Identification of Factors Affecting Sustainable Development Goals (SDG) with Application of Panel Data Analysis

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Abstract

The foundation for today's leading global framework for international collaboration is sustainability. The concept of sustainable development was evaluated to prioritize economic growth over social well-being and environmental viability. The purpose of this study is to identify the elements that influence the achievement of Sustainable Development Goals. The Data from the previous 22 years (the year 2000 to the financial year 2022) of 163 countries across the world has been collected through the United Nations Department of Economic and social affairs. Panel data analysis has been used to test the result. It is found that all the selected variables are affecting the SDG index score and the fixed effect model is found the best suitable for explaining 71.42 percent of the variance in the data.

Keywords- Sustainable Development Goals (SDG), Income, region, population, random model

Introduction

CSR is an obscure concept that falls short of striking the right balance between social needs and business economic goals (Nurunnabi et al., 2020). To increase the target and make programs more efficient, sustainable development targets were introduced in the UN's Agenda 2030. The concept of Sustainable Development Goals (SDGs) was initiated at The UN Conference in Rio de Janeiro in 2012. The purpose was to create a set of universal goals that addressed the world's urgent environmental, political, and economic concerns. MDGs were replaced by Sustainable Development Goals (SDGs) and took their place at the global level. The world has already agreed on sustainable development, a unique 2030 agenda.

The fundamental component of this new agenda is the 'Sustainable Development Goals (SDGs)', which include a good number of goals (17) and targets (169) as well as a significantly broader collection of indicators to track progress toward these goals and targets. Sustainable development is a systematic growth process (land, city, business, society, etc.) that meets present requirements without compromising

future generations' needs (WCED, 1987). When the word "sustainable development" first appeared, it was only used to refer to the damage done to natural resources and environmental resources as a result of industrial growth. However, this has been challenged because it focuses solely on environmental development while neglecting socio-eco development. The goal of sustainable development is to strike a balance between the two interests of eco-environmental development and protection (Sasanti, Cahyaningtyas, and R. Sapto Hendri Boedi Soesatyo 2020)

The Sustainable Development Goals (SDGs) are grouped into three groups: First group containing seven SDGs is included in the Millennium Development Goals; the second group is inclusivity (jobs, infrastructure, industrialization, and distribution). The third group is on sustainability and urbanization, which includes the final seven goals: sustainable urban and rural areas, life below water, "consumption and production; climate action; resources and environment; peace and justice; and the means of implementation and global partnership for it."

Economies and corporates have begun to focus on the environment, people, and planet to embrace Sustainable Development Goals (SDGs) in the hopes of improving financial performance (Muhmad and Muhamad 2021). The SDGs provide a lens through which economies can solve difficulties while simultaneously collaborating with their people to achieve the SDGs (Ernst & Young Gl 2017).

Review of Literature:

A review of several kinds of literature revealed an emphasis on CSR, sustainability, MDG, and SDG issues and challenges. Some articles are concerned with the disclosure and reporting of SDGs, while others are concerned with determining the factors that influence them.

The ambitious 'Sustainable Development Goals (SDGs)' proposed by the UN have been criticized for being inconsistent, difficult to measure, implement, and monitor. According to a discouraging analysis, the SDGs may have inconsistencies, particularly between socioeconomic development and environmental sustainability targets (Swain 2018).

The purpose of this paper is to look into large firms' adoption of the SDGs in Asia and Africa's low- and middle-income nations, as well as the company characteristics that influence their decision to adopt new sustainability reporting methods. The findings also reveal that certain corporate, organizational, and performance characteristics boost the chance of corporations adopting SDG reporting. This paper contributes to the academic and practical knowledge of variables impacting the adoption for reporting of SDG by multinational corporations in low- and middle-income countries in Asia and Africa, drawing on agency theory and legitimacy theory perspectives (Kazemikhasragh, Cicchiello, and Pietronudo 2021).

Our study aims to find how closely banks' reported performance corresponds to their support for the SDGs. It ends by highlighting In light of these crucial, pressing concerns, future research perspectives on the assessment of common values across the industry, as well as new prospects for improving the disclosure of SDG contributions (Avrampou et al. 2019).

The objective of this paper is to assess the contribution of the Indian business world to long-term growth. For these firms, the impact of characteristics such as business size, ownership arrangement, and sensitivity to the environment has been evaluated. The findings indicate that there is a substantial gap between the full potential and existing condition of Indian corporate sustainability investments, indicating that there is significant room for development. It can be concluded for the regulatory framework must alter if the private sector's engagement is necessary for the SDGs (Jha and Rangarajan 2020).

Corporate social responsibility (CSR) is one of the tools used to achieve sustainable development goals (SDGs). The goal of this research is to find out if the CSR actions of Indonesian companies support and fit with the SDGs, particularly in terms of attaining the goal of responsible consumption and production. The findings should encourage businesses to engage in business operations, particularly CSR initiatives that address SDG priority development goals (Tilt 2020, Gunawan, and Permatasari).

In recent years, one of the most important aspects of

corporate performance has been sustainability. The sustainability results must be appropriately presented in appropriate reports, the quality of which is governed by some criteria. The findings revealed that the corporations behaved differently in terms of sustainability policies (Spallini et al. 2021).

Based on the research gap the hypothesis has been framed

H01: There is no significant impact of selected variables on Sustainable Development Goals

Research Methodology

Following research methodology was adopted for the present study:

Sample size

The nature of research is empirical. Research work is based on secondary data. Last 22 years Data from the year 2000 to the financial year 2022 of 163 countries across the world has been collected through the 'Department of Economic and social affairs, United Nations' (https://unstats.un.org/sdgs/dataportal).

Measures of variables

The table shows the dependent and independent variables. SDG Index Score is taken as Dependent Variables and population, income, and region have been taken as independent variables for the study purpose

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Table : List of Variables used for factors affecting Sustainability Development Goals (SDG)

Dependent Variables	Independent Variables
SDG Index Score	Population
	Income
	Region

Research Objectives

The research has been made to meet with following objectives

- To know the factor affecting the SDG Index score
- To find the extent of various selected variables i.e population, income, and region on SDG Score

Statistical tools:

Descriptive statistics are used for basic analysis. Panel data analysis has been used to prove the hypothesis. The ordinary regression model, random model, and fixed model have been applied to find the fitness of the model.

Results and Discussion

The following equation has been framed to explore the impact of SDG Disclosure on Firm Performance:

$Yit = \beta_1 + \beta_2(\text{population}) + \beta_3(\text{Income}) + \beta_4(\text{region}) + + E\,it$

I– represents the penal data dimension and t denotes the time, U it – depicts to dependent variable, i.e. SDG Disclosure, C it – depicts to independent variables, β_1 - is the constant, b_2, β_3 and β_4- represents the coefficients. Table 1 below presents Variables used for analyzing the impact of factors affecting Sustainability Development Goals.

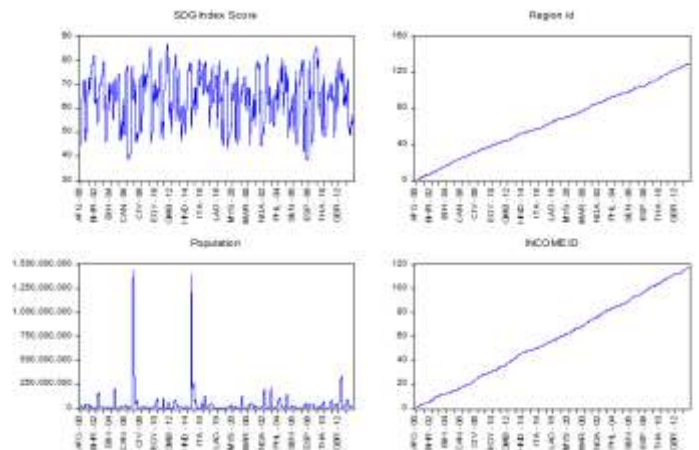$SDG\,it = \beta_1 + \beta_2(\text{population}) + \beta_3(\text{Income}) + \beta4(\text{region}) + + E\,it$

Chart 1 shows the description of the variables

Table 2: Descriptive Statistics

Variables	Population	Region id	INCOME ID	SDG Index Score
Observations	3586	3586	3586	3586
Minimum	142264	1.0	1.0	38.4
Maximum	1444216102	129.0	117.0	86.5
Mean	42451717	65.239	57.853	63.913
Median	10052127	69.000	60.000	65.132
Variance	219142243	1312.143	1159.995	110.225
Std. Deviation	148034538	36.2235	34.0587	10.4988
Skewness	7.808	-.002	.056	-.266
	.041	.041	.041	.041
Kurtosis	64.381	-1.117	-1.202	-.723
	.082	.082	.082	.082
Jarque Bera	653971	120	204	265
Probability	0	0	0	0

Table 2 represents the descriptive statistics, consisting mean value of all the selected variables. It is 42451717 for population, 65.239 for region, 57.853 for income, and 63.913 for SDG index score. The median value for each indicator were—10052127 for population, 69 for the region, 60 for Income, and 65.132 for SDG index score. Standard deviation is the indicator of scattered to mean on a frequency distribution. It can be commented that the dataset had a lighter tail than the normal distribution. Since the kurtosis of the SDG income score was below 3, depicts that distribution was platykurtic. The high significant values of the Jarque-Bera test indicate non-normally data.
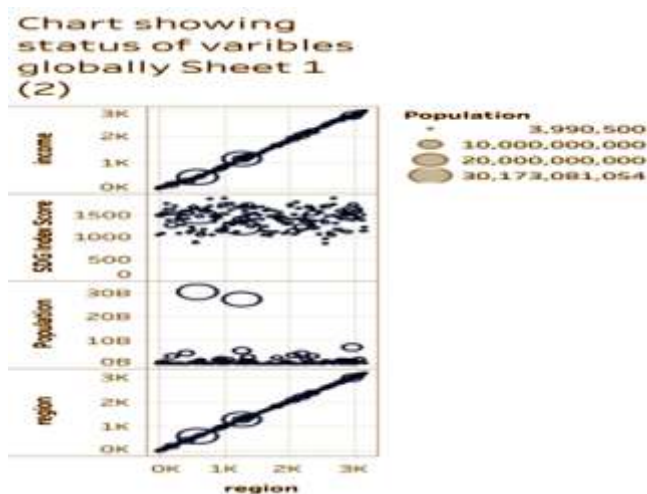
Accordingly, independent variables are identified and put in the equation as follows:

SDG_INDEX_SCORE = C(1) + C(2)*POPULATION + C(3)*INCOME_ID + C(4)*REGION_ID

H01: There is no significant impact of selected variables on Sustainable Development Goals

Ordinary Least Square, Fixed Effect and Random Effect Model

Ordinary Least Square, Fixed Effect and Random Effect Models

For empirical analysis, it needs to be the decision that what technique is more suitable for data i.e. panel regression or a simple regression. For this purpose, one should run a specific test that assists such a decision. E Views results depict that the null hypothesis has been rejected since the OLS estimator was unsuitable (p-value < 0.05) and inconsistent. Table 3 shows, the regression model of panel data with pooled regression, fixed effect model, and random effect model.

SDG_INDEX_SCORE = C(1) + C(2)*POPULATION + C(3)*INCOME_ID + C(4)*REGION_ID

Table 3 Results of Panel Data Regression

Variables	SDG Score						
	Pooled		Random		Fixed		
	coefficient	p-value	coefficient	p-value	coefficient	p-value	
C	40.9485	0	39.8219	0. 0000	40.9692	0	
Population	-1.29E-10	0.1062	1.78E-08	0	-7.86E-10	0.2156	
Income	8.2969	0.0403	0.0087	0.5682	0.0056	0.0308	
Region	0.0056	0	8.3782	0	8.2954	0	
Adj R²	0.6766		0.0821		0.7142		
F	2501.399		106.86		106.86		
F Sig.	0		0		0		
D-W	0.0026		0.1059		0.1059		
BPLM	0		N/A		N/A		
Hausman	N/A		1		N/A		

The following equation is the result of the test::

$$SDG\_INDEX\_SCORE = 65.6572047259 - 7.5931067217e\text{-}10*POPULATION + 0.418450937752*INCOME\_ID - 0.397314065722*REGION\_ID$$

The estimation of the Equation's outcomes has been shown in the above table. The pooled regression model was found not significant, also and results were tested through Breusch-Pagan L-M Test. Significant test values led to the estimation of the random effect model. Hausman test has been applied to choose the application of the appropriate test, whether fixed or the random effect mode is suitable. Significant test values led to the estimation of the Fixed Effect Model. The fixed effect has the highest adjusted R2 value (0.7142) means it can explain 71.42% variability in the data.

Conclusion

It is the need of today's era to make the policy, mission, or targets to fulfil the development of people, the planet, and the economy. To meet this requirement, the 'Sustainable Development Goals' has been developed by the united nation. The most recent innovation in social disclosures and corporate sustainability is assumed. To preserve future generations' economic well-being, environmental integrity, social cohesiveness, and prosperity, the global community must solve the major issues reflected in the sustainable development goals (SDGs). The result of panel data shows that the dependent variable Sustainable development goals are the most influenced by the independent variable population, income category, and region respectively. The income category is divided into four sub-categories i. e lower income class, lower middle-income class, upper middle-income class, and higher class. Income is an influencing factor to measure SDG income score. It is found the most significant to apply the Fixed Effect Model. The fixed effect has the highest adjusted R2 value (0.7142) means it has the ability to explain 71.42% variability in the data.

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