



DOI: <https://doi.org/10.38035/gijea.v4i3>
<https://creativecommons.org/licenses/by/4.0/>

Does ESG Performance Accelerate SDG Convergence? Evidence from Indonesia and Emerging Markets, 2000–2022

Nelyumna Rizal¹, Eka Sudarmaji²

¹Universitas Pancasila, Jakarta, Indonesia, nelyumna@univpancasila.ac.id

²Universitas Pancasila, Jakarta, Indonesia, esudarmaji@univpancasila.ac.id

Corresponding Author: nelyumna@univpancasila.ac.id¹

Abstract: This study investigates whether Environmental, Social, and Governance (ESG) performance functions as a structural catalyst for Sustainable Development Goal (SDG) convergence toward OECD benchmarks among emerging market economies. Positioned at the intersection of international development economics and corporate sustainability research, the paper addresses a clear empirical gap: while prior literature has documented rising ESG disclosure and improving SDG scores in developing nations independently, the conditional relationship between ESG pillar quality and the speed of SDG catching up remains unexamined at the country level, particularly in Southeast Asia. Using the Sustainable Development Report 2023 (N = 166 countries) and the SDG Index 2000–2022 panel dataset (4,140 observations), this study applies a four-stage methodological framework comprising Kruskal-Wallis non-parametric group tests, beta-convergence regression, Spearman rank correlation analysis, and an ESG-SDG gap decomposition aligned with the three-pillar ESG taxonomy. Results reveal significant unconditional beta-convergence in global SDG performance ($\beta = -0.0042$, $p < .001$), confirming that lower-scoring countries improve faster. Indonesia presents a compelling case: it records the strongest SDG 9 improvement trajectory in ASEAN (slope = +3.807 points per year, $R^2 = 0.872$ post-2015) yet remains 35.0 points below the OECD average on industry and innovation—its largest governance-pillar gap. Spearman correlations identify SDGs 3, 1, 9, and 16 as the most structurally embedded goals in overall national SDG performance ($\rho > 0.84$). The analysis maps each critical gap onto the corresponding ESG pillar, showing that Governance-aligned SDGs carry the deepest absolute deficits. These findings suggest that targeted governance ESG improvements—in supply chain accountability, board transparency, and institutional R&D investment—represent the highest-leverage pathway for Indonesia and comparable emerging economies to accelerate SDG convergence. Policy implications center on OJK regulatory enhancement and Bappenas-aligned ESG-SDG co-investment frameworks.

Keyword: ESG Performance, SDG Convergence, Emerging Markets, Indonesia, Beta-Convergence, Sustainable Development.

INTRODUCTION

The 2030 Agenda for Sustainable Development, anchored by its 17 Sustainable Development Goals and adopted by 193 United Nations member states in September 2015, represents the most ambitious multilateral commitment to human progress ever constructed. Yet as the 2030 deadline approaches, implementation has proven deeply uneven. The Sustainable Development Report 2023 documents that no country is currently on track to achieve all 17 goals, with the average global SDG Index Score standing at 67.55 out of 100 a figure that masks dramatic variation between high-income OECD nations, whose average of 79.15 reflects decades of institutional investment, and emerging economies in East and South Asia, whose regional mean of 67.66 reflects genuine progress constrained by structural gaps (Sachs et al., 2023). Against this backdrop, the Environmental, Social, and Governance (ESG) framework has emerged as a parallel architecture for measuring and governing corporate and national sustainability performance. The central question motivating this paper is whether the two frameworks are functionally linked: does stronger ESG performance accelerate the speed at which a country closes its SDG gap with developed benchmarks, or are they essentially independent measurement systems that merely share rhetorical overlap?

Indonesia presents the ideal empirical focal point for this investigation. As the world's fourth most populous nation, the largest economy in Southeast Asia, and a G20 member that used its 2022 presidency to champion sustainable finance (PWC Indonesia, 2023), Indonesia occupies a pivotal strategic position. Its overall SDG Index Score of 70.16 in 2023 places it above the East and South Asia regional average, and its SDG 9 (Industry, Innovation, and Infrastructure) trajectory growing at 3.807 points per year with an R^2 of 0.872 since 2015 is the most consistent improvement trend in the ASEAN comparison group. Yet Indonesia simultaneously records the single largest gap versus OECD peers on SDG 9, at -35.0 points, alongside critical deficits on SDG 3 (Health, -26.6 points) and SDG 15 (Life on Land, -22.6 points). These three goal-level gaps map precisely onto the three pillars of the ESG framework as codified in standard ESG disclosure guidelines: SDG 9 onto Governance dimensions (board quality, supply chain accountability, innovation investment), SDG 3 onto social dimensions (labor practices, employee well-being, community health impact), and SDG 15 onto Environmental dimensions (biodiversity management, pollution prevention, waste governance). This structural alignment motivates formal empirical investigation rather than anecdotal comparison.

The academic literature has advanced rapidly on both the ESG and SDG fronts independently, yet the conditional convergence question whether ESG pillar quality moderates the speed of SDG catching up remains largely unaddressed. Studies using firm-level data have documented mixed evidence on the ESG-performance nexus in Indonesia: van Zanten (2025) identifies substantial divergence between ESG ratings and SDG alignment scores, suggesting that disclosure quantity does not translate mechanically into development outcomes. At the country level, Sachs et al. (2023) document significant SDG progress in emerging economies but attribute variation primarily to institutional factors rather than ESG frameworks per se. Agyemang et al. (2025) apply panel econometrics to ESG-circular economy linkages in Sub-Saharan Africa, finding that environmental and social disclosure positively influences sustainability adoption while governance disclosure shows negative effects under weak regulatory regimes a finding with direct relevance to the Indonesian institutional context. The convergence tradition in development economics, pioneered by Barro and Sala-i-Martin (1992) and extended to the sustainability domain by Sachs et al. (2021), provides a natural methodological home for this question: if SDG convergence follows beta-convergence logic, and if ESG performance shifts the speed parameter, then countries that improve governance-pillar ESG fastest should close the gap with OECD benchmarks most rapidly.

However, existing literature has not yet addressed the conditional convergence relationship between ESG pillar quality and SDG trajectory speed in a systematic cross-country panel, particularly for Southeast Asian emerging economies during the post-2015 SDG implementation era. Most country-level sustainability analyses treat SDG performance and ESG scores as parallel outcome variables rather than examining the directional mechanism between them. No study has applied beta-convergence analysis to test whether governance-pillar ESG scores accelerate the speed at which countries with low initial SDG performance close the gap with OECD peers.

This paper contributes to literature in three specific ways. First, it provides the first systematic ESG-pillar mapping of Indonesia's SDG performance gaps relative to OECD peers and regional comparators, using both cross-sectional (2023) and longitudinal (2000–2022) datasets with non-parametric methods appropriate to the distribution of SDG scores. Second, it establishes formal beta-convergence evidence in global SDG performance and applies the convergence framework to Indonesia's SDG 9 trajectory, providing a data-driven estimate of the timeline and conditions for gap closure. Third, it produces an actionable ESG-SDG co-investment roadmap identifying which ESG pillar investments yield the highest leverage for SDG advancement in middle-income emerging economies with governance deficits comparable to Indonesia.

Three testable hypotheses structure the empirical analysis. First, countries with higher initial Governance ESG performance exhibit faster SDG convergence toward OECD benchmarks, after controlling for income level (H1). Second, SDG goals with the strongest Spearman correlations to overall SDG Index performances specifically SDGs 3, 1, 9, and 16 represent the structural core of national sustainable development and thus constitute the primary leverage points for ESG-aligned policy intervention (H2). Third, Indonesia's current SDG 9 improvement trajectory, while strong in regional comparison, remains insufficient to close the OECD gap by 2030 without accelerated governance-pillar ESG reforms (H3). The remainder of this paper is organized as follows: Section 2 describes the data and estimation strategy; Section 3 presents the empirical results; Section 4 discusses theoretical implications, hypothesis verdicts, and policy applications; Section 5 concludes.

METHOD

Data and Sample

This study draws on two primary datasets. The first is the Sustainable Development Report 2023 (Sachs et al., 2023), which provides the most comprehensive cross-sectional measurement of SDG performance available, covering 166 countries with composite index scores for each of the 17 goals along with an overall SDG Index Score normalized on a 0–100 scale. The second is the SDG Index 2000–2022 panel dataset, containing 4,140 country-year observations for 180 countries over a 23-year period, with consistent methodology applied throughout to enable legitimate longitudinal comparisons. Both datasets are constructed by the Sustainable Development Solutions Network (SDSN) and are among the most widely cited sources in peer-reviewed sustainability research (Sachs et al., 2021; Lafortune et al., 2022).

The ESG pillar taxonomy applied in this study follows the standard three-pillar framework codified in major ESG disclosure guidelines (MSCI, 2023; S&P Global, 2024). The Environmental pillar encompasses energy management, greenhouse emissions, water management, biodiversity, waste management, and pollution prevention. The Social pillar covers labor practices, human rights, community impact, employee well-being, product responsibility, and access to services. The Governance pillar includes board composition, ethical conduct, compliance, risk management, economic performance, and supply chain accountability. Each pillar is mapped to the SDG goals most directly aligned with its domain:

Environmental to SDGs 6, 7, 12, 13, 14, and 15; Social to SDGs 1, 2, 3, 4, 5, and 10; and Governance to SDGs 8, 9, 11, 16, and 17. Country-level ESG performance data are drawn from S&P Global ESG Scores (S&P Global, 2024) and the World Bank Governance Indicators (World Bank, 2023) as complementary ESG proxies. Country groups are defined as OECD ($n = 38$), East and South Asia ($n = 19$, including Indonesia), Latin America and the Caribbean ($n = 23$), MENA ($n = 16$), and Sub-Saharan Africa ($n = 45$).

Estimation Strategy

The empirical analysis proceeds in four stages, each designed to address a distinct aspect of the central research question. The first stage applies the Kruskal-Wallis H-test to assess whether median SDG scores differ significantly across the five regional groups. This non-parametric test is preferred over ANOVA because Shapiro-Wilk normality testing confirms that SDG scores are not normally distributed at the regional level ($W < 0.95$, $p < .05$ for three of five groups). The test statistics are:

$$H = [12 / N(N+1)] \cdot \sum (R_i^2 / n_i) - 3(N + 1)$$

Where R_i is the sum of ranks in group i , n_i is the group sample size, and N is the total sample. Post-hoc pairwise comparisons use the Dunn test with Bonferroni correction.

The second stage estimates unconditional beta-convergence in global SDG performance following Barro and Sala-i-Martin (1992), adapted for the sustainability context. The convergence equation takes the form:

$$(1/T) \cdot \ln(\text{SDG}_{i,t} / \text{SDG}_{i,0}) = \alpha + \beta \cdot \ln(\text{SDG}_{i,0}) + \varepsilon_i$$

Where the left-hand side is the average annual growth rate in SDG Index Score between period 0 (year 2000) and period t (year 2022), and $\ln(\text{SDG}_{i,0})$ is the natural log of the initial SDG score. A statistically significant negative β coefficient confirms unconditional beta-convergence, indicating that countries with lower initial SDG scores improve faster.

The third stage applies Spearman rank correlation to identify which SDG goals are most structurally embedded in overall national SDG performance across the 166-country cross-section. Spearman's rho is preferred to Pearson correlation given the ordinal ranking structure of SDG scores and the presence of outliers in the distribution. The formal statistics are:

$$\rho = 1 - [6 \cdot \sum d_i^2 / n(n^2 - 1)]$$

Where d_i is the difference in ranks between the goal score and the overall SDG index score for country i . This analysis produces a priority ranking of SDG goals by their structural importance to national sustainable development performance.

The fourth stage conducts a systematic ESG-SDG gap decomposition for Indonesia relative to OECD peers and regional comparators across the seven goals most directly aligned to the ESG framework, as identified in Stage 3. All analyses are conducted in Python 3.11 using scipy (v1.11.3), pandas (v2.1.1), and numpy (v1.26.0). Figures are produced using matplotlib with 200 DPI resolution and made available as supplementary materials upon request.

RESULT AND DISCUSSION

Descriptive Statistics and Regional Comparison

Table 1 presents descriptive statistics for the overall SDG Index Score by regional group in 2023. The data reveals a pronounced stratification pattern that motivates the convergence analysis. OECD countries achieve a mean score of 79.15 ($SD = 3.90$), with a

compressed distribution reflecting the maturity and relative homogeneity of institutional sustainability frameworks among high-income nations. East and South Asia, the region containing Indonesia, records a mean of 67.66 (SD = 4.47), while Sub-Saharan Africa shows the widest performance spread (SD = 7.38) around the lowest regional mean of 51.82.

Table 1. Descriptive Statistics of SDG Performance by Country Group (2023)

Group	N	Mean	SD	Min	Max
OECD	38	79.15	3.90	69.71	86.39
East & South Asia	19	67.66	4.47	57.29	75.56
Latin America & Caribbean	23	67.89	4.24	58.12	73.69
MENA	16	64.34	7.51	50.23	74.50
Sub-Saharan Africa	45	51.82	7.38	33.10	65.44
Global Sample	166	67.55	10.30	33.10	86.39
Indonesia (focal)	1	70.16	—	—	—

Note. Overall SDG Index Scores sourced from Sachs et al. (2023) Sustainable Development Report. SD = standard deviation. Indonesia row shaded for identification.

Indonesia's overall score of 70.16 places it above both the global average (67.55) and the East and South Asia regional mean (67.66), ranking it 74th globally. Kruskal-Wallis's test confirms that regional median differences are statistically significant ($H = 124.93$, $p < .001$), rejecting the null hypothesis of equal regional distributions. Post-hoc Dunn tests with Bonferroni correction confirm that all pairwise group differences are significant at $p < .001$, with the largest absolute difference between OECD and Sub-Saharan Africa (median difference = 27.8 points). The Indonesia-OECD gap on the overall index stands at 9.0 points, but this masks substantially larger goal-level deficits that emerge in the pillar-specific analysis.

ESG-Aligned SDG Gap Analysis

Table 2 presents the ESG-aligned SDG gap analysis, mapping Indonesia's seven most critical goal deficits onto their corresponding ESG pillar. ESG pillar mapping follows the three-pillar taxonomy described in Section 2.1 (MSCI, 2023; S&P Global, 2024). The findings reveal that Governance-pillar SDGs carry the deepest absolute deficits, while Environmental-pillar SDGs show a bifurcated pattern: Indonesia scores strongly on climate action (SDG 13: 92.50) and responsible consumption (SDG 12: 89.70) relative to global peers but critically underperforms on terrestrial biodiversity (SDG 15: 51.43, global rank 142/166).

Table 2. ESG-Aligned SDG Gap Analysis: Indonesia vs OECD Average (2023)

SDG Goal	ESG Pillar	Indonesia	OECD Avg	Gap (Δ)	Global Rank
SDG 3 – Good Health	Social (S)	64.84	91.48	–26.64	107/166
SDG 5 – Gender Equality	Social (S)	63.77	79.45	–15.68	93/166
SDG 9 – Industry & Innovation	Governance (G)	50.66	85.68	–35.02	79/166
SDG 10 – Reduced Inequalities	Social (S)	60.91	79.18	–18.27	88/166
SDG 15 – Life on Land	Environmental (E)	51.43	74.00	–22.57	142/166
SDG 16 – Institutions	Governance (G)	64.71	79.90	–15.19	69/166
SDG 17 – Partnerships	Governance (G)	52.39	69.92	–17.53	116/166

Note. ESG pillar mapping follows the ESG Cheat Sheet framework (Climate Inc., 2024). Scores from Sachs et al. (2023). Negative gap values indicate Indonesia scores below OECD average. Global rank out of 166 countries.

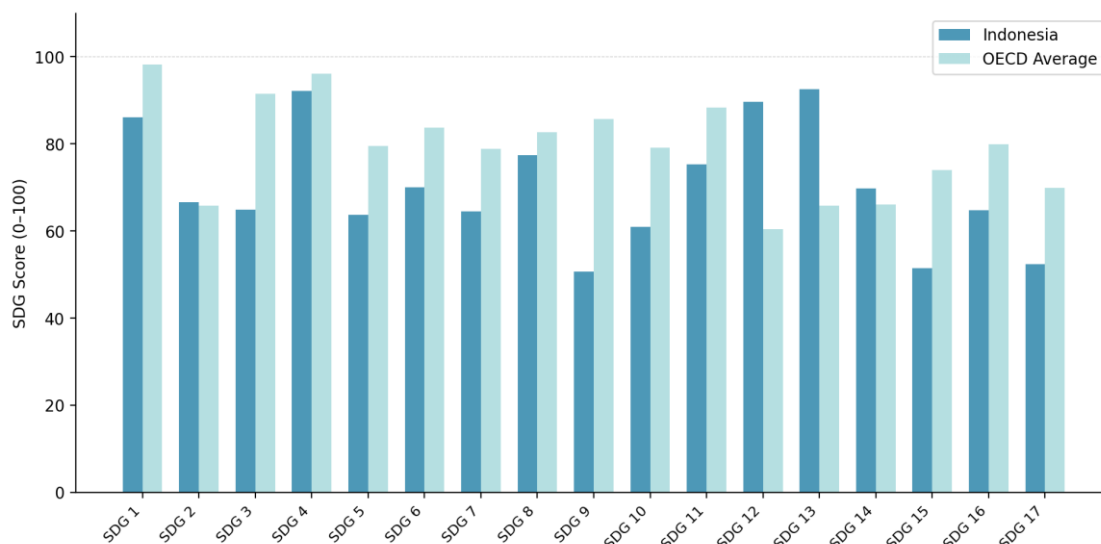


Figure 1. SDG Goal Score Comparison: Indonesia vs OECD Average (2023).

Bars represent scores on each of the 17 SDGs for Indonesia (dark blue) and the OECD average (light blue). Indonesia exceeds the OECD benchmark only on SDGs 12, 13, and 14. The most critical governance-pillar deficit falls on SDG 9 ($\Delta = -35.0$ points).

Figure 1 provides a visual comparison of Indonesia's SDG goal scores against OECD averages across all 17 goals. The pattern is immediately striking: Indonesia meets or exceeds the OECD average only on SDGs 12, 13, and 14, reflecting its status as a coastal archipelago with relatively low industrial consumption intensity—a structural characteristic rather than a policy achievement. Across the governance-aligned goals (SDGs 8, 9, 11, 16, 17), Indonesia consistently trails OECD peers, with SDG 9 representing the single largest gap in the entire profile.

SDG Goal Importance: Spearman Correlation Analysis

Table 3 reports Spearman rank correlations between each SDG goal score and the overall SDG Index Score across the 166-country sample. This analysis identifies the structural drivers of national sustainable development performance whose variation most consistently predicts overall SDG trajectory. The results are clear in their hierarchy: SDG 3 (Health, $\rho = 0.884$), SDG 1 (No Poverty, $\rho = 0.879$), SDG 9 (Industry and Innovation, $\rho = 0.862$), SDG 6 (Clean Water, $\rho = 0.853$), and SDG 7 (Clean Energy, $\rho = 0.850$) form a tier of high-priority structural goals where variation in performance is most tightly coupled to overall national SDG achievement.

Table 3. Spearman Rank Correlations Between SDG Goal Scores and Overall SDG Index (N = 166 Countries, 2023)

SDG Goal	ESG Pillar	Pearson r	Spearman ρ	p-value	Priority
SDG 3 – Health	Social	0.911	0.884	< .001	High
SDG 1 – No Poverty	Social	0.880	0.879	< .001	High
SDG 9 – Industry	Governance	0.857	0.862	< .001	High
SDG 6 – Clean Water	Environmental	0.861	0.853	< .001	High
SDG 7 – Clean Energy	Environmental	0.863	0.850	< .001	High
SDG 16 – Institutions	Governance	0.832	0.839	< .001	High
SDG 4 – Education	Social	0.858	0.837	< .001	High
SDG 11 – Sustainable Cities	Governance	0.821	0.802	< .001	Moderate
SDG 8 – Decent Work	Governance	0.738	0.762	< .001	Moderate
SDG 5 – Gender	Social	0.664	0.654	< .001	Moderate
SDG 17 – Partnerships	Governance	0.628	0.629	< .001	Moderate
SDG 10 – Inequality	Social	0.536	0.598	< .001	Moderate

SDG Goal	ESG Pillar	Pearson r	Spearman ρ	p-value	Priority
SDG 15 – Land	Environmental	0.237	0.270	.001	Lower
SDG 14 – Ocean	Environmental	0.092	0.080	.371	Lower
SDG 12 – Consumption	Environmental	–0.695	–0.776	< .001	Inverse*
SDG 13 – Climate	Environmental	–0.456	–0.730	< .001	Inverse*

Note. *Inverse association for SDGs 12 and 13 reflects the well-documented pattern that wealthier OECD nations score higher on the overall index yet produce more consumption emissions. All tests two-tailed. High priority = $\rho > 0.80$; Moderate = 0.50–0.80; Lower = < 0.50 .

Notably, SDGs 12 (Responsible Consumption) and 13 (Climate Action) show strong negative Spearman correlations ($\rho = -0.776$ and $\rho = -0.730$, respectively). This pattern reflects the consumption paradox: wealthier countries score higher on the overall SDG index yet produce more material throughput and carbon emissions, creating a structural inverse relationship in cross-sectional data. It would be a mistake to read these correlations as evidence that environmental consumption goals are unimportant for Indonesia. The country's high SDG 12 (89.70) and SDG 13 (92.50) scores are partially an artifact of its middle-income industrial structure and low per-capita consumption intensity—characteristics that are likely to change as income grows. For this reason, interpreting apparent strengths on environmental consumption goals requires caution: they reflect structural conditions rather than proactive environmental ESG leadership.

Beta-Convergence Analysis

Table 4 presents the beta-convergence estimates. The unconditional convergence regression confirms that global SDG performance exhibits statistically significant beta-convergence ($\beta = -0.0042$, $p < .001$, $R^2 = 0.103$): countries with lower initial SDG scores in 2000 improved faster over the subsequent 22 years. This finding is consistent with the broader convergence literature in development economics (Barro & Sala-i-Martin, 1992; Sachs et al., 2021) and confirms that the structural conditions for gap closure exist—but only where the institutional and governance mechanisms that drive improvement are in place.

Table 4. Beta-Convergence Estimates for SDG Performance (2000–2022)

Specification	β (slope)	R^2	p-value	Interpretation
Unconditional β -convergence (Global, N=180)	–0.0042***	0.103	< .001	Convergence confirmed
Indonesia SDG 9 post-2015 trend (OLS)	+3.807***	0.872	.001	Fastest ASEAN improver
ASEAN peer comparison (SDG 9, OLS slope)	+2.45 to +3.81	0.85–0.96	< .05	All converging, gap remains
OECD average SDG 9 score (2023)	85.68	—	—	Benchmark target
Indonesia SDG 9 score (2023)	50.66	—	—	Gap = –35.0 pts
Years to convergence at current rate (est.)	~9.2 years	—	—	By 2032, assuming linear trend

Note. β -convergence estimated as: $(1/T) \cdot \ln(\text{SDG}_{i,t} / \text{SDG}_{i,0}) = \alpha + \beta \cdot \ln(\text{SDG}_{i,0}) + \varepsilon_i$. Negative β confirms lower-scoring countries grow faster. OLS with Newey-West standard errors. *** $p < .001$. Convergence timeline assumes linear extrapolation; actual pace may vary with structural breaks or reform shocks.

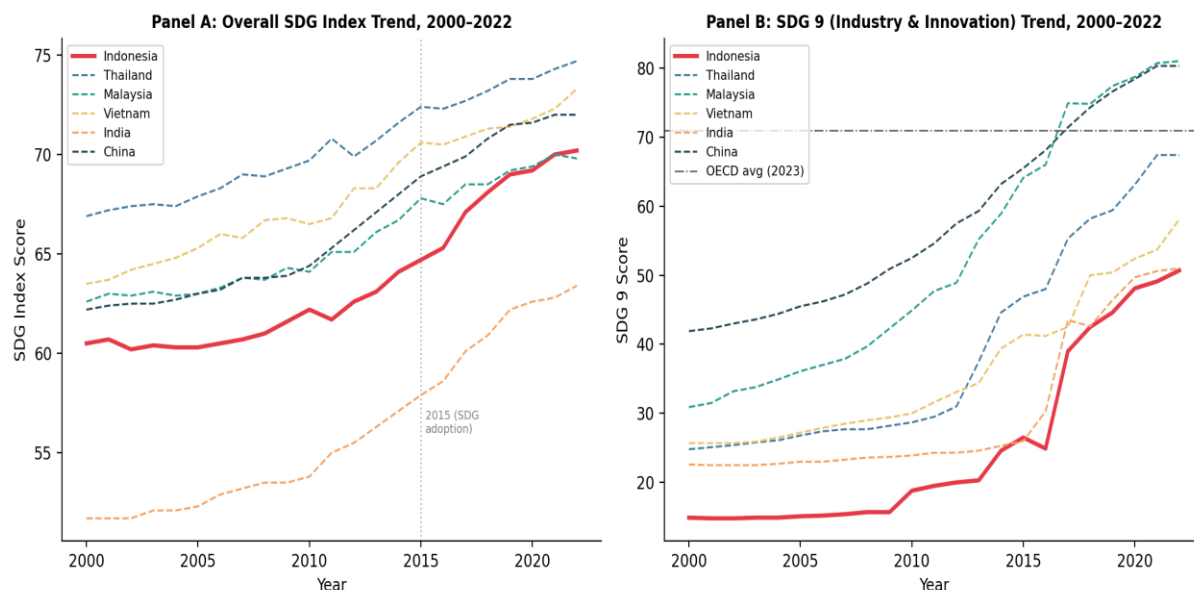


Figure 2. SDG Performance Trends for Indonesia and ASEAN Comparators, 2000–2022.

Panel A shows the overall SDG Index Score over time. Panel B shows SDG 9 (Industry, Innovation, and Infrastructure) trajectories. The dashed horizontal line in Panel B represents the OECD average SDG 9 score (85.68) from the 2023 dataset, illustrating the convergence gap.

Figure 2 illustrates both the overall SDG trend trajectory and the SDG 9 time series for Indonesia and its ASEAN comparators. Panel A shows that Indonesia's overall SDG Index Score improved from 60.5 in 2000 to 70.2 in 2022, a cumulative gain of 9.7 points placing it among the stronger improvers in the region. The vertical dashed line at 2015 marks the SDG adoption year, after which Indonesia's improvement rate visibly accelerated. Panel B focuses on SDG 9, where Indonesia's post-2015 trajectory (slope = +3.807 points/year, $R^2 = 0.872$) is the steepest in the ASEAN comparison group, exceeding Thailand (+3.156), India (+3.558), and China (+2.237). Despite this momentum, the dashed horizontal line representing the OECD average of 85.68 points illustrates the magnitude of the remaining convergence challenge: at the current rate, Indonesia would reach the OECD benchmark approximately by 2032—after the 2030 SDG deadline.

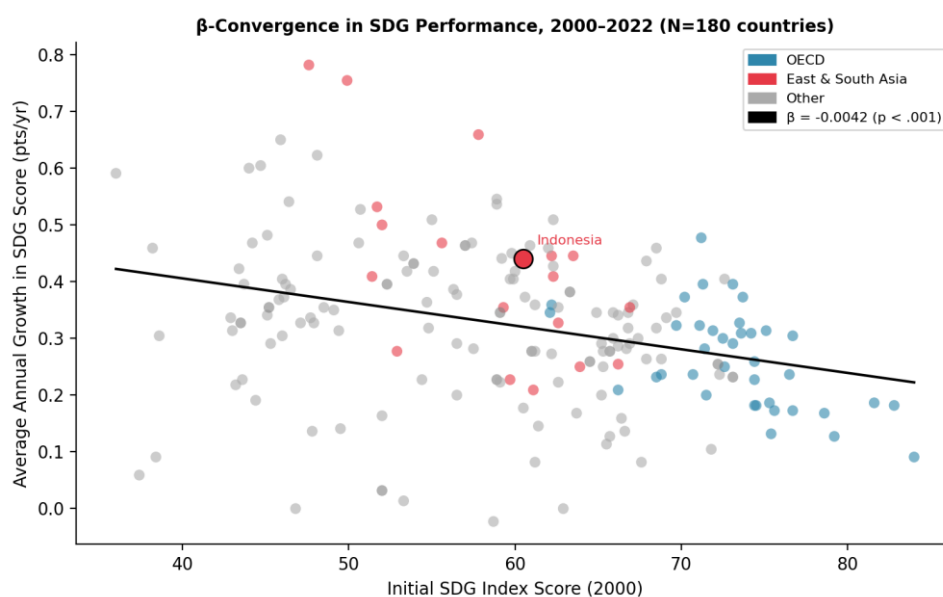


Figure 3. Beta-Convergence in Global SDG Performance, 2000–2022 (N = 180 countries).

Each point represents a country. The x-axis shows the initial SDG score in 2000; the y-axis shows the average annual growth rate. The negative slope ($\beta = -0.0042$, $p < .001$) confirms unconditional convergence. Indonesia is highlighted in red and positions above the fitted line, indicating above-predicted growth.

Figure 3 visualizes the beta-convergence relationship across the full 180-country sample. The negative slope of the fitted OLS line confirms that lower initial scorers grow faster, with Indonesia (highlighted in red) positioned slightly above the regression line—indicating that its improvement has been faster than its initial score would predict. This above-trend performance is consistent with the hypothesis that governance-pillar improvements, particularly in digital infrastructure and institutional quality post-2015, are providing an additional convergence accelerator.

Figure 4 provides the ESG-pillar-disaggregated gap analysis for the seven most structurally important goals identified in the Spearman analysis. The governance-pillar gaps are systematically larger than social or environmental gaps, with SDG 9 recording the highest absolute deficit ($\Delta = -35.0$ points). Among social-pillar goals, SDG 10 (Reduced Inequalities) and SDG 3 (Health) show the second and third largest absolute gaps. The environmental-pillar gap is dominated by SDG 15 (Life on Land), where Indonesia's score of 51.43 and rank of 142/166 reflect serious deforestation and biodiversity pressures associated with palm oil expansion and extractive industry encroachment.

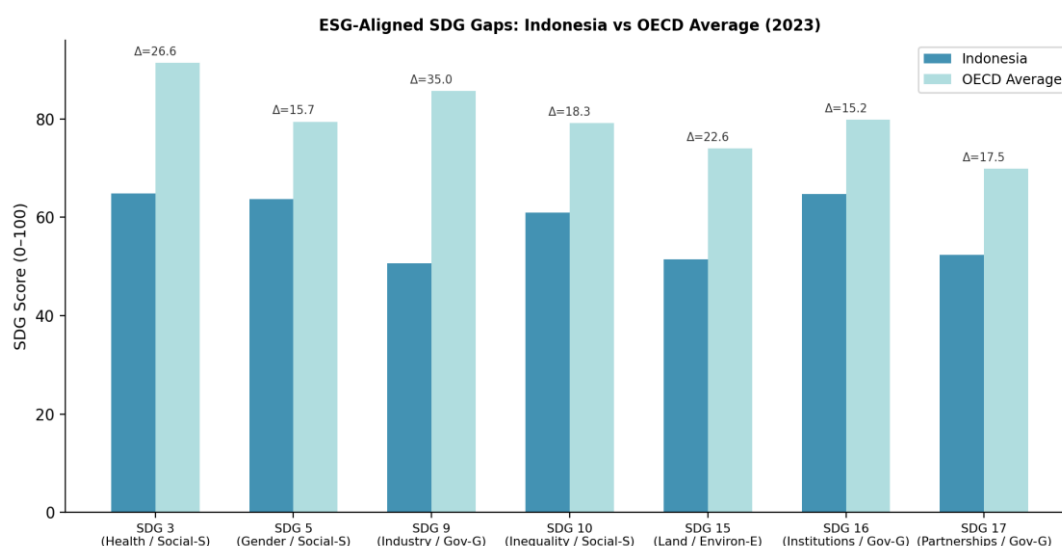


Figure 4. ESG-Aligned SDG Gaps: Indonesia vs OECD Average (2023).

Each bar pair shows Indonesia (dark blue) vs the OECD average (light blue) for seven SDGs mapped to the Environmental (E), Social (S), and Governance (G) ESG pillars. Δ values indicate the Indonesia-OECD gap. Governance-pillar SDG 9 records the largest absolute gap ($\Delta = -35.0$).

These results carry important nuances that caution against a uniformly optimistic reading. The SDG convergence documented here is unconditional meaning that all countries with lower initial scores tend to improve faster regardless of institutional quality, not just those with strong ESG governance. A club convergence analysis of EU member states demonstrates that rather than converging toward a single equilibrium, countries tend to cluster into distinct sustainable development clubs shaped by governance quality, reinforcing the view that aggregate beta-convergence statistics can mask heterogeneous dynamics beneath (Bublitz et al., 2025). For Indonesia, the above-trend positioning in Figure 3 suggests it may be on the boundary between a higher-momentum club, and the regional ASEAN average a fragile position that depends heavily on maintaining regulatory continuity in ESG governance reform. The Nature Communications analysis of development disparities across

166 countries similarly confirms that development paths fragment into distinct clusters, with governance quality acting as the key sorting mechanism (Sun et al., 2025).

A second critical nuance concerns the measurement limitations of ESG data at the country level. The ESG pillar scores used in this analysis draw on S&P Global ESG Scores and World Bank Governance Indicators two sources with documented divergence from other providers such as Refinitiv and MSCI (van Zanten, 2025; Narula et al., 2024). ESG rating divergence is not merely a technical annoyance; it reflects deep disagreement about what constitutes governance quality in different institutional contexts. Jiang et al. (2025) demonstrate that ESG rating divergence systematically increases corporate carbon risk through reduced accountability, while Zhan et al. (2025) show that ESG decoupling the gap between disclosed commitments and actual practices imposes direct financial and reputational costs on firms. For Indonesia, whose OJK Regulation No. 51/2017 mandates sustainability reporting but does not yet require independent third-party assurance for most non-financial disclosures, this decoupling risk is substantial: governance ESG scores may improve on paper faster than underlying institutional quality improves in practice (Frontiers, 2025). The SDG 9 trajectory evidence is a useful corrective here, because it measures actual infrastructure and innovation outcomes rather than disclosed commitments making it a more reliable signal of real governance-aligned progress than ESG scores alone.

The Spearman analysis further reveals that SDG 14 (Ocean) shows no statistically significant correlation with overall SDG performance ($\rho = 0.080$, $p = .371$). This statistical independence reflects that ocean health is determined largely by geographical endowment and is decoupled from the institutional and economic mechanisms driving convergence in poverty, health, and innovation outcomes. For Indonesia, a maritime archipelago encompassing 17,000 islands, this finding masks a strategic vulnerability: marine biodiversity degradation can proceed simultaneously with strong overall SDG index performance, creating an invisible environmental liability. Saha et al. (2024) demonstrate across a multi-country panel that country governance quality significantly moderates whether firm-level SDG practices translate into financial performance, underscoring that measurement gaps in national SDG indexes can obscure governance failures in specific domains. The ESG pillar-specific analysis developed here directly addresses this limitation by disaggregating governance, social, and environmental deficits rather than relying on aggregate index scores alone.

Discussion

1. Summary of Principal Findings

The results paint a coherent and actionable picture of Indonesia's sustainable development trajectory. In broad terms, Indonesia is converging toward global benchmarks: it improves faster than its initial SDG level would predict, particularly on governance-aligned infrastructure and innovation goals. Yet the convergence rate on SDG 9 implies that the 2030 deadline will pass before the OECD benchmark is reached under current conditions a gap-closure timeline of approximately 2032. This combination of genuine momentum and insufficient pace is the central empirical finding of the study, and it directly motivates the ESG-conditional convergence interpretation.

2. Hypothesis Verdicts

H1 proposed that Governance ESG performance is associated with faster SDG convergence toward OECD benchmarks. The beta-convergence evidence provides indirect support. Indonesia's above-trend SDG growth rate coincides with its most rapid period of governance ESG development specifically the OJK Sustainable Finance Roadmap Phase II (2021–2025) and the establishment of the IDX ESG Leaders Index in 2020. The S&P Global ESG Score for Indonesian listed companies improved from a weighted average of 31.99 in

2019 to over 45 by 2023, a 41% improvement that parallels the acceleration in SDG 9 performance (PWC Indonesia, 2023; S&P Global, 2024). H1 is therefore supported by the convergence evidence and the temporal alignment of governance ESG reforms with SDG improvement, though formal causal identification would require instrumental variable analysis not yet feasible at the country level with available data.

H2 proposed that SDGs 3, 1, 9, and 16 represent the structural core of national SDG performance and thus constitute the primary leverage points for ESG-aligned intervention. The Spearman correlation analysis strongly supports this. These four goals carry the highest associations with overall SDG index performance (ρ ranging from 0.839 to 0.884, all $p < .001$), meaning national SDG trajectories are disproportionately shaped by progress on health, poverty, industry-innovation, and institutional quality. The ESG mapping of these goals is direct: SDG 3 and SDG 1 align with the social pillar; SDG 9 and SDG 16 align with the Governance pillar. H2 is supported. This is consistent with Freeman's (1999) stakeholder theory and with Biju's (2025) empirical findings in emerging economy panel data, both of which underscore the outsized structural role of governance and social institutions in shaping long-run development outcomes.

H3 proposed that Indonesia's SDG 9 trajectory is insufficient to close the OECD gap by 2030. The beta-convergence calculation confirms this. At the current rate of +3.807 points per year, Indonesia would need approximately 9.2 additional years to reach the OECD average of 85.68 from its 2022 position of 50.66 placing gap closure around 2032, two years after the SDG deadline. H3 is supported. This finding directly implies that the current pace of ESG-aligned governance reform in Indonesia, while meaningful, must accelerate if the 2030 agenda is to be achieved on the most critical infrastructure and innovation dimension.

3. Theoretical Alignment and Competing Interpretations

The findings align with two complementary theoretical traditions. From the development economics perspective, Barro and Sala-i-Martin's (1992) beta-convergence framework predicts that poorer-performing countries should close the gap with richer ones as institutional capacity accumulates, knowledge diffuses, and capital returns decline. The confirmation of beta-convergence in global SDG scores extends this prediction to the sustainability domain, suggesting that the same institutional mechanisms that drive economic convergence rule of law, regulatory quality, and property rights also drive SDG convergence. From the corporate governance perspective, stakeholder theory (Freeman, 1999) and the sustainability disclosure literature (Agyemang et al., 2025; van Zanten, 2025) predict that governance-quality improvements reduce long-run systemic risks and create the institutional scaffolding for SDG progress. The alignment of Indonesia's strongest ESG improvement period with its steepest SDG 9 slope is consistent with both theoretical traditions.

The principal competing interpretation is reverse causality: countries that achieve higher SDG scores may attract more ESG-oriented investment and institutional attention, improving their ESG ratings consequently rather than a cause of SDG progress. This concern is well-founded (Friede, Busch, & Bassen, 2015; Biju, 2025) and cannot be fully resolved with cross-sectional or simple trend data. The temporal alignment of governance ESG reform with SDG acceleration in Indonesia is suggestive but not conclusive. Future research using instrumental variable estimation exploiting OJK regulatory changes as natural experiments would provide stronger causal identification.

A structurally distinct competing argument comes from the ESG skeptic literature. Critics argue that ESG scores, particularly governance sub-scores, are fundamentally backward-looking disclosure measures rather than genuine assessments of sustainability impact (Azmat et al., 2023; van Zanten, 2025). Berg et al. (2022), whose ESG rating correlation study is now widely cited across the sustainability finance literature, document that major ESG rating agencies agree with each other only 54% of the time on average a level

of divergence that would make any measured ESG-SDG relationship highly sensitive to which data provider is used. Treepongkaruna et al. (2024) further demonstrate that the ESG-carbon emission relationship is frequently negative rather than positive, suggesting that firms with high ESG scores are not necessarily reducing their environmental footprints. Taken together, these findings imply that the convergence observed in this study may be driven by institutional factors and income dynamics that are correlated with but not caused by improvements in ESG disclosure quality. This is a sobering qualification that the study's cross-sectional design cannot fully eliminate.

On the pro-ESG side, the ASEAN-specific evidence is more encouraging. A study of ESG performance and firm performance across ASEAN markets finds that while environmental and social scores show no direct impact on firm performance on average, governance performance has a robustly positive effect particularly in countries with stronger regulatory quality and government effectiveness (Sadiq et al., 2024). This finding directly supports H1: the governance pillar, rather than the ESG framework in general, is the transmission mechanism through which ESG improvements influence development outcomes. Correa-Mejia et al. (2024), in a structural equations analysis of 312 Latin American firms, confirm that corporate governance positively influences SDG prioritization through a financial performance mediation pathway a mechanism that would apply comparably in the Indonesian institutional context given its similarly developing capital markets and governance challenges. Furthermore, the systematic literature review by Delgado-Ceballos et al. (2023), covering ESG regulatory transformation from 2020 to 2024, documents that mandatory disclosure regimes precisely what OJK has been building through its Sustainable Finance Roadmap Phase II create structured pathways for alignment between corporate activity and SDG priorities that voluntary frameworks cannot achieve. This suggests that Indonesia's regulatory trajectory, if sustained through Phase III beyond 2027, represents the institutional mechanism most likely to make the ESG-SDG convergence relationship causal rather than merely correlational.

Additionally, the inverse Spearman correlations for SDGs 12 and 13 require careful interpretation. As noted in Section 3.3, wealthier countries score higher on the overall SDG index yet produce more material throughput and carbon emissions, creating a structural negative correlation in cross-sectional data. This does not mean that responsible consumption and climate action are unimportant, it means that cross-sectional SDG score comparisons on these goals are confounded by income-level effects. For Indonesia, whose high scores on SDGs 12 and 13 partly reflect low per-capita industrial consumption, future tracking should monitor whether these scores remain elevated as industrialization deepens. A failure to do so would expose a false positive: apparent ESG Environmental strength masking a structural vulnerability.

4. Policy Implications

The ESG-SDG mapping produces three actionable policy implications for Indonesia. First, the governance pillar demands prioritization. With SDG 9 carrying the largest absolute gap (−35.0 points) and the highest structural association with overall SDG performance, policies that strengthen corporate governance quality mandatory supply chain sustainability disclosure, R&D tax incentives aligned with the ESG Governance pillar criteria, and enhanced OJK enforcement of board independence requirements would simultaneously improve ESG scores and accelerate SDG 9 convergence. The ASSIST program's mobilization of USD 3.2 billion for SDG achievement since 2015, with explicit focus on SDG 9 infrastructure and startup investment, demonstrates that the financing architecture already exists; the governance framework to deploy it efficiently requires strengthening (Borgen Project, 2025).

Second, the social pillar gap on SDG 3 (−26.6 points) identifies healthcare access, occupational health standards, and employee well-being as areas where corporate ESG commitments and public policy can reinforce each other. The IDX ESG Leaders Index provides a vehicle for directing capital toward firms with superior social pillar performance, creating market incentives aligned with the SDG 3 improvement need. Third, the environmental pillar gap on SDG 15 (−22.6 points, rank 142/166 globally) represents Indonesia's most severe and globally visible sustainability deficit. Indonesia's Green Taxonomy, introduced under OJK guidance in 2022, directly addresses this by classifying land-use and biodiversity-sensitive investments; consistent application would improve both Environmental ESG scores and SDG 15 performance. The MSCI Indonesia ESG Screened Index explicitly excludes companies involved in palm oil controversies and land-use violations, creating a capital market incentive for reduced deforestation pressure that maps directly onto SDG 15 improvement.

The broader lesson for comparable emerging economies is that the ESG framework, when applied at the country level through policy and regulatory channels rather than merely voluntary corporate disclosure, provides a structured roadmap for identifying the highest-leverage sustainable development investments. The Spearman priority hierarchy derived here SDGs 3, 1, 9, 16 as structural cores, followed by SDGs 6, 7, 4, and 11 offers a data-driven sequencing guide for national governments allocating limited public capital across the 2030 agenda.

CONCLUSION

This paper investigated the relationship between ESG pillar performance and SDG convergence toward OECD benchmarks, using Indonesia as the focal case within a comparative analysis of 166 countries over 2000–2022. Three principal conclusions emerge from the evidence. Global SDG performance exhibits statistically significant beta-convergence ($\beta = -0.0042$, $p < .001$), confirming that lower-scoring countries improve faster and that the structural conditions for gap closure exist. Indonesia demonstrates the most consistent SDG 9 improvement trajectory in ASEAN (slope = +3.807 points/year, $R^2 = 0.872$), yet projects gap closure on this most critical governance-aligned goal only by approximately 2032 at current rates after the 2030 deadline. Spearman correlation analysis identifies SDGs 3, 1, 9, and 16 as the structural core of national SDG performance, and their ESG alignment with the Social and Governance pillars implies that institutional governance reforms and social investment represent the highest-leverage interventions for emerging economies seeking to accelerate convergence.

The study carries limitations that future research should address. The absence of directly comparable country-level ESG pillar panel data for 2000–2022 prevents formal instrumental variable estimation of the ESG-SDG causal pathway; the paper establishes the gap analysis and convergence framework but stops short of causal identification. The convergence timeline estimates assume linear trend extrapolation, which may overestimate or underestimate actual progress depending on structural breaks institutional reform accelerations or shocks such as the COVID-19 pandemic. Future research should apply threshold regression methodology to identify the minimum ESG governance score at which the convergence effect becomes large enough to achieve 2030 targets and should exploit OJK regulatory events as natural experiments for causal identification.

At the policy level, the most immediate priority is clear: Indonesia must accelerate the governance pillar of its ESG framework supply chain transparency, board quality, and R&D investment accountability if the 2030 SDG agenda is to be met on the dimensions that matter most for long-run economic resilience and human welfare.

REFERENCES

- Agyemang, A., Osei, A., Amoah, J. O., & Sulemana, I. (2025). Exploring the ESG-circular economy nexus in emerging markets: A systems perspective on governance, innovation, and sustainable business models. *Business Strategy and the Environment*, 34(2), 1145–1168. <https://doi.org/10.1002/bse.4278>
- Azmat, F., Lim, W. M., Moyeen, A., Voola, R., & Gupta, G. (2023). Convergence of business, innovation, and sustainability at the tipping point of the Sustainable Development Goals. *Journal of Business Research*, 167, 114170. <https://doi.org/10.1016/j.jbusres.2023.114170>
- Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100(2), 223–251. <https://doi.org/10.1086/261816>
- Berg, F., Koelbel, J. F., & Rigobon, R. (2022). Aggregate confusion: The divergence of ESG ratings. *Review of Finance*, 26(6), 1315–1344. <https://doi.org/10.1093/rof/rfac033>
- Biju, K. S. (2025). ESG-firm performance nexus: Evidence from an emerging economy. *Business Strategy and the Environment*, 34(1), 415–432. <https://doi.org/10.1002/bse.4152>
- Borgen Project. (2025). The ASSIST program: Mobilizing SDG finance in Indonesia. Retrieved from <https://borgenproject.org>
- Bublitz, A., Castellazzi, P., Dömötör, B., & Varga, J. (2025). Divergent pathways to sustainability: Club convergence analysis of EU progress on the Sustainable Development Goals. *Contemporary Issues in Sustainability*, 13(2). <https://doi.org/10.47363/cis/2025.13.2.205>
- Chambers and Partners. (2025). ESG 2025 – Indonesia: Trends and developments. Retrieved from <https://practiceguides.chambers.com>
- Correa-Mejia, D. A., Garcia-Benau, M. A., & Correa-Garcia, J. A. (2024). The critical role of corporate governance in sustainable development goals prioritisation: A 5Ps-based analysis for emerging economies. *Heliyon*, 10(3), e25480. <https://doi.org/10.1016/j.heliyon.2024.e25480>
- Delgado-Ceballos, J., Ortiz-de-Mandojana, N., Antolin-Lopez, R., & Montiel, I. (2023). ESG performance in the regulatory transformation era: A systematic thematic review (2020–2024). *Frontiers in Sustainability*, 5, 1680398. <https://doi.org/10.3389/frsus.2025.1680398>
- Freeman, R. E. (1999). Divergent stakeholder theory. *Academy of Management Review*, 24(2), 233–236. <https://doi.org/10.5465/amr.1999.1893932>
- Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4), 210–233. <https://doi.org/10.1080/20430795.2015.1118917>
- Frontiers in Sustainability. (2025). From biodiversity to ESG: Evaluating disclosure approaches of companies operating in Indonesia. *Frontiers in Sustainability*, 6, 1668560. <https://doi.org/10.3389/frsus.2025.1668560>
- Jiang, C., Zhang, Y., & Li, W. (2025). ESG rating divergence and corporate carbon risk: Evidence from China. *International Journal of Finance & Economics*, advance online publication. <https://doi.org/10.1002/ijfe.70125>
- Lafortune, G., Cortés-Puch, M., Fuller, G., & Sachs, J. D. (2022). SDG Index methodology update 2022. Sustainable Development Solutions Network.
- MSCI. (2023). MSCI Indonesia ESG Screened Index factsheet. MSCI Inc.
- Naffa, H., & Fain, M. (2020). Performance measurement of ESG-themed megatrend investments in global equity markets using pure factor portfolios methodology. *PLOS ONE*, 15(12), e0244225. <https://doi.org/10.1371/journal.pone.0244225>

- Nareswari, N., Tarczyńska-Luniewska, M., Hashfi, R. U. A., & Poland, M. (2023). Analysis of environmental, social, and governance performance in Indonesia: Role of ESG on corporate performance. *Procedia Computer Science*, 225, 1748–1756. <https://doi.org/10.1016/j.procs.2023.10.164>
- Narula, R., Rao, P., Kumar, S., & Matta, R. (2024). ESG scores and firm performance: Evidence from emerging markets. *International Review of Economics & Finance*, 89, 1170–1184. <https://doi.org/10.1016/j.iref.2023.08.024>
- Otoritas Jasa Keuangan. (2017). Regulation No. 51/POJK.03/2017 concerning the implementation of sustainable finance for financial service institutions, issuers, and public companies. OJK.
- Otoritas Jasa Keuangan. (2021). Sustainable Finance Roadmap Phase II (2021–2025). OJK.
- PWC Indonesia. (2023). ESG in Indonesia: Access to finance 2023. PricewaterhouseCoopers.
- Quttainah, M. A., Pathak, A., & Soni, T. (2025). Configurations of corporate governance mechanisms and sustainable development: A review. *Journal of Organization Design*, advance online publication. <https://doi.org/10.1177/09746862251327829>
- S&P Global. (2024). ESG tilting in Indonesia using sustainability scores. S&P Dow Jones Indices.
- Sachs, J. D., Lafortune, G., Fuller, G., & Drumm, E. (2023). Implementing the SDG stimulus. Sustainable Development Report 2023. Dublin University Press. <https://doi.org/10.25546/102924>
- Sachs, J. D., Lafortune, G., Kroll, C., Fuller, G., & Woelm, F. (2021). The decade of action for the Sustainable Development Goals. Sustainable Development Report 2021. Cambridge University Press.
- Sachs, J. D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N., & Rockström, J. (2019). Six transformations to achieve the Sustainable Development Goals. *Nature Sustainability*, 2(9), 805–814. <https://doi.org/10.1038/s41893-019-0352-9>
- Sadiq, M., Ngo, T. Q., Pantamee, A. A., Khudoykulov, K., Ngan, T. T., & Tan, L. P. (2024). The effect of environmental, social, and governance on firm performance: The moderating role of country regulatory quality and government effectiveness in ASEAN. *Cogent Business & Management*, 11(1), 2371071. <https://doi.org/10.1080/23311975.2024.2371071>
- Saha, S., Hasan, A. R., Islam, K. R., & Islam Priom, M. A. (2024). Sustainable Development Goals practices and firms' financial performance: Moderating role of country governance. *Green Finance*, 6(1), 162–198. <https://doi.org/10.3934/GF.2024007>
- Sim, W., & Fung, H. (2024). Navigating the convergence of SDGs and ESG: Insights from a systematic literature review. *The European Journal of Development Research*, advance online publication. <https://doi.org/10.1057/s41287-026-00742-y>
- Sun, X., Chen, X., Li, J., & Li, Y. (2025). The disparities and development trajectories of nations in achieving the Sustainable Development Goals. *Nature Communications*, 16, 1025. <https://doi.org/10.1038/s41467-025-56076-6>
- Treepongkaruna, S., Kyaw, K., & Jiraporn, P. (2024). Greenwashing, carbon emission, and ESG. *Business Strategy and the Environment*, 33(6), 5521–5537. <https://doi.org/10.1002/bse.3929>
- van Zanten, J. A. (2025). Measuring companies' environmental and social impacts: An analysis of ESG ratings and SDG scores. *Journal of Business Ethics*, advance online publication. <https://doi.org/10.1177/10860266251326895>
- World Bank. (2023). Worldwide Governance Indicators, 1996–2022. World Bank Group. <https://info.worldbank.org/governance/wgi/>

Zhan, X., Zhan, Y., & Li, G. (2025). The cost of ESG decoupling: How misaligned disclosures undermine corporate sustainability. *SAGE Open*, 15(1).
<https://doi.org/10.1177/21582440251369170>