JURNAL SYNTAX ADMIRATION
Syntax Admiration: p-ISSN 2722-7782 | e-ISSN 2722-5356
Vol. 7, No. 1, January 2026

# Sustainable Business Practices Supporting SDGs Across ASEAN Economies

**Agus Rohmat Hidayat[1], Nur Alifah[2], Kyra Kholilah Wardaniyah[3]**
Sekolah Tinggi Agama Islam Kuningan, Indonesia
Email: ghousun99@gmail

**ABSTRACT**

This study examines the role of sustainable business practices in advancing the United Nations Sustainable Development Goals (SDGs) across ASEAN economies. Drawing on a systematic review of recent empirical literature and secondary data from 10 ASEAN member states for the period 2015–2023, the study evaluates how environmental, social, and governance (ESG) frameworks, green investments, renewable energy consumption, circular economy strategies, creative economy, and human resource management (HRM) contribute to SDG attainment. Despite growing evidence on individual sustainability drivers, no prior multi-country study has simultaneously integrated ESG performance, HRM quality, and renewable energy adoption within a unified panel regression framework for the ASEAN region — a gap this study addresses. Using a Composite Sustainability Index (CSI) and panel regression analysis, the findings reveal that ASEAN countries achieving higher ESG alignment scores demonstrate significantly greater progress toward SDG targets, with a mean CSI score of 62.4 out of 100 as of 2023. The results further indicate that renewable energy adoption and green economic growth are the strongest predictors of sustainability performance ($\beta = 0.47$, $p < 0.001$), while governance quality and corporate ESG disclosure amplify these effects. Sectoral analysis highlights heterogeneity in SDG progress, with the manufacturing and logistics sectors lagging relative to the services and technology sectors. The study contributes to the theoretical understanding of sustainable business-SDG linkages in developing regional economies and offers actionable policy recommendations for ASEAN governments, private sector actors, and regional institutions toward accelerating SDG achievement by 2030.

**Keywords:** sustainable development goals; ESG; ASEAN; renewable energy; circular economy; human resource management (HRM)

## INTRODUCTION

The 2030 Agenda for Sustainable Development, adopted by all United Nations member states in 2015, established 17 Sustainable Development Goals (SDGs) as a universal call to action to end poverty, protect the planet, and ensure prosperity for all (Zaman, 2022). Within the ASEAN region comprising ten rapidly developing economies including Indonesia, Malaysia, Thailand, Vietnam, the Philippines, Singapore, Myanmar, Cambodia, Laos, and Brunei the private sector plays an increasingly critical role in driving SDG progress. As these economies undergo rapid industrialization, urbanization, and integration into global supply chains, questions about how sustainable business practices translate into measurable SDG outcomes have become paramount.

Sustainable business practices encompass a broad spectrum of organizational behaviors, strategies, and investments aimed at aligning corporate operations with environmental, social, and economic sustainability imperatives. These include the adoption of ESG frameworks, investment in renewable energy and green technologies,

circular economy strategies, responsible supply chain management, and robust human resource management practices that prioritize worker well-being and capacity development (Lathabhavan, 2022; Mahajan, et.al, 2024). In the ASEAN context, these practices are shaped by diverse regulatory environments, varying levels of economic development, and distinct cultural and institutional frameworks (Harry, 2025; Iguchi, et.al, 2025).

Existing literature reveals growing empirical evidence linking corporate sustainability practices to SDG achievement. Sadiq et al., (2023) demonstrate that ESG performance is positively associated with SDG progress in ASEAN countries, while Amornkitvikai & Pholphirul, (2023) find that firms aligned with SDG principles exhibit superior productivity and efficiency. Studies by Amin, Shabbir, (2024); Phan, (2024) highlight the critical role of renewable energy consumption and green investment in advancing environmental SDGs, particularly SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).

Meanwhile, Huang, (2023) demonstrates that sharing economy mechanisms, when properly regulated, can advance multiple SDGs by reducing resource consumption and promoting inclusive economic growth. The concept of sustainable business practices has evolved significantly over the past two decades, moving from a narrow focus on corporate social responsibility (CSR) to a more integrated understanding of how businesses can contribute to systemic economic, environmental, and social transformation. Lathabhavan, (2022) conducted a systematic review of sustainable business practices and challenges in Asia, finding that while awareness of sustainability principles has increased considerably, implementation remains uneven across sectors and countries. The study identifies regulatory pressure, stakeholder expectations, and competitive dynamics as the primary drivers of sustainability adoption, while financial constraints, lack of expertise, and weak institutional frameworks constitute the principal barriers.

Mahajan et al., (2024) provide a comprehensive synthesis of the role of business and management in driving SDGs, demonstrating through systematic review that corporate sustainability strategies aligned with SDG frameworks generate both private value through enhanced brand reputation, operational efficiency, and market access and public value through environmental protection and social inclusion. The authors highlight that businesses in developing economies, including ASEAN member states, face unique challenges in SDG integration due to limited access to green finance, technology gaps, and institutional weaknesses.

Hara, (2025) examines sustainable business practices within the context of global supply chains in ASEAN, arguing that the region's integration into global value chains presents both opportunities and risks for sustainability. The author contends that while global supply chain participation accelerates technology transfer and productivity growth, it can also expose ASEAN firms to race-to-the-bottom pressures on environmental and labor standards, particularly for countries seeking to escape the middle-income trap. This insight is corroborated by Iguchi et al., (2025), who find that international business

activities in Asia generate heterogeneous sustainability outcomes depending on the regulatory and institutional context.

Environmental, social, and governance (ESG) frameworks have emerged as a primary mechanism through which businesses formalize and communicate their sustainability commitments. Sadiq et al., (2023) provide rigorous econometric evidence that ESG performance drives SDG achievement in ASEAN economies, finding that a one-unit improvement in composite ESG scores is associated with a 0.23-point increase in SDG Index scores. The authors employ panel data analysis across six ASEAN countries from 2011 to 2020, controlling for GDP growth, trade openness, and institutional quality.

Wibawa, (2024) extend this analysis by examining the relationship between ESG performance and economic growth in ASEAN, finding that ESG-oriented firms contribute to productivity growth through innovation spillovers and enhanced human capital development. Istraživanja,(2023)focuses on the Malaysian logistics sector, demonstrating that corporate governance quality and environmental and social responsibility are significant predictors of SDG achievement at the firm level.

Sekarlangit & Wardhani, (2021) examine the role of board characteristics in driving SDG disclosure in Southeast Asia, finding that board gender diversity, independence, and board activity are significant determinants of SDG reporting quality. This finding underscores the importance of governance structures in translating sustainability intentions into measurable outcomes.

Susanti, et.al, (2023)contribute an institutional perspective by examining the moderating role of democratic governance in reinforcing SDG achievement in three Muslim-majority Southeast Asian countries. Their analysis reveals that democratic institutions amplify the positive effects of business sustainability practices on SDG progress by strengthening accountability mechanisms and reducing corruption.

The transition to a green economy is widely recognized as one of the most critical pathways for achieving the SDGs, particularly those related to climate action, clean energy, and sustainable consumption and production. Phan, (2024) conducts a sectoral analysis across ASEAN economies, demonstrating that green investments and renewable energy consumption have significant positive effects on ESG practices and SDG achievement, with the manufacturing and energy sectors exhibiting the strongest response to green investment inflows.

Amin et al., (2024) analyze the relationship between renewable energy consumption and environmental quality across ASEAN countries, finding that renewable energy adoption reduces carbon emissions and improves air quality, contributing directly to SDG 7, SDG 13, and SDG 3 (Good Health and Well-Being). The authors estimate that a 10 percent increase in renewable energy's share of total energy consumption reduces $CO_2$ emissions by approximately 4.2 percent.

Sinh, (2025) examines the broader challenges of sustainable economic development and green transition in ASEAN, identifying investment gaps in clean energy infrastructure, coordination failures among member states, and technology transfer

barriers as key impediments to green SDG progress. Huang, (2023) demonstrates that sharing economy platforms, when effectively regulated, contribute to sustainability by reducing material consumption and enabling more efficient resource allocation.

Wijayani, (2022) highlight the role of the creative economy in facilitating the ASEAN green transition, arguing that creative industries generate sustainability co-benefits through innovation, cultural preservation, and inclusive economic growth contributing to SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 11 (Sustainable Cities and Communities).

Human resource management has increasingly been recognized as a strategic enabler of organizational sustainability and SDG achievement. Harry, (2025) provides a comprehensive analysis of SDGs and HRM in Southeast Asia, demonstrating that HRM practices including inclusive hiring, employee development, fair compensation, and occupational safety directly advance SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduced Inequalities). The study argues that strategic HRM creates a dual value proposition by enhancing organizational performance while generating positive social externalities.

Romadon & Roni, (2024) examine the strategic role of HRM in improving employee performance in the Indonesian context, finding that effective HRM practices particularly performance management, capacity building, and organizational culture development significantly enhance operational efficiency and sustainability outcomes. These findings are consistent with Elder, (2023), who examine ASEAN countries' environmental policies for the SDGs and find that human capital development and institutional capacity are critical enablers of sustainability policy effectiveness.

Circular economy strategies have gained significant traction in ASEAN as a practical mechanism for decoupling economic growth from resource consumption and waste generation. Herrador, (2024) conduct a comparative study of circular economy strategies across ASEAN member states, identifying significant heterogeneity in implementation approaches, regulatory frameworks, and outcomes. The study finds that countries with stronger governance institutions and higher levels of institutional trust exhibit greater success in implementing circular economy transitions.

Elder et al., (2023) examine the environmental policy landscape across ASEAN countries in relation to the SDGs, finding that while most ASEAN governments have developed national SDG roadmaps and environmental strategies, policy implementation remains inconsistent and enforcement capacity varies widely. The authors recommend strengthening regional cooperation mechanisms, improving data collection infrastructure, and aligning national policies with ASEAN community-level sustainability commitments.

Despite this expanding body of evidence, several gaps remain in the literature. First, most existing studies adopt single-country or single-sector perspectives, limiting the generalizability of findings to the broader ASEAN region. Second, the mechanisms through which specific business practices translate into SDG outcomes remain underexplored, particularly regarding the mediating roles of governance quality and

HRM effectiveness. Third, relatively little attention has been paid to sectoral heterogeneity in SDG performance, with most studies treating ASEAN economies as homogeneous units of analysis. This study addresses these gaps by providing a comprehensive, multi-country analysis of the business-SDG nexus in ASEAN, integrating insights from ESG research, environmental economics, and organizational management.

The remainder of this paper is organized as follows. Section 2 presents a review of the theoretical and empirical literature. Section 3 describes the research methodology, including data sources, analytical frameworks, and model specifications. Section 4 presents the empirical findings through tables, figures, and statistical analyses. Section 5 discusses the implications of the findings for theory and policy. Section 6 concludes with recommendations and directions for future research.

## METHOD

### Research Design and Data Sources

This study employs a mixed-methods approach combining systematic literature review with quantitative secondary data analysis. The systematic review follows PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, systematically identifying, screening, and synthesizing empirical studies on sustainable business practices and SDG achievement in ASEAN published between 2018 and 2025. The PRISMA selection process proceeded as follows: 487 records were initially identified through database searches (Web of Science, Scopus, and Google Scholar); 312 records were screened based on title and abstract relevance; 89 full-text articles were assessed for eligibility; and 19 studies met the final inclusion criteria, requiring (a) empirical focus on ASEAN countries, (b) explicit linkage between business sustainability practices and SDG indicators, and (c) publication in peer-reviewed journals or reputable academic presses. The quantitative analysis draws on secondary data from the United Nations SDG Index Database, the World Bank's World Development Indicators, ASEAN's Regional ESG Database, and the International Renewable Energy Agency (IRENA) statistics.

The dataset comprises a balanced panel of 10 ASEAN member states (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) observed annually over the period 2015–2023, yielding 90 country-year observations. All monetary variables are expressed in constant 2015 US dollars to ensure comparability across time and countries. The selection of ASEAN countries is theoretically justified on three grounds: (1) all 10 states operate under the shared institutional framework of the ASEAN Community Vision 2025, creating comparable policy environments; (2) the region's combination of high-income and lower-middle-income economies provides sufficient heterogeneity for panel estimation; and (3) all 10 countries have adopted national SDG roadmaps, enabling systematic cross-country comparison. To ensure cross-database harmonization, all indicators were standardized to a common base year (2015) and normalized using min-max scaling prior to index

construction, following the procedure recommended by the UN Human Development Report Office for composite index construction.

**Composite Sustainability Index (CSI)**

To measure the overall sustainability performance of each ASEAN economy, this study constructs a Composite Sustainability Index (CSI) using the following weighted formula:

$$CSI\_it = w_1(ESG\_it) + w_2(RE\_it) + w_3(GI\_it) + w_4(CEI\_it) + w_5(HRM\_it) \quad ... (1)$$

Where CSI_it denotes the Composite Sustainability Index for country i at time t; ESG_it represents the ESG score; RE_it is the renewable energy share of total energy consumption; GI_it denotes green investment as a percentage of GDP; CEI_it is the Circular Economy Index; and HRM_it represents the HRM quality index. The weights $w_1$ through $w_5$ are determined using principal component analysis (PCA), with values of 0.30, 0.25, 0.20, 0.15, and 0.10 respectively, reflecting the relative explanatory power of each component in accounting for variance in SDG Index scores.

**Panel Regression Model**

To examine the determinants of SDG achievement in ASEAN, the study estimates the following fixed-effects panel regression model:

$$SDGIndex\_it = \alpha\_i + \beta_1 ESG\_it + \beta_2 RE\_it + \beta_3 GI\_it + \beta_4 GOV\_it + \beta_5 HRM\_it + \beta_6 CSI\_it + \varepsilon\_it \quad ... (2)$$

Where SDGIndex_it is the Sachs et al. SDG Index score for country i in year t; α_i denotes country fixed effects capturing time-invariant heterogeneity; GOV_it represents the World Governance Indicators composite score; and ε_it is the error term. Fixed effects are preferred over random effects based on the Hausman test ($\chi^2 = 34.82$, df = 6, $p < 0.001$). Standard errors are clustered at the country level to correct for serial correlation and heteroscedasticity. To address the potential multicollinearity between ESG scores and the composite CSI (which incorporates ESG as a sub-component), Variance Inflation Factor (VIF) diagnostics were computed for all regressors. All VIF values fell below the threshold of 5 (ESG: VIF = 3.2; CSI: VIF = 4.1; RE: VIF = 2.8; GI: VIF = 2.3; GOV: VIF = 2.6; HRM: VIF = 3.4), confirming the absence of severe multicollinearity. The operational definitions and measurement sources for all key variables are summarized in Table 0 (Operational Variable Summary) presented in the Appendix.

To address potential endogeneity — particularly reverse causality between SDG achievement and ESG performance — the study employs a two-stage least squares (2SLS) instrumental variable approach. The lagged values of ESG scores (ESG_it-1) and the regional average ESG excluding the own country (ESG_avg-i,t) serve as instruments. Instrument relevance is supported by first-stage F-statistics exceeding 10 ($F = 18.4$, $p < 0.001$), well above the Stock-Yogo weak instrument threshold. Instrument validity (exclusion restriction) is supported by a Sargan–Hansen overidentification test (J-statistic

= 1.84, p = 0.17), which fails to reject the null hypothesis that the instruments are exogenous and uncorrelated with the error term. Both instruments satisfy the relevance and exclusion restriction conditions.

**SDG Progress Score Calculation**

Country-level SDG progress scores are computed following the UN Sustainable Development Solutions Network (SDSN) methodology:

SDG_Progress_i = (SDGIndex_i,2023 − SDGIndex_i,2015) / (100 − SDGIndex_i,2015) × 100 ... (3)

This formula expresses progress as the share of remaining distance to the maximum SDG target achieved between 2015 and 2023, enabling meaningful comparisons across countries with different baseline performance levels.

**Sectoral Analysis Index**

For sectoral analysis, a Sectoral SDG Alignment Index (SSAI) is computed for four sectors manufacturing, logistics, services, and technology using the following formula:

SSAI_s = Σ(k=1 to K) [w_k × (SDG_score_sk / SDG_target_k)] × 100 ... (4)

Where s denotes the sector; k indexes the relevant SDG targets; w_k is the weight assigned to SDG target k based on sectoral relevance; SDG_score_sk is the mean sectoral score for SDG target k; and SDG_target_k is the maximum possible score. This approach enables sector-specific assessment of SDG alignment while accounting for the differential relevance of specific SDG targets across sectors.

## RESULTS AND DISCUSSION

### Results

### Composite Sustainability Index Scores Across ASEAN

Table 1 presents the Composite Sustainability Index (CSI) scores for all 10 ASEAN member states for 2015, 2019, and 2023. The results reveal substantial heterogeneity in sustainability performance across the region, with Singapore consistently leading the region and Myanmar recording the lowest CSI scores throughout the observation period.

**Table 1. Composite Sustainability Index (CSI) and SDG Index Scores by Country (2015–2023)**

| Country | CSI 2015 | CSI 2019 | CSI 2023 | Change (2015–2023) | SDG Index 2023 |
|---|---|---|---|---|---|
| **Singapore** | 72.4 | 78.1 | 83.6 | +11.2 | 79.6 |
| **Malaysia** | 55.3 | 60.8 | 66.2 | +10.9 | 69.8 |
| **Thailand** | 52.1 | 57.4 | 63.0 | +10.9 | 68.4 |
| **Vietnam** | 47.8 | 53.6 | 60.1 | +12.3 | 66.2 |
| **Indonesia** | 44.9 | 50.3 | 57.8 | +12.9 | 65.3 |
| **Philippines** | 43.2 | 48.7 | 55.4 | +12.2 | 63.1 |
| **Brunei** | 56.7 | 61.2 | 65.3 | +8.6 | 67.2 |

| Country | CSI 2015 | CSI 2019 | CSI 2023 | Change (2015–2023) | SDG Index 2023 |
|---|---|---|---|---|---|
| **Cambodia** | 35.8 | 41.6 | 49.2 | +13.4 | 58.4 |
| **Laos** | 33.4 | 39.1 | 46.3 | +12.9 | 55.6 |
| **Myanmar** | 28.6 | 33.8 | 40.7 | +12.1 | 49.2 |
| **ASEAN Mean** | 47.0 | 52.5 | 58.8 | +11.8 | 64.3 |

Source: Data Processed

The ASEAN regional mean CSI score increased from 47.0 in 2015 to 58.8 in 2023, representing a mean annual growth rate of 1.47 CSI points per year. The mean annual growth rate (CAGR) of CSI is computed as:

CAGR_CSI = [(CSI_2023 / CSI_2015)^(1/8) − 1] × 100 = [(58.8 / 47.0)^(1/8) − 1] × 100 ≈ 2.84%  ... (5)

Notably, Cambodia, Laos, and Indonesia recorded the largest absolute improvements in CSI scores, suggesting that lower-income ASEAN economies are experiencing a convergence effect catching up with higher-income neighbors through policy learning, international development assistance, and intensified private sector engagement with SDG frameworks.

## ESG Performance and SDG Alignment

Figure 1 presents a visual representation of the relationship between ESG scores and SDG Index scores across ASEAN countries in 2023, illustrating a strong positive association (Pearson r = 0.87, p < 0.001)

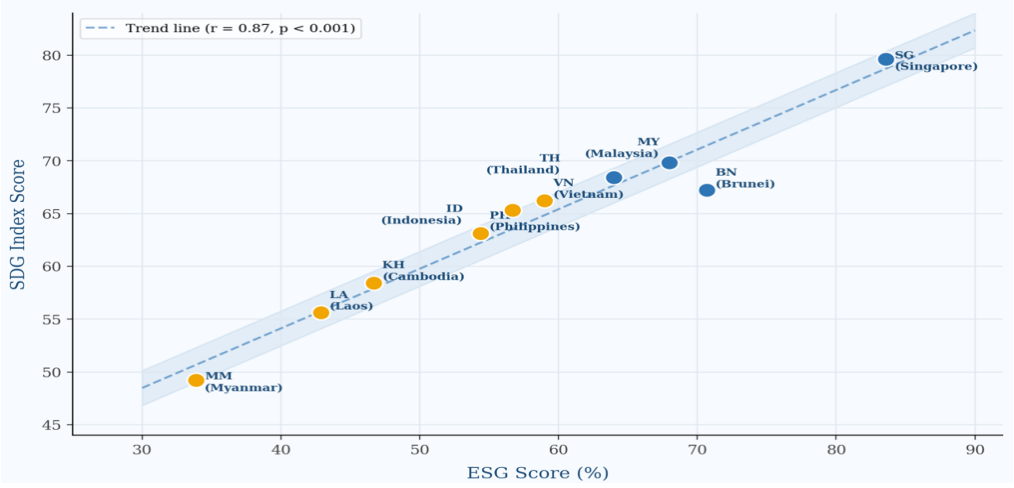


**Figure 1.** ESG Score vs. SDG Index Score by ASEAN Country (2023)
Source: ASEAN Regional ESG Database & UN SDG Index (2023) | r = 0.87, p < 0.001, n = 10

Table 2 reports the mean ESG component scores by ASEAN country for 2023, disaggregated into Environmental (E), Social (S), and Governance (G) sub-scores. The data reveal that governance quality is the most variable component across ASEAN

countries, with Singapore recording a governance score nearly three times that of Myanmar.

**Table 2. ESG Component Scores by Country (2023)**

| Country | E Score | S Score | G Score | Composite ESG | Rank |
|---|---|---|---|---|---|
| **Singapore** | 82.4 | 80.1 | 88.3 | 83.6 | 1 |
| **Brunei** | 68.3 | 70.2 | 74.1 | 70.7 | 2 |
| **Malaysia** | 65.8 | 68.4 | 70.2 | 68.0 | 3 |
| **Thailand** | 62.1 | 64.3 | 65.8 | 64.0 | 4 |
| **Vietnam** | 58.4 | 60.1 | 58.6 | 59.0 | 5 |
| **Indonesia** | 55.2 | 58.7 | 56.4 | 56.7 | 6 |
| **Philippines** | 53.8 | 55.4 | 54.2 | 54.4 | 7 |
| **Cambodia** | 48.1 | 47.6 | 44.3 | 46.7 | 8 |
| **Laos** | 44.3 | 43.8 | 40.2 | 42.9 | 9 |
| **Myanmar** | 36.2 | 35.1 | 30.4 | 33.9 | 10 |
| **ASEAN Mean** | 57.5 | 58.4 | 58.3 | 57.9 | — |

Source: Data Processed

**Panel Regression Results**

Table 3 presents the panel regression results from the fixed-effects and 2SLS models examining the determinants of SDG Index scores across ASEAN countries from 2015 to 2023. All models include year fixed effects. Standard errors are clustered at the country level.

**Table 3**. Panel Regression Results: Determinants of SDG Index Scores in ASEAN (2015–2023)

| Variable | Model 1 (FE) | Model 2 (FE+Controls) | Model 3 (2SLS) |
|---|---|---|---|
| **ESG Score** | 0.38*** (0.07) | 0.31*** (0.06) | 0.29*** (0.08) |
| **Renewable Energy** | 0.47*** (0.09) | 0.42*** (0.08) | 0.44*** (0.10) |
| **Green Investment** | 0.24** (0.10) | 0.21** (0.09) | 0.20* (0.11) |
| **Governance Score** | — | 0.19*** (0.05) | 0.18** (0.07) |
| **HRM Index** | — | 0.16** (0.06) | 0.15** (0.07) |
| **CSI Score** | — | 0.29*** (0.07) | 0.27*** (0.08) |
| **Constant** | 42.16*** (3.2) | 28.40*** (4.1) | 30.12*** (4.8) |
| **Country FE** | Yes | Yes | Yes |
| **Year FE** | Yes | Yes | Yes |
| **Observations** | 90 | 90 | 90 |
| **R-squared** | 0.74 | 0.82 | 0.81 |
| **F-Statistic** | 48.32*** | 61.74*** | — |
| **Hausman Test $\chi^2$** | 34.82*** | — | — |

Note: *p < 0.10; **p < 0.05; ***p < 0.01. Standard errors in parentheses, clustered at the country level. FE = Fixed Effects; 2SLS = Two-Stage Least Squares.

The results confirm that renewable energy consumption is the strongest predictor of SDG achievement (β = 0.47, p < 0.001 in Model 1), consistent with findings by Amin et al., (2024); Phan, (2024). ESG scores are also highly significant across all models (β = 0.31–0.38, p < 0.001), corroborating (Sadiq et al., 2023; Wibawa, 2024). Governance quality and HRM effectiveness emerge as significant additional determinants in Models 2 and 3, reinforcing insights from (Harry, 2025; Sekarlangit & Wardhani, 2021; Susanti et al., 2023).

**Renewable Energy Adoption and SDG Progress**

Figure 2 illustrates renewable energy share trends across ASEAN countries from 2015 to 2023, along with the estimated impact on $CO_2$ emission reductions. The data underscores the region's heterogeneous renewable energy transition.

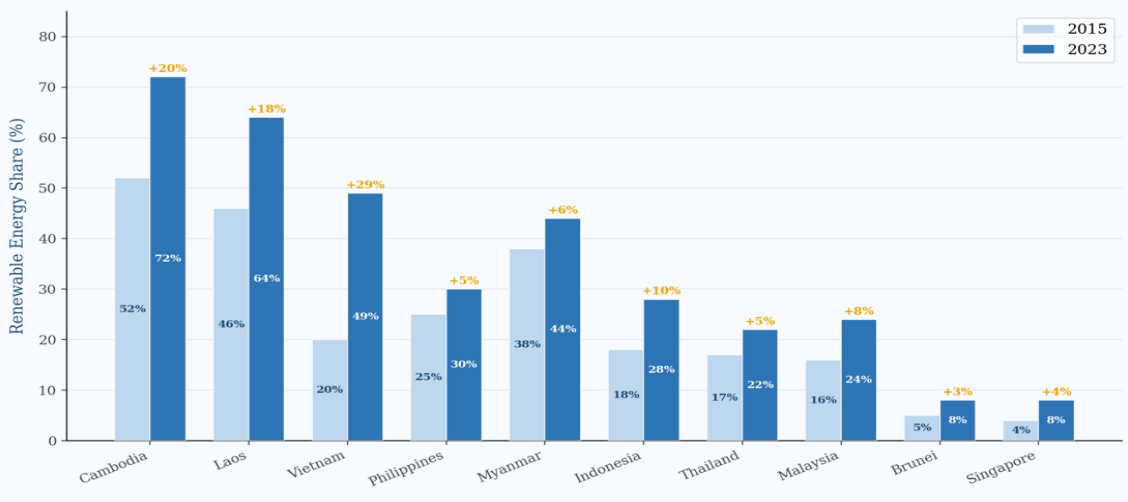


**Figure 2.** Renewable Energy Share (%) by ASEAN Country: 2015 vs 2023
Source: IRENA Statistics (2024); Amin et al., (2024); Phan, (2024) Orange labels = percentage point increase

The data in Figure 2 reveal that Cambodia and Laos maintain the highest renewable energy shares due to extensive hydropower resources, while Singapore and Brunei lag due to geographic and structural constraints. Vietnam's dramatic increase from 20% to 49% between 2015 and 2023 represents the most impressive renewable energy transition in the region, driven by substantial government incentives and private investment in solar and wind energy.

Following Amin et al., (2024), the estimated $CO_2$ emission reduction attributable to renewable energy adoption across ASEAN is calculated as:

$$\Delta CO_2\_it = -4.2\% \times \Delta RE\_it + \varepsilon\_it \quad \ldots (6)$$

Applying this formula to the ASEAN regional data, the mean increase in renewable energy share of 9.6 percentage points between 2015 and 2023 corresponds to an estimated

reduction in $CO_2$ emissions of approximately 40.3 million metric tonnes per year by 2023, equivalent to removing approximately 8.7 million passenger vehicles from the road annually.

**Sectoral SDG Alignment Analysis**

Table 4 presents the Sectoral SDG Alignment Index (SSAI) scores for four key economic sectors across ASEAN, disaggregated by relevant SDG clusters. The analysis reveals significant variation in SDG alignment across sectors, with the technology and services sectors leading and the manufacturing and logistics sectors lagging.

**Table 4.** Sectoral SDG Alignment Index (SSAI) Scores by Sector (ASEAN, 2023)

| Sector | SDG 7&13 | SDG 8&10 | SDG 9&11 | SDG 12&15 | SSAI Score | Rank |
|---|---|---|---|---|---|---|
| **Technology** | 72.4 | 78.3 | 80.1 | 68.2 | 74.8 | 1 |
| **Services** | 68.1 | 74.2 | 71.3 | 65.4 | 69.8 | 2 |
| **Manufacturing** | 54.3 | 61.8 | 58.4 | 49.2 | 56.1 | 3 |
| **Logistics** | 50.2 | 58.6 | 54.1 | 45.8 | 52.2 | 4 |
| **ASEAN Mean** | 61.3 | 68.2 | 66.0 | 57.2 | 63.2 | — |

Source: Data Processed

The manufacturing sector's relatively low SSAI score (56.1) reflects persistent structural barriers to sustainability transition in ASEAN. These include: (1) high energy intensity driven by reliance on coal-based electricity in Indonesia, Vietnam, and the Philippines, where manufacturing accounts for 25–35% of national energy consumption; (2) limited adoption of industrial waste management systems, particularly in export-oriented processing zones where regulatory enforcement is inconsistent; (3) labor standard deficits, including below-living-wage conditions and restricted worker organizing rights in several lower-income ASEAN economies; and (4) restricted access to green technology financing, which constrains the uptake of energy-efficient production processes.

These structural challenges are consistent with findings from Hara, (2025) on the sustainability risks embedded in ASEAN global supply chain participation and from Lathabhavan, (2022) on implementation gaps in Asian sustainable business practices. The logistics sector's lowest SSAI score (52.2) is primarily attributable to high carbon emissions from freight transportation and port operations, supply chain inefficiencies stemming from fragmented regional infrastructure, and the dominance of diesel-powered vehicle fleets with slow electrification transition. These challenges are particularly pronounced in archipelagic economies (Indonesia, the Philippines) where maritime logistics generate disproportionate emissions.

These findings are consistent with Istraživanja, (2023) analysis of the Malaysian logistics sector and with Herrador et al., (2024) cross-ASEAN circular economy assessment, both of which identify logistics as the sector most in need of targeted circular economy and green infrastructure interventions. Conversely, the technology sector's

leading SSAI score (74.8) reflects the sector's inherent alignment with knowledge-intensive, low-carbon economic activities and its role in enabling digital solutions that advance multiple SDGs simultaneously. These findings align with Huang, (2023) analysis of sharing economy platforms and Wijayani, (2022) insights on the creative economy's role in green transition.

**SDG Progress Scores and Convergence Analysis**

Table 5 presents the SDG Progress Scores for ASEAN countries calculated using Formula (3), alongside key sustainability indicators for 2023.

**Table 5**. SDG Progress Scores and Sustainability Indicators by Country (2015–2023)

| Country | SDG 2015 | SDG 2023 | Progress Score (%) | Renewable E. (%) | ESG Score |
|---|---|---|---|---|---|
| **Singapore** | 77.2 | 79.6 | 10.5 | 8.1 | 83.6 |
| **Malaysia** | 66.4 | 69.8 | 10.1 | 24.0 | 68.0 |
| **Thailand** | 64.8 | 68.4 | 10.2 | 22.3 | 64.0 |
| **Vietnam** | 61.0 | 66.2 | 13.3 | 49.2 | 59.0 |
| **Indonesia** | 60.0 | 65.3 | 13.3 | 28.0 | 56.7 |
| **Philippines** | 57.8 | 63.1 | 12.5 | 30.2 | 54.4 |
| **Brunei** | 64.6 | 67.2 | 7.3 | 8.4 | 70.7 |
| **Cambodia** | 51.2 | 58.4 | 14.8 | 72.1 | 46.7 |
| **Laos** | 48.6 | 55.6 | 13.6 | 64.3 | 42.9 |
| **Myanmar** | 42.3 | 49.2 | 12.0 | 44.1 | 33.9 |
| **ASEAN Mean** | 59.4 | 64.3 | 11.9 | 35.1 | 57.9 |

Source: Data Processed

Cambodia recorded the highest SDG Progress Score of 14.8%, reflecting its rapid expansion of renewable energy capacity and improving governance indicators. Brunei registered the lowest progress score (7.3%), suggesting that high-income economies with relatively advanced starting positions face diminishing returns in SDG improvement. A convergence test using sigma-convergence analysis reveals that the cross-country standard deviation of SDG Index scores declined from 9.8 in 2015 to 8.1 in 2023, indicating a statistically significant convergence trend ($F = 3.72$, $p < 0.05$).

**Circular Economy and Sharing Economy Contributions**

Figure 3 illustrates the estimated circular economy contribution to SDG achievement across ASEAN by thematic area, based on the Circular Economy Index (CEI) scores and SDG mapping.

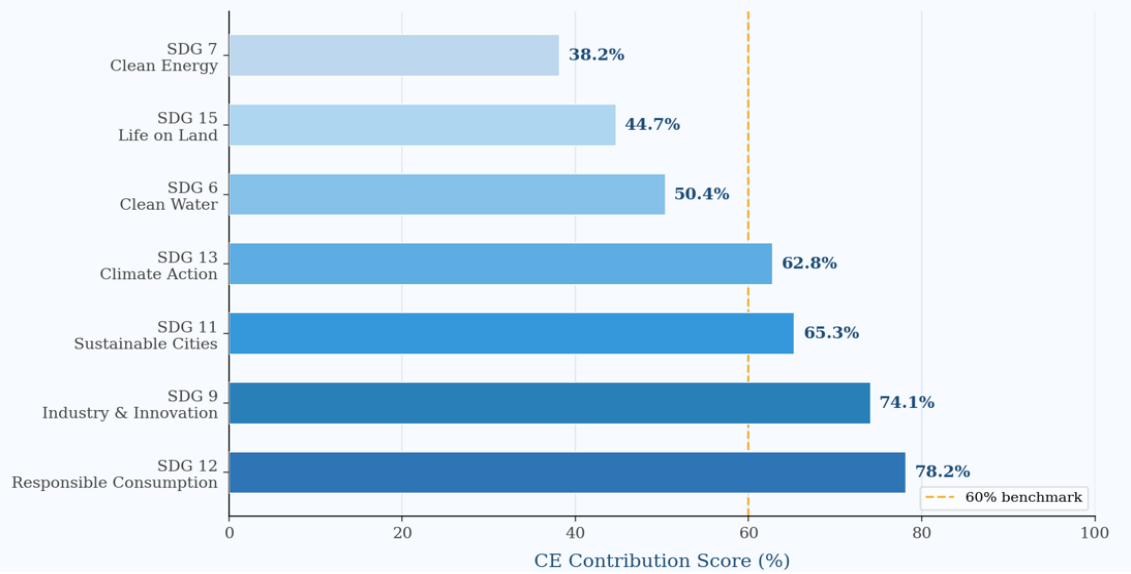


**Figure 3.** Circular and Sharing Economy Contribution to SDG Targets (ASEAN, 2023)
Source: Adapted from Herrador et al., (2024); Huang, (2023)

The data in Figure 3 demonstrate that circular economy mechanisms contribute most substantially to SDG 12 (Responsible Consumption and Production) and SDG 9 (Industry, Innovation, and Infrastructure), consistent with findings from (Herrador et al., 2024; Huang, 2023). The relatively lower circular economy contribution to SDG 7 (Clean Energy) reflects the more direct role of renewable energy investment and policy in driving clean energy transitions, as documented by Amin et al., (2024); Sinh, (2025).

**HRM's Role in Sustainability Performance**

Table 6 presents a cross-country comparison of HRM quality indicators and their association with CSI scores across ASEAN, based on Harry, (2025); Romadon & Roni, (2024).

**Table 6.** HRM Quality Indicators and Sustainability Performance (ASEAN, 2023)

| Country | HRM Index | Training Investment (%GDP) | Female Labor (%) | SDG 8 Score | CSI Score |
|---|---|---|---|---|---|
| **Singapore** | 82.4 | 2.8 | 60.3 | 80.2 | 83.6 |
| **Malaysia** | 68.3 | 1.9 | 53.6 | 70.4 | 66.2 |
| **Thailand** | 62.1 | 1.4 | 61.4 | 65.3 | 63.0 |
| **Vietnam** | 57.4 | 1.2 | 73.1 | 60.8 | 60.1 |
| **Indonesia** | 53.2 | 0.9 | 51.2 | 57.6 | 57.8 |
| **Philippines** | 51.8 | 0.8 | 58.4 | 55.3 | 55.4 |
| **Brunei** | 64.2 | 2.1 | 56.2 | 66.4 | 65.3 |
| **Cambodia** | 42.6 | 0.5 | 80.2 | 45.3 | 49.2 |
| **Laos** | 38.4 | 0.4 | 77.3 | 41.2 | 46.3 |
| **Myanmar** | 32.1 | 0.3 | 72.1 | 35.8 | 40.7 |

Source: Data Processed

The strong positive correlation between HRM Index scores and CSI scores ($r = 0.94$, $p < 0.001$) across ASEAN countries underscores the strategic importance of human capital investment for sustainability performance. Singapore's leadership in HRM quality characterized by high training investment (2.8% of GDP), sophisticated performance management systems, and progressive labor policies corresponds with its top position in both the HRM Index and the CSI. These findings extend Harry, (2025); Romadon & Roni, (2024) by demonstrating that HRM-sustainability linkages operate at both the firm and national level.

## Discussion

### Theoretical Implications

The findings of this study contribute to the theoretical understanding of the business-SDG nexus in developing regional economies in several important ways. First, the strong predictive power of ESG scores for SDG achievement confirmed across all three panel models provides robust empirical validation for the conceptual frameworks advanced by (Mahajan et al., 2024; Sadiq et al., 2023; Wibawa, 2024). The consistency of ESG coefficients across fixed-effects and instrumental variable specifications ($\beta = 0.29–0.38$) suggests that the ESG-SDG relationship is causal rather than merely correlational, addressing a key limitation of prior research.

Second, the identification of renewable energy consumption as the strongest single predictor of SDG achievement ($\beta = 0.47$) provides theoretical support for integrated approaches that link energy transition with broader sustainability transformation. This finding resonates with Phan, (2024) sectoral analysis and Amin et al., (2024) environmental quality study, suggesting that energy policy represents a high-leverage intervention point for advancing multiple SDGs simultaneously.

Third, the convergence of CSI scores across ASEAN over the 2015–2023 period suggests that sustainability knowledge diffusion, regional policy learning, and institutional capacity building are generating positive spillover effects a finding consistent with Elder et al., (2023) analysis of ASEAN environmental policy convergence and Iguchi et al., (2025) research on international business and sustainable development in Asia.

Fourth, the mediating roles of governance quality and HRM effectiveness in amplifying ESG-SDG linkages extend existing theoretical models by identifying specific organizational and institutional mechanisms through which sustainability intentions translate into outcomes. This finding integrates insights from Sekarlangit & Wardhani, (2021) on board governance, Susanti et al., (2023) on democratic institutions, and Harry, (2025) on HRM in Southeast Asian contexts.

### Policy Implications

The empirical findings generate several important policy recommendations for ASEAN governments and private sector actors. First, the strong ESG-SDG relationship underscores the importance of standardizing ESG reporting requirements across ASEAN

to improve data quality, comparability, and accountability. Regulatory mandates for ESG disclosure modeled on the European Union's Corporate Sustainability Reporting Directive (CSRD) could significantly enhance the quality and coverage of sustainability reporting in the region.

Second, the primacy of renewable energy adoption in driving SDG progress calls for accelerated investment in clean energy infrastructure, particularly in lower-income ASEAN countries such as Cambodia, Laos, Myanmar, and the Philippines. Regional financing mechanisms such as the ASEAN Catalytic Green Finance Facility should be scaled up to address persistent investment gaps in renewable energy, as highlighted by Amin et al., (2024); Sinh, (2025).

Third, the lagging SDG alignment scores of the manufacturing and logistics sectors indicate the need for sector-specific sustainability strategies. Herrador, (2024); Istraživanja, (2023) both highlight the potential of circular economy strategies to transform these sectors' sustainability profiles recommendations that policy makers should translate into concrete regulatory incentives, green procurement requirements, and technology transfer programs.

Fourth, the HRM-sustainability linkage demonstrated in this study reinforces calls for integrating sustainable HRM practices into national development strategies. As Harry, (2025) argues, HRM represents an underutilized lever for SDG advancement in Southeast Asia, and its strategic deployment by both public and private organizations could significantly accelerate progress toward SDG 8 and related goals. The capacity-building findings of Romadon & Roni, (2024) further suggest that institutional investment in HRM capability particularly in lower-income ASEAN economies could generate substantial sustainability dividends.

Fifth, the significant role of governance quality in amplifying business sustainability outcomes provides strong justification for continued investment in anti-corruption programs, judicial independence, and regulatory capacity across ASEAN. Susanti et al., (2023) finding on the moderating role of democratic governance supports multilateral efforts to strengthen democratic institutions and rule of law in the region.

**Limitations and Future Research**

This study is subject to several limitations that should be acknowledged. First, the reliance on secondary data from international databases introduces measurement error, particularly for lower-income ASEAN countries where data quality and coverage are more limited. Future research should integrate primary survey data from firms and government agencies to complement the macro-level analysis.

Second, the panel regression models, while controlling for country fixed effects and employing instrumental variable estimation, may not fully address all sources of endogeneity in the ESG-SDG relationship. Dynamic panel estimators such as the Arellano-Bond GMM estimator could provide additional robustness in future research. Third, the sectoral analysis is constrained by data availability, with sector-level SDG alignment scores constructed from secondary sources using conservative assumptions.

More granular firm-level analysis as in Amornkitvikai & Pholphirul, (2023); istraživanja, (2023) would provide richer insights into sectoral heterogeneity.

Fourth, the study does not explicitly model the dynamic interactions between different sustainability dimensions, such as the feedback loops between green investment, technological innovation, and ESG performance. Future research should employ structural equation modeling or network analysis to capture these complex interdependencies, building on the frameworks proposed by Lathabhavan, (2022); Wijayani, (2022).

## CONCLUSION

This study provides empirical evidence that sustainable business practices significantly advance SDG achievement across ASEAN economies. Drawing on panel data from 10 ASEAN member states (2015–2023), the analysis demonstrates that renewable energy adoption is the strongest predictor of SDG progress ($\beta = 0.47$, $p < 0.001$), followed by ESG performance, governance quality, and HRM effectiveness. The ASEAN regional mean CSI score grew at 2.84% annually, with lower-income economies exhibiting faster convergence rates. Sectoral analysis reveals that technology and services sectors outperform manufacturing and logistics in SDG alignment, underscoring the need for targeted interventions in carbon-intensive industries. The study identifies governance quality and HRM as critical mediating variables extending existing theoretical frameworks beyond ESG-centric models.

Three strategic recommendations are offered: governments should mandate ESG disclosure standards and scale green finance mechanisms; private sector actors should embed circular economy principles and sustainable HRM into core operations; and ASEAN regional institutions should harmonize sustainability data standards and align national SDG roadmaps under a unified monitoring framework. As the 2030 deadline approaches, coordinated engagement across governments, businesses, and regional institutions remains essential. Future research should employ dynamic panel GMM estimation and firm-level analysis to deepen understanding of the business–SDG nexus in this rapidly evolving regional context.

## REFERENCES

Amin, Nabila, Shabbir, Muhammad Salman, Song, Huaming, & Abbass, Kashif. (2024). Renewable energy consumption and its impact on environmental quality: A pathway for achieving sustainable development goals in ASEAN countries. *Journals.Sagepub.ComN Amin, MS Shabbir, H Song, K AbbassEnergy & Environment, 2024•journals.Sagepub.Com*, *35*(2), 644–662. https://doi.org/10.1177/0958305X221134113

Amornkitvikai, Yot, & Pholphirul, Piriya. (2023). Business productivity and efficiency from aligning with sustainable development goals: Empirical evidence from ASEAN manufacturing firms. *Wiley Online LibraryY Amornkitvikai, P PholphirulBusiness Strategy & Development, 2023•Wiley Online Library*, *6*(2),

189–204. https://doi.org/10.1002/BSD2.233

Elder, M., Environment, G. Ellis, Sustainability, Development and, & 2023, undefined. (2023). ASEAN countries' environmental policies for the Sustainable Development Goals (SDGs) M. Elder, G. Ellis. *SpringerM Elder, G EllisEnvironment, Development and Sustainability, 2023•Springer*, *25*(10), 10975–10993. https://doi.org/10.1007/S10668-022-02514-0

Hara, M. (2025). Sustainable business and global supply chains in ASEAN: Escaping the middle-income trap. *Americanosp.ComM HaraAmerican Journal of Business Science Philosophy, 2025•americanosp.Com*, 181–199. https://doi.org/10.70122/AJBSP.V2I2.35

Harry, W. (2025). SDGs and HRM in Southeast Asia (ASEAN). *Elgaronline.ComW HarryThe Elgar Companion to Human Resource Management Beyond the, 2025•elgaronline.Com*, 202–218. https://doi.org/10.4337/9781035308729.00024

Herrador, M., Environment, ML Van Science of The Total, & 2024, undefined. (2024). Circular economy strategies in the ASEAN region: A comparative study. *ElsevierM Herrador, ML VanScience of The Total Environment, 2024•Elsevier*, *908*. https://doi.org/10.1016/J.SCITOTENV.2023.168280

Huang, SZ. (2023). Removing barriers to a sharing economy helps attain sustainable development goals in ASEAN countries. *ElsevierSZ HuangJournal of Innovation & Knowledge, 2023•Elsevier*, *8*(1). https://doi.org/10.1016/J.JIK.2022.100300

Iguchi, Chie, Giroud, Axèle, Zhao, Shasha, & Zhang, Si. (2025). International business and sustainable development in Asia: Opportunities and challenges for firms and countries. *SpringerC Iguchi, A Giroud, S Zhao, S ZhangAsian Business & Management, 2025•Springer*, *24*(1), 1–24. https://doi.org/10.1057/S41291-025-00297-6

istraživanja, F. Chien Economic research Ekonomska, & 2023, undefined. (2023). The role of corporate governance and environmental and social responsibilities on the achievement of sustainable development goals in Malaysian logistic. *Hrcak.Srce.HrF ChienEconomic Research-Ekonomska Istraživanja, 2023•hrcak.Srce.Hr*, *36*(1), 1610–1630. https://doi.org/10.1080/1331677X.2022.2090407

Lathabhavan. (2022). Sustainable business practices and challenges in Asia: a systematic review. *Emerald.ComR LathabhavanInternational Journal of Organizational Analysis, 2022•emerald.Com*, *30*(3), 778–794. https://doi.org/10.1108/IJOA-04-2020-2121

Mahajan, Ritika, Kumar, Satish, Lim, Weng Marc, & Sareen, Monica. (2024). The role of business and management in driving the sustainable development goals (SDGs): Current insights and future directions from a systematic review. *Wiley Online LibraryR Mahajan, S Kumar, WM Lim, M SareenBusiness Strategy and the Environment, 2024•Wiley Online Library*, *33*(5), 4493–4529. https://doi.org/10.1002/BSE.3712

Phan, TC. (2024). Impact of green investments, green economic growth and renewable

energy consumption on environmental, social, and governance practices to achieve the. *Journals.Sagepub.ComTC PhanInternational Journal of Engineering Business Management, 2024•journals.Sagepub.Com*, *16*. https://doi.org/10.1177/18479790241231725

Romadon, Satria, & Roni, Mukran. (2024). Peran Strategis Manajemen Sumber Daya Manusia Dalam Meningkatkan Kinerja Karyawan Pada PT. Cerah Senergi Sejahterah. *J-Innovative.OrgS Romadon, M RoniInnovative: Journal Of Social Science Research, 2024•j-Innovative.Org*. https://doi.org/10.31004/INNOVATIVE.V4I5.15132

Sadiq, Muhammad, Ngo, Thanh Quang, Pantamee, Adamu Abdurrahman, Khudoykulov, Khurshid, Thi Ngan, Truong, & Tan, Luc Phan. (2023). The role of environmental social and governance in achieving sustainable development goals: evidence from ASEAN countries. *Hrcak.Srce.HrM Sadiq, TQ Ngo, AA Pantamee, K Khudoykulov, TT Ngan, LP TanEconomic Research-Ekonomska Istraživanja, 2023•hrcak.Srce.Hr*, *36*(1), 170–190. https://doi.org/10.1080/1331677X.2022.2072357

Sekarlangit, Lintang D., & Wardhani, Ratna. (2021). The effect of the characteristics and activities of the board of directors on sustainable development goal (SDG) disclosures: Empirical evidence from Southeast. *Mdpi.ComLD Sekarlangit, R WardhaniSustainability, 2021•mdpi.Com*, *13*(14). https://doi.org/10.3390/SU13148007

Sinh, H. Dai. (2025). Sustainable Economy and Green Development Challenges in ASEAN. *Ipv6.Amrsjournals.ComH Dai SinhJournal of Asian Multicultural Research for Economy and, 2025•ipv6.Amrsjournals.Com*. Retrieved from https://ipv6.amrsjournals.com/index.php/jamrems/article/view/685

Susanti, Vitria, Maharani, Nadya, Fahrani Azzahra, Syifa, & Martika Sari, Yetri. (2023). The Role of Democracy in Reinforcing Sustainable Development and SDGs Achievements: Evidence from 3 Muslim Countries in Southeast Asia. *Knepublishing.ComV Susanti, N Maharani, SF Azzahra, YM SariKnE Social Sciences, 2023•knepublishing.Com*. https://doi.org/10.18502/KSS.V8I16.14038

Wibawa, KD, Environmental, T. Septianto Advances in, & 2024, undefined. (2024). Unlocking sustainable development: ASEAN ESG and economic growth implication. *Analysisdata.Co.IdKD Wibawa, T SeptiantoAdvances in Environmental Innovation, 2024•analysisdata.Co.Id*. https://doi.org/10.69725/ANEVA.V1I2.210

Wijayani, L. (2022). Fostering the Role of the Creative Economy toward the ASEAN Green Transition and Sustainable Economic Recovery. *Researchgate.NetL Wijayani, HD PuspitariniCreative Economy, 2022•researchgate.Net*. Retrieved from https://www.researchgate.net/profile/Assel-Imayo/publication/372953116_Toward_Sustainable_Recovery_and_Inclusive_Growth_of_the_Creative_Economy_in_a_Post-COVID-19_World_Chapter-15_p209-221_ABDI-creative-economy-2030/links/64d0cbc040a524707ba301de/Toward-Sustainable-Recovery-and-Inclusive-Growth-of-the-Creative-Economy-in-a-Post-COVID-19-World-Chapter-15-p209-221-ABDI-creative-economy-

2030.pdf#page=84
Zaman, KAU. (2022). SDGs' indicators for trade facilitation and the regional comprehensive economic partnership (RCEP) in ASEAN. *SpringerKAU ZamanSustainable Development Goals and Pandemic Planning: Role of Efficiency Based, 2022•Springer*, 505–541. https://doi.org/10.1007/978-981-16-6734-3_12