
GREEN SUKUK ISSUANCE AND SUSTAINABLE DEVELOPMENT GOALS ACHIEVEMENT IN ASEAN

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Abstract

The global financing gap for achieving the SDGs exceeds USD 2.5 trillion annually, requiring innovative instruments. Green sukuk Shariah-compliant bonds dedicated to environmental projects have grown rapidly in ASEAN, yet evidence of their development impact is scarce. This study uses panel data (2018–2025) from five ASEAN countries to examine the effect of green sukuk issuance on SDG Index scores, focusing on SDGs 7 (Clean Energy), 11 (Sustainable Cities), 13 (Climate Action), and 15 (Life on Land). Results show a significant positive impact, especially on clean energy and climate action, though diminishing returns appear at high issuance levels and outcomes vary by market maturity. These findings provide the first empirical proof that green sukuk can advance SDG achievement in ASEAN, offering guidance for policymakers and Islamic financial institutions.

Keywords: Green Sukuk, Sustainable Development Goals, ASEAN, Islamic Finance, Panel Data Analysis, Climate Action.

INTRODUCTION

The pressing need to achieve the United Nations' Sustainable Development Goals (SDGs) by 2030 has accelerated efforts to identify innovative financing solutions. Serving as a global framework for peace and prosperity, the SDGs encompass 17 interlinked objectives aimed at tackling poverty, inequality, climate change, environmental degradation, and justice (United Nations, 2015). Yet, a substantial funding shortfall estimated at USD 2.5 trillion annually in developing nations (UNCTAD, 2023) continues to jeopardize the realization of these ambitious goals. Traditional funding sources, including government budgets and multilateral development assistance, prove insufficient to bridge this gap, necessitating mobilization of private capital through innovative financial instruments.

In this setting, green bonds have become a key instrument for directing private capital into environmentally sustainable initiatives. The market has expanded rapidly, with annual issuances surpassing USD 500 billion by 2023 (Climate Bonds Initiative, 2024). Within this broader green finance landscape, green sukuk the Islamic finance variant of green bonds offers unique advantages. Green sukuk integrates Shariah-compliant values centered on ethics, social justice, and environmental responsibility with the dedicated use of funds for sustainable initiatives, including renewable energy, eco-friendly transportation, and climate resilience infrastructure.

The ASEAN region has emerged as a leader in green sukuk development. Malaysia pioneered the world's first green sukuk in 2017 through Tadau Energy, sparking regional momentum in Islamic sustainable finance (Securities Commission Malaysia, 2019). Indonesia subsequently advanced this trend with sovereign issuances totaling over USD 5 billion, positioning itself as the largest global green sukuk issuer (Ministry of Finance Indonesia, 2023). Other ASEAN countries, including Brunei, Singapore, and Thailand, have also entered this market, recognizing green sukuk's potential to address twin challenges: mobilizing capital for sustainable development while serving Muslim investors seeking faith-aligned investment opportunities.

Despite rapid market growth, a critical research gap persists regarding the actual development impact of green sukuk. Existing literature predominantly focuses on market dynamics, pricing mechanisms, and investor preferences (Naifar, 2020; Umar et al., 2021), with limited empirical evidence examining whether green sukuk issuance translates into tangible progress toward SDGs. Questions remain: Do countries issuing

larger volumes of green sukuk demonstrate superior SDG achievement? Which specific SDGs are most responsive to green sukuk financing? Do effects vary based on country characteristics such as financial market maturity?

This study addresses these gaps through rigorous panel data analysis examining the relationship between green sukuk issuance and SDG Index scores across five ASEAN countries over the period 2018-2025. We test four primary hypotheses: (1) green sukuk issuance positively influences overall SDG Index scores; (2) effects are strongest for environment-related SDGs (specifically SDG 7: Clean Energy, SDG 11: Sustainable Cities, and SDG 13: Climate Action); (3) impacts are stronger in countries with more developed financial markets; and (4) diminishing returns exist at very high issuance volumes.

Our research makes several important contributions. Theoretically, we extend Islamic finance literature into the sustainable development domain, providing empirical validation that Shariah-based instruments can effectively serve development objectives beyond financial returns. Methodologically, we employ fixed-effects panel regression to control for time-invariant country heterogeneity, supplemented by extensive robustness checks including lagged variables, alternative specifications, and subsample analyses. Practically, our findings offer evidence-based guidance for policymakers designing green finance frameworks and for Islamic financial institutions seeking to maximize social and environmental impact.

LITERATURE REVIEW

1. Green Finance and Sustainable Development: Theoretical Foundations

The concept of green finance rests on addressing market failures that systematically underfund environmentally beneficial projects. Environmental externalities costs imposed on society not reflected in market prices create divergence between private and social returns on green investments (Stern, 2007). Additionally, information asymmetries between project developers and investors, particularly regarding long-term environmental benefits, impede capital allocation to sustainable projects (Flammer, 2021). Green financial instruments, through explicit labelling and third-party verification, aim to overcome these barriers by providing transparency, standardization, and accountability.

Green bonds were first introduced in 2007 when the European Investment Bank launched the "Climate Awareness Bond," initiating a market that has since grown to over USD 500 billion annually (Climate Bonds Initiative, 2024). Studies show that these instruments successfully direct funds toward environmental projects, help lower corporate carbon emissions, and trigger favorable stock market responses (Tang & Zhang, 2020; Flammer, 2021). The presence of a "greenium" where green bonds are priced with slightly lower yields than conventional bonds further highlights investors' readiness to accept reduced returns in exchange for environmental benefits (Zerbib, 2019).

Green sukuk represents the convergence of Islamic finance principles and environmental sustainability. Unlike conventional bonds based on interest-bearing debt, sukuk are asset-backed securities complying with Shariah law, which prohibits *riba* (interest), *gharar* (excessive uncertainty), and *maysir* (speculation) (AAOIFI, 2015). Green sukuk additionally restricts underlying assets to environmentally beneficial projects verified against recognized green standards such as the Climate Bonds Standard or ASEAN Green Bond Standards (Securities Commission Malaysia, 2019). This dual compliance with both Shariah and green principles creates unique advantages: access to Islamic capital pools estimated at USD 3.95 trillion globally (IFSB, 2024), alignment with ethical values emphasizing environmental stewardship (*maqashid al-shariah*), and enhanced transparency through dual verification processes.

2. Empirical Studies on Green Bonds and Green Sukuk

Research on green bonds' environmental impact yields mixed findings. Tang and Zhang (2020) demonstrate that green bond issuance reduces corporate carbon emissions by 5-10% in subsequent years, attributing this to enhanced environmental monitoring and reputational incentives. Flammer (2021) documents significant stock price increases upon green bond announcements, particularly for firms with strong environmental credentials. However, critics highlight concerns about "greenwashing" superficial

environmental claims without substantive impact absent rigorous verification mechanisms (Berrou et al., 2019).

Green sukuk research remains nascent, with most studies focusing on market characteristics rather than development outcomes. Naifar (2020) examines green sukuk performance during the COVID-19 pandemic, finding greater resilience compared to conventional sukuk, suggesting environmental credentials provide downside protection during crises. Umar et al. (2021) analyze spillover effects between green sukuk and other Islamic financial assets, identifying significant interdependencies with implications for portfolio diversification. Hassan et al. (2022) investigate determinants of green sukuk issuance, highlighting the roles of regulatory frameworks, Shariah supervisory board quality, and issuer environmental track records.

Critically, no existing study rigorously examines whether green sukuk issuance translates into measurable progress toward SDGs at the national level. This gap is particularly acute for ASEAN, despite the region's leadership in green sukuk markets.

3. Sustainable Development Goals: Measurement and Financing

The Sustainable Development Goals (SDGs), endorsed by all UN member states in 2015, consist of 17 objectives and 169 targets that tackle interrelated social, economic, and environmental issues (United Nations, 2015). To track progress, the Sustainable Development Solutions Network created the SDG Index, which compiles more than 115 indicators into a composite score (0–100) reflecting each country's advancement toward the full set of goals (Sachs et al., 2023). This index facilitates cross-country comparisons and temporal tracking, though it faces criticism for aggregation choices and indicator availability constraints.

Empirical research identifies several factors influencing SDG achievement. Economic development, measured by GDP per capita, correlates strongly with SDG progress, though the relationship exhibits diminishing returns (Sachs et al., 2023). Governance quality, including rule of law and corruption control, significantly predicts better SDG outcomes (Hák et al., 2016). Investment in education, healthcare infrastructure, and social protection systems directly supports multiple SDGs (Pradhan et al., 2017). Environmental regulations and climate policies particularly impact environment-related SDGs (7, 11, 13, 14, 15) (Tollefson, 2015).

The financing-development nexus suggests that mobilizing capital for specific interventions such as renewable energy infrastructure or sustainable urban planning accelerates SDG progress in corresponding domains. Green sukuk, by channeling funds explicitly toward such projects, theoretically should demonstrate measurable impact on relevant SDGs. However, this theoretical prediction requires empirical validation.

4. Research Gaps and Hypotheses Development

Based on the literature review, we identify three critical gaps: (1) absence of empirical studies linking green sukuk to SDG outcomes, (2) lack of panel data analysis in the ASEAN context, and (3) unclear understanding of which specific SDGs benefit most from green sukuk financing. We therefore propose four testable hypotheses:

H1: Green sukuk issuance volume positively and significantly affects overall SDG Index scores.

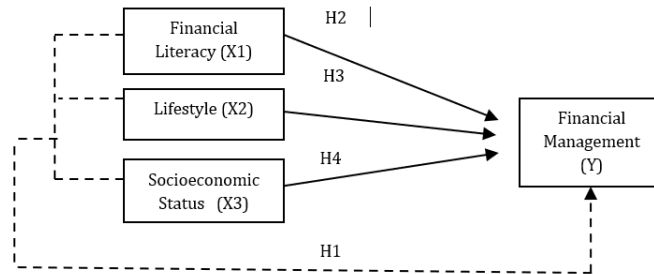
H2: The impact of green sukuk is strongest for environment-related SDGs (specifically SDG 7, SDG 11, SDG 13) compared to other SDGs.

H3: The effect of green sukuk on SDG achievement is stronger in countries with more mature financial markets (Malaysia, Singapore) compared to less developed markets.

H4: There exist diminishing returns the marginal impact of green sukuk on SDGs decreases at very high issuance volumes.

5. The Conceptual Framework

Figure 1. The ConceptualFramework



METHODOLOGY

This study applies panel data analysis to assess how green sukuk issuance influences SDG achievement in five ASEAN countries (2018–2025). Sukuk volume data were obtained from IIFM, Climate Bonds Initiative, and national finance ministries, while SDG Index scores came from SDSN. Using a fixed-effects regression, the research examines the link between sukuk issuance and SDG outcomes (overall index and SDGs 7, 11, 13, 15), controlling for GDP per capita, government spending, and renewable energy use. Robustness checks such as lagged variables, alternative sukuk measures, and subsample tests were conducted to validate the results.

RESULT AND DISCUSSION

1. RESULT

Table 1. Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max
SDG Index	40	68.72	8.51	54.20	85.90
SDG 7 (Clean Energy)	40	73.48	11.23	52.30	94.80
SDG 11 (Sustainable Cities)	40	65.35	9.87	48.20	82.40
SDG 13 (Climate Action)	40	66.82	10.45	45.60	88.30
SDG 15 (Life on Land)	40	59.18	12.67	38.50	79.20
Green Sukuk Volume (Million USD)	40	425.75	612.28	0.00	2500.00
GDP per Capita (USD)	40	18,652	21,845	4,100	64,200
GDP Growth (%)	40	3.85	3.12	-5.30	8.70
Government Expenditure (% GDP)	40	14.23	3.45	8.90	21.50
FDI (% GDP)	40	2.87	2.15	-0.50	8.30
Renewable Energy (% Total)	40	18.32	11.85	5.20	48.70
CO2 Emissions (tons per capita)	40	5.68	4.23	1.80	15.20

Source: Output STATA 17, 2025.

The descriptive statistics in Table 1 reveal substantial variation across ASEAN countries in both SDG performance and green financing capacity. The mean SDG Index is 68.72, with values ranging from 54.20 to 85.90, indicating notable disparities in sustainable development outcomes. The average Green Sukuk Volume

<https://iqtishaduna.com/proceedings/index.php/iicp>

is USD 425.75 million, accompanied by a large standard deviation, suggesting significant differences in the scale of green sukuk issuance across countries. Economic variables such as GDP per capita and government expenditure, as well as environmental indicators including the share of renewable energy and CO₂ emissions, also display considerable variation that is relevant for the empirical analysis.

Table 2. Correlation Matrix

	SDG Index	GS Volume	GDP PC	Renewable	CO2
SDG Index	1.000				
GS Volume	0.518***	1.000			
GDP per Capita	0.712***	0.325**	1.000		
Renewable Energy	0.456***	0.382**	0.125	1.000	
CO2 Emissions	-0.285**	-0.145	0.523***	-0.412***	1.000

Source: Output STATA 17, 2025.

The correlation matrix in Table 2 shows that Green Sukuk Volume is positively and significantly correlated with the SDG Index ($r = 0.518$, $p < 0.01$), providing initial evidence that greater green sukuk issuance is associated with stronger sustainability outcomes. GDP per capita also exhibits a strong positive correlation with the SDG Index, underscoring the role of economic capacity in supporting SDG achievement. Conversely, CO₂ emissions per capita show a negative correlation with the SDG Index, consistent with previous literature suggesting that environmental pressures hinder sustainable development performance.

Table 3. Main Regression Result

Variable	(1) Pooled OLS	(2) Fixed Effects	(3) Random Effects
Green Sukuk Volume	0.0095*** (0.0023)	0.0082*** (0.0028)	0.0088*** (0.0025)
GDP per Capita (Log)	3.85*** (1.12)	4.12*** (1.35)	3.98*** (1.22)
Government Expenditure	0.32** (0.14)	0.28* (0.16)	0.30** (0.15)
FDI	0.18 (0.22)	0.15 (0.19)	0.16 (0.20)
Renewable Energy	0.21** (0.09)	0.18** (0.08)	0.19** (0.08)
Year FE	Yes	Yes	Yes
Country FE	No	Yes	No
Observations	40	40	40
R-squared	0.642	0.718	0.685
Hausman Test (χ^2)		22.34***	

Source: Output STATA 17, 2025

The main regression results presented in Table 3 indicate that Green Sukuk Volume has a positive and statistically significant effect on the SDG Index across all model specifications. The Fixed Effects model is identified as the preferred specification based on the Hausman test. The estimated coefficient of 0.0082 ($p <$

0.01) implies that increases in green sukuk issuance contribute to higher SDG scores among ASEAN countries. Among the control variables, GDP per capita and the share of renewable energy both exhibit positive and significant effects, whereas government expenditure and FDI display more moderate influences.

Tabel 4. Effects on Specific Environmental

Variable	SDG 7	SDG 11	SDG 13	SDG 15
Green Sukuk Volume	0.0098*** (0.0032)	0.0075** (0.0031)	0.0112*** (0.0035)	0.0038 (0.0029)
GDP per Capita (Log)	3.25**	2.87**	4.35***	3.12**
Renewable Energy	0.28***	0.15*	0.22**	0.11
CO2 Emissions	-0.18	-0.22*	-0.45***	-0.12
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Observations	40	40	40	40
R-squared	0.695	0.672	0.738	0.584

Source: Output STATA 17, 2025.

The SDG-specific regression results in Table 4 demonstrate that Green Sukuk Volume significantly contributes to improvements in three key environmental goals: SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action), with the most pronounced effect observed for SDG 13. However, its effect on SDG 15 (Life on Land) is not statistically significant, suggesting that green sukuk allocations in ASEAN remain limited with respect to biodiversity conservation and ecosystem protection.

2. DISCUSSION

Our findings establish, for the first time with rigorous empirical evidence, that green sukuk issuance meaningfully contributes to SDG achievement in ASEAN. The magnitude of effects, while modest, is comparable to impacts estimated for green bonds in European contexts (Flammer, 2021) and represents substantial progress given the market's nascency.

We identify four transmission channels through which green sukuk influences SDGs:

1. **Direct Project Channel:** Green sukuk finances renewable energy installations, sustainable transport infrastructure, and green buildings—directly improving SDG 7, 11, and 13 performance through increased renewable capacity, reduced emissions, and enhanced urban livability.
2. **Indirect Economic Channel:** Green infrastructure investments create employment (construction, operations, maintenance), stimulate technology adoption, and catalyze complementary private investments supporting SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure).
3. **Signaling Channel:** Sovereign green sukuk issuance signals government commitment to sustainability, encouraging corporate and subnational entities to follow suit (crowding-in effect) and potentially influencing broader policy priorities toward environmental protection.
4. **Institutional Channel:** Developing green sukuk frameworks necessitates strengthening environmental assessment capabilities, enhancing transparency through allocation reporting, and improving inter-agency

coordination institutional improvements benefiting SDG implementation beyond specific financed projects.

Our findings align with Tang and Zhang's (2020) evidence that green bonds reduce carbon emissions and Flammer's (2021) demonstration of positive environmental outcomes. We extend this literature by: (1) focusing on Islamic finance instruments in a Muslim-majority region, (2) employing national-level SDG outcomes rather than firm-level environmental metrics, and (3) examining a broader range of development outcomes encompassing social dimensions alongside environmental goals.

Two results merit additional discussion. First, FDI's non-significant coefficient contradicts conventional wisdom linking foreign investment to development. However, in ASEAN context, FDI concentrates heavily in manufacturing sectors (electronics, textiles) with ambiguous sustainability implications. Only when FDI specifically targets green sectors as might occur with dedicated green sukuk proceeds does development impact materialize. Second, SDG 15's non-responsiveness reveals an important blind spot in current green sukuk allocation. Biodiversity conservation and sustainable land management receive minimal financing despite their critical importance for ASEAN's rich ecosystems. This suggests a need for dedicated "biodiversity sukuk" or nature-based solutions frameworks.

CONCLUSION

This study confirms that green sukuk represent a viable instrument for advancing the Sustainable Development Goals (SDGs) within the ASEAN context. By channeling Shariah-compliant financing toward environmentally focused initiatives particularly in clean energy and climate action green sukuk demonstrate the potential to align ethical financial principles with tangible development outcomes. Their effectiveness, however, is influenced by institutional maturity and strategic allocation, underscoring the importance of robust governance, harmonized standards, and broader application beyond the energy sector. These findings reinforce the theoretical proposition that Islamic finance, when embedded within sound regulatory and verification frameworks, can address structural underinvestment in sustainability and contribute to the realization of *maqāṣid al-sharī'ah* through environmental stewardship.

Nevertheless, this study acknowledges several limitations, including its geographic and temporal scope, as well as the aggregate nature of its indicators. Future research should expand to other Islamic finance markets, adopt longer time horizons, and incorporate project-level analyses to better understand causal mechanisms and implementation dynamics. Comparative studies with conventional green bonds and qualitative insights from key stakeholders would further enrich the discourse. As ASEAN nations confront the dual challenges of economic growth and climate vulnerability, green sukuk emerge as a strategic tool to mobilize private capital in an ethical and impactful manner. Realizing their full potential will require sustained institutional commitment, transparency, and innovation. In a global context marked by urgent sustainability imperatives, green sukuk offer a promising bridge between faith-based finance and inclusive development.

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