Impact of Country-level Environmental, Social and Governance Pillars on Sustainable Development Goals: Evidence from G20 Countries

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Abstract

Due to current economic ambiguities, achieving Sustainable Development Goals (SDGs) has become increasingly significant. This study investigates how environmental, social, and governance (ESG) indicators impact SDG achievements in G20 countries. The study uses renewable energy consumption as the environmental pillar, primary education as the social pillar, and governance effectiveness as the governance pillar. Control variables include gross domestic product and foreign direct investments. The random effect estimation was applied to 16 G20 countries spanning from 2000 to 2020, and the findings revealed a significant negative impact of renewable energy consumption on SDG scores. Similarly, a significant negative impact of primary education on SDG scores and a significant positive impact of governance effectiveness on SDG scores. We also employed Panel-Corrected Standard Errors (PCSE) and Cross-Sectional Time-Series Feasible Generalized Least Squares Regression to check the robustness of the results. The study offers valuable insights for policymakers and regulators focused on SDG achievement.

Keywords*: ESG, Renewable energy consumption, Primary education. Governance effectiveness, SDG*

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1. Introduction

Over the past century, global surface temperatures have been rising continuously, leading to rising sea levels, significant snow and ice cover reductions, species extinctions, and other severe environmental issues. The main reason for global warming is the use of non-renewable energy, burning fossil fuels, and the emission of harmful gases, especially carbon dioxide (CO2) (Paramati et al., 2017). Historically, conventional energy sources have been the foundation of energy consumption in manufacturing. The Sustainable Development Goals (SDGs) established by the United Nations focused on reducing the ill effects of conventional energy sources and are based on three dimensions: environmental, social, and economic, and must be achieved by all countries via concerted effort by 2030 (Hieu & Hai, 2023). The United Nations General Assembly's agenda for Sustainable Development included 17 goals and 169 targets, focusing on the five Ps: planet, people, prosperity, peace, and partnership (Herrero et al., 2021; Sadiq et al., 2023). The SDGs were created to solve several global issues, such as poverty, inequality, climate change, environmental degradation, peace, and justice (Neupane et al., 2018). Since the past few decades, researchers' focus has been on sustainability, as sustainability is essential for each discipline as sustainability ensures the preservation of natural resources, climate change mitigation, environmental protection, social equity, economic stability, health and wellbeing, resilience against crises, and global responsibility (Bali Swain & Yang-Wallentin, 2020).

The SDGs have constantly been a central point in G20 communique, with sustainable development being one of the areas where the G20 has adopted numerous agreements (Görlich

et al., 2020). Each year, the G20 presidency rotates among member nations. In 2022–2023, India held the presidency, aiming to adopt a peaceful and sustainable world (Gautam, 2022). During its presidency, India prioritized establishing a greener economy, promoting inclusive growth, advancing technology, and empowering women, all in alignment with the SDGs. The motto of India's G20 presidency, "One Earth, One Family, One Future," underlines the interconnectedness of all life forms, humans, animals, and plants, and the necessity of protecting them to ensure a sustainable future (*Overview of G20*, 2023). In our research, we have selected G20 countries as our sample due to their substantial influence. The G20 covers highly developed nations, representing 85% of the world's GDP, 75% of global trade, and nearly 67% of the global population. These nations should enthusiastically lead the way in progressing the implementation of the SDGs both domestically and internationally (Görlich et al., 2020; McBride et al., 2019; Modi, 2022). The G20 countries and the SDGs have the same overarching goals since they both strive for sustainable, prosperous, and inclusive growth.

As discussed above, the SDGs include environmental, social, and economic elements, supporting all ESG indicators. ESG's three pillars- environmental, social, and governance, are important for achieving SDGs. According to the World Bank, each pillar has numerous indicators; we selected three indicators from each pillar for country-level ESG as independent variables. A good ESG score helps reduce negative impacts on a country's sustainable economy (Hieu & Hai, 2023). SDGs provide an inclusive framework to address global issues such as resource depletion, biodiversity loss, climate change, hunger, inequalities, health, education, corruption, war, and gender disparity (Delgado-Ceballos et al., 2023; Wettstein et al., 2019; Ans Kolk et al., 2017). Although SDGs are macro-level objectives for nations, corporations actively cooperate in achieving them (Montiel et al., 2021; Delgado-Ceballos et al., 2023). ESG principles help investors make informed decisions and are a company's non-financial disclosure, protecting the interests of creditors, stakeholders, and shareholders (Zhao et al., 2018; Escrig-Olmedo et al., 2019). ESG measures a firm's commitment to societal welfare, environmental cleanliness, and economic growth (Sadiq et al., 2023). SDGs can be achieved through the combined efforts of all corporations and business organizations by reducing pollution, promoting social wellbeing, and increasing the performance of the business organization (Consolandi et al., 2020; Sadiq et al., 2023).

The first pillar undertaken in the study is renewable energy, as renewable sources should be used for producing and consuming energy to achieve climate change mitigation (Kumari et al., 2021; IEA, 2020). Hoa et al. (2023) found that renewable energy reduces CO2 emissions. Renewable energy consumption and production encourage the achievement of SDGs as it can relate to most of the SDGs. Therefore, we have taken renewable energy consumption as the independent variable. Renewable energy consumption is one of the indicators of the environmental pillar of ESG. The G20 countries committed to doubling the amount of renewable energy produced globally by 2030 and accelerating measures to phase out coal power in accordance with national conditions (Herald, 2023). The second pillar is education, which is defined as the goal alone in SDG 4, reflecting that major attention is given to education in world development (Vladimirova & Le Blanc, 2016). Investing in education helps increase individuals' talents and productivity and ultimately helps enhance the country's income level and overall development (Njong, 2010). Formal education enhances the intellectual skills and talents of the individual and makes people human capital, which can enhance productivity (Omojimite, 2010). Education plays a significant role in the achievement of SDGs. Moreover, education helps the economy grow, improves society, reduces CO2 emissions, and protects the environment and natural resources (Yan et al., 2022). Therefore, education can relate to most of the SDGs. Hence, we have taken education as an independent variable. It is one of the indicators of the social pillar of ESG. The third pillar is governance, defined as the government’s capacity to plan, create, and maintain laws for its citizens and various institutions

in the nation. Governance is also an essential part of any country as the whole country is regulated by governance. Therefore, it is also a significant indicator of the achievement of SDGs. There are six measures of governance, namely voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law, and the control of corruption (Abid, Ikram, Wu, & Ferasso, 2021; Kaufmann, Kraay, & Zoido-Lobatón, 1999). In our study, we have taken governance effectiveness as an independent variable as it is one of the indicators of the governance pillar of ESG.

Our study will contribute valuable insights to the existing pieces of literature. First, our study will contribute to how the country-level ESG will impact SDG scores with the unique data set from 2000-2020. This study considered renewable energy consumption as the proxy for the environmental pillar, primary education as the proxy for the social pillar, and governance effectiveness as the measure of the governance pillar. To the best of our knowledge, till today, there is no such study investigating the relationship between ESG pillars and SDG scores and considering these three pillars. Second, we selected G20 countries as sample countries. It comprises the world's 19 largest economies (Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the UK, and the US) along with the European Union and African Union; as of 2023 ("G20," 2023). Due to the lack of data, we excluded the US, Saudi Arabia, EU, African Union, and Japan from our study. Third, for empirical examination, our study utilized panel data regression using a fixed effect model for all explanatory variables. Moreover, we have utilized robust regression to test the robustness of our results. Finally, we found that our results are robust across all the models. Lastly, this study will help policymakers and the government take corrective actions to achieve SDGs, which will help enhance the SDG scores of the countries.

The remaining parts of the paper are as follows: Section 2 discusses the reviewed literature, Section 3 discusses the data and methods, Section 4 represents the data analysis and findings, and Section 5 discusses the conclusion and potential policy implications.

2. Literature review

SDGs are a set of 17 objectives given by the United Nations and accepted by 193 UN member countries. The SDGs aim to protect the environment, reduce poverty, and provide a peaceful and prosperous life to the people. SDGs are based on three aspects: environmental, social, and economic. Previous works of literature have shown that SDGs are essential for the world.

2.1. Theoretical background

There are numerous theoretical justifications for businesses to implement sustainable practices. Prior research has employed various theories, such as agency theory, legitimacy theory, and stakeholder theory, to analyze how ESG initiatives can participate in achieving the SDGs. However, this study focuses on the stakeholder perspective. According to stakeholder theory by Freeman and Dmytriyev (2020), organizations must consider the interests and concerns of various stakeholders, including customers, investors, suppliers, and creditors. Moreover, enhanced oversight and surveillance by the supervisory board can mitigate the agency costs arising from the actions of the board of directors and shareholders (Al-Ahdal et al., 2022; Al-Ahdal & Prusty, 2020). Implementing environmental strategies that address stakeholders' concerns can enhance environmental performance and garner stakeholder support (Soana, 2024). Stakeholder theory suggests that the success of a company's goods and services centers on satisfying the interests of its diverse combination of partners interconnected through a network of joint ventures (Velte, 2017). Therefore, managers are gradually prioritizing the disclosure of ESG initiatives, as this transparency raises value creation for diverse stakeholders by lessening the company's exposure to future risks (Maji & Lohia, 2023). The adoption of

mandatory ESG disclosure is increasing to improve the quality, objectivity, and transparency of ESG information while mitigating fraud. Compulsory ESG disclosure offers many advantages to stakeholders (Moharram et al., 2024). The alignment between sustainability and stakeholder theory is evident in their shared long-term viewpoint, emphasized by similarities in strategic planning. Stakeholder theory aims to create joint benefits for all stakeholders, parallel to the objectives outlined in the 2030 Agenda (Kayikci et al., 2022). Environmental, social, and corporate governance regulations are designed to enhance relationships between organizations and stakeholders, benefiting both parties and enhancing various SDGs (Sadiq et al., 2023) According to this theory, companies unveil ESG information to address stakeholders' needs and demands. Improved transparency increases stakeholder acceptance and support (Buallay & Al-Ajmi, 2020). As we know SDG framework encompasses global objectives, this study considers the interests of all the stakeholders and the entire planet. For this reason, we have operated the stakeholder theory in this study as previously incorporated by (Jha & Rangarajan, 2020; Kayikci et al., 2022; Maji & Lohia, 2023).

2.2. ESG and SDGs linkage

Sustainability is a key focus for businesses today. ESG investing links with the UN's SDGs. In previous works of literature, it is found that ESG performance impacts the achievement of SDGs. For example, Yang et al. (2022) found renewable energy, green finance, and a green economy positively affect sustainability in G7 nations. Hassani and Bahini (2022) noted that ESG practices improve the financial performance of companies during the global financial crisis, leading to economic growth. (Sadiq et al., 2023) discovered a positive link between ESG disclosures and economic growth on SDG achievement in ASEAN countries. Hieu & Hai (2023) found that ESG responsibilities and economic development positively impact SDGs in BRICS countries. Another study by Ainou et al. (2023) concluded that governments should promote renewable energy's availability, affordability, and societal acceptability to combat climate change and achieve SDGs. Plastun et al. (2020) examined the impact of ESG disclosure regulations on the SDG index ranking of the 50 largest countries and verified a positive relationship between ESG disclosure and SDG rankings. They suggested that including ESG criteria can enhance a country's economic development. As we have seen, most studies found a positive relationship between ESG performance and SDG achievement. In previous studies, ESG as a whole was taken, but in our study, we have bifurcated the ESG into its three pillars: environmental, social, and governance. Based on the (World Bank Group, 2023), this study used renewable energy as a proxy of environmental performance, education, and governance effectiveness as a proxy of social and governance performance, respectively, of G-20 nations.

2.2.1. Renewable energy and SDGs linkage

Renewable energy plays a crucial role in balancing environmental and economic concerns, aiding sustainability goals by reducing carbon emissions while sustaining economic growth (Sarwar & Alsaggaf, 2021). Alola et al. (2022) remark on persistent economic growth in G-7 and G-20 nations but warn of environmental degradation due to resource exploitation, demanding a shift to renewables. Several prior studies have been done based on the relationship between renewable energy consumption and economic growth to focus on this issue. Saidi and Omri (2020) prove the positive impact of renewable energy consumption on economic growth and its role in curbing carbon emissions, emphasizing the need to transition away from conventional energy sources. Using a panel data method, Inglesi-Lotz (2016) found that increased renewable energy consumption boosts GDP in OECD countries. Chen et al. (2022) confirmed these findings for selected Asian countries from 1992-2020, and they also found a positive role of renewable energy consumption in economic growth. Brazovskaia et al. (2021)

showed similar results in the Russian Asiatic zone. (Güney, 2019)added non-renewable and renewable energy and studied their impact on sustainable development. They highlighted renewable energy's more substantial positive impact on SDGs than non-renewable energy.

Alola et al. (2022) and Paramati et al. (2017) studied the impact of renewable energy on sustainability in G-20 nations. Alola et al. used the ecological footprint as a proxy for sustainable development, analyzing data from 2000-2016. They found positive impacts of renewable energy, legal systems, trade freedom, regulations, and sound money on ecological footprints, but not GDP. Paramati et al. found that renewable energy positively affects economic output and reduces CO_2 emissions. Furthermore, non-renewable energy increases CO_2 emissions. From the above literature survey, it is clear that renewable energy is related to economic growth, but very few studies have tested this relationship using sustainable development as a dependent variable. This literature shows a link between renewable energy and economic growth, especially for G-20 nations.

2.2.2. Education and SDGs linkage

SDG 4 aims for quality education for all, focusing on free education for girls and boys, vocational skills for employment, and gender equality (United Nations, 2023). Education enhances economic growth, poverty reduction, gender equality, and better health (Vladimirova & Le Blanc, 2016). Reza and Widodo (2013) analyzed the effects of education, capital, and labour on Indonesia's GDP from 1996 to 2009. The results found that the positive association between education per worker and GDP growth is the maximum compared to the other two variables, implying that educated workers help in the company's growth, leading to the growth of the economy. They employed meta-analysis regression on 57 studies to affirm their findings. Benos and Zotou (2014) and Singh et al. (2022) confirm education's positive impact on GDP growth. Additionally, Awan et al. (2011) found that higher education levels and experience reduce poverty in Pakistan, highlighting education's crucial role in economic development and poverty alleviation. Njong (2010) conducted a cross-sectional study in Cameroon, finding a correlation between poverty, education, and experience levels, with higher education and experience reducing poverty. Vladimirova & Le Blanc (2016) analyzed 37 world-level reports, indicating education (SDG4) correlates with other SDG goals like energy and water. Mehmood (2021) investigated the impact of renewable energy, education, FDI, and non-renewable resources on CO2 emissions in G-11 nations, concluding that education has a negative effect on emissions. Thus, from the above studies, it is evident that education helps increase environmental awareness among citizens and improves economic growth and the overall achievement of SDG goals. However, previous studies focused on individual SDG goals and not on the impact of education on the SDG score.

2.2.3. Governance effectiveness and SDGs linkage

Good governance contributes to addressing climate change and environmental degradation, allowing efficient measures to prevent global warming and greenhouse gas emissions, thus assisting in achieving SDGs (Sarwar & Alsaggaf, 2021). Aziz and Sarwar (2023) performed research in Saudi Arabia to identify the role of governance in achieving sustainable economic development. Additionally, the role of governance before and after the 2030 vision was analyzed using ARDL and the dynamic ARDL method. The result indicated a negative impact of governance effectiveness on the sustainable economic growth of Saudi Arabia. Han et al. (2014) found positive effects of good governance practices, i.e., government effectiveness, political stability, control of corruption, and regulatory quality on economic growth globally. Leal Filho et al. (2016) compared Baltic Sea nations to find the role of good governance in achieving sustainability and concluded that countries with better governance principles perform better. Good governance practices even help in improving the human development level. Lin et al. (2014) studied governance's impact on child mortality using a

semi-parametric model across 149 countries. The impact of six governance indicators was tested on child mortality of under 5 years children in 149 countries, finding a negative relationship between governance and child mortality. The above studies highlight the importance of good governance in achieving social issues like reducing child mortality, improving human development levels, reducing carbon emissions, improving economic growth, and achieving sustainable development goals. Out of the six indicators mentioned in the world development indicators for governance, most of the studies have used governance effectiveness; therefore, in this study, we also used governance effectiveness as the representative of good governance. From the previous literature, it is clear that governance has an important role, but very few studies have been done to measure the individual impact of governance effectiveness on the SDG score of G-20 nations.

Based on the theoretical discussion, we have framed the hypothesis to be tested as follows:

H_1. *There is significantly positive impact of ESG components on sustainable development goals.*

The hypothesis formation and conceptual model of the study presented in Figure 1 are based on the existing literature review.

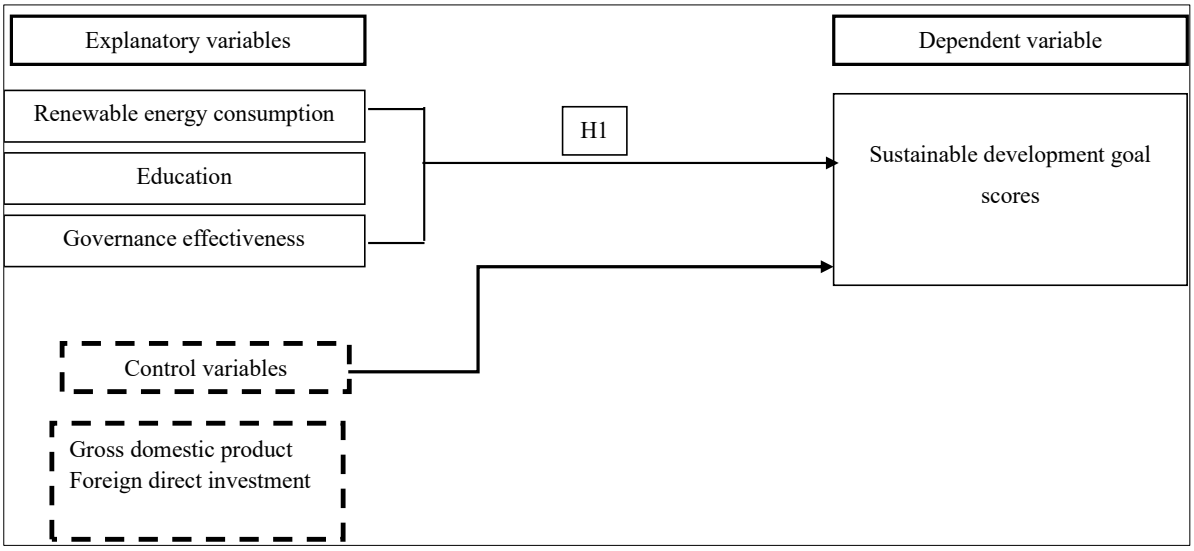

Figure 1. Conceptual model of the study

3. Data and methods

3.1. Data

This study analyses the direct effect of ESG indicators (renewable energy consumption (REC) (Saidi & Omri, 2020);(Ucler et al., 2023); (Inglesi-Lotz, 2016); (Dam et al., 2023); (Güney, 2019);(Chen et al., 2022), education (EDU) (Njong, 2010); (Omojimite, 2010);(Awan et al., 2011), and governance effectiveness (GE) (Ofori et al., 2023); (Aziz & Sarwar, 2023); (Bouchoucha et al., 2019) on the SDG index score for G20 countries[1]. The study period is selected based on data availability from 2000-2020. Data on SDG index score is taken from the Sustainable Development Report 2023 (Sachs et al., 2023) published by the United Nations. In contrast, governance effectiveness is collected from the Worldwide Governance Indicators

[1] Due to lack of data we have taken only 16 countries from G20 countries, including Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Republic of Korea, Mexico, Russia, South Africa, Turkey, and UK.

(WGI) database, and renewable energy consumption, primary education, FDI, and GDP are collected from World Development Indicators (WDI). According to the World Bank, ESG has three pillars: environmental, social, and governance. These pillars include numerous indicators, and we have selected three as independent variables, one from each. These are renewable energy consumption (environmental pillar), primary education (social pillar), and governance effectiveness (governance pillar). SDG score is taken as the dependent variable in our study with two controlling variables: GDP (Han et al., 2014); (Alsaleh et al., 2021) and FDI (Bouchoucha et al., 2019); (Han et al., 2014);(Ofori et al., 2023). We have used the natural logarithm of GDP. The summary of the variables is presented in Table 1.

Table 1. Data description

Abbreviations	Variables	Unit	Definition[2]
SDGs	Sustainable development goal score	SDG index score	The SDG Index Scores range from 0 (lowest outcome) to 100 (target achieved).
REC	Renewable energy consumption	Percentage of total final energy consumption	Renewable energy consumption refers to the percentage of energy obtained from renewable sources in the total final energy used.
GE	Governance effectiveness	Percentile rank	Government effectiveness ranges from 0 (lowest) to 100 (highest).
EDU	Primary education	Total no of enrolled Pupils	Primary education pupils represent the overall count of students enrolled in both public and private schools at the primary level
GDP	GDP per capita (constant LCU)	Local currency units	When a country's gross domestic product is expressed in its local currency, it is referred to as GDP in constant local currency units.
FDI	Foreign direct investment	Net inflows (% of GDP)	Foreign direct investments are net funds from investors seeking a significant management stake (at least 10% of voting stock) in businesses in another economy.

3.2. Methods

To examine the impact of country-level ESG indicators on SDG scores, the study utilized the econometric method on the panel data of 16 G20 countries. We performed the Hausman test, which confirmed that the random effect estimation was more suitable for each independent variable. We have run three models, one for each independent variable. The study examined the direct effect of country-level ESG on SDG scores. Thus, the models are estimated as follows:

$$\mathrm{SDGs}_{it} = \alpha + \beta_1 REC_{it} + \beta_2 EDU_{it} + \beta_3 GE_{it} + \beta_2 LGDP_{it} + \beta_3 FDI_{it} + \varepsilon_{it} \quad (1)$$

4. Data analysis and results

4.1. Descriptive statistics

The descriptive statistics of numerous key variables of the study, based on a dataset comprising 336 observations, are presented in Table 2, which reveals that the average SDG score is around 70.29 and the median is 70.96, with a generally balanced distribution. Regarding explanatory variables, REC has a mean of 15.80, with a median and standard deviation of 11.365 and 12.95, respectively. REC shows some variation across the sample countries. On the other hand, governance effectiveness has mean and median of 68.39 and 63.72, respectively, with 27.86 minimum and 97.56 maximum values. EDU is another

[2] The definitions are sourced from the World Bank database website at https://databank.worldbank.org/ and the SDG report 2023 (Sachs et al., 2023).

explanatory variable that has variations across investigated countries due to different educational systems, availability of resources, different levels of income, population, and pupils enrolled at various levels of education. In terms of GDP, the mean and median are around 11.53 and 10.79, respectively, with a standard deviation 2.30. The investigated countries' average FDI is around 2.28, with minimum and maximum values of -3.60 and 12.73, respectively.

Table 2. Descriptive statistics

Variables	Mean	Median	Std. dev.	Minimum	Maximum	Observations
SDGs	70.29	70.97	7.07	51.66	83.05	336
REC	15.80	11.37	12.96	1905951.00	139869904.00	336
GE	68.39	63.72	19.31	27.86	97.56	336
EDU	21302545.61	4973975.00	37155516.62	1905951.00	139869904.00	336
LGDP	11.53	10.79	2.30	9.27	17.52	336
FDI	2.29	2.00	1.79	-3.61	12.73	336

4.2. Correlation

The correlation matrix in Table 3 shows that SDGs have a negative association with REC (-0.43), implying that increasing renewable energy usage may be connected with a lower SDG score. This could imply that countries with lower SDG scores invest more in renewable energy. Similarly, EDU is also negatively correlated with SDG scores (-0.62), which may be due to a mismatch in enrollment numbers and quality of education. The higher number of enrolments does not necessarily have quality education. On the contrary, we found that GE (0.66) has been positively associated with SDG scores. Effective governance can lead to higher SDG scores in investigated countries. In terms of control variables, FDI (0.12) has a positive association with SDG scores, implying that larger FDI can promote higher SDG scores in investigated countries. GDP (-0.129) is negatively associated with SDG scores, implying that economic growth leads to lower SDG. Numerous studies have found that economic growth follows the environmental Kuznets curve, and GDP also contributes to CO2 emissions. We can conclude that economic growth is hard to achieve with sustainability. The correlation matrix indicates no significant multicollinearity among the independent variables, as they do not exhibit high correlations. Additionally, the variance inflation factor (VIF) values in Table 3 confirm the absence of multicollinearity among the independent variables, as all VIF values are below 2.

Table 3. Correlation matrix

Variables	***(1)***	***(2)***	***(3)***	***(4)***	***(5)***	***(6)***
(1) SDGs	1.000					
(2) GE	0.670***	1.000				
(3) LGDP	-0.129**	-0.151***	1.000			
(4)REC	-0.436***	-0.380***	-0.039	1.000		
(5) EDU	-0.621***	-0.331***	-0.040	0.479***	1.000	
(6) FDI	0.129**	0.195***	-0.233***	-0.043	-0.009	1.000
Variance inflation factor (VIF)		1.288	1.084	1.405	1.349	1.089
1/VIF		0.777	0.922	0.712	0.741	0.918

Note: *** p<0.01, ** p<0.05, * p<0.1

4.3. Results and Discussion

4.3.1. Direct effect estimation

Table 4 presents the results of a random-effects regression analyzing the impact of three ESG indicators—renewable energy consumption (environmental), primary education pupils (social), and government effectiveness (governance)—on the sustainable development of G20 countries, represented by the SDG Index Score. The regression includes 336 observations across 16 groups (countries), with each group having an average of 21 observations. Following

the Hausman and Breusch-Pagan LM tests, we confirmed that the random effects model is suitable for our analysis. The model's R-squared values indicate that the predictors explain 44.64% of the variation overall. The Wald chi-square test is highly significant ($p < 0.0000$), suggesting the model fits the data well. The environmental indicator renewable energy consumption has a negative and significant effect on the SDG Index Score, with a coefficient of -0.054 ($p < 0.000$). This implies that an increase in renewable energy consumption is associated with a decrease in the SDG Index Score, a counterintuitive result that may warrant further investigation into the specific contexts and mechanisms within G20 countries.

Our findings contradict those of Inglesi-Lotz (2016), Güney (2019), Apergis and Payne, 2010a), Apergis and Payne (2010b), Chen et al. (2022) as all of them identified a positive influence of renewable energy consumption on economic growth. Similarly, Kumari et al. (2021) reported a positive effect of REC on economic wellbeing. Remarkably, no prior research has explored the impact of REC on the overall SDG scores. This study attempted to fill this gap. The negative impact of REC on SDG score in our study is due to the use of less REC in the total energy consumption of G20 nations. Moreover, social indicator primary education pupils also show a negative and significant impact on the SDG Index Score, with a coefficient of -3.25e-08 ($p = 0.001$). Although the coefficient is minimal, it indicates that a higher number of primary education pupils is linked to a slight decrease in the SDG Index Score, suggesting potential inefficiencies or quality issues in the education systems. Our findings deviate from Pauw et al. (2015). While Habib et al. (2019) identified a positive relationship between education and women's empowerment, Yan et al. (2022) reported a negative impact of education on CO2 emissions. (Awan et al., 2011) and Njon (2010) discovered a negative association between education and poverty, whereas Reza and Widodo (2013), Babatunde and Adefabi (2005) and Benos and Zotou (2014) found that education positively influences economic growth. Prior studies have primarily examined the effects of education on individual SDGs, such as poverty, economic growth, women's empowerment, and renewable energy, rather than the overall SDG score. Our study shows that the negative impact of education on SDG scores is nearly negligible, probably due to using primary education as the sole indicator. Therefore, primary education alone may not significantly enhance SDG scores but could have a positive impact when combined with secondary and tertiary education. Furthermore, government effectiveness has a positive and highly significant impact on the SDG Index Score, with a coefficient of 0.052 ($p < 0.000$). This finding underscores the importance of effective governance in promoting sustainable development in G20 countries. The conclusions align with Abid et al. (2021), who demonstrated a positive relationship between good governance and environmental sustainability and contradicted Sarwar and Alsaggaf (2021), who identified a negative impact of governance effectiveness on CO2 emissions. Keser and Gökmen (2018) observed a positive impact of governance on human development, whereas Aziz and Sarwar (2023) reported a negative connection between governance effectiveness and economic growth. Additionally, Lin et al. (2014) found that governance negatively affects child mortality. Overall, effective governance is crucial for achieving all SDGs. Considering the inclusive impact of ESG indicators on SDG scores, Hieu and Hai (2023), Sadiq et al. (2023), and Soni (2023) identified a positive link between these variables. Plastun et al. (2020) observed that ESG disclosure fulfilment is more dominant in developed countries and that ESG disclosure guidelines significantly influence a country's standing in the SDGI. The control variable foreign direct investment (FDI) net inflow has a negative and significant effect on the SDG Index Score, with a coefficient of -0.063 ($p = 0.026$), indicating that higher FDI inflows are associated with a lower SDG Index Score.

Regarding the overall findings, the study reveals a negative impact of environmental indicators on SDG scores, a slightly negative impact of social indicators, and a highly significant positive impact of governance on SDG scores for G20 nations. In line with

stakeholder theory, our results suggest that employing environmentally and socially relevant practices, joined with robust governance, guarantees the wellbeing of diverse stakeholders and the planet as a whole. Additionally, the findings indicate that a high ESG score boosts a country's SDG score. Thus, ESG practices can help mitigate negative impacts on the planet. Overall, the analysis highlights the complex relationships between different ESG indicators and sustainable development outcomes, suggesting that while governance effectiveness strongly supports sustainable development, the roles of renewable energy consumption and primary education pupils are more nuanced and may involve additional contextual factors.

Table 4. Direct effect estimation

	Random effect		
Variables	**Coefficients**	**Standard error**	**z-statistics**
REC	-0.0544***	0.0141	-3.87
EDU	-3.25e-08***	1.01e-08	-3.21
GE	0.0524***	0.00867	6.04
LGDP	0.464	0.334	1.39
FDI	-0.0628**	0.0282	-2.23
Constant	60.49***	4.003	15.11
Year effect	Included		
R-square	0.4464		
Observations	336		
Number of countries	16		
P-value	0.000		
Hausman test ($chi^{2)}$	6.71		
Breusch Pagan LM test ($chi^{2)}$	2894.67***		

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.3.2. Robustness check

Tables 5 and 6 present the results of a robustness check using two different methods: Panel Corrected Standard Errors (PCSE) (Al-Matari et al., 2020) and Cross-Sectional Time-Series Feasible Generlized Least Squares (FGLS) Regression (Al-Matari et al., 2020). Both methods are applied to analyze the impact of various predictors on the SDG Index Score, ensuring the reliability of the results obtained from the random effects model. Renewable energy consumption (REC) has a negative and highly significant effect on the SDG Index Score in both methods, with a coefficient of -0.167 ($p < 0.000$). This finding is consistent with the random effects model, where REC also showed a negative impact. Furthermore, EDU also exhibits a negative and highly significant effect across both methods, with coefficients of -3.18e-08 (PCSE) and -3.17e-08 (FGLS). These results align with the random effects model, indicating a consistent negative relationship between the number of primary education pupils and the SDG Index Score. Moreover, GE maintains a positive and highly significant impact on the SDG Index Score in both robustness checks, with coefficients of 0.0467 ($p < 0.000$). This is consistent with the random effects model, reinforcing the importance of effective governance in promoting sustainable development. Additionally, LGDP and FDI show non-significant effects in both methods, with LGDP coefficients of -0.0729 (PCSE) and -0.0711 (FGLS) and FDI coefficients of -0.00501 (PCSE) and -0.00494 (FGLS). These results align with the random effects model, where LGDP had a non-significant impact. Although FDI was significant in the random effects model, it was not in the robustness checks. Year effects are included in both methods, and the constant term is positive and highly significant, similar to the random effects model, with values of 67.38 (PCSE) and 67.37 (FGLS).

Therefore, the robustness checks using PCSE and FGLS confirm the key findings from the random effects model. Renewable energy consumption and primary education pupils have a negative impact on the SDG Index Score, while government effectiveness positively

influences it. The consistency across these methods enhances the reliability of the conclusions drawn from the random effects model.

Table 5. Panel correct standard error (PCSE)

	Panel corrected standard error		
Variables	**Coefficients**	**Standard error**	**z-statistics**
REC	-0.167***	0.0208	-8.03
EDU	-3.18e-08***	7.80e-09	-4.07
GE	0.0467***	0.00943	4.95
LGDP	-0.0729	0.0786	-0.93
FDI	-0.00501	0.0201	-0.25
Constant	67.38***	1.059	63.63
Year effect	Included		
Observations	336		
Number of countries	16		
P-value	0.000		

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6. Cross-Sectional Time-Series FGLS Regression

	Feasible generalized least square		
Variables	**Coefficients**	**Standard error**	**z-statistics**
REC	-0.167***	0.0186	-8.99
EDU	-3.17e-08***	6.30e-09	-5.02
GE	0.0467***	0.00775	6.03
LGDP	-0.0711	0.0828	-0.86
FDI	-0.00494	0.0161	-0.31
Constant	67.37***	1.067	63.14
Year effect	Included		
Observations	336		
Number of countries	16		
P-value	0.000		

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion and Policy recommendations

This study examined the influence of important environmental, social, and governance (ESG) variables, specifically renewable energy consumption (REC), primary education pupils (EDU), and government effectiveness (GE), on the sustainable development of G20 countries with different income levels. The findings consistently demonstrated consistent patterns using a random effects model and were further validated by robustness checks conducted by PCSE and FGLS methodologies. The SDG Index Score was negatively affected by renewable energy consumption and the number of primary education learners. However, it was positively influenced by government effectiveness. These findings highlight the intricate and interconnected nature of environmental, social, and governance in influencing sustainable development outcomes in various economic settings.

The adverse effect of utilizing renewable energy on the SDG Index Score is paradoxical and indicates possible inefficiencies or transitional difficulties in using renewable energy sources in G20 nations. This discovery emphasizes the necessity for policies that not only encourage the deployment of renewable energy but also guarantee its efficient integration into current energy systems to realize its advantages for sustainable development. Likewise, the adverse impact of elementary education students on the SDG Index Score indicates concerns regarding the caliber of education or the compatibility of educational achievements with wider development objectives. Improving the quality and applicability of education systems is

essential for maximizing the potential of human resources in achieving sustainable development.

The relationship between government effectiveness and the SDG Index Score highlights the crucial significance of efficient governance in attaining sustainable development. Efficient governance guarantees the effective implementation of policies and initiatives, proper allocation of resources, and the establishment of accountability systems. This discovery implies that G20 countries should prioritize enhancing their sustainable development results by strengthening their governance structures and practices.

From a regulatory standpoint, these findings suggest that policymakers should prioritize enhancing the efficiency of renewable energy regulations by tackling integration obstacles and fostering innovation in energy technologies. Furthermore, it is crucial to implement educational reforms prioritizing the quality of education and its alignment with the present and future demands of the labor market. Enhancing the governance structures, promoting openness, and improving the public sector's efficiency can substantially contribute to sustainable development. Regulations should also encourage cooperation involving several stakeholders in governance processes, including the commercial sector, civil society, and international organizations.

Further investigation is needed to explore the precise mechanisms by which the use of renewable energy and the teaching of primary school students contribute to sustainable development. Examining the contextual elements that impact these linkages in various income-level G20 countries can offer a more detailed and nuanced understanding. In addition, examining the impact of other ESG variables, such as healthcare and economic fairness, could enhance the comprehension of sustainable development dynamics. Conducting longitudinal studies that monitor changes over time and comparing high-income and low-income G20 countries would provide significant insights for determining specific policy initiatives. Thus, this study emphasizes the significance of adopting a comprehensive approach to sustainable development, considering the complex interconnections among environmental, social, and governance issues. To make substantial progress towards reaching their SDGs, G20 countries can overcome the outlined hurdles and capitalize on the benefits of efficient governance.

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References

Al-Ahdal, W. M., Almaqtari, F. A., Zaid, D. A., Al-Homaidi, E. A., & Farhan, N. H. (2022). Corporate characteristics and leverage: evidence from Gulf countries. PSU Research Review, 6(2). https://doi.org/10.1108/PRR-01-2020-0001

Al-Ahdal, W. M., & Prusty, T. (2020). Does board structure index and ownership structure index impact on top listed Indian company's performance? International Journal of Business Governance and Ethics, 14(4). https://doi.org/10.1504/IJBGE.2020.110831

Abid, N., Ikram, M., Wu, J., & Ferasso, M. (2021). Towards environmental sustainability: Exploring the nexus among ISO 14001, governance indicators and green economy in Pakistan. Sustainable Production and Consumption, 27, 653–666. https://doi.org/10.1016/j.spc.2021.01.024

Almaqtari, F. A., Al Ahdal, W. M., Arafat, M. M. Y., & Farhan, N. (2023). Impact of country-level governance on entrepreneurial performance: a cross-country analysis. Afro-Asian J. of Finance and Accounting, 1(1). https://doi.org/10.1504/aajfa.2023.10061718

Al-Matari, E. M., Al-Ahdal, W. M., Farhan, N. H., Senan, N. A. M., & Tabash, M. I. (2020). Determinants of top executive management effect on firm performance in the financial sector: Panel data approach. Contaduria y Administracion, 65(4). https://doi.org/10.22201/fca.24488410e.2020.2414

Alsaleh, M., Abdul-Rahim, A. S., & Abdulwakil, M. M. (2021). The importance of worldwide governance indicators for transitions toward sustainable bioenergy industry. *Journal of Environmental Management*, *294*. https://doi.org/10.1016/j.jenvman.2021.112960

Apergis, N., & Payne, J. E. (2010a). Renewable energy consumption and economic growth: Evidence from a panel of OECD countries. *Energy Policy*, *38*(1), 656–660. https://doi.org/10.1016/j.enpol.2009.09.002

Apergis, N., & Payne, J. E. (2010b). Renewable energy consumption and growth in Eurasia. *Energy Economics*, *32*(6), 1392–1397. https://doi.org/10.1016/j.eneco.2010.06.001

Awan, M., Sarwar, M., Muhammad, W., Awan, M. S., Malik, N., Sarwar, H., & Waqas, M. (2011). Munich Personal RePEc Archive Impact of education on poverty reduction impact of education on poverty reduction. *Munich Personal RePEc Archive*. https://mpra.ub.uni-muenchen.de/31826/

Aziz, G., & Sarwar, S. (2023). Revisit the role of governance indicators to achieve sustainable economic growth of Saudi Arabia – pre and post implementation of 2030 Vision. *Structural Change and Economic Dynamics*, *66*, 213–227. https://doi.org/10.1016/j.strueco.2023.04.008

Babatunde, M. A., & Adefabi, R. A. (2005). Long Run Relationship between Education and Economic Growth in Nigeria: Evidence from the Johansen's Cointegration Approach. *Regional Conference on Education in West Africa: Constraints and Opportunities*.

Bali Swain, R., & Yang-Wallentin, F. (2020). Achieving sustainable development goals: predicaments and strategies. *International Journal of Sustainable Development and World Ecology*, *27*(2), 96–106. https://doi.org/10.1080/13504509.2019.1692316

Benos, N., & Zotou, S. (2014). Education and Economic Growth: A Meta-Regression Analysis. *World Development*, *64*, 669–689. https://doi.org/10.1016/j.worlddev.2014.06.034

Bouchoucha, N., Sousse, F., & Yahyaoui, I. (2019). Foreign Direct Investment and economic growth: The role of governance Foreign direct Investment and economic growth: The role of the governance. *Economics Bulletin*, *39*(4), 2711–2725. https://www.researchgate.net/publication/338720280

Buallay, A., & Al-Ajmi, J. (2020). The role of audit committee attributes in corporate sustainability reporting: Evidence from banks in the Gulf Cooperation Council. *Journal of Applied Accounting Research*, *21*(2), 249–264. https://doi.org/10.1108/JAAR-06-2018-0085

Chen, J., Su, F., Jain, V., Salman, A., Tabash, M. I., Haddad, A. M., Zabalawi, E., Abdalla, A. A., & Shabbir, M. S. (2022). Does Renewable Energy Matter to Achieve Sustainable Development Goals? The Impact of Renewable Energy Strategies on Sustainable Economic Growth. In *Frontiers in Energy Research* (Vol. 10). Frontiers Media S.A. https://doi.org/10.3389/fenrg.2022.829252

Consolandi, C., Phadke, H., Hawley, J., & Eccles, R. G. (2020). Material ESG Outcomes and SDG Externalities: Evaluating the Health Care Sector's Contribution to the SDGs. *Organization and Environment*, *33*(4), 511–533. https://doi.org/10.1177/1086026619899795

Dam, M. M., Işık, C., & Ongan, S. (2023). The impacts of renewable energy and institutional quality in environmental sustainability in the context of the sustainable development goals: A novel approach with the inverted load capacity factor. *Environmental Science and Pollution Research*, *30*(42), 95394–95409. https://doi.org/10.1007/s11356-023-29020-8

Freeman, R. E., & Dmytriyev, S. (2020). Corporate Social Responsibility and Stakeholder Theory: Learning From Each Other. *Symphonya. Emerging Issues in Management*, *1*, 7–15. https://doi.org/10.4468/2017.1.02freeman.dmytriyev

G20. (2023). In *Wikipedia*. https://en.wikipedia.org/wiki/G20#Members

Gautam, A. (2022). India and g20: strengthening and shaping global governance. *EPRA International Journal of Multidisciplinary Research (IJMR)-Peer Reviewed Journal*, *8*(10). https://doi.org/10.36713/epra2013

Görlich, D., Kharas, H., Rickels, W., & Strauss, S. (2020). *The sustainable development agenda: leveraging the g20 to enhance accountability and financing*. *Task force 7. G20 support for sdgs and development cooperation.* https://www.global-solutions-initiative.org/wp-content/uploads/2022/11/T20_TF7_PB6.pdf

Güney, T. (2019). Renewable energy, non-renewable energy and sustainable development. *International Journal of Sustainable Development and World Ecology*, *26*(5), 389–397. https://doi.org/10.1080/13504509.2019.1595214

Habib, K., Shafiq, M., Afshan, G., & Qamar, F. (2019). Impact of Education and Employment on Women Empowerment. *European Online Journal of Natural and Social Sciences*. www.european-science.comhttp://www.european-science.com

Han, X., Khan, H., & Zhuang, J. (2014). *Do governance indicators explain development performance? A cross-country analysis*. http://ssrn.com/abstract=2558894

Herald, D. (2023, September). G20 aims to triple renewable energy capacity; no mention of fossil-fuel phase-out. *Deccan Herald*. https://www.deccanherald.com/india/g20-aims-to-triple-renewable-energy-capacity-no-mention-of-fossil-fuel-phase-out-2680079

Herrero, M., Thornton, P. K., Mason-D'Croz, D., Palmer, J., Bodirsky, B. L., Pradhan, P., Barrett, C. B., Benton, T. G., Hall, A., Pikaar, I., Bogard, J. R., Bonnett, G. D., Bryan, B. A., Campbell, B. M., Christensen, S., Clark, M., Fanzo, J., Godde, C. M., Jarvis, A., … Rockström, J. (2021). Articulating the effect of food systems innovation on the Sustainable Development Goals. In *The Lancet Planetary Health* (Vol. 5, Issue 1, pp. e50–e62). Elsevier B.V. https://doi.org/10.1016/S2542-5196(20)30277-1

Hieu, V. M., & Hai, N. T. (2023). The role of environmental, social, and governance responsibilities and economic development on achieving the SDGs: evidence from BRICS countries. *Economic Research-Ekonomska Istrazivanja* , *36*(1), 1338–1360. https://doi.org/10.1080/1331677X.2022.2086598

Hoa, P. X., Xuan, V. N., & Phuong Thu, N. T. (2023). Nexus of innovation, renewable consumption, FDI, growth and CO2 emissions: The case of Vietnam. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(3). https://doi.org/10.1016/j.joitmc.2023.100100

IEA. (2020). *World Energy Outlook 2020*.

Inglesi-Lotz, R. (2016). The impact of renewable energy consumption to economic growth: A panel data application. *Energy Economics*, *53*, 58–63. https://doi.org/10.1016/j.eneco.2015.01.003

Jha, M. K., & Rangarajan, K. (2020). Analysis of corporate sustainability performance and corporate financial performance causal linkage in the Indian context. *Asian Journal of Sustainability and Social Responsibility*, *5*(1). https://doi.org/10.1186/s41180-020-00038-z

Kaufmann, D., Kraay, A., & Zoido-Lobatón, P. (1999). Policy research working paper *Aggregating Governance Indicators*. http://www.worldbank.org/wbi/governance/working_papers.htm.

Kayikci, Y., Kazancoglu, Y., Gozacan-Chase, N., & Lafci, C. (2022). Analyzing the drivers of smart sustainable circular supply chain for sustainable development goals through stakeholder theory. *Business Strategy and the Environment*, *31*(7), 3335–3353. https://doi.org/10.1002/bse.3087

Keser, A., & Gökmen, Y. (2018). Governance and Human Development: The Impacts of Governance Indicators on Human Development. *Journal of Public Administration and Governance*, *8*(1), 26. https://doi.org/10.5296/jpag.v8i1.12336

Kumari, N., Kumar, P., & Chandra Sahu, N. (2021). Do energy consumption and environmental quality enhance subjective wellbeing in G20 countries? *Environmental Science and Pollution Research*. https://doi.org/10.1007/s11356-021-14965-5/Published

Lin, R. T., Chien, L. C., Chen, Y. M., & Chan, C. C. (2014). Governance matters: An ecological association between governance and child mortality. *International Health*, *6*(3), 249–257. https://doi.org/10.1093/inthealth/ihu018

Maji, S. G., & Lohia, P. (2023). Environmental, social and governance (ESG) performance and firm performance in India. *Society and Business Review*, *18*(1), 175–194. https://doi.org/10.1108/SBR-06-2022-0162

McBride, B., Hawkes, S., & Buse, K. (2019). Soft power and global health: The sustainable development goals (SDGs) era health agendas of the G7, G20 and BRICS. *BMC Public Health*, *19*(1). https://doi.org/10.1186/s12889-019-7114-5

Modi, N. (2022). Today, India's commences its G20 Presidency. *Press Information Bureau*. https://pib.gov.in/PressReleasePage.aspx?PRID=1880141

Moharram, A. H., Hashim, H. A., Alahdal, W. M., & Adnan, S. B. M. (2024). Should esg disclosure be mandatory? An overview. Journal of Sustainability Science and Management, 19(3), 221–236. https://doi.org/10.46754/jssm.2024.03.015

Neupane, S., Boutilier, Z., Kickbusch, I., Mehdi, A., Sangiorgio, M., Told, M., & Taylor, P. (2018). SDGs, health and the G20: A vision for public policy. *Economics*, *12*(1). https://doi.org/10.5018/economics-ejournal.ja.2018-35

Njong, A. M. (2010). The effects of educational attainment on poverty reduction in Cameroon. *Journal of Education Administration and Policy Studies*, *2*(1), 1–008. https://doi.org/10.5897/IJEAPS10.058

Ofori, E. K., Onifade, S. T., Ali, E. B., Alola, A. A., & Zhang, J. (2023). Achieving carbon neutrality in post COP26 in BRICS, MINT, and G7 economies: The role of financial development and governance indicators. *Journal of Cleaner Production*, *387*. https://doi.org/10.1016/j.jclepro.2023.135853

Omojimite, B. U. (2010). Education and Economic Growth in Nigeria: A Granger Causality Analysis (Pp. 90-108). *An International Multi-Disciplinary Journal, Ethiopia*, *4*(3a), 1994–9057. www.afrrevjo.com

Overview of G20. (2023). Ministry of Earth Sciences.

Paramati, S. R., Mo, D., & Gupta, R. (2017). The effects of stock market growth and renewable energy use on CO2 emissions: Evidence from G20 countries. *Energy Economics*, *66*, 360–371. https://doi.org/10.1016/j.eneco.2017.06.025

Pauw, J. B. de, Gericke, N., Olsson, D., & Berglund, T. (2015). The effectiveness of education for sustainable development. *Sustainability (Switzerland)*, *7*(11), 15693–15717. https://doi.org/10.3390/su71115693

Plastun, A., Makarenko, I., Khomutenko, L., Osetrova, O., & Shcherbakov, P. (2020). SDGs and ESG disclosure regulation: Is there an impact? Evidence from Top-50 world economies. *Problems and Perspectives in Management*, *18*(2), 231–245. https://doi.org/10.21511/ppm.18(2).2020.20

Reza, F., & Widodo, T. (2013). The impact of education on economic growth in indonesia. In *Journal of Indonesian Economy and Business* (Vol. 28, Issue 1).

Sachs, J. D., Lafortune, G., Fuller, G., & Drumm, E. (2023). *Sustainable development report 2023 Implementing the SDG Stimulus Includes the SDG Index and Dashboards*. https://doi.org/10.25546/102924

Sadiq, M., Ngo, T. Q., Pantamee, A. A., Khudoykulov, K., Thi Ngan, T., & Tan, L. P. (2023a). The role of environmental social and governance in achieving sustainable development goals: evidence from ASEAN countries. *Economic Research-Ekonomska Istrazivanja*, *36*(1), 170–190. https://doi.org/10.1080/1331677X.2022.2072357

Sadiq, M., Ngo, T. Q., Pantamee, A. A., Khudoykulov, K., Thi Ngan, T., & Tan, L. P. (2023b). The role of environmental social and governance in achieving sustainable development goals: evidence from ASEAN countries. *Economic Research-Ekonomska Istrazivanja*, *36*(1), 170–190. https://doi.org/10.1080/1331677X.2022.2072357

Saidi, K., & Omri, A. (2020). The impact of renewable energy on carbon emissions and economic growth in 15 major renewable energy-consuming countries. *Environmental Research*, *186*. https://doi.org/10.1016/j.envres.2020.109567

Sarwar, S., & Alsaggaf, M. I. (2021). The role of governance indicators to minimize the carbon emission: a study of Saudi Arabia. *Management of Environmental Quality: An International Journal*, *32*(5), 970–988. https://doi.org/10.1108/MEQ-11-2020-0275

Soana, M. G. (2024). Environmental strategies, environmental performance and board sustainability committees: Are financial and non-financial companies different? *Research in International Business and Finance*, *69*. https://doi.org/10.1016/j.ribaf.2023.102208

Soni, T. K. (2023). Demystifying the relationship between ESG and SDG performance: Study of emerging economies. *Investment Management and Financial Innovations*, *20*(3), 1–12. https://doi.org/10.21511/imfi.20(3).2023.01

Ucler, G., Inglesi-Lotz, R., & Topalli, N. (2023). Exploring the potential of the belt and road initiative as a gateway for renewable energy in diverse economies. *Environmental Science and Pollution Research*. https://doi.org/10.1007/s11356-023-29464-y

Velte, P. (2017). Does ESG performance have an impact on financial performance? Evidence from Germany. *Journal of Global Responsibility*, *8*(2), 169–178. https://doi.org/10.1108/JGR-11-2016-0029

Vladimirova, K., & Le Blanc, D. (2016). Exploring Links Between Education and Sustainable Development Goals Through the Lens of UN Flagship Reports. *Sustainable Development*, *24*(4), 254–271. https://doi.org/10.1002/sd.1626

World Bank Group. (2023). *World Development Indicators*.

Yan, Y., Zhou, J., Zhou, S., Rao, D., Zhou, J., & Fareed, Z. (2022). Investigating the Role of Education, Foreign Investment, and Economic Development for Sustainable Environment in BRI Countries: Application of Method of Movements Quantile Regression. *Frontiers in Environmental Science*, *10*. https://doi.org/10.3389/fenvs.2022.874275