 2022; Endri et al., 2022; Rahman et al., 2024; Shalhoob, 2023; Wan Zahari, 2025; Ahmed et al., 2026)
Green project financing, renewable energy, and SDGs	13 (22.8%)	The use of Green Sukuk/Islamic green finance for green projects, renewable energy, climate mitigation, conservation, restoration, and SDGs.	Some studies emphasize financing potential, but evidence of environmental and social outcomes is not uniform and is often based on use-of-proceeds claims.	Project-level impact measurement, longitudinal tracking of use-of-proceeds, and indicators of emissions, clean energy, conservation, and SDGs.	(Ali et al., 2024; Suriani et al., 2024; Siswantoro & Surya, 2021; Wibowo et al., 2026; Abdelhadi Mohamed Ali & Ugurlu, 2025; Morshed, 2026; Hoque et al., 2026)
Market performance, risk, pricing, and spillovers	10 (17.5%)	Yield, spread, greenium, market reaction, uncertainty, connectedness, hedging, climate risk, and Green Sukuk market dynamics.	Findings on greenium, risk-return, and resilience are not fully consistent because they depend on markets, periods, liquidity, and benchmark instruments.	Cross-country panels, longer horizons, liquidity controls, event studies, climate risk exposure, and robustness checks.	(Lee et al., 2025; Pirgaip & Arslan-Ayaydin, 2024; Hariz et al., 2025; Belkhir et al., 2025; Billah & Adnan, 2024; Khan et al., 2026; Bucheeri et al., 2025)
Investor behavior, adoption intention, and actor perceptions	4-7 article indicators	Purchase intention, niyyah, investment interest, perceptions of investors/bankers, literacy, trust, religious values, and pro-environmental behavior.	The demand side remains less developed than regulatory and issuance studies; behavioral findings are shaped by respondent context and survey design.	Multi-level adoption models for retail investors, institutional investors, bankers, and issuers, including testing of willingness to invest/pay.	(Faisal et al., 2023; Timur et al., 2025; Ashraf et al., 2026; Rahman et al., 2020; Syed Azman et al., 2022; Akinde et al., 2025)
Shariah, maqasid, ethics, and SRI	9 (15.8%)	Shariah compliance, maqasid, hifz al-bi'ah, ethical values, spirituality, SRI, social impact, and societal value.	The compatibility between shariah and sustainability is often affirmed normatively, but operational and measurable maqasid indicators remain limited.	A Maqasid-Green Sukuk Index, shariah-environmental audit, and integration of hifz al-bi'ah with use-of-proceeds and project outcomes.	(Wibowo et al., 2026; Bin-Armia & Riana, 2023; Afifah et al., 2026; Radzi & Sakai, 2022; Richardson, 2019; Richardson, 2020; Mahomed & Mahbot, 2024)

Technology, verification, greenwashing, and reporting	2 (3.5%)	Blockchain, traceability, reporting quality, impact audit, independent verification, and greenwashing testing.	This is the most frontier theme; early studies show that accountability is essential to prevent Green Sukuk from becoming a merely formal green claim.	Disclosure index, greenwashing test, blockchain-enabled reporting, digital audit, and cross-country validation.	(Bader et al., 2026; Gassouma et al., 2026)

3. Issuance, Regulation, and Governance: Between State Support and Market Capacity

The theme of issuance, regulation, and governance is one of the most dominant clusters. The literature shows that Green Sukuk issuance is strongly influenced by state capacity, regulatory design, issuance standards, support from financial institutions, and issuer credibility. Keshminder et al. (2022, pp. 76-94) show that Malaysia's experience in facing Green Sukuk issuance challenges requires a qualitative approach that pays attention to performance, barriers, and reconciliation frameworks. Abdullah and Keshminder (2022, pp. 985-1005) add a market leader perspective on factors driving Green Sukuk, while Mahomed and Mahbot (2024, pp. 1065-1081) emphasize lessons from Khazanah's Sukuk Ihsan as an SRI sukuk experience that shows the importance of social and sustainability design. In Indonesia, Supriyadi et al. (2023, pp. 151-180) discuss the legal framework of Green Sukuk as sustainable Islamic bonds, while Rahman et al. (2024, pp. 818-837) examine whether the policy approach adopted for Green Sukuk issuance prioritizes areas that are truly needed. These studies share the view that governance is a prerequisite for issuance; their differences lie in their emphasis on legal frameworks, market design, and the priority use of proceeds.

The debate in this cluster arises from the question of whether regulation functions more as a market catalyst or merely as a legitimacy device. On the one hand, the Malaysian experience shows that partnerships with international institutions, Islamic capital market standards, and issuer reputation can drive issuance (Liu & Lai, 2021, pp. 1896-1914; Keshminder et al., 2022, pp. 76-94). On the other hand, studies of Indonesia, Saudi Arabia, Bangladesh, and the GCC show that regulation does not automatically guarantee project pipelines, market liquidity, or reporting quality (Endri et al., 2022, pp. 38-49; Shalhoob, 2023, pp. 351-360; Ahmed et al., 2026, pp. 22-42; Abdulla & Araibi, 2025). The strength of this cluster is its ability to explain institutional contexts and implementation barriers. Its weakness is that many studies remain document, legal, or single-case analyses, so the generalization and evaluation of regulatory impact remain limited. The open research gap is the need for cross-country comparative studies that connect taxonomy, shariah governance, fiscal incentives, reporting standards, and post-issuance effectiveness.

4. Green Project Financing and SDGs: From Use-of-Proceeds to Impact Measurement

The cluster of green project financing, renewable energy, and SDGs is the largest theme in the article corpus. Literature in this cluster positions Green Sukuk as an instrument with potential to finance climate mitigation, renewable energy, green infrastructure, conservation, and the sustainable development agenda. Ali et al. (2024, pp. 21097-21123) show the linkage between Green Sukuk and economic growth, social development, and financial performance in Indonesia. Suriani et al. (2024, pp. 98-107) examine the global relationship between Green Sukuk and climate change in issuing countries, while Siswantoro and Surya (2021, Article 012044) review Indonesian Green Sukuk in the context of climate change. Sectoral project literature has also begun to develop. Abdelhadi Mohamed Ali and Ugurlu (2025, pp. 1-25) propose Green Sukuk to finance solar energy projects in Turkey, while Wibowo et al. (2026, pp. 224-252) develop a forestry Green Sukuk model that harmonizes hifz al-bi'ah for sustainable restoration in Indonesia. These studies all show the potential of Green Sukuk to bridge sustainable financing needs, but they differ in the level of evidence: some are based on empirical data, some are conceptual, and others are project case studies.

The critical debate in this theme concerns the difference between the use of proceeds and actual impact. Green Sukuk is commonly understood through the logic of use-of-proceeds, in which funds are allocated to projects that meet green criteria. This approach is important, but it is not sufficient to prove impact. If the literature only shows that funds are used for green projects, the sustainability conclusion remains procedural. Stronger analysis needs to assess outcomes such as renewable energy capacity built, emission reduction, ecosystem restoration, water conservation, or contribution to SDG indicators. Rahman et al. (2024, pp. 818-837) have warned of the importance of prioritizing areas that are truly needed, while Hoque et al. (2026, Article 129514) compare green bonds and Green Sukuk as protection against climate risks. The strength of the green project literature is its high relevance to the global agenda; its weakness is the absence of uniform impact measurement indicators and the limited number of post-issuance evaluations based on project-level data.

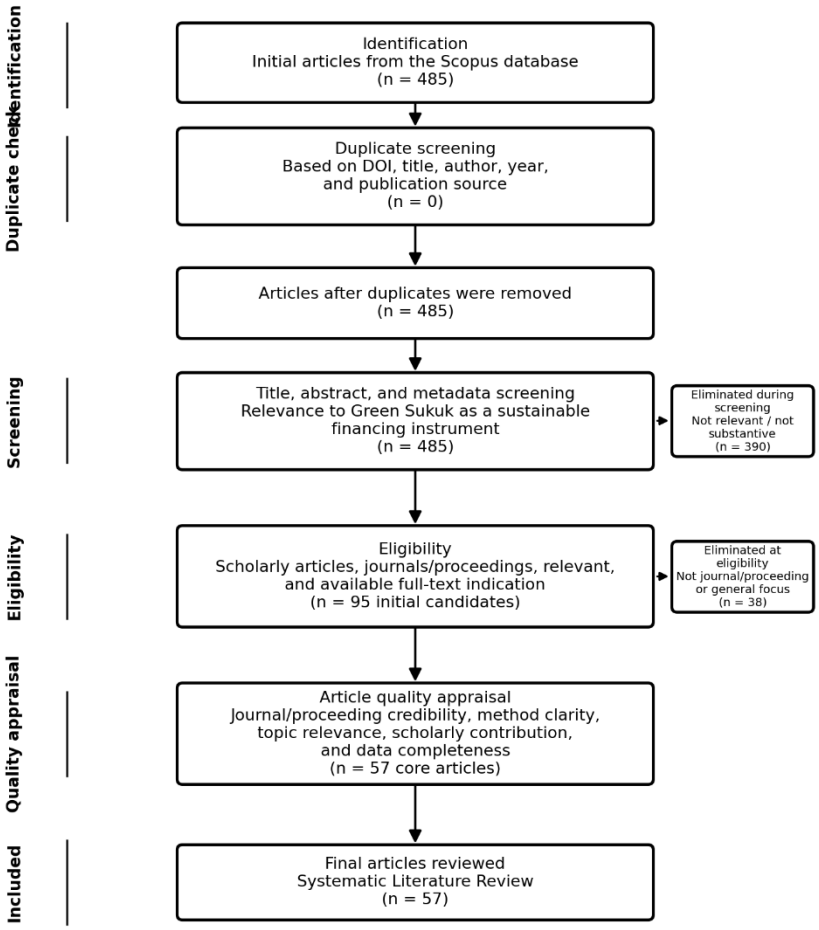

Figure 1. Article selection flow for Green Sukuk as a sustainable financing instrument based on the stages of identification, screening, eligibility, quality appraisal, and inclusion.

5. Market Performance, Risk, Greenium, and Spillovers

Market literature shows an important shift from normative studies toward empirical testing of Green Sukuk characteristics as investment instruments. Lee et al. (2025, pp. 1353-1373) compare Green Sukuk and green bonds, placing both in a discussion of whether green-shariah instruments behave differently in the market from conventional green instruments. Pirgaip and Arslan-Ayaydin (2024, pp. 423-440) find indications of greenium in the primary market for Green Sukuk, while Hariz et al. (2025, pp. 950-975) model the dependence structure between Malaysian Green Sukuk spreads and uncertainty factors. Belkhir et al. (2025) expand the discussion through analysis of asymmetric uncertainty effects on the nexus of Green Sukuk, clean energy, and related factors. Other studies place Green Sukuk in the context of geopolitical risk, climate policy uncertainty, and spillovers in Islamic green finance (Billah & Adnan, 2024, Article 101372; Khan et al., 2026, pp. 1-17; Helmi et al., 2026, pp. 1-44). Collectively, this cluster shows that Green Sukuk is increasingly

treated as a market asset that can be tested through yield, spread, volatility, and connectedness.

Although empirically stronger, the market literature still produces conclusions that are not entirely consistent. Greenium may arise under certain conditions, but its magnitude is influenced by liquidity, issuer reputation, issuance size, benchmark instrument, and primary or secondary market context. Market reactions are also not always uniform. Khairisma et al. (2025, pp. 1771-1791) examine stock market reactions and SDG contributions of pioneering issuers, adding dimensions of reputation and sustainability signaling. Machine learning has begun to be used to predict the yield impact of Green Sukuk (Bucheeri et al., 2025), but predictive approaches face challenges of interpretability and external validation. The strength of this cluster is its ability to provide stronger quantitative evidence; its weakness is the limited availability of Green Sukuk data, especially for cross-country and long-term analysis. The open research gap concerns testing greenium, risk-return, and resilience using cross-country panel data, longer time horizons, and explicit robustness checks.

6. Investor Behavior and the Demand Side of the Market

The literature on investor behavior remains relatively small compared with studies of issuance and regulation, but its contribution is important because the success of Green Sukuk is determined not only by the supply of instruments, but also by market acceptance. Faisal et al. (2023, Article 7430) examine Indonesian investors' purchase intentions toward Green Sukuk and show the importance of values, perceptions, and sustainability orientation. Timur et al. (2025, pp. 2403-2432) extend a behavioral model of Muslim investors in retail Green Sukuk through a pro-environmental behavior approach. Ashraf et al. (2026, Article 159) study the niyyah of Islamic bankers in Bangladesh toward Green Sukuk for sustainable finance, while Rahman et al. (2020, pp. 599-619) review the development of SRI sukuk in Malaysia from stakeholder perspectives. The differences lie in the object of respondents: retail investors, bankers, stakeholders, or market actors. The commonality is that this literature indicates that religiosity, trust, literacy, risk perception, and perceived environmental impact influence Green Sukuk adoption.

The main weakness in the behavioral topic is the dominance of cross-sectional surveys and the limited representativeness of respondents. Behavioral studies often succeed in explaining intention, but do not always explain actual purchase behavior, willingness to pay, or preferences between Green Sukuk and conventional green instruments. Syed Azman et al. (2022, pp. 256-273) compare stakeholder preferences for SRI sukuk, social impact bonds, and conventional bonds, opening space to assess differences in value between Islamic and conventional

instruments. Akinde et al. (2025, Article 89) begin to use machine learning to predict Green Sukuk investment interest in Nigeria, but the use of ML-based behavioral data remains rare. An important research gap in this theme is the need for multi-level adoption models that distinguish retail investors, institutional investors, bankers, issuers, and regulators. Such models should include Islamic-green financial literacy, trust in issuers, perceived impact, religious values, risk, and policy incentives.

Table 2. Patterns of methods, strengths, weaknesses, and analytical implications

Method category	Number	Pattern of use	Strength	Weakness	Implications for improvement
Conceptual/document analysis	10 (17.5%)	Developing normative arguments, conceptual frameworks, and document interpretation.	Strong for formulating models and normative foundations.	Empirical validation and outcome measurement are often weak.	Requires data triangulation, expert interviews, and secondary data analysis.
Qualitative/case study	10 (17.5%)	Analyzing issuance practices, policies, issuers, and country contexts.	Context-rich and able to explain institutional configurations.	Limited generalizability when based on a single country/institution.	Multiple-case studies and cross-jurisdiction comparisons.
Quantitative-econometric/market	10 (17.5%)	Testing yield, spread, greenium, uncertainty, spillovers, and market reaction.	Strong for testing empirical relationships and instrument performance.	Constrained by limited Green Sukuk market data.	Cross-country panels, robustness checks, liquidity controls, and causal models.
Legal/policy/document analysis	9 (15.8%)	Assessing legal frameworks, governance, shariah compliance, and issuance standards.	Strong for evaluating regulation and institutional alignment.	Often does not test policy impacts on outputs/outcomes.	Policy evaluation based on issuance, pricing, and project-impact indicators.
Review/SLR/bibliometric	8 (14.0%)	Mapping trends, intellectual structure, themes, and research gaps.	Strong for organizing the state of the art.	Vulnerable to database, keyword, and search-period limitations.	PRISMA, quality appraisal, multi-database search, and reliable thematic coding.
Survey/behavior/adoption	7 (12.3%)	Measuring intention, perception, trust, literacy, and adoption determinants.	Explains the demand side and market acceptance.	Vulnerable to self-report bias and cross-sectional design.	Longitudinal surveys, stronger SEM, preference experiments, and multi-group analysis.
Machine learning/predictive	3 (5.3%)	Predicting yield, pricing, investment interest, or verification quality.	Able to capture nonlinear patterns and make predictions.	Interpretability and external validation remain challenging.	Explainable AI, out-of-sample validation, and documentation of features/models.

7. Maqasid al-Shariah, Ethics, and SRI: From Normative Legitimacy to Evaluative Indicators

The cluster of maqasid, ethics, and SRI shows the distinctive position of Green Sukuk in the discourse of Islamic sustainable finance. The literature emphasizes that Green Sukuk must not only meet green standards, but also align with shariah compliance and the objectives of public benefit. Wibowo et al. (2026, pp. 224-252) show that hifz al-bi'ah can be harmonized in a forestry Green Sukuk model, while Bin-Armia and Riana (2023, pp. 110-130) criticize pseudo-environmental values and emphasize the importance of ethical spirituality in Indonesian Green Sukuk. Afifah et al. (2026, pp. 95-119) discuss strengthening the legal verification framework for sustainable projects, while Radzi and Sakai (2022, pp. 77-96) position SRI sukuk within a convergence of values between Islamic finance and socially responsible investment. Richardson's studies (Richardson, 2019, pp. 394-428; Richardson, 2020, pp. 313-355) develop discussions of responsible finance sukuk and societal value, thereby expanding the argument that sustainable sukuk should be evaluated according to its social contribution, not only its legal design.

The main debate in this cluster is whether maqasid al-shariah functions as normative justification or can be operationalized as an evaluation tool. Some literature uses maqasid to affirm the compatibility of shariah and sustainability, but few studies formulate measurable indicators to assess hifz al-bi'ah, intergenerational justice, benefit distribution, and integrity in the use of funds. When maqasid is not translated into indicators, Green Sukuk risks having only rhetorical legitimacy. This synthesis emphasizes the need for a Maqasid-Green Sukuk Index or a maqasid-based sustainable financing framework that connects shariah compliance, governance, use-of-proceeds, impact reporting, and environmental outcomes. The strength of the maqasid literature is its theoretical power for Islamic finance; its weakness is the lack of empirical validation and the absence of consistent evaluative indicators. This gap provides a strong space for novelty because it can distinguish Green Sukuk from conventional green bonds substantively rather than merely formally.

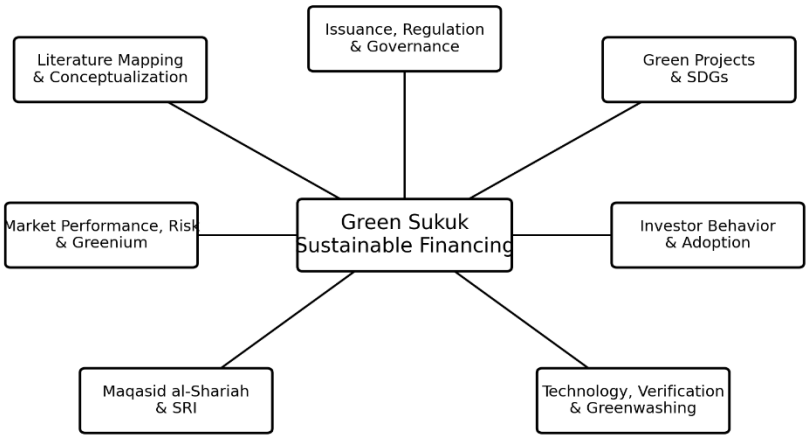

Figure 2. Thematic map of the Green Sukuk literature based on seven main clusters and inter-theme relationships in sustainable financing.

8. Technology, Verification, Greenwashing, and Accountability

Technology, verification, greenwashing, and reporting constitute the smallest and most frontier cluster. Bader et al. (2026, pp. 301-313) show that blockchain-enabled verification, reporting quality, and Green Sukuk pricing have begun to receive important attention in the Malaysian experience. Gassouma et al. (2026, Article 755) explicitly test greenwashing in Green Sukuk in MENA and ASEAN countries. These two studies expand the literature from issuance toward post-issuance accountability. This development is crucial because the quality of Green Sukuk is determined not only by contract structure, prospectus, or green label, but also by the issuer's ability to demonstrate traceability in the use of funds, reporting quality, and independent verification. Otherwise, Green Sukuk may face the same risk as green bonds: sustainability claims that are not proportional to actual impact.

A critical synthesis indicates that greenwashing should become a central issue in future discussion. At the early stage, the literature mostly asked how Green Sukuk could be issued and how the market responded. At a more mature stage, the literature needs to ask whether the instrument truly reduces emissions, improves environmental quality, or strengthens social welfare. Technologies such as blockchain can support traceability, but technology is not a single solution. Accountability still requires reporting standards, shariah-environmental audit, independent verification, and impact indicators. The research gap in this theme is very strong because the number of studies remains small while practical needs are high. Research opportunities include the development of disclosure indices, greenwashing tests, digital audits of use-of-proceeds, and cross-country comparisons of relationships among reporting quality, pricing, and investor trust.

9. Methodological Synthesis: Strengths, Limitations, and Directions for Improvement

In terms of method, the Green Sukuk literature shows a relatively balanced distribution, but it is not yet fully integrative. Conceptual/document analysis, qualitative/case studies, and quantitative-econometric approaches each comprise 10 articles or 17.5%. Legal/policy/document analysis includes 9 articles, review/SLR/bibliometric studies 8 articles, survey/behavior/adoption studies 7 articles, and machine learning/predictive modeling 3 articles. This pattern shows that the Green Sukuk field is moving from a normative and institutional stage toward empirical and predictive stages. The strength of conceptual and legal studies lies in their explanation of norms, contracts, regulation, and governance. The strength of qualitative studies lies in the depth of issuance context. The strength of quantitative

studies lies in testing markets, risks, and pricing. Surveys help explain the demand side, while machine learning opens opportunities to predict yield, pricing, and investment interest.

Methodological limitations are also clear. Conceptual studies risk lacking empirical validation. Case studies are rich in context but difficult to generalize. Market studies are often constrained by data availability, short horizons, and Green Sukuk liquidity that is not yet as deep as the conventional bond market. Behavioral studies are vulnerable to self-report bias and cross-sectional design. Bibliometric reviews often depend on database selection, keywords, and search periods. Machine learning offers prediction, but requires model transparency and interpretability. Therefore, the future methodological agenda should move toward multi-method design: PRISMA-based systematic reviews with quality appraisal, cross-country panel studies, multiple-case studies, project-level impact data, longitudinal surveys, and explainable AI. In this way, the Green Sukuk literature can move from potential claims toward evidence that is more testable and comparable.

Table 3. Research gaps and research development agenda

Research gap	Synthesis evidence	Development agenda	Recommended methods/data
Fragmented literature	Studies are separated across regulation, markets, projects, investors, maqasid, and accountability.	Integrative SLR of Green Sukuk as a sustainable financing value chain.	Thematic synthesis, quality appraisal, and bibliometric support.
Project impact not yet measured	Many studies stop at use-of-proceeds claims and do not assess project outcomes.	Impact measurement framework linking funds, projects, emissions, conservation, and SDGs.	Longitudinal project-level data and content analysis of impact reports.
Maqasid/hifz al-bi'ah remains normative	Shariah compliance often functions as legitimacy rather than as an evaluative indicator.	Maqasid-Green Sukuk Index and shariah-environmental audit.	Delphi/AHP/ANP, expert validation, and empirical testing.
Greenwashing and reporting are rarely studied	Few studies examine reporting quality, digital verification, and greenwashing practices.	Digital accountability framework for use-of-proceeds traceability and verification.	Disclosure index, blockchain model, greenwashing test, and cross-country analysis.
The demand side is underdeveloped	Investor studies remain limited compared with supply-side and regulatory studies.	Demand-side adoption model based on religious values, green literacy, trust, and perceived impact.	Multi-segment surveys, PLS/CB-SEM, and investment choice experiments.
Market evidence is inconsistent	Greenium, spread, resilience, and Green Sukuk risk are affected by liquidity, market context, and data horizon.	Comparative market-performance synthesis with green bonds and conventional sukuk.	Cross-country panel/time-series, event study, and quantile connectedness.

10. Synthesis Framework: Green Sukuk as a Sustainable Financing Value Chain

Based on the thematic synthesis, this article proposes reading Green Sukuk as a sustainable financing value chain. The chain begins with instrument and contract design, issuance governance, regulation and taxonomy, fund allocation to green projects, project implementation, outcome measurement, reporting, verification, market pricing, and investor response. This framework helps overcome fragmentation in the literature. Regulatory studies explain issuance requirements but

do not always answer project impact. Market studies explain pricing but do not always evaluate use-of-proceeds. Investor studies explain interest but are not always connected to project quality. Maqasid studies explain normative legitimacy but are not always operational. Greenwashing studies test accountability, but their number remains limited. The value-chain framework connects all these themes so that Green Sukuk can be evaluated from upstream to downstream.

The scientific contribution of this synthesis lies in positioning maqasid, governance, and impact measurement as three analytical axes. Maqasid provides a normative basis for assessing whether Green Sukuk supports public benefit, including environmental protection. Governance ensures that issuance structures, reporting standards, and verification operate credibly. Impact measurement tests whether financed projects generate verifiable sustainability outcomes. These three axes address the main weaknesses of the literature: fragmentation, unmeasured normativity, and limited accountability. Thus, this article not only maps the literature but also offers an integrative agenda for the development of Islamic sustainable finance. The practical implications are that regulators need to strengthen taxonomy and reporting; issuers need to build traceability; investors need to assess impact quality; shariah institutions need to expand audits from contract compliance toward environmental compliance; and researchers need to deepen empirical data across countries and instruments.

11. Cross-Thematic Comparison and Scientific Contribution

Cross-thematic comparison shows that the Green Sukuk literature moves through three logics that are not always connected. The first is institutional logic, in which Green Sukuk develops when regulation, shariah governance, taxonomy, issuer credibility, and state support are available. This logic is strong in studies of Malaysia, Indonesia, Saudi Arabia, Bangladesh, and the GCC (Liu & Lai, 2021, pp. 1896-1914; Keshminder et al., 2022, pp. 76-94; Shalhoob, 2023, pp. 351-360; Ahmed et al., 2026, pp. 22-42; Abdulla & Araibi, 2025). The second is market logic, in which the instrument is evaluated according to yield, spread, greenium, resilience, and investor response. This logic is reflected in comparative, pricing, and connectedness studies (Lee et al., 2025, pp. 1353-1373; Pirgaip & Arslan-Ayaydin, 2024, pp. 423-440; Hariz et al., 2025, pp. 950-975; Belkhir et al., 2025; Khan et al., 2026, pp. 1-17). The third is impact logic, in which Green Sukuk is evaluated based on fund allocation, green projects, SDG outcomes, maqasid, and accountability. This logic appears in studies of green projects, forestry, solar energy, greenwashing, and blockchain verification (Ali et al., 2024, pp. 21097-21123; Wibowo et al., 2026, pp. 224-252; Abdelhadi Mohamed Ali & Ugurlu, 2025, pp. 1-25; Bader et al., 2026, pp. 301-313; Gassouma et al., 2026, Article 755). These three logics provide different contributions, but this

is precisely where the integrative gap appears. Green Sukuk cannot be understood only as an institutional product, a market asset, or an impact claim in isolation; it must be read as an instrument that connects all three.

Differences in findings across studies can also be explained by differences in units of analysis. Policy studies often use countries, regulations, and issuers as units of analysis, so their conclusions emphasize the enabling environment. Market studies use instruments, indices, yields, spreads, and prices as units of analysis, so their conclusions emphasize efficiency, risk, and liquidity. Behavioral studies use individuals or stakeholders as units of analysis, so their findings emphasize trust, religiosity, and perceived impact. Maqasid studies use norms and values as units of analysis, so their conclusions emphasize ethical legitimacy. Technology and greenwashing studies use reporting and verification as units of analysis, so their findings highlight accountability. These differences explain why the literature sometimes appears inconsistent. Such inconsistency is not merely a weakness, but a sign that Green Sukuk is a multidimensional object requiring a cross-level synthesis framework: micro investors, meso issuers and projects, and macro regulation and markets.

The conceptual contribution drawn from this comparison is the need to shift the focus from an instrument-centered review toward an impact-centered review. Instrument-centered reviews tend to evaluate definitions, structures, contracts, and issuance; this approach is important, but it is not sufficient to answer the expectations of reputable journals that emphasize contribution to knowledge. Impact-centered reviews evaluate how instrument design produces changes in projects, markets, investors, and governance. Thus, Green Sukuk needs to be analyzed through more evaluative questions: who guarantees the credibility of the instrument, what projects are actually financed, what indicators are used to assess impact, how greenwashing risk is prevented, and how maqasid is operationalized as an evaluation tool. This shift forms the basis of the article's scientific contribution because it unites normative, empirical, and practical aspects within a single discussion framework.

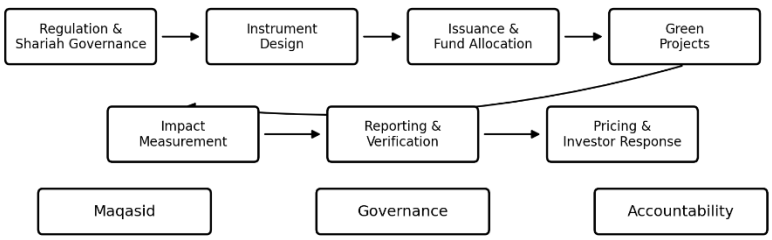

Figure 3. Synthesis framework of Green Sukuk as a sustainable financing instrument based on maqasid, governance, and impact measurement.

12. Implications of the Synthesis and Future Research Agenda

The discussion shows that Green Sukuk has great potential as a sustainable financing instrument, but its academic strength depends on the ability of the literature to answer three critical issues. First, Green Sukuk needs to be distinguished from conventional sukuk and green bonds through evidence of added value, not merely through labels. This added value may include the integration of shariah compliance, fund accountability, and environmental impact. Second, sustainability claims need to be tested through project data and outcome indicators. Without this, the literature will continue to operate at the level of prospectus and discourse. Third, maqasid al-shariah needs to be translated into evaluative indicators so that the substance of Islamic sustainable finance can be distinguished from ethical rhetoric. These three issues simultaneously show that Green Sukuk is a field that is mature in terms of issues, but still developing in terms of methodology and measurement.

The future research agenda can be directed toward four paths. The first path is project-level impact evaluation to assess the alignment between use-of-proceeds, project realization, and environmental outcomes. The second path is cross-country comparative research to explain how regulation, taxonomy, and shariah governance influence issuance and reporting quality. The third path is investor behavior research that connects religious values, green literacy, trust, and perceived impact with actual investment decisions. The fourth path is accountability research that tests greenwashing, reporting quality, and verification technology. Through this agenda, the Green Sukuk literature can provide stronger contributions to Islamic sustainable finance theory, Islamic capital market policy, and sustainable financing practice. This synthesis emphasizes that the future of Green Sukuk research does not lie in asking whether the instrument is green, but in how it proves green impact transparently, measurably, and in accordance with maqasid.

CONCLUSION

This study concludes that Green Sukuk has developed into an important instrument in sustainable financing that brings together Islamic finance principles, the need for a low-carbon transition, and the sustainable development agenda. The reviewed literature shows that research is no longer limited to the normative legitimacy of Green Sukuk as a shariah-green instrument, but has moved toward more complex issues, including issuance governance, green project financing, contributions to the SDGs, market performance, investor behavior, maqasid al-shariah, and accountability for greenwashing risk. This trend confirms that Green Sukuk has a strategic position in the development of Islamic sustainable finance.

The scientific contribution of this article lies in an integrative synthesis that positions Green Sukuk as a sustainable financing instrument based on three main axes: maqasid, governance, and impact measurement. This synthesis shows that the success of Green Sukuk

cannot be measured merely by the number of issuances or by formal compliance with shariah principles and green labels. The credibility of this instrument depends strongly on its ability to consistently connect the use of proceeds, project quality, socio-environmental impacts, reporting transparency, and independent verification.

The main research gaps identified are the limited measurement of impact based on project data, the lack of operational maqasid indicators, particularly hifz al-bi'ah, the limited attention given to investor behavior, and the scarcity of studies on accountability and greenwashing. Theoretically, these findings enrich the Islamic sustainable finance literature by emphasizing the need to shift from instrument-centered reviews toward impact-centered reviews. Practically, the findings provide guidance for regulators, issuers, investors, and verification institutions to strengthen Green Sukuk governance. Future research is recommended to develop cross-country studies, impact measurement models, a Maqasid-Green Sukuk Index, and empirical analysis based on market and sustainable project data.

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