

Sustainable Bonds in Indonesia: A Systematic Literature Review and Future Prospects

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ABSTRACT

The aim of this study is to review publications on sustainable bonds in Indonesia between 2017 and 2024 using a systematic literature review (SLR). Using the SPAR-4-SLR methodology, 30 relevant articles were sourced from Scopus and Sinta 1 and 2 databases, identified through keywords including "sustainable bond", "green bond", "green sukuk", "social bond", "sustainability bond", "sustainability-linked bond", "eco-bond", "blue bond", "green Islamic bond", "SRI sukuk", "ESG bond", "climate bond", "SDG bond", and "Indonesia". A bibliometric analysis using Vosviewer was performed to map keyword co-occurrences, revealing green bonds and green sukuk as dominant themes. The study identifies key drivers of sustainable bonds such as investor awareness, regulatory advancements, green marketing, and challenges like high capital costs, greenwashing risks, and regulatory inconsistencies. Emerging instruments such as blue sukuk, sovereign climate-aligned bonds, and earthquake bonds offer new avenues for sustainable finance in Indonesia. This research underscores the critical role of sustainable bonds in achieving climate goals and social inclusion while emphasizing the need for broader studies on underrepresented bond types.

Keywords:

Climate finance, ESG investment, green bond, green sukuk, sustainable bonds

Obligasi Berkelanjutan di Indonesia: Tinjauan Literatur Sistematis dan Prospek ke Depan

ABSTRAK

Tujuan penelitian ini adalah mereview publikasi mengenai obligasi berkelanjutan di Indonesia pada kurun waktu 2017 s.d. 2024. Dengan menggunakan *systematic literature review (SLR)*. Dengan menggunakan metodologi SPAR-4-SLR, sebanyak 30 artikel relevan diidentifikasi dari basis data Scopus dan Sinta (akreditasi Sinta 1 dan 2) melalui kata kunci seperti "green bond", "green sukuk", "sustainable bond". Analisis bibliometrik dengan Vosviewer menunjukkan dominasi tema green bond dan green sukuk yang didorong oleh sektor keuangan syariah dan dukungan regulasi. Studi ini mengidentifikasi pendorong obligasi berkelanjutan seperti kesadaran investor, perkembangan regulasi, dan pemasaran hijau, serta tantangan berupa biaya tinggi, risiko greenwashing, dan inkonsistensi regulasi. Instrumen baru seperti blue sukuk, sovereign climate-aligned bonds, dan obligasi gempa bumi menunjukkan potensi baru dalam pembiayaan berkelanjutan. Temuan ini menekankan pentingnya obligasi berkelanjutan bagi pencapaian tujuan iklim dan inklusi sosial, serta perlunya riset lebih lanjut pada jenis obligasi yang masih kurang dieksplorasi tersebut.

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1. Introduction

Sustainable bonds have emerged as a key financial tool for directing investments toward projects that advance Sustainable Development Goals (SDGs) (ICMA, 2019). These instruments allow investors to align their portfolios with environmental, social, and governance (ESG) principles (Bennani et al., 2018) and contribute to positive impact creation (Bajra & Wagner, 2024). The global sustainable bond market has grown rapidly, reaching US\$847 billion by 2023 (Climate Bonds Initiative, 2024), fueled by heightened investor awareness of sustainability issues (Ren et al., 2023) and the urgent need to tackle critical problems, such as climate change (Chavarría-Flores & Warren, 2024; Faisal et al., 2023; Tolliver et al., 2020) and social inequality (Park, 2018). In Asia, particularly in developing nations such as Indonesia, sustainable bonds are increasingly critical for bridging the substantial funding gap required to meet SDG targets (Prakash & Sethi, 2022), supporting projects in renewable energy, energy efficiency, sustainable transportation, and social inclusion (Azhgaliyeva et al., 2020; Dong et al., 2023; Park, 2018).

In Indonesia, the relevance of sustainable bonds is underscored by the government's proactive policies and commitment to sustainable development (Saa, 2024). As a nation with ambitious SDG targets and a pressing need to combat climate change and socioeconomic disparities, Indonesia has positioned sustainable finance as the cornerstone of its national agenda (Ronaldo & Suryanto, 2022). The Indonesian government has shown its dedication to sustainable finance through pioneering initiatives of green sukuk issuance to support eco-friendly projects (Santoso, 2020). In 2018, Indonesia launched its first green sukuk, raising \$1.25 billion, the largest green sukuk in the world (Indonesia Ministry of Environment and Forestry, 2018). This urgency is further reflected in the regulatory framework established by the Indonesian Financial Services Authority (OJK), which introduced the Sustainable Finance Roadmap Phase I (2015–2019) and subsequent regulations, such as POJK 60/POJK.04/2017 and its 2023 update, POJK 18/POJK.04/2023 (OJK, 2015, 2017, 2021, 2023). These policies not only promote the issuance of green, social, sustainability, and sustainability-linked bonds and sukuk, but also signal the government's determination to mobilize capital for sustainable development amid rising environmental and social challenges.

The Indonesian sustainable bond market has witnessed significant milestones, with both the public and private sectors contributing to its growth. For instance, PT Sarana Multi Infrastruktur became Indonesia's first green bond issuance in 2018, with an issuance value of IDR 500 billion (Dadag, 2018), followed by PT Bank Rakyat Indonesia Tbk's inaugural sustainability bond in 2019, with a total issuance of US\$ 500 million (Banjarnahor, 2019). More recently, PT Sarana Multigriya Financial pioneered the issuance of the first social bond in Indonesia in 2023 worth IDR 500 billion (Indonesia Ministry of Finance, 2022), and PT Steel Pipe Industry of Indonesia launched the first sustainability-linked bond in 2024 worth IDR 1 trillion (Nityakanti & Rahmawati, 2024). Figure 1 shows a steady rise in the outstanding share of Indonesia's sustainable bonds. The increase in the outstanding shares of each type of sustainable bond shows that this instrument is increasingly in demand by investors and issuers in Indonesia. This growth indicates

that sustainable bonds are becoming increasingly important for sustainable development in Indonesia.

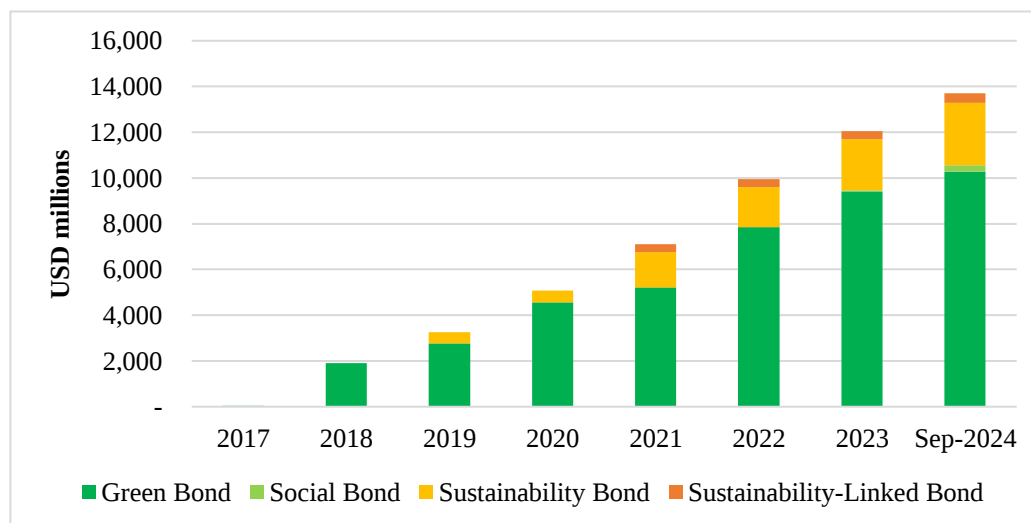


Figure 1. Indonesia's sustainable bonds outstanding shares

Source: Asian Bonds Online, 2024

Despite significant progress, Indonesia's sustainable bond market is still relatively new and requires further development to meet sustainable funding needs. Investors' and issuers' limited awareness and comprehension of sustainable bonds still needs improvement (Primambudi, 2023; Rakatama et al., 2023). The availability of standardized and easily accessible data and information is essential to support analysis and decision-making related to sustainable bonds (Saa, 2024). In addition, issuers should avoid the risk of greenwashing when issuing sustainable bonds (Anugrahaeni, 2017). A strong mechanism and framework are required to prevent greenwashing (Alhaq et al., 2023; Yunita et al., 2023).

Several studies have conducted systematic literature reviews (SLR) on sustainable bonds in Indonesia. They have predominantly focused on green sukuk (Alkadi, 2024; Araminta et al., 2022; Delle Foglie & Keshminder, 2022; Dewananda et al., 2023; Khalilurrahman & Mubarrak, 2022), leaving a gap in comprehensive analyses that encompass the full spectrum of sustainable bond types—green, social, sustainability, and sustainability-linked bonds. This study addresses this gap by conducting a systematic literature review (SLR) that systematically examines sustainable bonds in Indonesia. Unlike previous research, which often narrowed its scope to a single instrument, this study integrates diverse bond types and situates them within Indonesia's policy-driven sustainability agenda. This research aims to synthesise existing literature, track the growth and influence of publications, highlight key thematic insights, and propose directions for future studies to enhance the understanding and development of Indonesia's sustainable bond market as a tool for achieving sustainable development. By doing so, this study seeks to serve as a vital resource

for researchers, policymakers, and market participants to foster a more inclusive and robust sustainable finance ecosystem in Indonesia.

2. Literature Review

Theoretical Framework

The development of sustainable bonds in Indonesia can be analyzed using multiple theoretical lenses. Sustainable development theory underpins the role of these instruments in balancing economic, environmental, and social objectives (Yunita et al. 2023). However, existing research often applies this theory broadly, overlooking Indonesia's unique economic constraints and competing priorities of sustainability and economic growth (Sekarintias et al., 2023). While stakeholder theory highlights the interplay between investors, issuers, and regulators (Endri et al., 2022), it is yet to be critically examined in the context of Indonesia's nascent sustainable bond market, where investor engagement remains limited.

The role of signalling theory in explaining issuers' motivations to adopt sustainable bonds is well-documented (Endri et al., 2022). However, research has not fully addressed whether such signals are effective in an emerging market like Indonesia, where ESG awareness is still developing (Primambudi, 2023). Additionally, green finance theory and institutional economics highlight the importance of policy and financial innovation (Azhgaliyeva et al., 2020; Guild, 2020). However, Indonesia's evolving regulatory landscape presents a case in which institutional gaps, such as standardization deficits and limited transparency, hinder market growth.

Given Indonesia's significant role in Islamic finance, Maqashid Syariah's theory is crucial to understanding the application of green sukuk. This theory emphasises achieving social welfare (maslahah) by aligning financial instruments with Sharia principles, ensuring that economic activities promote environmental preservation (hifz al-bi'ah), social justice, and ethical investment (Khalilurrahman & Mubarrak, 2022). As a Sharia-compliant instrument, Green Sukuk is a unique, sustainable finance tool that integrates Islamic ethical values with environmental and social objectives (Mangunjaya, 2023). However, studies rarely examine how Maqashid Syariah interacts with Indonesia's regulatory landscape or influences investors' perceptions of sustainable finance. This study addresses these gaps by systematically synthesising these theories within Indonesia's socio-economic and regulatory context.

Sustainable Bonds

Sustainable bonds are key in promoting sustainable economic growth by aligning economic, social, and environmental priorities, as outlined in the global Sustainable Development Goals (SDGs) framework, encompassing various types—green bonds, social bonds, sustainability bonds, sustainability-linked bonds (SLBs), and green sukuk—each classified by their allocation of proceeds and objectives (ICMA, 2019; OJK, 2023; Prakash & Sethi, 2022). Green bonds finance environmentally beneficial initiatives, such as climate-related projects or activities, with companies, governments, or agencies committing the proceeds exclusively to these purposes (Flammer, 2021), while social bonds fund projects that deliver measurable social outcomes, such

as affordable housing and healthcare (Park, 2018; Sege & Harper Browne, 2017), and sustainability bonds combine both environmental and socio-economic benefits (OECD, 2019). In contrast, SLBs tie their structure to specific sustainability performance targets, allowing flexible use of proceeds (Feldhütter et al., 2024), and green sukuk, a Sharia-compliant bond instrument, supports eco-friendly projects like biodiversity conservation and energy efficiency, accelerating SDG achievement (Araminta et al., 2022; Foglie & Keshminder, 2022).

In Indonesia, the sustainable bond market has evolved since the 2016 Paris Agreement ratification, with the government and the Indonesian Financial Services Authority (OJK) driving growth through frameworks like the 2017 POJK 60/POJK.04/2017 on green bonds and the 2023 POJK 18/POJK.04/2023 on sustainability-based debt securities and sukuk, which expanded regulations to cover green bonds, social bonds, sustainability bonds, SLBs, and sukuk variants, providing comprehensive guidelines on fund use, project eligibility, and reporting (Guild, 2020; Khalilurrahman & Mubarrak, 2022; OJK, 2015, 2017, 2023). These developments, alongside initiatives like the Sustainable Finance Roadmap (2015–2019) and green retail bond issuances, underscore Indonesia's commitment to sustainable finance, encouraging businesses to innovate and enhancing public awareness while addressing environmental and social challenges (Schumacher, 2020).

Globally, studies have examined the role of green bonds in financing climate mitigation (Flammer, 2021) and the contributions of social bonds to social impact projects (Park, 2018). However, research conducted by the SLR method specific to Indonesia has primarily focused on green sukuk (Alkadi, 2024; Araminta et al., 2022; Delle Foglie & Keshminder, 2022; Dewananda et al., 2023; Khalilurrahman & Mubarrak, 2022), with less attention given to other sustainable bond types. A bibliometric review (Foglie & Keshminder, 2022) revealed that while green sukuk issuance has been widely analysed in structure and performance, limited research has explored its long-term impact on Indonesia's climate financing goals. Moreover, studies have yet to critically assess the effectiveness of Indonesia's regulatory policies, such as POJK 60/POJK.04/2017, which focuses on green bonds, and POJK 18/POJK.04/2023, which expands regulations to include other sustainable bond types, in driving market expansion beyond green sukuk.

This study contributes to the literature by offering a systematic review that expands beyond the existing green sukuk-centric discourse. It examines a broader range of sustainable bonds beyond green sukuk, including green bonds, social bonds, sustainability bonds, and SLBs. It critically evaluates regulatory policies and their effectiveness in fostering market development, including POJK 60/POJK.04/2017 scope about green bonds. It also identifies key barriers and opportunities in Indonesia's sustainable bond market while mapping future research directions. By synthesising the fragmented literature and addressing these gaps, this study provides a forward-looking analysis to guide policymakers, market participants, and researchers in advancing Indonesia's sustainable finance ecosystem.

3. Research method

This study adopts the Scientific Procedures and Rationales for Systematic Literature Reviews (SPAR-4-SLR) methodology, developed by Paul et al. (2021), to conduct a systematic literature review (SLR) on sustainable bonds in Indonesia. SPAR-4-SLR is a rigorous, transparent, and replicable protocol designed to synthesise existing research across three key stages systematically: assembling, arranging, and assessing (Paul et al., 2021). This methodology was chosen for its structured approach, which ensures comprehensive coverage of the literature and facilitates the identification of trends, gaps, and future research directions. To analyse the data, this study employs bibliometric analysis using Vosviewer software and variable mapping to explore causal relationships and propose future research agendas, enhancing the depth and actionable outcomes of the review.

In the assembling stage, the study identifies and collects literature relevant to sustainable bonds in Indonesia. Two electronic databases were utilised: Scopus and Sinta (accredited Sinta 1 and 2 journals). Scopus was selected for its extensive coverage of high-quality, peer-reviewed international literature, providing a global perspective on sustainable bonds. Sinta, encompassing 128 nationally accredited journals at Sinta 1 and 2 levels, was chosen to capture context-specific research reflecting Indonesia's unique sustainable finance landscape. This dual-database approach ensures a balanced synthesis of global and local insights, enriching the analysis.

The search was conducted for the period 2017–2024, a timeframe selected because Indonesia's Financial Services Authority (OJK) issued its first green bond regulation (POJK No. 60/POJK.04/2017) in 2017, marking the formal inception of sustainable bond frameworks in the country. This period captures the subsequent evolution of the market and research following this regulatory milestone, aligning with significant developments such as the 2018 green sukuk issuance and updates like POJK 18/POJK.04/2023 in 2023. Relevant keywords included "sustainable bond," "green bond," "green sukuk," "social bond," "sustainability bond," "sustainability-linked bond," "eco-bond," "blue bond," "green Islamic bond," "SRI sukuk," "ESG bond," "climate bond," "SDG bond," and "Indonesia." The initial search yielded 90 articles from Scopus and 15 from Sinta, forming the preliminary dataset.

The arranging stage involved structuring and refining the collected literature. Bibliographic details (article title, journal title, keywords) were extracted and tabulated for each article. Articles were then filtered based on their relevance to sustainable bonds, excluding those not explicitly addressing this focus (studies on conventional bonds or unrelated financial instruments). Only final, published conceptual, empirical, and review articles were included. Scopus articles were limited to English, while Sinta articles included English and Indonesian to reflect local scholarship. This purification process reduced the dataset to 21 articles from Scopus (from 90) and nine from Sinta (from 15), totalling 30 articles for analysis.

In the assessing stage, the 30 selected articles were evaluated using a multi-method approach: bibliometric analysis, qualitative content analysis, and variable mapping for causality studies. Bibliometric analysis was performed using Vosviewer, a specialised tool for visualising

bibliometric networks, such as keyword co-occurrences and publication trends. Vosviewer’s focus on mapping interconnections aligns with the study’s aim to identify thematic clusters and research trajectories. All 21 Scopus and 9 Sinta articles were analysed in Vosviewer, leveraging their metadata (keywords and abstracts) to generate network visualisations (Figure 5) highlighting dominant themes, influential journals, and interdisciplinary connections. Qualitative content analysis complemented the bibliometric approach by synthesising the articles' findings to uncover key themes, challenges, and opportunities. This analysis informed the narrative discussion of sustainable bond development in Indonesia. Variable mapping was employed in the causality study to determine future research directions. This method identifies and maps causal relationships between variables across the articles, as depicted in Figures 6–8. By synthesising these relationships, the study pinpointed research gaps, such as underexplored bond types and impacts, and proposed targeted agendas for future investigation. This mapping enhances the study’s contribution by offering a structured basis for advancing sustainable bond scholarship.

Stage 1: Assembling	Identification Review domain: Sustainable Finance, Sustainable finance instrument Research questions: 1. What are the main themes and trends in research on sustainable bonds in Indonesia? 2. What are the key factors driving or hindering the development of the sustainable bond market in Indonesia? 3. What are the future research directions in the field of sustainable bonds in Indonesia? Source type: Conceptual and empirical articles in journals Source quality: Scopus
	Acquisition Search mechanism and material acquisition: Scopus Search period: 2017 to 2024 Search keywords: "sustainable bond", "green bond", "green sukuk", "social bond", "sustainability bond", "sustainability-linked bond", "eco-bond", "blue bond", "green Islamic bond", "SRI sukuk", "ESG bond", "climate bond", "SDG bond", and "Indonesia" Total number of articles returned from the search: 90 articles
Stage 2: Arranging	Organization Organizing codes: Article title, journal title, author keyword Organizing framework(s): Not applicable
	Purification Article type excluded: Article not related to sustainable bond Subject Area Inclusion: Nil Article type included: conceptual and empirical “articles” and “reviews” in “journals” Article publication Stage for Inclusion: Final Filtered Laguange for Inclusion: English Filtered Search Result: 21 articles

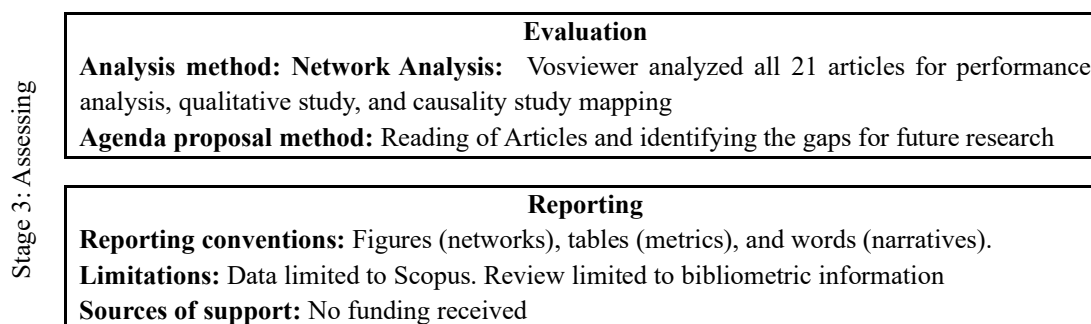
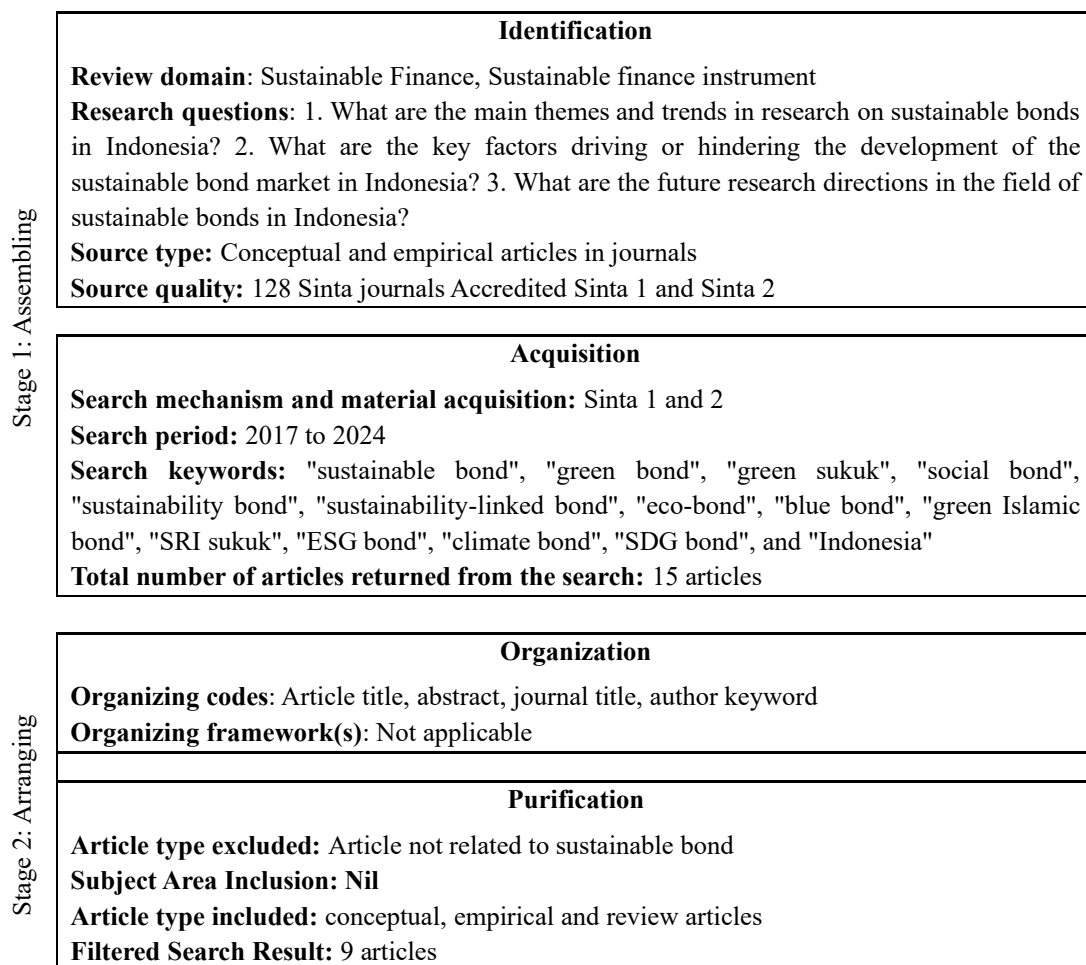


Figure 2. Review protocol of SPAR-4-SLR for Scopus journal

Figure 2 illustrates the SPAR-4-SLR process applied to the Scopus database. It depicts the progression from an initial search yielding 90 articles (2017–2024) to a refined set of 21 articles focused on sustainable bonds, achieved through relevance-based filtering. The figure highlights using Vosviewer to analyse all 21 articles, producing visualisations such as keyword co-occurrence networks and publication trend graphs. These outputs address the research questions by identifying global trends and themes in sustainable bond research relevant to Indonesia.



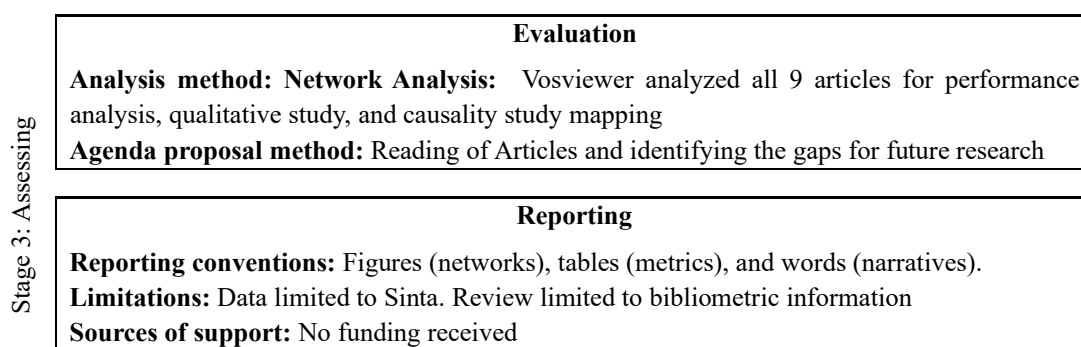


Figure 3. Review protocol of SPAR-4-SLR for SINTA journal

Figure 3 presents the SPAR-4-SLR process for the Sinta database, detailing the review of 128 accredited Sinta 1 and 2 journals. It shows the reduction from 15 retrieved articles to 9, filtered for relevance to sustainable bonds, and the subsequent analysis of all nine articles using Vosviewer. The figure visualises Indonesian-specific research trends, complementing the global perspective from Scopus, and supports identifying local themes and gaps.

4. Results and discussion

This study investigates the research trajectory of sustainable bonds in Indonesia over the period 2017–2024, a timeframe initiated by the Indonesian Financial Services Authority’s (OJK) introduction of green bond regulations (POJK 60/POJK.04/2017) and extending through significant market and regulatory developments. Figure 4 traces the history of studies on sustainable bonds, revealing a steady rise in publications from 2017, with a pronounced acceleration between 2022 and 2024. This uptick corresponds with key milestones, such as Indonesia’s first green sukuk issuance in 2018 and the expanded regulatory framework under POJK 18/POJK.04/2023, reflecting growing scholarly recognition of sustainable bonds as critical tools for financing climate action, renewable energy, and Sustainable Development Goals (SDGs) in Indonesia.

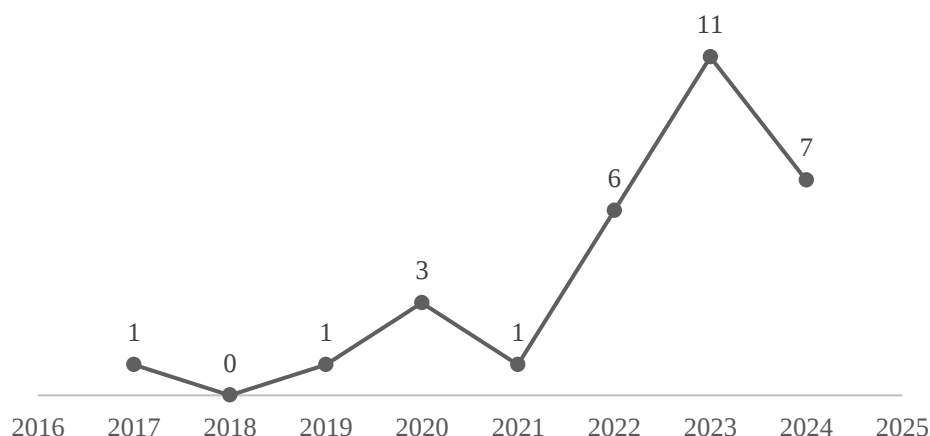


Figure 2. History of studies sustainable bonds in Indonesia

Table 1. Result of article tracing based on keyword "Sustainable Bonds"

Journal	Total
International Journal of Energy Economics and Policy	2
JEJAK	2
Journal of Sustainable Finance & Investment	2
Kajian Ekonomi & Keuangan	1
Al-Iqtishad	1
Bulletin of Monetary Economics and Banking	1
Development in Practice	1
El-Mashlahah	1
Environment, Development and Sustainability	1
Environmental Economics	1
Environmental Science and Policy	1
EPE: Nature and Space	1
Financial Innovation	1
Global Journal Al-Thaqafah	1
International Journal of Emerging Markets	1
International Journal of Ethics and Systems	1
JEBIS: Jurnal Ekonomi dan Bisnis Islam	1
Journal of Accounting and Investment	1
Journal of Climate Finance	1
Journal of Infrastructure, Policy and Development	1
Journal of the Siam Society	1
Mathematics	1
Renewable Energy	1
Review of Accounting and Finance	1
SHARE Jurnal Ekonomi dan Keuangan Islam	1
Shirkah: Journal of Economics and Business	1
Sustainability	1
Total	30

Table 1 complements this temporal insight by cataloguing 30 articles published across 25 journals from 2017 to 2024, spanning economics, finance, environmental science, and ethics. Leading journals include the International Journal of Energy Economics and Policy, JEJAK, and the Journal of Sustainable Finance and Investment, with two articles highlighting a focused interest in energy economics, regional impacts, and sustainable investment strategies. The remaining 22 journals, each contributing one article—such as Al-Iqtishad, Environmental Science and Policy, and Sustainability—demonstrate the topic’s interdisciplinary reach. This diversity underscores broad academic engagement with sustainable bonds, enriched by Indonesia’s unique blend of Islamic finance and sustainability priorities.

The combined analysis of Figure 4 and Table 1 reveals a robust research trend over 2017–2024, with publication volume surging in the later years and scholarship distributed across varied fields. The period’s growth aligns with increased market activity and policy support.

Network analysis of keywords

Figure 5 provides an informative visualisation of Indonesia's sustainable bonds research landscape, derived from a network analysis of keywords across 30 articles (21 from Scopus and nine from Sinta) using VOSviewer. This software mapped keyword co-occurrences extracted from titles, abstracts, and author-provided keywords, revealing dominant thematic clusters and interconnections that reflect research trends and priorities in Indonesia's sustainable finance ecosystem from 2017 to 2024.

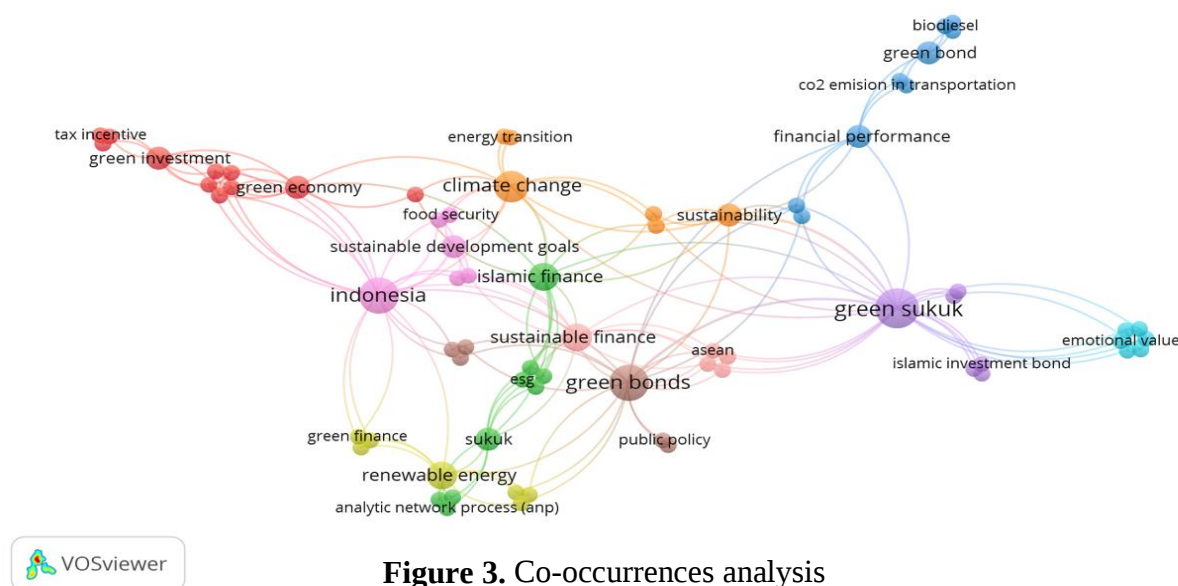


Figure 3. Co-occurrences analysis

The centrality of clusters such as green sukuk and green bonds underscores their pivotal role in driving sustainable financing, aligning with Indonesia's pioneering issuance of green sukuk in 2018 (US\$1.25 billion) and early green bond initiatives like PT Sarana Multi Infrastruktur's IDR 500 billion issuance in 2018. For instance, Primambudi (2023) highlights green sukuk's feasibility in financing Indonesia's biodiesel industry, illustrating its practical application in renewable energy transitions. The dominance of green sukuk also shows the alignment between sustainability principles and Islamic finance values, which are increasingly receiving attention in Indonesia (Araminta et al., 2022).

The network also reveals strong linkages between the sustainability cluster and related themes such as Sustainable Development Goals (SDGs), climate change, and renewable energy, showing that the issuance of sustainable bonds in Indonesia is heavily motivated by national commitments to the SDGs and global climate goals post-Paris Agreement, particularly in tackling climate change and advancing renewable energy (Dewananda et al., 2023). Azhgaliyeva et al. (2020) emphasise green bonds' role in deploying renewable energy in Southeast Asia, including Indonesia. Faizi et al. (2024) demonstrate how green sukuk supports SDG attainment, particularly

in climate mitigation. These findings reflect Indonesia's policy framework, such as POJK 18/POJK.04/2023, which integrates environmental and social objectives into bond regulations.

Beyond green instruments, the analysis identifies emerging clusters like social bonds, sustainability bonds, and sustainability-linked bonds (SLBs), reflecting recent market developments such as PT Bank Rakyat Indonesia's US\$ 500 million in 2019, PT Sarana Multigriya Financial's IDR 500 billion social bond in 2023, and PT Steel Pipe Industry's IDR 1 trillion SLB in 2024. However, these clusters are less prominent, suggesting limited research coverage compared to green sukuk and bonds, possibly due to their nascent stage in Indonesia. The Islamic finance cluster's connection to green sukuk highlights opportunities for Sharia-compliant innovations like blue sukuk, though studies on these remain sparse (Rusydiana & Irfany, 2021). This network analysis underscores a research bias toward green sukuk, driven by Indonesia's Islamic finance heritage, but also signals a gap in exploring the full spectrum of sustainable bonds, aligning with this study's aim to provide a broader synthesis.

Study of Sustainable Bonds in Indonesia Based on Qualitative Study

This qualitative analysis synthesises findings from 21 articles (14 Scopus, 7 Sinta) to explore sustainable bonds' development, challenges, and opportunities in Indonesia. It reveals a narrow focus solely on green bonds and green sukuk, with notable extensions like blue sukuk and Sovereign Climate-Aligned Bonds (SCBs) also emerging. Several articles use qualitative approaches, such as case studies, interviews, and systematic literature reviews, to explore various aspects of sustainable bonds in Indonesia.

Anugrahaeni (2017) provides an overview of Indonesia's bond and sukuk market, framing the growth of green bonds and sukuk within a supportive financial ecosystem bolstered by OJK regulations like POJK 60/POJK.04/2017. Saa (2024) focuses on the role of government in promoting green investment by analysing the policies that affect the utilisation of green bonds in Indonesia and their impact on sustainable development. Endri et al. (2022) examine corporate green sukuk, highlighting its potential to channel private capital into green projects while identifying barriers such as limited investor awareness. Wirawan & Sari (2023) emphasises green sukuk's role in financing the used cooking oil (UCO)-based biodiesel industry, advancing renewable energy goals, whereas Azhgaliyeva et al. (2020) explore green bonds' capacity to attract international investment for renewable energy and energy efficiency across ASEAN, underscoring Indonesia's reliance on external funding.

Santoso (2020) investigates green sukuk's contributions to Sustainable Development Goals (SDGs) and climate change mitigation, establishing a legal groundwork for its expansion, while Hariyani and Kusuma (2020) advocate its application in municipal waste management, presenting innovative urban solutions. Mangunjaya (2023) highlights the influence of Islamic traditions on sustainable finance, aligning green sukuk with Maqashid Syariah principles, and Faizi et al. (2024) map the potential of Islamic climate finance, with green sukuk as a central focus. Yunita et al. (2023) analyse governance and transparency challenges in aligning private finance with SDGs

through green bonds, pointing to risks like greenwashing and regulatory gaps. Rakatama et al. (2023) identify Indonesia's climate funding gap, advocating green financing for adaptation and low-carbon development. Suroso et al. (2022) assess green sukuk's contribution to NDC energy targets, stressing international collaboration.

Five systematic literature reviews (SLRs) focus on green sukuk: Dewananda et al. (2023) emphasise sustainable agriculture and food security; Alkadi (2024) notes broader investor participation; Khalilurrahman & Mubarrak (2022) evaluate retail green sukuk's structure and challenges; Foglie & Keshminder (2022) call for standardised frameworks and investor education; and Araminta et al. (2022) highlight benefits and hurdles for sustainable development.

Beyond green instruments, Rusydiana and Irfany (2021) introduce blue sukuk for marine conservation, expanding sustainable finance's environmental scope, while Chavarría-Flores & Warren (2024) propose SCBs to tie private investment to national climate targets, offering a novel policy tool. Guild (2020) examines political and institutional barriers to green finance, particularly in renewable energy, urging policy reform.

This synthesis underscores that prior research exclusively centres on green bonds and sukuk, reflecting their dominance in Indonesia's sustainable finance landscape. The 13 of 21 articles on green sukuk highlight its market maturity and cultural resonance, driven by Indonesia's Islamic finance heritage and regulatory support (e.g., POJK 18/POJK.04/2023). This concentrated focus on green and environmentally aligned instruments underscores their pivotal role in Indonesia's sustainable finance landscape, aligning with this study's aim to provide a comprehensive synthesis. However, the complete absence of studies addressing social, sustainability, and sustainability-linked bonds (SLBs) within the 21 articles reveals a striking limitation. Social bonds, which could target social inclusion, sustainability bonds combining environmental and social goals, and SLBs tied to performance outcomes remain unexplored despite their potential to address Indonesia's broader socioeconomic challenges alongside environmental priorities. This gap restricts the scope of sustainable finance research, emphasising green objectives over a more holistic sustainability framework, and signals an urgent need for expanded investigation to capture Indonesia's sustainable bond market's potential fully. This narrow scope limits the understanding of Indonesia's broader sustainable bond potential despite challenges like regulatory inconsistencies, greenwashing risks, and low investor education noted across the literature. These findings position green bonds and sukuk as pivotal tools for environmental goals, signalling an urgent need for expanded exploration beyond these instruments, aligning with this study's comprehensive objectives.

Causality study of sustainable bonds

This study conducted a causal study examining the drivers and impacts of sustainable bond issuance, building a focused analysis of 9 articles (7 from Scopus and two from Sinta) listed in Table 2. The VOSviewer network in Figure 5 identifies green bonds and sukuk as dominant themes, reflecting their central role in sustainable finance literature for funding environmental

initiatives like renewable energy and climate mitigation. While not appearing in the VOSviewer network visualisation in Figure 5, Earthquake bonds emerged during the keyword search, indicating their presence within the literature. Their absence from Figure 5 stems from visualisation constraints. However, their relevance to the sustainable bond agenda—particularly their capacity to finance disaster risk in a seismically active nation like Indonesia—prompted their inclusion in this study. This decision aligns earthquake bonds with the broader sustainable finance framework, complementing green bonds and sukuk by addressing resilience against natural disasters, a critical sustainability challenge.

Figures 6–8 illustrate causal relationships between variables influencing the sustainable bond market in Indonesia, drawing from the articles listed in Table 2. The arrows in these figures depict different types of relationships: solid arrows represent positive effects, dashed arrows indicate negative effects, and combined solid-dashed arrows signify no significant effect. These relationships are numbered 1 to 9, corresponding to specific findings from prior research listed in Table 2.

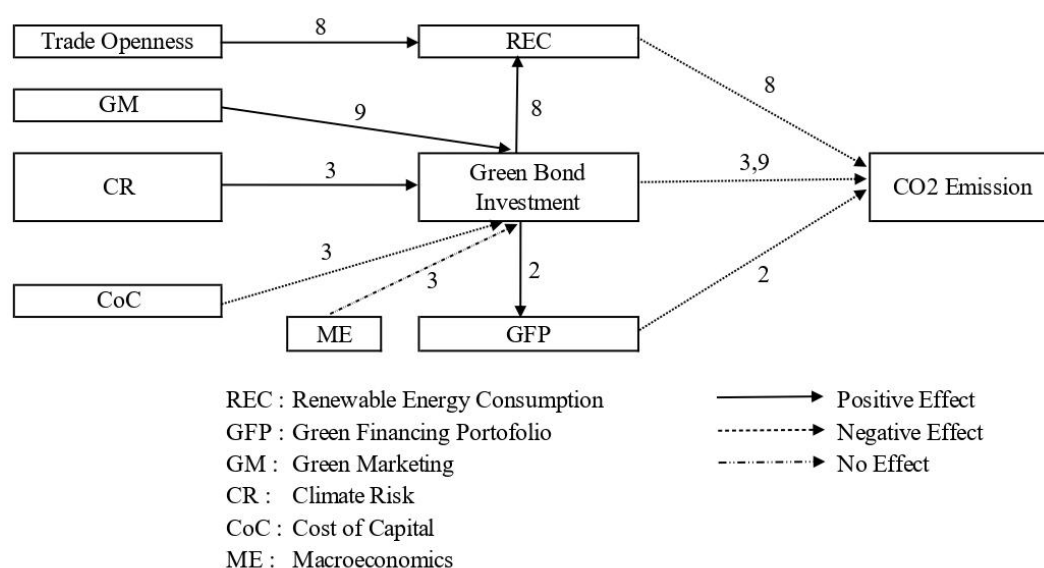


Figure 4. Mapping causality green bond

Figure 6 illustrates a conceptual framework for green bond investment, drawing on findings from Dong et al. (2023), Muhajir (2024), Sabbar et al. (2023), and Sapiri & Putra (2023). Green Marketing (GM) and Climate Risk (CR) positively influence green bond investment, with Sabbar et al. (2023) demonstrating that green marketing campaigns in Indonesia significantly increase investor demand by raising awareness of the environmental benefits of green bonds, as evidenced by their panel data analysis of 560 Indonesian firms from 2002 to 2021. Dong et al. (2023) support the positive role of Trade Openness in facilitating green technology transfer, further encouraging investment in green bonds by enhancing renewable energy consumption (REC) in Southeast Asia, including Indonesia. However, the Cost of Capital (CoC) negatively affects investment, noting that

high financing costs, such as certification fees, deter sustainable projects in the Indonesian bond market, highlighting a key barrier to green bond uptake (Muhajir, 2024). Investment enhances REC and the Green Financing Portfolio (GFP), which in turn reduces CO₂ emissions, aligning with Indonesia's national climate goals, find that a 1% increase in green bond issuance leads to a 0.16–0.44% rise in REC (Dong et al., 2023), and further supported by Sapiri & Putra (2023), who emphasises that the Green Financing Portfolio (GFP) plays a critical role in reducing CO₂ emissions through sustainable project financing. Additionally, Muhajir (2024) underscores the importance of integrating climate risk into investment decisions to bolster the effectiveness of green bonds in achieving environmental outcomes. Also, it indicates that macroeconomic factors (ME), like Economic Policy Uncertainty (EPU), do not affect green bond investments.

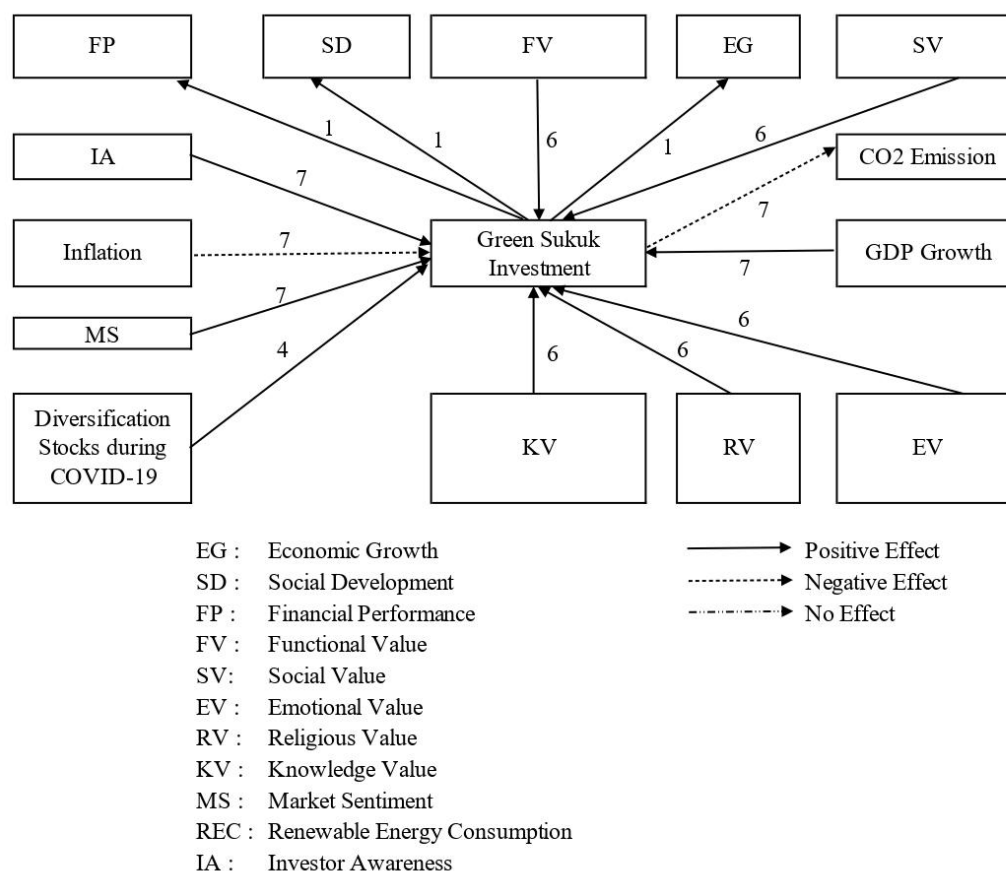


Figure 5. Mapping causality green sukuk

Figure 7 represents a conceptual framework centred on Green Sukuk Investment, depicted as a rectangular box, illustrating its role as a Sharia-compliant tool for funding sustainable projects. Surrounding this core are economic, social, and environmental factors, as explored by Ali et al. (2024), Faisal et al. (2023), Narayan et al. (2022), and Primambudi (2023). Economic Growth

(EG) and Functional Performance (FP) positively influence investment because a growing economy provides financial capacity and reliable returns to attract investors (Ali et al., 2024; Primambudi, 2023). Market Sentiment (MS), via the Jakarta Islamic Index (JII), has a limited effect, indicating that investors prioritise conventional markets over Islamic indices (Primambudi, 2023). Investor Awareness (IA) and Diversification During Stocks COVID-19 positively impacts investment since green consciousness drives demand (Primambudi, 2023), and investors seek safer assets during the pandemic (Narayan et al., 2022). Social factors like Functional Value (FV), Social Value (SV), Emotional Value (EV), Religious Value (RV), and Knowledge Value (KV) also drive investment, as they fulfil practical, social, emotional, religious, and informational needs of investors (Faisal et al., 2023). Inflation negatively affects investment because it raises borrowing costs, deterring investors (Primambudi, 2023). The primary outcome is CO₂ Emission reduction as green sukuk financing mitigates greenhouse gas emissions through sustainable projects like biofuels (Primambudi, 2023).

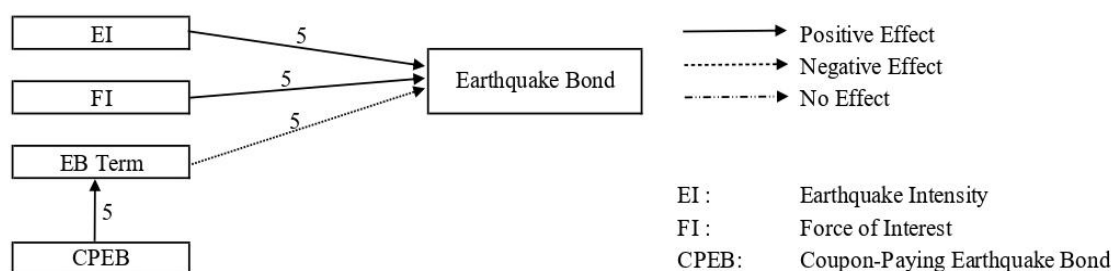


Figure 6. Mapping causality earthquake bond

Figure 8 identifies causal effects on Earthquake Bond (EB) pricing. Earthquake Intensity (EI) increases EB prices because higher intensity signals greater risk, raising investor yield demands. Force of Interest (FI) also raises prices by 3–10% as stochastic rates add uncertainty in discounting. GPD Type I selection (vs. Type II) impacts prices by 6–7%, as a better fit ensures accurate risk assessment, affecting pricing. EB Term negatively affects EB prices as longer terms increase uncertainty, but positively impacts Coupon-Paying EB (CPEB) prices, as extended terms add more coupon payments, boosting value. For Indonesia, with 258.5 annual extreme earthquakes, shorter-term EBs can secure quick funds at lower prices, while longer-term CPEBs attract investors with higher returns, aiding seismic risk management.

Table 2. List of causality mapping

No.	Article	Writer	Journal	Source
1	An empirical study of the effects of green Sukuk spur on economic growth, social development, and financial performance in Indonesia	Ali et al. (2024)	Environment, Development and Sustainability	Scopus
2	Causality of Bank Financial Performance, Green Bond, CSR, Green Financing Portfolio and CO ₂ Emissions in Transportation: Evidence from Indonesia	Sapiri and Putra (2023)	International Journal of Energy Economics and Policy	Scopus
3	Cost of Capital and Climate Risk in the Indonesian Bonds Market	Muhajir (2024)	Bulletin of Monetary Economics and Banking	Sinta
4	Did green debt instruments aid diversification during the COVID-19 pandemic?	Narayan et al. (2022)	Financial Innovation	Scopus
5	Earthquake Bond Pricing Model Involving the Inconstant Event Intensity and Maximum Strength	Ibrahim et al. (2024)	Mathematics	Scopus
6	Examining the Purchase Intentions of Indonesian Investors for Green Sukuk	Faisal et al. (2023)	Sustainability	Scopus
7	Financing Biofuel Through Green Sukuk Corporate: Stage, Potential, and Maturity	Primambudi (2023)	JEJAK	Sinta
8	Role of trade and green bond market in renewable energy deployment in Southeast Asia	Dong et al. (2023)	Renewable Energy	Scopus
9	The Role of Green Marketing and Promotion of Green Energy Bonds to Reduce Carbon Emissions in Indonesia	Sabbar et al. (2023)	International Journal of Energy Economics and Policy	Scopus

5. Conclusions, limitations, and recommendations

This systematic literature review (SLR), utilising 30 articles from Scopus and Sinta databases spanning 2017–2024, highlights the importance of sustainable bonds in Indonesia’s sustainable development efforts, addressing climate change, renewable energy, and socioeconomic disparities. Notable milestones—such as 2018 the world’s largest green sukuk (US\$1.25 billion), PT Bank Rakyat Indonesia’s 2019 sustainability bond (US\$500 million), PT Sarana Multigriya

Financial's 2023 social bond (IDR 500 billion), and PT Steel Pipe Industry's 2024 sustainability-linked bond (IDR 1 trillion)—reflect strong investor demand and issuer innovation. Supported by the Indonesian Financial Services Authority's (OJK) regulations, including POJK 60/POJK.04/2017 and POJK 18/POJK.04/2023, these instruments establish sustainable bonds as vital for advancing Sustainable Development Goals (SDGs) by channelling capital into ESG-aligned projects.

Research predominantly focuses on green bonds and sukuk, which are aligned with Indonesia's environmental goals and Islamic finance heritage. The VOSviewer analysis identifies thematic clusters around green bonds and sukuk linked to renewable energy and SDGs, emphasising their roles in climate mitigation projects like biodiesel, waste management, and renewable energy deployment. Qualitative findings highlight green bonds' capacity to attract international investment for renewable energy and energy efficiency, alongside green sukuk's maturity in applications such as biodiesel, waste management, and climate adaptation, complemented by emerging instruments like blue sukuk and Sovereign Climate-Aligned Bonds (SCBs). Causality studies reveal drivers like green marketing, climate risk, and investor awareness boosting investment, with CO₂ emission reduction as the primary outcome, though high capital costs and inflation pose challenges. Instruments like earthquake bonds broaden the scope, addressing disaster resilience in Indonesia's seismic context. However, social, sustainability and sustainability-linked bonds (SLBs) remain underexplored despite their issuance and potential for social inclusion and broader ESG goals beyond CO₂ reduction. Persistent challenges—limited investor awareness, regulatory gaps, greenwashing risks, and insufficient standardised data—hinder market growth.

While green bonds and sukuk excel at reducing CO₂ emissions, neglecting other bond types limits a holistic understanding of sustainable finance's potential in Indonesia. This study has limitations: its reliance on Scopus and Sinta databases may exclude relevant grey literature or non-indexed local studies, and the analysis does not profoundly explore the socioeconomic impacts of sustainable bonds beyond environmental outcomes. These constraints suggest caution in generalising findings across all sustainable finance dimensions. Future research should investigate social, sustainability, and SLBs to address these gaps, assessing their comprehensive socioeconomic and environmental impacts. Recommendations include enhancing investor education and transparency to boost awareness, strengthening regulations to mitigate greenwashing, and improving data standardisation for better decision-making. Integrating Islamic finance with broader sustainability goals can further amplify Indonesia's efforts, fostering a more inclusive and resilient sustainable finance ecosystem. This SLR provides a synthesised foundation to guide researchers, policymakers, and market participants toward a sustainable future in Indonesia.

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