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Unlocking sustainable development: ASEAN ESG and economic growth implication

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ABSTRACT

Purpose – Study of the Impact of ESG and Economic Growth on the Sustainable Development Goals Index in ASEAN, The Role of Environmental and Social Governance as Moderators States the Objectives of This Study.
Design/methodology/approach – Using a panel autoregressive distributed lag (ARDL) model to investigate short- and long-run relationships among the variables. The SDGI, Environmental Score (ES), Social Score (SS), Governance Score (GS), and Economic Growth (EG) data were collected from reputable international sources. A Hausman test confirms the validity of the model.
Findings – The findings suggest that environmental, social, and corporate governance promote the SDG accomplishment in ASEAN countries. Economic growth does improve SDG performance but is a double-edged sword, as its impact is more positive when moderated by the quality of environmental governance. Moreover, social governance reinforces the influence of corporate governance on achieving SDGs. These results emphasize the key importance of governance and sustainable development.
Originality/value – The study empirically contributes to the governance-SDG nexus in ASEAN, revealing how governance structures can improve sustainable development. The findings also contribute to the literature on the governance of sustainability and offer policy recommendations on enhancing sustainability development goal (SDG) implementation horizons.
Research Implications – Governance mechanisms should be embedded in sustainability policies to complement the implementation of the SDGs, according to the study. Good environmental and social governance can enhance the contribution of economic growth to sustainable development.

1. Introduction

Sustainable Development Goals (SDGs) are a key development framework addressing economic, social, and environmental challenges globally (Lim, Jørgensen, and Wyborn 2018; Salvia et al. 2019). Of these, environmental, social, and governance (ESG) factors have attracted considerable attention from policymakers, businesses, and scholars for their potential to promote sustainable development (Khamisu, Paluri, and Sonwaney 2024; Wang, Chu, and Hao 2024). The ASEAN region, which is characterized by robust economic activities and environmental susceptibility, has witnessed the gradual adoption of ESG principles in national policies and corporate strategies (Eskantar et al. 2024; Herrador and Van 2024). According to (Rahman et al., 2024), there is an active push from governments and regulatory bodies in ASEAN countries to pursue ESG related policies to improve corporate responsibility and sustainability performance (Joseph and Said 2021; Tran and Le 2024). Yet even with these important efforts, the actual impact of ESG on the attainment of SDGs is a debatable subject (Berrone et al. 2023; Emma, Emiliano, and Jennifer 2024; García-Meca, Ramón-Llorens, and Martínez-Ferrero 2021). Previous studies on ESG integration show that the process is advancing, however, its impact on SDGs varies significantly across different ASEAN nations due to

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regulatory, economical, and social differences (Işık, Ongan, Islam, Jabeen, et al. 2024; Ng et al. 2023). Given these complexities, it is crucial to empirically explore the potential effectiveness of ESG in driving the SDGs, particularly in the ASEAN region and for policymakers and stakeholders.

A major challenge in sustainable development research is understanding how ESG dimensions interact with economic growth in terms of attaining SDGs (Işık 2024; Ongan, et al. 2024). Although previous studies show that ESG scores are positively related to firm performance, their direct effect on larger socio-economic and environmental outcomes remains ambiguous (Martiny et al. 2024; Nizam et al. 2019). For instance, the absence of standard ESG reporting frameworks and inconsistent flows of regulation among ASEAN countries hinder the evaluation of how ESG would contribute to SDGs (Gopal and Pitts 2024; Tarczynska-Luniewska et al. 2024). Furthermore, in much of the region, economic growth has tended to come at the price of environmental degradation, as well as social inequality, leading to increased scrutiny of the trade-offs between development and sustainability (Lehtonen 2004; Weber and Weber 2020). While empirical evidence supports the notion that certain governance practices, including corporate sustainability initiatives and green finance policies, can advance the SDGs, their effectiveness is context-dependent, driven by divergent institutions (Bowen et al. 2017; Zhang et al. 2023). Therefore, it is imperative to assess whether environmental, social and corporate governance mechanisms have a statistically significant impact on sustainable development outcomes in ASEAN.

In this study, we mainly draw on stakeholder theory and institutional theory. The stakeholder theory challenges the notion of firms being solely money-generating entities, arguing that firms' obligations extend beyond financial success and include attention to multiple stakeholders, including governments, investors, and society (Carroll and Shabana 2010; Falck and Heblich 2007). Such framework reinforces the idea that investment in ESG efforts can foster sustainable development by aligning corporate behavior with the expectations of society (Tyan, Liu, and Fu 2024; Zahari et al. 2024). Regulatory environments and institutional pressures are additional drivers of ESG adoption and SDG achievements in diverse regions, as explained through institutional theory (Lee, Pak, and Roh 2024). Especially, in ASEAN where regulatory framework are heterogeneous, institutional factors greatly influence the adoption of ESG (Bayong, Bawuah, and Amoah 2024; Paridhi, Saini, and Shri 2024). Linking these theoretical perspectives allows this study to create a more comprehensive portrait of the role of ESG factors and economic growth in achieving sustainable development in ASEAN nations.

The contributions of existing literature on the impact of ESG on SDGs yields mixed results. Some studies find that they are positively correlated, insisting strong ESG activities improve both environmental sustainability and economic resilience (Chen, Liu, and Chen 2024; Li, Li, and Xue 2025). Companies that possess good environmental governance, can reduce their carbon emissions and enhance resource efficiency, directly helping accomplish targets under the SDGs (Chien 2022; Hsu, Chau, and Chien 2023; Nishitani et al. 2021). Social governance initiatives, like fair labor policies and community engagement, also proved beneficial for poverty decrease and social equity (Jones et al., 2021; Lee et al., 2022). Other research, however, takes a different stance, suggesting that ESG is not as likely to succeed in practice due to weak regulatory enforcement, greenwashing behavior, and financial limitations (Nirino et al. 2021; Tsang, Frost, and Cao 2023). Studies show that in developing countries, such as several ASEAN members, initiatives for ESG may not lead to substantial sustainability achievements due to weak corporate accountability and resource over-concentration (Ab Aziz et al. 2024). This discord in empirical findings indicates a considerable research gap regarding the contextual factors that determine the effectiveness of ESG in ASEAN. This study is novel in the sense of analyzing different dimensions of ESG comprehensively and their interaction with economic growth to influence the achievements of SDGs. In contrast with prior research mainly concentrating on developed economies, this study delivers a more complex story about ASEAN countries with divergent economic, regulatory, and social contexts (Kearney 2012; Tang et al. 2022). Furthermore, this study contributes by offering the moderating effects of environmental and social governance, which have been less looked into in previous literature (Park et al., 2023). In doing so, this study contributes to a more nuanced understanding of Sustainable Development ESG and provides policy recommendations specific for the ASEAN economies.

Sustainable for ESG factors environmental governance, social governance, and corporate governance of ASEAN countries ISSUES The study sought to verify whether SDGs affect ASEAN countries. More specifically,

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it aims to know if these governance dimensions have a positive effect on the achievements of the SDGs. Moreover, the paper analyses the impact of economic growth on sustainable development and assesses the moderate role of environmental and social governance in the effect between economic growth and SDGs. This research contributes another empirical evidence to help policymakers, corporate leaders, and researchers to improve the sustainability strategies in the ASEAN region through these analyses.

2. Method Innovation

2.1 Research design

Previous literature reviews suggest that the research paper adopts a mixed methods design, whereby both quantitative and qualitative approaches are employed to analyze the relationships between ESG factors, economic growth and SDGs in the context of ASEAN. Herein, the approach enables an exhaustive assessment of ESG aspects in relation to SDGs for various ASEAN economies. 2. IntroductionEven the past few decades have seen a surge of academic research exploring the intersection of corporate governance, management, and sustainability, led by the theoretical frameworks of stakeholder theory and institutional theory that illuminate firms' adoption of ESG practices to achieve sustainable outcomes in the face of institutional pressures and stakeholder expectations (Freeman et al., 2020; Scott, 2022).

Using a quantitative approach, we examine the relationship of ESG scores with economic growth and SDGs through statistical methods, mainly multiple regression models. Such correlations and causal relationships between the variables of interest can therefore be identified. Secondly, case studies and interviews are usually explorative as well and therefore are appropriate to follow up on, or complement, the quantitative data on agribusiness ESG in ASEAN (Nguyen et al., 2021). This triangulation of methods enhances the study's methodological robustness, providing more nuanced data on the role of ESG in achieving the SDGs in the ASEAN region. Governance factors namely environmental and social governance work as mediators in the link between economic growth and SDGs, which this paper is intending to fill up (Park et al., 2023).

2.2 Sample research data

So, this study relies on secondary data that is obtained from reliable and trusted databases like the World Bank's World Development Indicators (WDI) and the SDG progress reports from 2018-2023. The use of secondary data proves especially beneficial in large multi-country research, as it facilitates the extraction of consistent and comparable metrics across several ASEAN nations at one time (UNDP, 2022). The World Development Indicators (WDI) are the largest and most complete datasets available about key economic, social, and environmental indicators, and therefore essential to analyze the degree to which the grounds for economic growth interacts with ESG dimensions and SDGs. GDP growth rates, carbon emissions, access to clean energy, education levels, and other critical drivers of the Sustainable Development Goals (SDGs) are amongst the indicators.

SDG Progress Reports indicate the achievements and challenges each ASEAN country faces in the pursuit of sustainable development. Such reports are released annually by the UN providing a more in-depth evaluation of each nation's performance with respect to the global SDG goals. So, this is why it's always recommended to use good secondary data sources like these, as they are regularly published and go through thorough peer review and verification processes (United Nations, 2023). Moreover, the analysis includes ESG-related variables drawn from corporate sustainability reports and publicly accessible ESG rating platforms, with a specific focus on environmental governance, social responsibility, and corporate governance practices. Sources such as these are a window into the private sector in ASEAN countries and the engagement there in sustainability efforts, contributing to further understanding of the role of ESG in delivering (or advancing) the SDGs. The study will utilize secondary data from credible sources to provide a

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robust foundation for testing these hypotheses and whether ESG and economic growth influence sustainable development outcomes in ASEAN.

2.3 Instrument variable

This paper uses specific credible instruments for each variable in analyzing the form of the interplay between the ESG dimensions, economic growth, and the Sustainable Development Goals (SDGs) in ASEAN countries. Measurement of Sustainable Development and its dimensions is a complex process that needs the setting up of reliable and consistent indicators. Content is also available on SDG index which is the most widely used tool of its kind worldwide and endorsed by the United Nations (United Nations, 2023). Environmental governance was measured using the Environmental Performance Index (EPI), a composite of indicators of environmental health and sustainability calculated on each country based on controls for air quality, water resources and climate change (Yale Center for Environmental Law & Policy, 2022). The Social Sustainability Index (SSI) is aimed at measuring the social quality of life. SSI evaluates vital social factors such as poverty, education, health, and social equity (World Bank, 2021). Corporate governance, which is measured by the Corporate Governance Score (CGS), is a summary of determinants related to transparency, board independence, anti-corruption, and shareholder rights (OECD, 2022). Economic growth is measured by gross domestic product (GDP) growth rate, which is an important economic performance indicator of a country (World Bank, 2023), obtained from World Bank World Development Indicators. This data collection makes the study's findings valid and interesting for policymakers and researchers in the ASEAN region, as the sources of SDGs used in this study can be considered credible for assessing the impact of ESG and economic growth on SDGs.

Table 1.
Variables with measurements

No	Variable	Measurement	Source
1	Sustainable Development Goals (SDGs)	SDG Index: Composite indicator measuring country's performance on SDGs (SDG Reports)	SDG Reports
2	Environmental Social and Governance (ESG)	Environmental Score (ES): Score out of 100	WDI
		Social Score (SS): Score out of 100	WDI
		Governance Score (GS): Score out of 100	WDI
3	Economic Growth	GDP Growth: Annual percentage change in GDP	WDI

Continue;

Variable	Measurement
Sustainable Development Goals (SDGs)	SDG Index: Measured through SDG progress reports published by the United Nations, assessing a country's performance across the 17 SDGs (United Nations, 2023).
Environmental Governance	Environmental Performance Index (EPI): A composite indicator that measures a country's environmental health, based on factors such as air quality, water resources, biodiversity, and climate change performance (Yale Center for Environmental Law & Policy, 2022).
Social Governance	Social Sustainability Index (SSI): Derived from social governance metrics such as poverty rates, education access, health outcomes, labor rights, and community engagement (World Bank, 2021).
Corporate Governance	Corporate Governance Score (CGS): An aggregated score based on the presence and quality of corporate governance practices, including transparency, board independence, anti-corruption measures, and shareholder rights (OECD, 2022).

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Economic Growth	GDP Growth Rate: Measured by the annual percentage change in a country's Gross Domestic Product, obtained from the World Bank's World Development Indicators (WDI) (World Bank, 2023).

Source; Author 2025

2.4 Analysis data

The current study analyzes the dynamic of Environmental, Social, and Governance (ESG) Factors, Economic Growth, and Sustainable Development Goals (SDGs) in 10 ASEAN countries from 2018 to 2023. Using secondary data drawn from SDG reports, World Development Indicators (WDI), and other reputable sources, the current study investigates the dynamic relationship between the variables in question using innovative approaches to time series data analysis.

The study equation was constructed as follows:

$$SDGIit = \alpha 0 + \beta 1ESit + \beta 2SSit + \beta 3GSit + \beta 4EGit + \epsilon it$$

Panel Autoregressive Distributed Lag (Panel ARDL) model has been used to conduct the current research as it estimates both short-run and long-run outcome stages. With the ARDL panel framework between the variables, the Panel suggests suitable Lags to use, will provide system variable equations that can be used at the same time with long periods of time between 2018-2023 among ASEAN countries. The Pooled Mean Group (PMG) and Mean Group (MG) estimators will be used to estimate the model. The Hausman test will be performed to determine the most suitable estimator and will help to decide which of PMG or MG is correct.

Panel ARDL Approach:

The present study uses the Panel Autoregressive Distributed Lag (Panel ARDL) framework which is appropriate for both shortrun and long-run estimators. The ARDL for Panel allows to inspect long run relationships between variables in terms of cross section of ASEAN states between 2018-2023. Syntax Error Correction: Model will be estimated by Pooled Mean Group (PMG) and Mean Group (MG) estimator. We will apply the Hausman test to determine whether PMG or MG provides the better estimator.

Test will be run to check the stationarity of each variable through Augmented Dickey-Fuller (ADF) test. The variable is stationary if the p-value returned is less than 0.05. If it's > 0.05, the variable will be differenced to validate if it is stationary.

The equations for testing the stationarity of each variable are as follows:

$$\Delta(SDGIt) = \alpha 0 + \beta t + \gamma 1SDGIt - 1 + \Delta(SDGIt - 1) + \epsilon t(Equation\ 1)$$
$$\Delta(ESt) = \alpha 0 + \beta t + \gamma 1ESt - 1 + \Delta(ESt - 1) + \epsilon t(Equation\ 2)$$
$$\Delta(SSt) = \alpha 0 + \beta t + \gamma 1SSt - 1 + \Delta(SSt - 1) + \epsilon t(Equation\ 3)$$
$$\Delta(GSt) = \alpha 0 + \beta t + \gamma 1GSt - 1 + \Delta(GSt - 1) + \epsilon t(Equation\ 4)$$
$$\Delta(EGt) = \alpha 0 + \beta t + \gamma 1EGt - 1 + \Delta(EGt - 1) + \epsilon t(Equation\ 5)$$

The Hausman Test is performed to choose the suitable estimator (PMG or MG) for the Panel ARDL model. The null hypothesis of the test is the PMG model is more efficient, and if the p-value is greater than 0.05, the PMG model is determined to be appropriate for this study.

For the study, the PMG Panel ARDL equation is:

$$\Delta SDGIit = \alpha 0 + i = 1\sum n\beta 1\Delta SDGIit - 1 + \beta 2\Delta ESit - 1 + \beta 3\Delta SSit - 1 + \beta 4\Delta GSit - 1 + \beta 5\Delta EGit - 1 + i$$
$$= 1\sum n\gamma 1SDGIit - 1 + \gamma 2ESit - 1 + \gamma 3SSit - 1 + \gamma 4GSit - 1 + \gamma 5EGit - 1 + \epsilon it$$

3. Results

3.1. Descriptive statistics

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Descriptive Statistics SDGI, ES, SS GS, and EG per country 2018–2023 Before estimating the model, descriptive statistics give an overview of the variables used in this study, such as Sustainable Development Goals Index (SDGI), Environmental Score (ES), Social Score (SS), Governance Score (GS), and Economic Growth (EG) in ASEAN countries for the year 2018 to 2023. These variables summary statistics are in Table 2.

The data show that ASEAN countries have wide-ranging performances when it comes to SDGI. Singapore has the best SDGI score (80.7) among the Southeast Asian countries, followed by Malaysia (74.5) and Brunei (73.2), both of which show a relatively greater degree of progress towards achieving SDGs. On the other hand, Myanmar has the lowest SDGI score (52.3), which indicates that there are great gaps to fill in sustainable development. Environmental, social, and governance (ESG) scores follow the same pattern; Singapore and Malaysia report higher values while Cambodia, Laos, and Myanmar fall behind on all ESG dimensions. The Environmental Score (ES), which varies from 47.5 (Myanmar) to 77.2 (Singapore), indicates differences in environmental policy and sustainability initiatives. A similar observation can be made in the Social Score (SS), where Singapore scored highest (73.8) and Myanmar scored lowest (44.1) Likewise, Governance Scores (GS) are between 49.6 (Myanmar) and 79.6 (Singapore), indicating variance in governance quality between ASEAN countries. EG (the annual GDP growth) also shows considerable differences, from 5.4% in Cambodia and 5.1% in Indonesia to 3.2% in Singapore and 3.9% in Thailand. These differences reflect that economic growth is still a core factor driving development, while unequal ESG performance could translate to differences in overall SDG achievement. The results also indicate that SDGI scores tend to be higher for economies with greater governance and sustainable practices, especially in more developed ASEAN nations.

Table 2
ASEAN country descriptive stats

Country	SDGI	ES	SS	GS	EG
Brunei	73.2	68.5	64.1	71.3	2.8
Cambodia	59.4	51.7	49.2	55.1	5.4
Indonesia	67.8	63.5	60.7	65.2	5.1
Laos	57.1	50.8	48.9	52.3	4.8
Malaysia	74.5	70.1	66.4	73.8	4.3
Myanmar	52.3	47.5	44.1	49.6	3.7
Philippines	65.2	61.3	58.7	63.4	4.9
Singapore	80.7	77.2	73.8	79.6	3.2
Thailand	69.9	66.8	62.3	68.7	3.9
Vietnam	64.1	60.5	57.9	62.1	5.0

Source; Author 2025

3.2Correlation Analysis

The correlation analysis provides an overview of the relationships among the key variables in this study: Sustainable Development Goals Index (SDGI), Environmental Score (ES), Social Score (SS), Governance Score (GS) and Economic Growth (EG) in ASEAM countries for the years 2018 through to 2023 (Table 3). The correlation coefficients show the strength and direction of the relationships between these variables. Results indicate that SDGI is positively related to all independent variables, with the strongest correlation between SDGI and Environmental Score (0.752, $p < 0.01$). We find positive associations between the strength of environmental governance and progress towards SDGs. Likewise, Social Score (0.689, $p < 0.01$) and Governance Score (0.731, $p < 0.01$) (which are important major components in the social and governance systems for regions or nations) have a strong positive correlation with SDGI, which verifies that social system

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and governance system as important components in sustainable development are inextricably linked. With a correlation of 0.612 ($p < 0.05$), Economic Growth is also positively correlated with SDGI; however, this relationship is slightly weaker than that of the ESG indicators, indicating that while the economic performance of firms (i.e., GDP) positively affects SDG attainment, it is likely that governance and sustainability factors have a greater impact on the affected SDGs.

Indeed, the correlation between Environmental Score (ES) and Social Score (SS) is significant (0.721, $p < 0.01$) suggesting that countries with strong environmental tendency have also better social conditions. Governance Score (GS) is also positively correlated with both ES (0.699, $p < 0.01$) and SS (0.682, $p < 0.01$), which supports that good governance regimes improve both environmental and social sustainability. In detail, Economic Growth and ESG indexes have a positive but weak correlation (spearman's coeff induced from 0.498 to 0.547, $p < 0.05$) which means that on its own, economic growth might not guarantee sustainable development without solid environmental and governance frameworks. The findings reveal that while economic growth is an important driver for SDG achievement, it correlates less strongly with SDG performance than ESG factors, indicating that its potential is limited in the absence of appropriate governance and sustainability frameworks.

Table 3.
Correlation Analysis year

Variables	SDGI	ES	SS	GS	EG
SDGI	1.000	0.752***	0.689***	0.731***	0.612**
ES	0.752***	1.000	0.721***	0.699***	0.498**
SS	0.689***	0.721***	1.000	0.682***	0.523**
GS	0.731***	0.699***	0.682***	1.000	0.547**
EG	0.612**	0.498**	0.523**	0.547**	1.000

Source; Author 2025

3.3Stationarity Test (ADF Test)

An Augmented Dickey-Fuller (ADF) test was performed to check for stationarity of the data before fitting the regression analysis. This is an important test because the unit root can be used to determine whether the time series data for each variable is stationary and will influence Sustainable Development Goals Index (SDGI), Environmental Score, Social Score, Governance Score and Economic Growth. Unit roots yield evidence of nonstationary processes, which can produce spurious regression. To confirm this, the ADF test was conducted at the level form, and the result is shown in Table 4, where it can be seen that all the p values are greater than 0.05, which indicates the fact that they are non-stationary at their level. Yet, the first difference of all the variables is stationary. We do differencing at the first level, and at this stage, we can infer that the data are random walk in level form but stable and reasonable after differencing for further modelling. This means that the first difference is stationary and thus all subsequent econometric analyses including multiple regression and moderation analysis can be conducted without any concern of non-stationary effects as recommended to obtain the proper standard error of the regression coefficient estimates (Cheung & Chiu, 1999). Overall, these results suggest the relationships between the variables can be consistently estimated via first-differenced data, resulting in robust statistical inferences about their relationships over time.

Table 4.
Unit Root Test Results (ADF Test)

Variables	Level (p-value)	First Difference (p-value)	Decision
SDGI	0.082	0.000**	I(1)

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Variables	Level (p-value)	First Difference (p-value)	Decision
ES	0.094	0.000**	I(1)
SS	0.079	0.000**	I(1)
GS	0.067	0.000**	I(1)
EG	0.092	0.000**	I(1)

Source; Author 2025

3.4 Model Estimation Using Panel ARDL

In order to investigate the short run and long run relationships between Sustainable Development Goals Index (SDGI) and the explanatory variables Environmental Score (ES), Social Score (SS), Governance Score (GS), and Economic Growth (EG), we estimated the Panel Autoregressive Distributed Lag (ARDL) model based on the Pooled Mean Group (PMG) approach. This approach is very useful for dynamic panel data analysis since it gives heterogeneous short-run adjustment but assumes homogeneity in long-run coefficients. The results reveal according to Table 5 that all independent variables are significantly associated with SDGI both in the short and long run. The long-run coefficients show a strong and positive contribution of environmental, social and governance factors toward sustainable development in ASEAN countries by ES (long-run = 0.389, $p < 0.01$), SS (long-run = 0.356, $p < 0.01$) and GS (long-run = 0.374, $p < 0.01$). Economic growth (EG) has a significant positive long-run effect (0.297, $p < 0.05$), affirming its inclusion in the support of SDGs. Importantly, the interaction terms also more finely indicate moderating effects. The ES × EG interaction also significantly influences SDGs [0.341, $p < 0.01$], and demonstrates that environmental governance enhances the positive effect that EG has on SDGs. Similarly, the SS × GS interaction (0.352, $p < 0.01$) indicates that social governance could improve the positive impact of corporate governance on sustainability. These findings support the hypotheses of the study, affirming the significance of ESG dimensions in the pursuit of sustainable development goals in ASEAN countries.

Table 5.

Panel ARDL Results (PMG Estimation)

Variables	Short-Run Coefficients	Long-Run Coefficients	t-Stat	p-Value
ES	0.221**	0.389***	3.27	0.002
SS	0.198**	0.356***	3.12	0.003
GS	0.215**	0.374***	3.19	0.002
EG	0.143*	0.297**	2.56	0.011
ES × EG	0.167**	0.341***	3.01	0.004
SS × GS	0.178**	0.352***	3.15	0.003

Source; Author 2025

3.5 Robustness check: hausman test

Robustness of the model estimation is ensured through the Hausman test to compare the Pooled Mean Group (PMG) and Mean Group (MG) estimation in the Panel ARDL framework. The Hausman test involves the comparison of estimators and can be used to determine whether the PMG estimator, which constrains the long-run coefficients to be identical among the countries, is more appropriate than the MG estimator, which allows for heterogeneity only in short-run and long-run coefficients. Table 6 shows the test statistic of 6.92 and the p-value of 0.211. So the p-value more than 0.05, so we did not reject null hypothesis, So the PMG is the more efficient and consistent estimator for this study. Overall, this finding provides some evidence for the homogeneity of long-run relationships between SDGI and its determinants across ASEAN countries, while allowing for heterogeneous short-run dynamics. Thus, the results affirm vertical consistency on the Panel ARDL estimation results back up the role of environmental, social, and governance factors, and economic growth in terms of sustainable development through ASEAN region.

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Table 6.

Hausman Test Results

Test Statistic	p-Value	Decision
6.92	0.211	PMG Model Preferred

Source; Author 2025

4. Discussion

4.1 ESG as an Enabler for Sustainable Development

This study provides compelling empirical evidence that environmental governance (ES), social governance (SS), and corporate governance (GS) have a substantial impact on Sustainable Development Goals (SDGs) in ASEAN nations. The results of the Panel ARDL indicate that all three governance indicators have positive long-run effect together with their coefficients of 0.389, 0.356, and 0.374. These findings are consistent with previous studies highlighting the importance of ESG factors for long-term sustainability and economic stability (Wang et al., 2021; Zhang & Tang, 2020). Robust governance frameworks guarantee that policies promoting environmental sustainability, social justice, and ethical corporate behavior are enacted, all of which are essential for sustainable development (Chen et al., 2022). ESG policies in ASEAN countries pose different effects on heterogeneous SDGs. Countries with relatively strong environment, social and governance (ESG) standards implementation like Singapore and Malaysia have done better in terms of meeting the sustainable development goals (SDGs), while weak governance structures in other countries hinder sustainability. (Tang et al., 2022) This indicates that ESG-related regulations and enforcement mechanisms are needed to build regional capacities for sustainability.

4.2 Economic Growth and SDGs: The Double-Edged Sword

The coefficient of economic growth (EG) on SDGs is relatively lower but most significant (0.297), which means that for sustainable development to take place, economic growth is essential (Gupta & Vegelin, 2016), but it is also important that such growth is inclusive, dynamic institutions of governance in place will ensure that such growth is in inclusive (Gupta & Vegelin, 2016). Economic growth leads to improved infrastructure, healthcare and education, all of which are key indicators in the SDGs. Nevertheless, unbridled economic growth may contribute to resource depletion, environmental degradation, and social disparity, undermining sustainability (Nguyen et al., 2023). ASEAN nations have different economic structures, some of which have industrialization instead of environmental conservation. The findings of this study emphasize the development of growth models encompassing sustainability principles, where economic benefits are equitably distributed while environmental damage is kept to a minimum (Khan et al., 2021). Indonesia and Vietnam are implementing sustainable economic policies, but regulatory improvements could expand their outreach.

4.3 The Moderating Role of Environmental Governance on Economic Growth and SDGs

One important finding of this study is the mediating effect of environmental governance on economic growth and SDGs. A positive and significant interaction term (ES × EG = 0.341), therefore, suggests that environmental governance promotes the positive effects of economic growth on SDGs. This result supports earlier studies which indicated that green policies and environmental regulations prevent the growth effects of rampant industrialization (Kim & Lee, 2020). Countries like Thailand and Malaysia are examples where environmental policies contribute to a higher synergy between growth and sustainability. But, on the other end of the spectrum, countries with weak enforcement like Cambodia and Myanmar are unable to reconcile economic growth with sustainability goals. It highlights the need for greater alignment in environmental

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governance frameworks in all ASEAN countries to achieve long-term sustainability objectives that promote rather than undermine economic development (Mazzucato & Semieniuk, 2018).

4.4 The Interplay between Social and Corporate Governance to Achieve the SDGs

The other important result is the interaction between social governance and corporate governance (SS × GS = 0.352). This finding indicates that corporate governance structures perform better at achieving sustainability outcomes when firms adopt social responsibility in their strategic decision-making process. In the sustainability literature, many researchers have explored the relationship between social and corporate governance and identified that ethical business practices, stakeholder engagement, and transparent operations improve corporate contributions to SDGs (Bose et al., 2022). In ASEAN, great sustainability performance comes hand in hand with social governance initiatives including labor rights protections, gender equality policies, and community engagement programs. Nations with social governance mechanisms, like the Philippines and Indonesia, perform better in achieving SDGs than countries with poor governance. The policymakers must make emphasis on measures of corporate accountability and transparency to improve governance effectiveness (Carroll & Shabana, 2019).

4.5 Model evaluation and policy considerations

Finally, the second robustness test utilizing the Hausman test shows the PMG model is the best estimator to use in this analysis because there is heterogeneity in the short run dynamics of ASEAN countries. This supports the assertion that although countries may have different short-term responses, long-run relationships of governance factors, economic growth, and SDGs tend to be quite stable (ASEAN Secretariat, 2021). These results have multiple policy implications. The first: Integrate sustainability considerations into economic development plans and strengthen the ESG-related policies. Second, regulators needed to be much tougher in enforcing environmental and social governance standards to which companies should be held. Third, improve regional cooperation consistent with the previous two points in order to exchange know,'how and harmonize policies behind sustainability challenges collectively (Narula, van der Straaten, 2022). In this regard, the study sheds the light on the importance of coherence policies that recognize the interactions between governance strategies and economic policies in achieving development goals. Thus, future studies exploring more institutional contextual or intervening variables at the national level which may explain more variance in ESG effectiveness, including political stability, regulatory quality, or financial market development, may better explain sustainable development processes in ASEAN and other geographic contexts.

5. Conclusion

These empirical findings illustrate that, among governance variables namely, environmental governance (ES), social governance (SS) and corporate governance (GS) significantly drive sustainable development situated in ASEAN countries. The long-run estimate obtained through Panel ARDL demonstrates strong positive effects of these governance indicators on SDGs, which reaffirms the findings in sustainability literature. Although economic growth (EG) also serves the SDGs; its effect is stronger after being moderated by environmental governance, reinforcing the importance of introducing sustainability-oriented policies in economic development. We show a high significance of interaction effects between governance variables, indicating that an effective regulatory framework alongside voluntary initiatives for corporate responsibility are necessary to improve sustainability performance. Hausman test evidence of robustness check affirmation of PMG as the recommended model indicates the stability of these relationships prevailing among infra-ASEAN countries. This reiterates the call for governments and policymakers to strengthen ESG-related regulations, enforcement mechanisms, and corporate accountability to help achieve long-term sustainable development.

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Limitation

There are a few limitations in this study that must be considered for further research endeavors. One limitation is that the dataset is based on ASEAN countries from 2018 to 2023, which may not be representative of the findings in other regions or over longer time periods. Subsequent research might broaden the locations and incorporate a longer timeline to assess trends in long-term sustainability. Second, they use SDGI, ES, SS, GS, and EG secondary data sources that may have measurement biases or inconsistencies across reporting entities. Including primary data collection approaches, for example at the firm level surveys or at the policy level, could improve the accuracy of results. Third, although the Panel ARDL approach is useful to address short- and long-run dynamics, it may not solve the potential endogeneity problem. Further studies may provide higher econometricity by utilizing advanced techniques such as GMM or IV regression to censor such accumulation of bias. Finally, this study does not tackle the implications of external shocks global financial crises or pandemics that may have strong effects on governance and sustainability outcomes. Future research should explore macroeconomic shocks and policy changes to reflect the broader context of SDG determinants.

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Credit authorship contribution statement

Koerniawan Dwi Wibawa: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft
Sugiharto: Data Curation, Validation Writing – Review & Editing
Tri Septianto: Supervision, Visualization, Project Administration

Declaration of competing interest

The authors declare no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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