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The role of environmental, social, and governance responsibilities and economic development on achieving the SDGs: evidence from BRICS countries

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ABSTRACT

Sustainable development goal (SDG) achievement has gained increasing trend due to the current economic uncertainty that demands the attention of scholars, practitioners, and regulators. Hence, the study examines the environmental, social, and governance (ESG) responsibilities and economic development such as economic growth, net national income and FDI on the SDG achievements in BRICS countries. The secondary data is considered for the study which was collected from various resources like SDG reports published by the united nation and World Bank Indicators (WDI) from 1991 to 2020. The current research has checked them without structural breaks stationarity using Dickey-Fuller (ADF) test, Phillips–Perron (PP) test, and Kwiatkowski–Phillips–Schmidt–Shin (KPSS), while stationarity with structural breaks has been examined using the 'zivot-andrews' test. The study also employed the ARDL technique to verify the association among the constructs. The findings revealed that ESG responsibilities, economic growth, net national income, FDI, and inflation positively correlate with SDG achievements in BRICS countries. This article provides help to the regulators while making policies related the SDG achievement.

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1. Introduction

The United Nations established the Sustainable Development Goals to accomplish universal efforts to protect the environment, reduce poverty, and secure people's peace and prosperity. The United Nations established 17 goals to promote corporate social responsibility across the world, and numerous governments have attempted to implement them (Bebbington & Unerman, 2020; Degai & Petrov, 2021; Peng & Huang, 2020; Piligrimienė et al., 2021). The researchers attempted to determine the practical application and implementation of the UN SDGs in BRICS nations in this study. Although governments play an important role in putting international

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manifestos into action, non-governmental organizations and private firms also play an important role. There are 17 goals narrated s sustainable development goals provided by the United Nations. There is a number of countries that adopt these goals to attain sustainable development. These 17 goals are end of poverty, zero hunger, good health, and well-being, education quality, availability of clean water, innovation as well as infrastructure, elimination of inequality, cities and community's sustainability, consumption and production responsibility, climate actions, life below water, life on land, justice and strong institutions, partnership for goals (Bali Swain & Yang-Wallentin, 2020; Dabbous & Tarhini, 2021; Dimian et al., 2021; Ma'ruf & Aryani, 2019). The achievement of these 17 goals plays a vital goal towards the betterment of not a country but for the entire globe.

It is to be noted that BRICS countries are focusing these goals keenly. These 17 goals performance is discussed thoroughly in the following phase. As we all aware of this fact that the primary goal of United Nations is to exterminate the factor poverty from this world. The over global poverty rate is depressing. In spite of the fact that numerous groups have been working ceaselessly to eliminate poverty, the latest data highlights a bleak picture. In 2013, 767 M people were expected to be living below the international poverty threshold of $1.90 a day. Poverty is the ultimate cause of hunger. The undernourished individuals % in worldwide reduced with the rate of 15% in the period between 2000–2002, and 11% between 2014–2016. It is estimated that globally 793 M people fall in the category of undernourished which is a better figure as compare to the prior one. A significant growth can also be seen in various health ranges throughout the globe. However, still loads of efforts are needed to attain SDGs and other health objectives by 2030 especially in particular regions. However, in particular regions, there is a still need to achieve SDGs and other health objectives by 2030 (Antinienė et al., 2021; Bexell & Jönsson, 2017; Richterová et al., 2021). The findings also reveal a deplorable global health sector is distorted due to illnesses and teeming of suffering individuals. After poverty, another main objective of UN is to provide quality education. The statistics of 2014 indicates that 2/3 children were engaged in primary and pre-primary education in the year preceding the official entry age for primary school; however, only 4/10 were enrolled in the least-developed nations. Gender equality statistics vary by country.

The definition of Gender equality varies as per country. Thereby, it is hard to collect authentic and reliable data Each country has its own definition of gender equality, making it difficult to collect reliable data on the subject. Regardless of contradictory definitions, gender inequality issue still exists at global level as women and girls are refrain from their basic rights and opportunities. From the period of 2005-2016, 19% of women ranges between 15-49 suffered physical and sexual violence by their intimate partner annually. This evidence is collected from 87 countries. The findings depict a severe condition that the UN's gender equality program tries to solve globally (Gadeikiene & Svarcaite, 2021; Holliday et al., 2019; Zygmunt, 2020).

The scarce resources along with increasing population, it is always hard for governments to create good jobs for their citizens while also promoting economic progress. From 2010 to 2015, the global average annual growth rate of real GDP per capita was 1.6 percent, up from 0.9 percent in 2005–2009. This is particularly difficult

in developing and less developed countries. In 2015, the economic effect of air travel was expected to be 3.5% of global GDP. Obtaining such growth is difficult for under developing and developing countries, especially those which are landlocked. During the period of 2005-2016, an upward shift in manufacturing value-added figure was observed which was from 15.3% to 16.2% in terms of GDP. The UN has highlighted 'equality' as a key indicator of long-term development (Mahmood et al., 2021; Rinaldi, 2019; Yousaf et al., 2021). From 2008 to 2013, the lowest 40% of the population's per capita income increased faster than the national average in 49 of 83 nations with data. The causes of inequality vary from one country to the next. The increasing patterns in urban as well rural population are unsatisfactory at global level. The urban population has grown rapidly in recent decades. With its sustainable cities and community's indicator, the United Nations aspires to improve people's quality of life. The cities house are 54% of worldwide population, which is projected to increase almost billion people by the year 2030 (Al-Omoush et al., 2020; Bebbington & Unerman, 2020; Degai & Petrov, 2021; Özer et al., 2020; Zhao et al., 2021).

Manufacturing businesses are accountable for the sustainable production of commodities; however, it is also necessary that common people take the responsibility and play their part as a sustainable customer. The UN has established a number of awareness and legislation programs to promote responsible consumption and production and putting efforts as well for its execution. Domestic material consumption grew from 1.2 kg to 1.3 kg per unit of GDP from 2000 to 2010, while total domestic material consumption climbed from 48.7 billion tonnes to 71.0 billion tonnes over the same period. 'Climate Action' is a top priority for world leaders; various international organizations, including the United Nations, have identified climate as a driver of sustainable development and have listed it among their objectives (Herrera-Echeverry et al., 2020; Tan et al., 2021; Zhang et al., 2021). It is crucial because of its direct relationship to many facets of human existence. According to reports in United Nations manifestos, planetary warming increased in 2016, reaching a new record of around 1.1 degrees Celsius over the preindustrial period, indicating a worrying indicator of fast climate change. The achievement of sustainable development goals strongly influences the economy of the country in a positive context. In this context, the GDP of BRICS in 2021 and as expected in 2026 is given in Figure 1.

The present study will address some gaps that prevail in the literature like 1) sustainable development goals being one of the important topics of the current era need to be researched a lot to explore its more horizon, 2) Lassala et al. (2021), Ma'ruf and Aryani (2019) tested the nexus between finance and sustainable development goals whereas the present study added the variables like environmental, social and governance responsibilities, 3) Jelinkova et al. (2021), Karobliene and Pilinkiene (2021) tested the nexus between sharing economy and sustainable development goals whereas the present study added the variables like environmental, social and governance responsibilities, 4) McBride et al. (2019) investigated the sustainable development goals in G7 countries whereas the present study aimed to test in BRICS, 5) Yuan and Zhang (2020), Iqbal et al. (2020) and Zhou et al. (2019) tested the sustainable development goals with moderation and mediation effect with primary data whereas the present study aimed to test with secondary data, 6) the proposed model

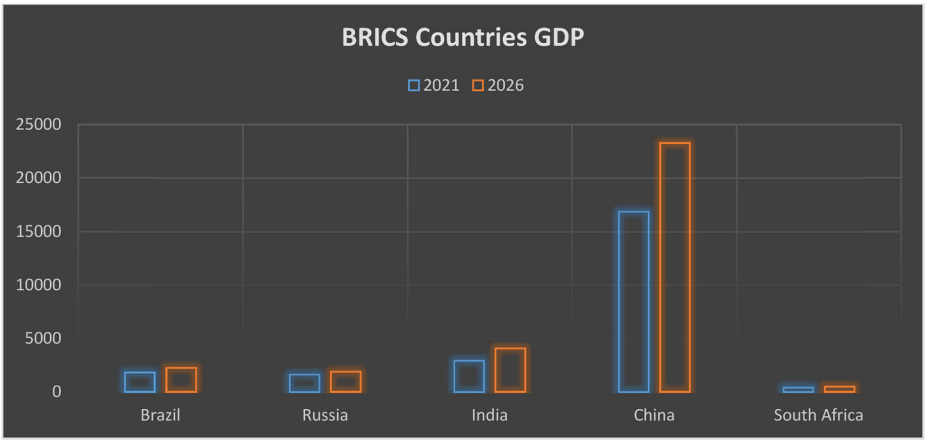

Figure 1. BRICS country's GDP in 2021 and 2026.
Sources: Authors estimation.

of environmental, social and governance responsibilities, economic development and sustainable development goals not tested before in BRICS countries.

The structure of the present study is further divided into various phases. In the first phase, the introduction of the study was presented. In the second phase, the evidence regarding environmental, social and governance responsibilities, economic development, and sustainable development goals will be discussed in the light of the past studies. The third phase will discuss the methodology regarding environmental, social and governance responsibilities, economic development and sustainable development goals related data and analyse its validity. The fourth phase will present the findings of the study based on the analysis conducted thus, approving the results. The paper will end with implications, the conclusion, and finding recommendations for the study.

2. Literature review

From the past few decades, sustainable development goals had been highlighted as an important factor for the world. The developed, as well as developing countries, are taking every initiative for their sustainable development goals. BRIC countries had maintained their focus on the issues of governance, social and environment that directly impacts the sustainable development goals. Gondek (2021) and Rinaldi (2019), investigated the prominent role of environmental, governance and social for sustainable development. The study revealed that the concerns and emphasized focus on the environmental, social and governance scores contribute to the achievement of sustainable development goals. There are risks of environmental, social and governance that could create disturbance in the achievement of sustainable development goals. Ainou et al. (2022) and Huang et al. (2021), explored the relationship between the performance of environmental governance and collaborative networks with social influence. The finding indicates that the scores of governances along with environmental and social perspectives could benefit SDG. It is important to maintain the ESG scores in any country because it poses negative implications toward the sustainable economy

and sustainable development. Peng and Zhong (2021), interpreted the role of governance, environmental activism and social transparency and its responsiveness for local sustainability. The study enumerated the dominant role of ESG scores in the achievement of SDGs. Among the risks of environmental, social and governance, board independence, workers safety and energy efficiency are prominent one. These are required to be maintained with effective efforts that could produce sound financial sustainability for the BRIC countries. It is also necessary for the effective achievement of sustainable development goals to maintain worker safety in the country. This could be possible with the help of effective policies and safety measures by providing numerous open opportunities. Bali Swain and Yang-Wallentin (2020) and Chien et al. (2021b), examined the strategies and predicaments for the achievement of sustainable development goals through various scores. Finding emphasized on the environmental, social and governance factors could insert positive role for sustainable development goals. These open opportunities not only enhance the motivation for sustainable development contribution but also in increasing energy efficiency. Chien et al. (2021a) and Tomalin et al. (2019), analyzed the relationship between sustainable development goals and the factors of religion that possess a greater influence on the culture. Results indicate that economic, political, social and cultural aspects are more important for achieving sustainable development goals. This fragrance of environment, social and governance structure and its management also insert dominant impact while achieving the sustainable development goals. While achieving the sustainable development goals, many environmental as well as the social opportunities could also be achieved. This achievement of social context, governance bodies and environmental aspects positively help in promoting the more sustainable development goals.

The economies of the world are suffering from huge factors that comprise macroeconomic factors and also impact the development of countries. The factors of macro economy are persistent over the achievement of sustainability in BRIC countries. Therefore, economic growth has been taken as an essential element among the macroeconomic factors that influence sustainable development goals. Chien et al. (2022) and Lee and Lin (2018), enumerated the relationship between twin crisis, financial markets and economic growth with the preference of sustainable development. The study revealed that economic growth along with financial policies helps in achieving sustainable development goals. Economic growth is usually responsible for the increment in the generation of economic services and goods. Burger (2017) and Huang et al. (2021b), examined the relationship between formal sector employment and economic growth and its role toward sustainability. The finding indicates that economic growth through business cycles supports sustainable development goals. Strong economic growth is important for every country because it is usually used worldwide for rating as well as for investment opportunities. Economic growth directly plays a vital role in the possible and positive achievement of sustainable development goals. Huang et al. (2021a) and Shen et al. (2018), assessed the outliers of economic growth and financial development with a prime focus on development. The study revealed that economic growth induces a positive influence on sustainable development goals. BRIC countries maintained and sustained their economic growth

according to their valid and strong production of services and goods. This helped these countries to pose positive and strong gesture in the international market to consider these countries as a better place for investments. Strengthened and strong economic growth positively helps in increasing the human capital, technology, labor force and capital goods. Hennebry et al. (2019), investigated the role of economic conditions as well as migrant workers for the realization of sustainable development goals. Findings revealed that economic growth is a positive indicator for attaining sustainable development goals. These enhancements in technology help the countries to develop skills among the workers that could help in more production. On the other hand, the labor force also inserts a positive role in the achievement of sustainable development goals. Guo et al. (2021) and Huang et al. (2021c), narrated the numerous approaches of innovation with the help of big resources to realize sustainable development goals. Finding states that the digital infrastructure and economic consideration could help in sustainable development goals. Human capital as well as capital goods is also important that are increased with the robust economic growth. The development in the factors of human capital, capital goods, technology and labor force are dominating their influence toward the attainment of sustainable development goals.

External influences were always consistent on the financial as well as economic development that could be posed as beneficial for sustainability. The attraction of foreign direct investment has induced a positive role in economic as well as financial development. The significant role of foreign direct investment has been considered vital for the attainment of sustainable development goals in BRIC countries. Bojnec and Fertő (2018) and Kamarudin et al. (2021), examined the relationship between outward globalization and foreign direct investment for sustainable development. The study indicates that foreign direct investment is a positive element for effective sustainable development. Foreign direct investment usually comes from outside the border and also gives significant rise to the businesses of many countries. Lan et al. (2022) and Rahman and Grewal (2017), enumerated the international trade and foreign direct investment and their role in the efficacy of sustainable development. The study revealed both elements contribute a major portion in achieving sustainable development goals. Mostly the old businesses working in developing countries could get a prominent stance to their expansion of operations in the region. The significant boost of foreign direct investment has been evident in manufacturing and services due to a large number of jobs creation. Ameer et al. (2017) and Li et al. (2021), emphasized the relationship between domestic investment and outward foreign direct investment for sustainable development. The substantial increment in foreign direct investment also helps the countries to take advantage of sustainable development goals. The era of foreign direct investment produces huge opportunities for the old as well as new businesses for their smooth operations. Not only this, but the increased elimination of unemployment also tends to be the factor that attained boost and helped overall countries to take sustainable development goals. Gammage and Stevanovic (2019) and Liu et al. (2022a), assessed the relationship between care deficits, migration and gender along with the element of foreign direct investment for sustainable development goals. Finding narrated that the investment and its

development directly impacts sustainable development goals. Advanced equipment and higher incomes toward the employees due to foreign direct investment also vitally impacts the sustainable development goals. Ingutia (2020) and Liu et al. (2022b), interpreted the marginalization of investment as well as educational opportunities for the sustainable development goals. Results indicate that the progress of sustainable development goals could get significant rise by the foreign direct investment. The amount is not subject matter for the foreign direct investment, but it could be considered as aid that could be negative for sustainable development. Therefore, the positive interpretation of establishing new businesses of corporate finance and other investment opportunities could help in sustainable development.

Income of government, businesses and households are important in the developed and developing countries to contribute its proportion toward sustainability. Countries having low-income standards are usually unable to meet the requirements of sustainable development. Therefore, the positive integration of net national income induces positive measures in BRIC countries for achieving significant sustainable development goals. Guo et al. (2021) and Li and Chen (2019), analyzed the balances of the trade from the perspectives of global income and national income that impacts the sustainable development goals. It is necessary for the strengthened net national income because the effective income contributes a major portion toward the sustainable development goals. Net national income is related to the national products that are excluded from the indirect taxes. Liu et al. (2021) and Veselinović et al. (2020), examined the impact of education and jobs on the net income in developing countries that inserts a prominent role toward sustainable development. This encompasses different scenarios of businesses that could be derailed due to higher taxes and play lack of focus in helping sustainable development. More generation of income by the households contributes a larger proportion toward the economic development and sustainability. Liang (2021), assessed the net national income from the perspectives of demand-driven growth, traps of middle income and distribution of functional income influencing sustainability. Net national income is also responsible for the wages and salaries that combine toward load toward the business and government. The huge receipts of net national income by the government could positively help in developing the infrastructure in any country. Holliday et al. (2019) and Moslehpour et al. (2022b), explored the role of gender migration and its income over the achievement of sustainable development goals. Results stated that net national income whether in business or household contributes a significant proportion toward sustainable development goals. This development not only positively helps the businesses and industries but also could be beneficial in the attainment of sustainable development goals. The larger portion of gross domestic product is also involved in net national income that could be drastic in sustainable development goals. Degai and Petrov (2021) and Moslehpour et al. (2022a), enumerated the investment, knowledge and natural resources and their aspiration toward the sustainable development goals. Study states that equality and equity, livelihoods of people, governance rights toward net national income positively impacts the sustainable development goals. Ultimately, the sustainable development goals could be achievement from numerous perspectives, but the factors associated with net national income contributes huge portion. Net national

income is exclusive of taxes and that helps more in attaining the sustainable development goals.

Purchasing power poses the attention of consumers and their attitude toward the development and sustainable economic conditions. The decline in purchasing power indicates the higher rates of inflation that reduces the attention of consumers and also reduce their efforts toward their contribution to the economy. In BRIC countries, the higher rates and spikes in inflation address some negative impacts on the consumers and also influences the sustainable development goals. Miccoli and Neri (2019) and Moslehpour et al. (2021), examined the surprises and expectations of inflation and its sensitivity toward the programs involved with the sustainable development goals. The basket of services and goods that could be availed by the consumers is decreased due to higher inflation and the higher prices of commodities in the market. Dammak and Helali (2017) and Sadiq et al. (2022b), narrated the threshold impact of economic growth and inflation on sustainable development. Findings revealed that the phenomena of inflation with new policies help in achieving sustainable development goals. When people are unable to meet the expenses from their required pocket, inflation has a significant role. Therefore, the role of inflation not only disrupts the positive approach of goods and services but also derails the sustainable development goals. Hegerty (2017) and Sadiq et al. (2022a), interpreted the relationship between regimes of exchange rates, monetary policy and inflation volatility. Results indicate that the behaviour of inflation and its fluctuation is primarily important for the spillovers toward sustainable development goals. The hot economy also presents inflation where people attain more cash and surplus but the higher prices and devaluation of money could be negative for sustainable development. Bexell and Jönsson (2017) and Sadiq et al. (2021), analyzed the responsibility of the United Nations to help countries in achieving sustainable development goals while reducing the rates of inflation. The finding indicates that inflation helps in raising consumer demands, but a devaluation of money could be negative for the sustainable development goals. The surplus of cash and excess credit for the spending also results in inflation and businesses could not be able to contribute in sustainable development goals. When the consumers are intentioned or had the intention to buy more and spend more that may also result in the rise of prices. Dadelo (2020) and Zhang et al. (2021), investigated the countermeasures and challenges in the big ocean of growing world where inflation is dominant factor. Findings revealed that inflation poses an emerging impact on sustainable development goals. This rise of prices could disrupt and decrease the supply required to meet the consumer demand that must influence the required goals of sustainable development. The devaluation of money is posed as negative while rising demand of consumers according to their spending can contribute boost to the economy.

3. Research methodology

The article examines the ESG responsibilities, economic growth, net national income, FDI and inflation on the SDG achievements in BRICS countries such as Brazil, Russia, India, China and South Africa. The present article has taken secondary data

Table 1. Measurement of variables.

S#	Constructs	Instrument	Sources
01	SDGs	SDG Index	SDG Report
02	ESG	ESG score out o 100	WDI
03	Economic Growth	GDP growth (annual percentage)	WDI
04	Foreign Direct Investment	FDI net inflow (% of GDP)	WDI
05	Net National Income	Net national income (annual percentage growth)	WDI
05	Inflation	Inflation, consumer price (annual percentage)	WDI

Source: WDI & SDG report.

from secondary sources like SDG reports published by the united nation and WDI from 1991 to 2020. The equation has developed by the researchers using understudy constructs is as follow:

$$SDGI_{it} = \alpha_0 + \beta_1 ESGS_{it} + \beta_2 EG_{it} + \beta_3 FDI_{it} + \beta_4 NNI_{it} + \beta_5 INF_{it} + e_{it} \quad (1)$$

Where;
SDGI = SDG Indexi = Country$t$ = Time Period
ESGS = Environmental, Social and Governance Score
EG = Economic Growth
FDI = Foreign Direct Investment
NNI = Net National Income
INF = Inflation

The present article treated SDG achievement as the DV and measured it through SDG index extracted from SDG reports published by United Nations. Moreover, the study has selected two predictors such as ESG responsibilities and economic development. The ESG responsibilities variable is measured as the ESG scores published by World Bank. In contrast, the current research has used three dimensions for economic development such as economic growth measured as the GDP growth (annual %), FDI measured as the FDI net inflow (% of GDP) and net national income (NNI) measured as the NNI (annual percentage growth). Finally, the current research has used inflation as the control variable and measured as the inflation consumer price (annual percentage). Table 1 provides the cleared picture of measurement of variables.

The article results include the 'descriptive statistics (country wise, year wise and overall), correlation matrix, ADF test, PP test, KPSS test, zivot-andrews test, ARDL bound test, and ARDL test'. The descriptive statistics show the variables used, such as standard deviation, minimum values, mean, maximum value, and the number of observations used. In addition, the correlation matrix exposed the directional association among the variables. The ADF, PP, and KPSS tests have checked the without structural breaks stationarity, while the 'zivot-andrews' test checks the stationarity with structural breaks. The equation for ADF test, PP test, and KPSS test is given as under:

$$d(Y_t) = \alpha_0 + \beta t + \mathrm{Y} Y_{t-1} + d(Y_t(-1)) + \varepsilon_t \quad (2)$$

In addition, the stationarity of constructs has been examined individually. Hence, the separate equations are given as under:

SDG Index

$$d(SDGI_t) = \alpha_0 + \beta t + \mathrm{Y}SDGI_{t-1} + d(SDGI_t(-1)) + \varepsilon_t \tag{3}$$

ESG Score

$$d(ESGS_t) = \alpha_0 + \beta t + \mathrm{Y}ESGS_{t-1} + d(ESGS_t(-1)) + \varepsilon_t \tag{4}$$

Economic Growth

$$d(EG_t) = \alpha_0 + \beta t + \mathrm{Y}EG_{t-1} + d(EG_t(-1)) + \varepsilon_t \tag{5}$$

Foreign Direct Investment

$$d(FDI_t) = \alpha_0 + \beta t + \mathrm{Y}FDI_{t-1} + d(FDI_t(-1)) + \varepsilon_t \tag{6}$$

Net National Income

$$d(NNI_t) = \alpha_0 + \beta t + \mathrm{Y}NNI_{t-1} + d(NNI_t(-1)) + \varepsilon_t \tag{7}$$

Inflation

$$d(INF_t) = \alpha_0 + \beta t + \mathrm{Y}INF_{t-1} + d(INF_t(-1)) + \varepsilon_t \tag{8}$$

The study also runs the ARDL to test the linkage among the constructs. ARDL is an effective estimation tool and can apply when the variables are stationary at the level and first difference. In addition, ARDL is also provided with the best results even the researchers have used (Marín, 2020; Sharif et al., 2020) as current research has used only 30 observations. Finally, the ARDL model produces the 'short and long-run' results together. The equation is given as under:

$$\begin{aligned}\Delta SDGI_t = {} & \alpha_0 + \sum \delta_1 \Delta SDGI_{t-1} + \sum \delta_2 \Delta ESGS_{t-1} + \sum \delta_3 \Delta EG_{t-1} + \sum \delta_4 \Delta FDI_{t-1} \\ & + \sum \delta_5 \Delta NNI_{t-1} + \sum \delta_6 \Delta INF_{t-1} + \varphi_1 SDGI_{t-1} + \varphi_2 ESGS_{t-1} + \varphi_3 EG_{t-1} \\ & + \varphi_4 FDI_{t-1} + \varphi_5 NNI_{t-1} + \varphi_6 INF_{t-1} + \varepsilon_1\end{aligned} \tag{9}$$

In above expression, 'δ_1, δ_2, δ_3, δ_4, & δ_5' that exposed the coefficients for 'short-term' nexus among variables. The expression also indicates 'φ_1, φ_2, φ_3, φ_4, φ_5, & ε_1' that represents the coefficients of 'long-term' nexus and 'error term'. In addition, the study also used the 'granger causality test' that exhibits 'bidirectional, unidirectional and no linkage' among the constructs. The expression is mentioned below:

$$\mathrm{Y_t} = \beta_0 + \sum\nolimits_{\mathrm{j=1}} \beta_{\mathrm{1j}} \mathrm{Y_{t-1}} + \sum\nolimits_{\mathrm{h=1}} \beta_{\mathrm{2h}} \mathrm{Y_{t-p}} + \varepsilon_{\mathrm{t}} \tag{10}$$

$$\mathrm{X_t} = \acute{\alpha}_0 + \sum\nolimits_{\mathrm{s=1}} \acute{\alpha}_{\mathrm{1s}} \mathrm{Y_{t-s}} + \sum\nolimits_{\mathrm{t=1}} \acute{\alpha}_{\mathrm{2t}} \mathrm{X_{t-m}} + \varepsilon_{\mathrm{t}} \tag{11}$$

Table 2. Descriptive statistics (country).

	SDGI	ESGS	EG	FDI	NNI	INF
Brazil	72.533	66.358	2.213	2.762	2.590	187.17
Russia	70.059	63.241	0.861	1.888	3.271	59.098
India	67.188	59.663	5.812	1.275	6.259	7.238
China	75.980	69.325	9.289	3.362	8.497	4.051
South Africa	72.071	67.610	2.033	1.188	2.544	6.458

Source: Authors estimation.

4. Study results

The current article has shown the descriptive statistics with respect to the country that highlighted the maximum SDGI in China while minimum SDGI in India. In addition, the results exposed the maximum ESGS in China while minimum SDGI in India and the maximum EG in China while minimum ESGS in Russia. The findings also indicated the maximum FDI in China while minimum FDI in South Africa and the maximum NNI in China while minimum SDGI in South Africa and the maximum INF in Brazil while minimum SDGI in China. Table 2 shows these figures.

The current article has shown the descriptive statistics with respect to years that highlighted the maximum SDGI in 2020 while minimum SDGI in 1991. In addition, the results exposed the maximum ESGS in 2020 while minimum SDGI in 1991 and the maximum EG in 2007 while minimum ESGS in 2020. The findings also indicated that the maximum FDI in 2011 while minimum FDI in 1991 and the maximum NNI in 1991 while minimum in 1993 and the maximum INF in 1993 while minimum SDGI in 2018. Table 3 shows these figures.

The descriptive statistics show the variables used, such as standard deviation, minimum values, mean, maximum value, and the number of observations used. The findings exposed that the 150 observations were used and SDGI average value was 71.556, and ESGS mean value was 65.239. In addition, the results also exposed that the average value of EG was 4.042 per cent while the mean value of FDI was 2.095 per cent. Finally, the results have shown that the mean value of NNI was 4.632 per cent and the average value of INF was 52.803 per cent. Table 4 shows the statistics.

In addition, the correlation matrix exposed the directional association among the variables. The figures exposed that ESGS, EG, FDI, NNI, and INF positively link with SDG index BRICS countries. Table 5 shows the correlation among variables.

The ADF, PP, and KPSS tests have checked the without structural breaks stationarity. The results exposed that the SDGI, ESGS, NNI and INF are stationary at level. In contrast, the results exposed that EG and FDI are stationary at first difference. Table 6 highlighted these findings.

In addition, the 'zivot-andrews' test has been applied to check the stationarity with structural breaks. The outcomes exposed that the SDGI, ESGS, NNI and INF are stationary at level. In contrast, the results exposed that EG and FDI are stationary at first difference. Table 7 highlights the results.

In addition, the co-integration has been evaluated using the ARDL bound test and the numbers exposed the bigger value of f-stats in contrast with critical values. These results exposed that co-integration exists. Table 8 shows these outcomes.

Table 3. Descriptive statistics (year).

	SDGI	ESGS	EG	FDI	NNI	INF
1991	63.916	57.575	1.057	0.918	14.399	93.726
1992	64.312	58.136	0.499	1.168	−2.167	197.367
1993	64.707	58.495	3.225	1.404	−4.369	566.456
1994	65.103	58.989	3.236	1.458	−3.264	485.411
1995	65.498	59.449	4.342	1.471	1.334	59.824
1996	65.894	59.909	4.045	1.581	8.823	17.631
1997	66.289	60.370	4.136	2.238	4.619	8.047
1998	66.684	60.830	1.914	1.956	2.037	10.044
1999	67.080	61.290	5.155	2.322	7.073	19.811
2000	67.475	61.750	6.184	2.189	8.769	7.508
2001	72.573	64.800	4.470	3.003	4.475	7.704
2002	72.898	65.054	4.878	2.005	6.358	7.460
2003	73.027	65.255	5.858	1.629	6.640	7.798
2004	73.174	65.547	7.110	1.969	8.824	4.877
2005	73.537	66.465	6.839	2.292	8.542	5.528
2006	73.537	66.285	7.710	2.479	9.307	4.908
2007	73.813	66.786	8.364	3.188	9.486	6.003
2008	74.009	67.137	5.245	3.595	3.182	8.824
2009	74.206	67.489	1.559	2.483	2.848	6.791
2010	74.403	67.84	6.840	2.617	8.103	6.223
2011	74.599	68.192	5.247	2.644	5.648	6.901
2012	74.796	68.543	4.332	2.250	5.074	5.627
2013	74.993	68.894	4.280	2.534	3.663	6.484
2014	75.190	69.246	3.498	2.083	3.508	5.772
2015	75.386	69.597	2.168	1.764	2.209	7.084
2016	75.583	69.948	2.537	2.173	1.781	5.865
2017	75.780	70.300	3.610	1.710	4.608	3.446
2018	75.976	70.651	3.872	1.847	2.893	3.414
2019	76.173	71.003	2.710	1.994	2.130	3.790
2020	76.370	71.354	−3.669	1.887	2.431	3.772

Source: Authors estimation.

Table 4. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
SDGI	150	71.566	5.404	56.872	79.962
ESGS	150	65.239	5.788	53.983	76.673
EG	150	4.042	4.849	−14.531	14.231
FDI	150	2.095	1.449	0.002	6.187
NNI	150	4.632	8.145	−29.587	58.814
INF	150	52.803	254.11	−1.401	2075.888

Source: Authors estimation.

Table 5. Matrix of correlations.

Variables	SDGI	ESGS	EG	FDI	NNI	INF
SDGI	1.000					
ESGS	0.667	1.000				
EG	0.512	0.659	1.000			
FDI	0.428	0.645	0.346	1.000		
NNI	0.654	−0.327	−0.440	−0.290	1.000	
INF	0.532	0.527	0.727	0.492	−0.533	1.000

Source: Authors estimation.

The results of the ARDL model in Table 9 revealed that ESG responsibilities, economic growth, net national income, FDI and inflation have a positive linkage with SDG achievements in BRICS countries in the short run. In addition, the regression Sq (0.498730) explains that 49.8% of changes occurred because of selected predictors. The Table also shows the ARDL short-run linkage.

Table 6. Unit root test (without structural breaks).

		ADF Test		PP Test		KPSS Test	
	Level	t-statistics	p-values	t-statistics	p-values	t-statistics	p-values
SDGI	I(0)	−2.728	0.043	−3.733	0.021	−2.873	0.033
ESGS	I(0)	−3.539	0.023	−2.873	0.039	−3.982	0.020
EG	I(1)	−7.762	0.000	−8.763	0.000	−7.921	0.000
FDI	I(1)	−6.629	0.000	−7.543	0.000	−6.843	0.000
NNI	I(0)	−3.622	0.019	−5.763	0.000	−3.912	0.0021
INF	I(0)	−4.927	0.007	−3.882	0.019	−2.871	0.032

Source: Authors estimation.

Table 7. Unit root test (with structural breaks).

	Level		1st Difference	
	ZA Test	Break Point	ZA Test	Break Point
SDGI	−3.464***	2002	−6.832***	2004
ESGS	−2.321***	1999	−5.873***	2000
EG	−1.842	2008	−8.543***	2008
FDI	−1.239	2007	−5.763***	2008
NNI	−6.543***	2009	−5.522***	2007
INF	−4.982***	2008	−8.910***	2008

Source: Authors estimation.

Table 8. ARDL bound test.

Model	F-stats	Lag	P-level	Bound test (critical values)	
				I(0)	I(1)
SDGI/(ESGS,EG,FDI,NNI,INF)	6.732	4	1%	7.43	7.83
			5%	6.32	6.64
			10%	5.72	5.99

Source: Authors estimation.

Table 9. Short-run coefficients.

Constructs	Coef	St.error	t-Stats	
Sig.Vlaue				
D(ESGS)	0.902813	0.230932	3.909432	0.0176
D(EG)	0.893827	0.309928	2.883983	0.0398
D(FDI)	4.983025	1.502922	3.315558	0.0263
D(NNI)	1.470192	0.439201	3.347424	0.0256
D(INF)	1.702924	0.782098	2.177379	0.0453
CointEq(-1)*	−1.678392	0.293807	−5.712566	0.0000
R-sq	0.498730		Mean DV	−0.043852
Adj R-sq	0.476429		S.D. DV	2.124322

Source: Authors estimation.

Table 10. Long-term coefficients.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ESGS	1.654733	0.498262	3.321009	0.0122
EG	4.093782	1.498333	2.732224	0.0319
FDI	1.639032	0.342621	4.783805	0.0000
NNI	3.983029	0.893837	4.456102	0.0000
INF	2.893632	1.027262	2.816839	0.0295
C	0.983732	0.338095	2.909632	0.0223

Source: Authors estimation.

The ARDL model findings also indicates that ESG responsibilities, economic growth, net national income, FDI and inflation have positive association with SDG achievements in BRICS countries in the long run. Table 10 depicts the ARDL long-run linkage.

Table 11. GCT.

Null Hypothesis	F-Stats	Sig.value	Decision
ESGS does not Granger Cause SDGI	5.98303	0.0000	Bidirectional
SDGI does not Granger Cause ESGS	4.73039	0.0000	
EG does not Granger Cause SDGI	3.98302	0.0032	Unidirectional
SDGI does not Granger Cause EG	0.09839	0.7639	
FDI does not Granger Cause SDGI	6.76348	0.0000	
SDGI does not Granger Cause FDI	1.42329	0.2928	Unidirectional
NNI does not Granger Cause SDGI	6.87363	0.0000	
SDGI does not Granger Cause NNI	5.83762	0.0000	Bidirectional
INF does not Granger Cause SDGI	0.54732	0.6543	
SDGI does not Granger Cause INF	1.09837	0.1892	No

Source: Authors estimation.

Finally, the current research also used the 'granger causality' test that exposed the 'bidirectional, unidirectional and no linkage' among the constructs. The results indicated a bidirectional association among ESGS and SDGI and NNI and SDGI. In addition, the findings also exposed the unidirectional linkage among EG and SDGI and FDI and SDGI. Finally, the results also revealed no correlation among INF and SDGI. Table 11 depicts the Granger causality test results.

5. Discussions

The results stated that ESG has a positive relation to the attainment of SDGs. These results agree with Consolandi et al. (2020), which shows that when the business management feels its responsibility to the environmental quality, social well-being of the stakeholders, and the business itself, their form their policies for the attainment of a quality environment both for workers, the establishment of solid relationship goals for the stakeholders' well-being, and the achievement of business competitive advantages. This results in high environmental, social, and economic performance, which are three poles on which the SDGs are based. The results are also supported by Saetra (2021) and Singh and Shaik (2021), which shows that in the fulfilment of ESG responsibilities, the firms can achieve business effectiveness which leads to the firm economic performance contributing to the financial resources in the economy. The economy has high growth, there is a high employment rate, sufficient income, and there is no poverty and hunger. Hence, the ESG helps attain SDGs. These results agree with Litvinenko et al. (2022), which examines that the evaluation of corporate performance through ESG score motivate the firms to remove the negative impacts on the environment because of the use of technologies and energy resources. As a result of the ecological friendly processes, these negative environmental impacts are removed, and the availability of clean water, pleasant air, and clean soil are possible.

The results showed that economic growth has a positive relation to the attainment of SDGs. These results match with Eisenmenger et al. (2020), which tells that in the high economic growth, the business enterprises play an active role in the business practices. They employ innovative technology, employ more workers, and ensure responsible consumption through energy efficiency and responsible production through innovative good, quality products. This helps achieve SDGs relating to innovation, industry, and infrastructure, no poverty, responsible consumption &

production, efficiency etc. These results also agree with Maes et al. (2019), which shows that in countries having high economic growth, the businesses which have high financial performance try to sustain this performance through encouraging social and environmental performance as well. This struggle on the part of business firms SDGs like proper sanitation, clean air, water and land, good health, social development, peace, and justice lead the economy towards sustainable economic performance. These results match with Al-Qudah et al. (2022), which examines that in the high economic growth, there is development in science and technology. The use of innovative information technologies for education purposes enables the educational institutions to promote education in all the regions of the country without any distinction and improves the quality of the education sector as well. This brings sustainability to the development of country.

The findings showcased that FDI is positively correlated to SDG attainment. The findings are consistent with Lopes et al. (2020), which suggests that FDI is the source of additional investment in domestic enterprises. This helps not only undertaking the activities which are necessary for gaining financial goals of the firms but also help to carry out activities which are peculiar for the stakeholders' well-being. This may be in the form of removing unemployment, taking care of the health of the stakeholders, and educational training for employees to improve professional literacy. Thus, FDI helps achieve SDGs. These results are in line with Zhuang et al. (2021), which states that for the achievement of SDGs, which are linked to the environmental and social performance of institutions, proper attention and regulation is required. In case the foreign entities employ their resources in the domestic business programs, they have a keen interest in the working and achievement of its. For this purpose, they require regulations and proper reports for this. Hence, FDI help achieves SDGs.

The results showed that NNI has a positive relation to the attainment of SDGs. These results match with Hogan et al. (2018), which highlights that the firms in the country where NNI is high maintain the quality of the resources, technologies, equipment, and infrastructure and the quality of products. This maintenance by all the individual economic units assures the quality resources, technologies, equipment, and infrastructure for meeting future business needs and sustains the economic performance. So, the high NNI helps achieve SDGs. These results also agree with Barbier and Burgess (2019), which reveals that the increased NNI enhances the government revenues. These revenues can be used for investment in environmentally friendly programs within the country. This improves environmental protection and serves to achieve the SDG. These results also match with Coscieme et al. (2020), which states that the increase in the NNI encourages ecological-friendly projects like waste disposal management, water management, and climate protection management in profit and non-profit making organizations. It saves the environment from climate change and protects the health of humans who provides for labor. This brings sustainability in the growth of country along with SDGs achievement.

The results showed that inflation has a positive relation to the attainment of SDGs. These results match with Dabbous and Tarhini (2021), which indicates that in an inflation economic period, there is more circulation of money in the economy and the government directly or through social institutions is engaged in the construction,

developmental, and environmentally friendly projects. This results in improved public health quality of life on land and underwater and assures sustainability with good quality natural resources and human resources. It also encourages production in many businesses, raises employment opportunities, and improves people's living standards. So, inflation may be helpful in getting SDGs. These results also agree with Kutan et al. (2018), which examines the impacts of inflation on SDGs achievement. This study suggests that during inflation, the worth of stock for the big businesses rises, as an increase in the value of stored material, assets in ownership, and increased prices of their products and services enhance the profitability of firms. This motivates the firms for the achievement of SDGs like innovation adoption, infrastructure improvement, employing renewable energy resources, accountable production, and increase in employment for labor. These results are also in line with Arefieva et al. (2018), which shows that the increased earnings in the situation when there is inflation within the economy help the businesses and government to pay attention to the SDGs achievement, which requires a large number of financial resources.

6. Implications

The present study carries both theoretical and empirical implications. The study throws ample light on SDGs, which have been proposed by the UN-GA resolution, which was passed for the achievement of SD for the country. The study emphasizes the ESG score, economic growth, FDI, NNI, and inflation for the achievement of SD goals for the country. ESG score itself has three drivers of sustainable development like ES, SS and CGS, and for this reason, ESG score has alone been examined as the predictor of SGDs achievement. The present study, which examines ES, SS and CGS in a single term and examines its influence on SDGs achievement, adds to the literature. Economic growth, FDI, NNI, and inflation are the four economic factors whose influence on the achievement of SDGs have been examined by authors. But very few studies are there which collectively analyze the impacts of economic growth, FDI, NNI, and inflation on the achievement of SD goals. The present study contributes to the literature as it describes the economic growth, FDI, NNI, and inflation impacts on the achievement of SD goals simultaneously.

This study has a greater significance in all the countries, especially those where the economies mostly rely on the industrial sector, the use of technologies, plants, energy resources, and transportation as all these can affect the planet, people well-being, public prosperity, and eternity in economic progress. This paper guides the way to the achievement of SDGs proposed by the UN-GA resolution for the sustainable development of a country. These SDGs are based on people, prosperity, planet, peace, and partnership. This article provides help to the regulators while making policies related the SDG achievement. The study is a guideline for government, economists, businesses units, and general people. The aim of the government of any country is to improve the country development and the well-being of countrymen. The government can have guidance from this study on how to achieve SDGs whose objective is to ensure sustainable country development and the welfare of the public. The economists must form the policies to encourage ESG score execution economic growth is

present, and motivate the foreigners to make an investment in domestic projects for getting SDGs. If the individual businesses want to survive in the market and sustain their performance, they must struggle for ESG adoption, the contribution to economic growth, high FDI, NNI, and inflation while forming the policies for attaining SDGs.

7. Conclusions

The BRICS countries: Brazil, Russia, India, China, and South Africa are facing many social and environmental problems because of the increasing pollution, which stresses the resources consumption and residence and causes CO2 emissions and an exponential increase in economic activities like industrial works, the use of different types of technologies, and transportation which all require the energy usage and increase in the greenhouse gas emissions. Moreover, in this country, there are many social and economic problems like inequality, social backwardness, poverty, hunger, unemployment, education deficiencies, and bad quality infrastructure. These all problems are a danger for countries' eternal survival and sustainable development and thus, require attention. The authors wrote the present to drive attention to these issues along with the solutions to these problems. The aim of the study was to check the role of ESG score, economic growth, FDI, NNI, and inflation in the achievement of SDGs for the country. Through a quantitative research technique, the authors analyzed ESG score, economic growth, FDI, NNI, and inflation and the achievement of SDGs for the BRICS countries, including Brazil, Russia, India, China, and South Africa and present results about the impacts of ESG score, economic growth, FDI, NNI, and inflation on the achievement of Sustainable development goals. The findings revealed the positive association of ESG score, economic growth, FDI, NNI, and inflation with SDGs achievement.

The results indicated that when business management recognizes its responsibility for environmental quality, social well-being of stakeholders, and the business itself, they develop policies for achieving a quality working environment for employees, for stakeholders' well-being, and achieving competitive business advantages. This leads to improved environmental, social, and economic outcomes, which are the three pillars upon which the SDGs are built. The results stated that during high economic growth, the firms use cutting-edge technology, hire more employees, adopt innovative processes, and assure careful consumption. This contributes to the achievement of SDGs such as innovation, industry, and infrastructure, as well as no poverty, responsible consumption and production, efficiency etc. The results meant that FDI assists achieve SDGs with the improvement in the environmental and social performance of institutions, increasing proper attention and encouraging regulation. The increased NNI enhances the useable revenues for institutions and government and encourages them to make an investment in environmentally friendly programs and social-friendly activities within the country. The findings also showcased that the inflation in the country gives way to the attainment of SDGs with an increase in profitability, revenues, and money in circulation.

Many limitations are associated with the current study. These limitations must be addressed and removed by researchers and scholars. The BRICS countries: Brazil, Russia, India, China, and South Africa are the developing countries with less or more development pace, similar but specific environmental and social characteristics along with specific economic conditions. The study conducted in BRICS countries is not likely to be equally valid in developing countries other than BRICS and the developed that have entirely different situations. The authors are required to conduct similar research in both developed and developing countries in different regions of the world. The present research is about the role of ESG score, economic growth, FDI, NNI, and inflation in the achievement of SDGs for the country for a specific time period like 1991 to 2020. For the limited period for analysis of the variables and their relationship, the results may not be true in some other time period or in the long run because of the change in the conditions. It is the duty of the authors to select two or three sections of the time period to analyze the nexus among factors with true results.

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