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Nexus between Governance and Sustainable Development in Developing Countries: A Simultaneous Approach

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Abstract

Research Originality: The present research contributes a novel task in examining the simultaneous relationship between governance and sustainable development (SD), aiming to capture the endogenous relationship between these two concepts.

Research Objectives: This study examines the relationship between governance and sustainable development in 59 developing countries, utilizing annual data from 2006 to 2022.

Research Methods: The study employs panel Generalized Methods of Moment (GMM) and panel three-stage least squares (3SLS) techniques by using STATA 17. Data for this study is extracted from the World Development Indicators (WDI), International Financial Statistics, and World Governance Indicators.

Empirical Results: The findings indicate that governance, tax-to-GDP ratio, and financial development are positively related to SD. Moreover, SD also has a positive impact on governance in developing countries. Control variables, including the misery index and population, are negatively related to governance.

Implications: The study offers policy recommendations to enhance transparency and government quality, which are integrated into the development process to reduce social disparities, mitigate environmental challenges, foster economic growth, and ensure the well-being of citizens.

Keywords:

financial development; governance; sustainable development; developing countries; panel GMM; panel 3SLS.

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INTRODUCTION

The concept of sustainable development aims to fulfil the needs of today's generation without compromising the ability of future generations to meet their own needs (Duran et al., 2015). The structure of the SDGs focuses on achieving harmony and prosperity for every individual by 2030, through the eradication of hunger and protection of the environment. The SDGs aim to ensure that lower income and social disparities, as well as a sustainable environment, are taken into account during the economic growth process. In this manner, sustainable development ensures a prosperous and healthy environment for living for current and future generations (UN, 2023). Sustainability refers to the reliability or stability, whereas "development" indicates a change or a process. The definition of "sustainable development" refers to balanced growth and evolution, indicating that the present is better than the past and the future will be better than the present. In this context, environmental management policies, social progress, and balanced growth are considered essential for attaining sustainable development (Frolova et al., 2019).

Good governance was first proposed by the World Bank in 1989, which includes six indicators for evaluating the framework of good governance. International organizations have also supported these indicators, including voice and accountability, government effectiveness, political stability, regulatory quality, control of corruption, and the rule of law (Huang & Ho, 2017). In recent years, global organizations such as the World Bank, the League of Nations, the OECD, the IMF, and the Asia-Pacific Economic Cooperation Forum have placed a greater emphasis on governance. An adequate governance structure is crucial for enhancing the country's competitiveness and improving an individual's living standard. Therefore, the connection between development and governance has become a key area of attention worldwide, particularly in developing countries, aimed at promoting reforms and reducing poverty (Grindle, 2004).

A governance system that is open and accountable is crucial for sustainable development (SD). The public has access to data, information, and processes that enable informed decision-making through transparency. Empirically, good governance has a more substantial impact due to its emphasis on accountability, transparency, and balanced strategies for economic growth (Thanh et al., 2020). Trustworthy institutions with transparent oversight procedures and clear objectives are crucial for implementing SD plans. Control of corruption and political stability are essential for achieving economic growth. In addition, political stability will increase the opportunities for funds transfer and provide a better environment for the inflow of investment in countries. Consequently, the absence of violence and terrorism indicators, which are measured as good governance, is also important for achieving growth (Odugbesan et al., 2021).

Two decades of discussion about governance and sustainable development in academia have seen significant progress, although there remains a lack of studies focused on how they interact, especially within developing countries. Many researchers have focused on one aspect at a time, and as a result, have not adequately studied the interplay between governance and development. The objective is to add clarity by examining the

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relationship between governance quality and sustainable development, and how they interact with one another. The present research is important and interesting because it examines the relationship between governance and sustainable development in parallel. This study examines the two-way relationship between improvements in governance and overall sustainability, providing a clearer understanding of both. This perspective is particularly critical in developing countries, which often have weak institutions, low state capacity, and urgent development challenges that must be addressed simultaneously.

The impact of governance on sustainable development is consistent at both the micro and macro levels. A review of empirical studies reveals a complex picture, with different scholars examining the relationships between governance and growth, corruption and growth, and environmental sustainability. According to previous research, corruption harms SD (Mugellini, 2019; Hope Sr., 2023). While few studies revealed the role of governance in attaining SDGs (Gündoğdu & Aytekin, 2022; Irtyshcheva et al, 2022; Liu & Alden, 2022; Lyulyov et al., 2024), few studies reported the role of governance in attaining environmental sustainability (Ikenga et al., 2022; Elander, 2022; Raper et al., 2022; Safdar et al., 2022; Shu et al., 2023; Balsalobre et al., 2023). However, these studies have considered a very narrow scope of governance and SD.

The present research portrays that good governance can mitigate corruption and misuse of public funds, which eventually contributes to SD. This research is significant for readers and policymakers to guarantee accountability, address economic and social disparities, mitigate environmental challenges, encourage economic growth, and ensure the well-being of citizens. Policymakers will achieve a better understanding after analysis of this research of how the governance framework impacts SD outcomes and finds which aspects of governance are more important for encouraging sustainable growth as well. Furthermore, our empirical findings help inform the formulation of appropriate policies related to identifying specific governance structure weaknesses, such as higher corruption, lower transparency, and a weak institutional framework, which are obstacles to desirable growth and development in developing economies.

Our research provides contributions in two ways. First, previous studies have examined the separate impacts of governance and corruption on growth and environmental sustainability; however, little consideration has been given to their mutual interaction, particularly in the developing world. This study fills this gap by using six combined indicators for the governance index and a sustainable development index that measures both the HDI and Ecological Impact Index in the context of developing countries. Second, a vast empirical literature applying combined modelling methods to study the dynamic interactions between governance and sustainable development outcomes does not exist. This paper offers novelty by employing a simultaneous equation modelling technique that can help analyze the mutual causality and support the response between governance and SD more rigorously. The novelty of this study lies not only in its interdependency but also in its focus on developing countries, where sustainability imperatives and governance problems are intricately intertwined.

By filling this gap, this research helps advance the discussion among researchers. This study employs simultaneous modelling to examine the impact of government quality on sustainable development in developing countries. In this way, we understand the implications of governance and SD over the years.

METHODS

This study aims to estimate the relationship between governance and sustainable development for a panel of 59 developing countries from 2006 to 2022, resulting in a sample of 1003 observations. To achieve the primary objective of the research, the dynamic panel data estimation process, specifically the panel GMM method, was employed by examining the existing literature for this purpose. The dynamic panel data requires N>25 and T<25 as the first assumption. The second assumption for endorsing this model is that a fixed effect should be present in the model. The final and utmost imperative assumption for the application of dynamic panel data is the presence of a lagged value of the dependent variable, serial correlation, along with group-wise heteroscedasticity. The purpose of selecting dynamic panel data and panel GMM estimation methods is that, based on these assumptions, an endogeneity problem exists, which is addressed by Adekunle (2021) and Asongu & Odhiambo (2021), as in the above equation, where the lagged dependent variable is included as the explanatory variable in the model is known as a dynamic panel data model. The dependent variable becomes an explanatory variable with a lag value. This type of model is usually expressed in the form of this equation:

$$Y_{it} = dY_{it-1} + \beta X_{it} + \mu_{it} \quad (1)$$

Where Y_{it}, dependent variable dY_{it-1}, lagged value of a dependent variable βX_{it}*Explanatory* variables. The dynamic panel data model has two types: firstly, the autoregressive panel data model indicates that the model contains only the lagged dependent variable as the explanatory variable. Arellano and Bond (1991) introduced the Different GMM techniques of dynamic panel assessment to resolve the issues in auto-regressive models, such as endogeneity and autocorrelation. Meanwhile, the lagged values of independent variables used as instrumental variables, determined by the first differences, are known as the Difference GMM approach. The autoregressive panel data model is shown as:

$$Y_{it} = dY_{it-1} + \beta X_{it} + \mu_{it} \quad (2)$$

When the difference equation and the level equation are analyzed as one system together, it is called System GMM. Hansen (1982) introduced the System GMM technique to resolve the problems in distributed lagged models, such as endogeneity, autocorrelation, and heteroscedasticity. Meanwhile, the lagged values of independent variables used as independent variables are known as the distributed lagged model. The distributed lag model is shown as:

$$Y_{it} = \delta Y_{it-1} + \beta X_{it} + \beta X_{it-1} + \mu_{it} \quad (3)$$

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Since the estimation method of the Two-Step System GMM is used in our equation. Primarily, the panel data set is balanced, and N>T. Furthermore, the System GMM technique is used for the reason that the endogeneity and autocorrelation problems exist in the model. The study also used the Arellano and Bond test to solve the problems of serial correlation. Lastly, the instrument overidentification is checked by the Sargan test.

The simultaneous Equations are also assessed using 3SLS followed by Zellner, (1992) and Murshed & Mredula, (2018). One of the assumptions of the OLS estimation approach is undermined by heteroscedasticity in the data. Conversely, the 3SLS technique supposes that the error terms within each equation are both homoscedastic and serially uncorrelated, regardless of whether structural error terms may be associated with the simultaneous equations. It is essentially a kind of Instrumental Variables (IV) estimate where correlations between various equations, including unobserved error factors, are enabled. By taking these correlations into account, equation-by-equation regression becomes effective.

Table 1. Variables and Measurement

Symbol	Variables	Definitions	Sources
SD	Sustainable development	The sustainable development index consists of the average and expected years of school, life expectancy at birth, GNI per capita 2011 PPP$, CO2 emissions tons, and material footprint. On a scale between 0 and 100.	Hickel (2020)
GOV	Governance	The Governance Index includes accountability, regulatory quality, political stability, government effectiveness, control of corruption, and rule of law. The index is calculated by a weighted average formula. The index values fell in a range from -2.5 to 2.5.	World Governance Indicators (WGI)
PS	Public Spending	Includes government expenditure and is measured as a percentage of GDP.	IMF
TAX	Tax Revenue	Tax revenue is measured as a ratio of GDP.	WDI
FD	Financial Development	The financial development is comprised of two components: the financial institution index and the financial market index. This is an index scale between the value of 0 to 1.	IMF
GFCF	Gross Fixed Capital Formation	Capital formation is annually measured as a percentage of growth.	WDI
MI	Misery Index	The misery index is calculated as the sum of unemployment and inflation rates. This is an index that goes from 0 to indefinite.	WDI
TRADE	Trade Openness	Trade openness is generally measured through the ratio of exports + imports and divided by gross domestic product. Export, import, and GDP data are taken in constant 2015 prices, stated in USD.	WDI
POP	Population	Population, total includes the actual classification of population, which includes everyone who lives there, regardless of citizenship or legal status.	WDI

The 3SLS methodology evaluates all coefficients quickly, in contrast to the 2SLS method with a set of simultaneous equations, which calculates the slope variables of each equation separately. 3SLS also provides reliable parameter estimation in cases when equations are interdependent. We have utilized the two simultaneous equations to establish the nexus between governance and sustainable development in developing countries. The regression models are as follows:

$$SD_{it} = \alpha_0 + \alpha_1 GOV_{it} + \alpha_2 PS_{it} + \alpha_3 TAX_{it} + \alpha_4 FD_{it} + \alpha_5 GFCF_{it} + \mu_{1it} \quad (4)$$

$$GOV_{it} = \beta_0 + \beta_1 SD_{it} + \beta_2 MI_{it} + \beta_3 TRADE_{it} + \beta_4 LnPOP_{it} + \mu_{2it} \quad (5)$$

where 'it' denotes entities and periods, 't' is the time which is used in this research (2006 from 2022, and 'i' indicates the cross-sectional aspects of the data (the 59 developing countries).

Subsequently, the static panel model provides robust and reliable results by using fixed and random effects. Both models mitigate and control unobserved heterogeneity omit variable partiality and check the applicability of random and fixed effects models through the Hausman test. Moreover, the static effect estimators are biased because the lagged value of the dependent variable is affected by its current value. In summary, the article contributes noteworthy perspectives on the nexus of governance and sustainable development in developing countries with the help of the above-mentioned appropriate techniques.

The governance index developed by Kaufmann & Kraay (2024) is in line with Pahlevi (2017) and Roy (2021). However, the governance index calculation in our paper is different from Kaufmann & Kraay (2024), Pahlevi (2017), and Roy (2021) in that we used a weighted average formula. All indicators of good governance are classified into two groups developed by the World Bank, the first characterized by weak governance, with an estimation value of -2.5. On the other hand, strong governance specifies a 2.5 estimation value. The weighted average formula is as follows:

I= (1/6* Voice and Accountability) + (1/6* Political Stability) + (1/6* Government Effectiveness) + (1/6* Regulatory Quality) + (1/6* Rule of Law) + (1/6* Control of Corruption) (6)

where I indicate the index.

The sustainable development index was constructed by Hickel (2020), which includes five indicators: education, life expectancy, income, CO2 emissions, and material footprint. The sustainable development index has been measured as the human development index as well as the ecological efficiency index. The all-variable list is presented in Table 1.

RESULTS AND DISCUSSION

The main findings indicate that the relationship between governance and sustainable development in developing countries is significant and positive, suggesting that a good governance structure provides transparent and accountable policies, which are crucial

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for achieving sustainable development. Sustainable development enhances governance structures through economic stability and effective resource management, thereby promoting sustainable development. This section presents the descriptive statistics (Table 2), correlation (Table 3), and panel GMM outcomes of both models (Table 4). The findings of the 3SLS are presented in Table 5. The results of FE and RE are presented in Table 6.

Descriptive statistics of the analysis are presented in Table 2, which specifies that the 'SD' mean is 0.662 with a standard deviation (Std.D) of 0.113. The maximum and minimum values of SD are 0.85 and 0.367, respectively. The GOV mean is -0.454 with a Std.D of 0.469. The minimum and the maximum values of GOV are -2.02 and 0.683, respectively. The PS average is 25.8 with a Std.D of 9.59. The PS maximum value is 66.4, and 8.21 is the minimum value. Additionally, the TAX average is 15.5 with a Std.D of 6.02. The tax maximum and minimum values are 39.9 and 3.48, respectively. The perceived FD average is 0.230 with a Std.D of 0.136. The FD maximum and minimum values are 0.732 and 0.037, respectively. The GFCF mean is 6.29 with a Std.D of 19.0. The maximum and minimum GFCF are 231.9 and -84.8, respectively. The mean is 14.1 with a standard deviation of 11.2. The maximum and the minimum values are 183.8 and -1.79, respectively. The TRADE average is 0.701 with a Std.D of 0.306. The maximum is 1.90, and the minimum value is .193. The LnPOP mean value is 16.5 with a Std.D of 1.51. The maximum and minimum values are 21.0 and 12.5, respectively.

Table 2. Descriptive Statistics

Variables	Mean	Std. Deviation	Min.	Max.
SD	0.66	0.11	0.37	0.85
GOV	-0.45	0.47	-2.02	0.68
PS	25.89	9.60	8.22	66.44
TAX	15.57	6.03	3.49	39.99
FD	0.23	0.14	0.04	0.73
GFCF	6.29	19.09	-84.88	231.93
MI	14.11	11.23	-1.80	183.84
TRADE	0.70	0.31	0.19	1.90
LnPOP	16.58	1.51	12.57	21.07

The correlation analysis among variables is shown in Table 3. The findings indicate that governance and financial development have a low positive correlation with sustainable development. In contrast, public spending, tax revenue, the misery index, and trade openness also have negligible positive associations with sustainable development. The gross fixed capital formation and population have a negligible negative association with sustainable development from 2006 to 2022 for developing economies.

Table 3. Correlation Matrix

	(SD)	(GOV)	(PS)	(TAX)	(FD)	(GFCF)	(MI)	(TRADE)	(LnPOP)
SD	1.0000								
GOV	0.4593	1.0000							
PS	0.2640	0.2768	1.0000						
TAX	0.1012	0.2480	0.6317	1.0000					
FD	0.4051	0.4885	0.2742	0.1239	1.0000				
GFCF	-0.1595	-0.1264	-0.1121	-0.0636	-0.1333	1.0000			
MI	0.0332	-0.0852	0.0899	0.1041	0.0918	-0.1253	1.0000		
TRADE	0.1821	0.3093	0.3933	0.3912	0.1559	-0.0135	-0.0168	1.0000	
LnPOP	-0.0964	-0.2015	-0.2536	-0.3741	0.3347	0.0098	-0.0440	-0.4177	1.0000

Results of the two-step system GMM for models 1 and 2 are presented in Table 4. The main findings of this section are a two-way relationship between core variables, such as governance and sustainable development. However, sustainable development and governance are used as explanatory variables with a lag value in both models. The first model results indicate that governance has a significant and positive impact on sustainable development, suggesting that governments that invest in education, infrastructure, and innovation support sustainable technologies, such as renewable energy production. This result supports the concept of economic sustainability and a sustainable environment in society, aligning with previous studies, such as Massey (2022) and Gündoğdu & Aytekin (2022). The results of tax revenue have a positive impact on sustainable development, indicating that tax revenue can support governments in financing environmental protection and sustainable programs. This condition includes financial support for hydropower, solar, and wind power projects, as well as support for environmental conservation and laws and acts that prevent environmental pollution, and the management of natural resources. These results have been found in previous related studies, such as Gurdal et al. (2021).

Furthermore, financial development has a positive impact on sustainable development, as it enables families to make investments in health and education, leading to social returns and human capital development. Human capital is capable of generating new ideas, developing new knowledge, and adding to the industry's knowledge base. Thus, human capital is a vital factor that determines a positive, sustainable development and an increase in well-being. These results align with Nguyen et al. (2022). Gross fixed capital formation has an insignificant impact on sustainable development, indicating that investments in automobile financing, such as electric buses, public transportation, metro lines, and bike lanes, contribute to environmental sustainability. These results are similar with Maune et al. (2023). Moreover, public spending is significantly and negatively associated with sustainable development, indicating that while public spending is important for development, it also increases public debt, diverting funds from essential expenditures on infrastructure, education, and health to service the debt. These results are similar to Hamadu (2024).

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The second model results indicate that sustainable development has a positive association with governance, which indicates that sustainable development concerns the protection of the environment, social justice, and economic stability, enabling the development of better governance structures that are responsive to society and more efficient. The results of trade openness have a positive association with governance, indicating that trade requires improvements in the regulatory environment, transparency, and bureaucratic efficiency, which reduces the probability of corruption and increases accountability. These results are similar to those of Effiong et al. (2023).

Table 4. Empirical Results for Sustainable Development and Governance

Variables	(SD) GMM	(GOV) GMM
SD		0.16240*** (0.000)
GOV	0.00984*** (0.000)	
PS	-0.00044*** (0.000)	
TAX	0.00052** (0.034)	
FD	0.02744*** (0.001)	
GFCF	0.00003 (0.176)	
MI		-0.00124*** (0.000)
TRADE		0.05209** (0.014)
LnPOP		-0.02685*** (0.000)
Constant	0.07108*** (0.000)	0.27316** (0.027)
Observation	885	885
Number of ids	59	59
Wald Chi2	1.3406***	0.39035 ***
Sargan test (Prob)	19.38 (0.250)	75.99 (0.126)
AR (2)	1.14 (0.253)	-0.03 (0.975)

*** indicates 'p<0.01', ** indicates 'p<0.05' and * indicates 'p<0.1'.

The misery index has a negative association with governance, indicating that in developing countries where governance structures are already relatively weak, increasing misery leads to governance challenges such as corruption, organizational incompetence, and poor decision-making. The results of this study align with a previous study by Majeed

(2014), who found a negative impact of inflation and unemployment on governance. Furthermore, population size has a negative association with governance in developing countries, indicating that population growth exacerbates unemployment and poverty problems when job creation fails to keep pace. High unemployment often leads to social unrest, increased crime rates, and political instability.

Both models indicate that the Wald-chi2 value is significant, suggesting that both models provide a good fit and that the parameters differ significantly from their expected values. The Sargan test chi-square value is not significant, specifying that overidentifying restrictions are valid. To conclude, both models exhibit the absence of autocorrelation, with insignificant auto-regressive (AR) values.

Table 5 presents the 3SLS findings for both models. The simultaneous model indicates that sustainable development and governance are treated as endogenous variables in this analysis. The first model shows the impact of governance on sustainable development in developing countries. The outcomes demonstrate that governance has a positive impact on sustainable development. Due to good governance, the use of available resources is well-monitored, leading to better-quality development, including the eradication of poverty and inequality, as well as improvements in environmental issues. Effective governance that promotes accountability and fosters political stability alongside the rule of law is crucial for implementing sustainable environmental policies. For instance, sound government frameworks can promote sustainable policies on environmental aspects, improve the provision of public services, encourage economic growth, and support the development of underprivileged societies. Moreover, good governance promotes the engagement of people with their leaders, as well as giving them a voice in their governance; hence, sustainable development will be of higher quality. These results align with previous studies, such as Massey (2022), which investigated the positive impact of adequate governance and public administration on achieving sustainable development. Gündoğdu & Aytekin (2022) reported that governance indicators, such as democracy, the rule of law, and regulatory quality, have a positive effect on sustainable development.

Public spending has an insignificant impact on sustainable development. Through government expenditure on the health and education sectors, people will be empowered, resulting in improved human capital and lower poverty levels. A skilled workforce is capable of generating new ideas, developing new knowledge, and contributing to the industry's knowledge base. Thus, human capital is a vital factor that determines positive, sustainable development and an increase in well-being, securing funding for organizations and programs involved in enforcing environmental laws and regulations, environmental conservation, pollution prevention, and ecosystem recovery. The protection of the environment plays a crucial role in achieving environmental sustainability. The positive association between public spending and sustainable development was also found by Cristóbal et al. (2021), who identified a positive role of public spending in achieving 17 SDGs in upper-middle-income countries.

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Table 5. Empirical results of 3SLS

Equation	Obs.	Parms	RMSE	R^2	Chi2	ρ
SDI	1003	5	.10047	0.2118	614.88	0.0000
GOV	1003	4	.52702	-0.2604	390.85	0.0000
Variables			(SD) 3SLS			(GOV) 3SLS
SD						4.8086*** (0.000)
GOV			0.14210*** (0.000)			
PS			0.00019 (0.273)			
TAX			-0.00023 (0.416)			
FD			0.13172*** (0.000)			
GFCF			-0.00013** (0.032)			
MI						-0.00211*** (0.003)
TRADE						0.02197 (0.293)
LnPOP						-0.03814*** (0.000)
Constant			0.69576*** (0.000)			-2.9913*** (0.000)
Observation			1003			1003
R-squared			0.2118			-0.2604

*** indicates 'p<0.01', ** indicates 'p<0.05' and * indicates 'p<0.1'.

In contrast, tax revenue has an insignificant impact on sustainable development. Raising tax revenue levels may have adverse effects on sustainable development in developing countries if it is not well-managed. High taxes have adverse effects on small businesses and low-income individuals, potentially depressing entrepreneurship and economic growth. This condition can lead to increased unemployment and poverty, ultimately destabilizing social sustainability. Additionally, when increased revenue is spent inefficiently, it is often lost through corruption or allocated to unproductive sectors. It does not enhance public services, including education, health services, and infrastructure, which are vital for long-term development. In this manner, an increase in tax revenue that can potentially finance development can undermine sustainability if it suppresses economic activity and is not appropriately reinvested. These findings are compatible with previous studies, such as Abd Hakim et al. (2022), who reported that

direct and indirect tax deters growth in developing countries due to weak institutional performance.

The finding that financial development is positively related to sustainable development and a sound financial system enhances the ability of sources of finance for individuals, small businesses, and large businesses to invest in sustainable activities, such as renewable energy and other green technologies. Financial independence is also achieved by empowering excluded individuals through the provision of banking services, savings, and micro-financial credit facilities, thereby enhancing the welfare of these individuals and the broader community. Furthermore, it enables shaping external stakeholder environments, such as financial markets, as a source of foreign direct investment and as agents that can mobilize domestic savings and invest in activities aligned with achieving sustainable development. These results align with Nguyen et al. (2022), which found a positive relationship between financial development and economic growth in emerging markets.

However, the impact of GFCF is negative on sustainable development. In developing countries, large-scale construction projects, such as roadways, buildings, and industries, can have a negative impact on the environment through deforestation. However, building and reconstructing roads within forests, wetlands, and ecosystems can lead to water pollution, reduce biodiversity, and have permanent detrimental effects on the environment. All these impacts will weaken the environmental dimension of sustainability. In contrast, Maune et al. (2023) noticed a positive relationship between capital formation and economic growth. This finding suggests that investments in automobile financing, such as electric buses, public transportation, metro lines, and bike lanes, will contribute to environmental sustainability. Furthermore, green transportation reduces pollution, lowers carbon emissions, and enhances the well-being of urban communities. The resilience of the transport system also enhances access to employment opportunities and services, leading to social progress and economic growth.

The results of the governance model are presented in this section. Sustainable development has a positive impact on governance. Sustainable development plays a crucial role in enhancing governance in developing countries by increasing transparency, eradicating unfair disparities, enhancing institutional capacity, and promoting long-term planning and sustainable development. Sustainable development concerns, including the protection of the environment, social justice, and economic stability, facilitate the development of better governance structures that are responsive to society and more efficient. Efficient incorporation of sustainability into national development activities enables developing countries to construct enhanced governance frameworks for sustainable development that would promote peace, sustainable economic development, and human development. There is a positive relationship between HDI and governance quality. If education levels increase, individuals become more aware of their rights, understand how their government functions, and comprehend how politics works.

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This paper indicates that the misery index is negatively associated with governance. In developing countries where governance structures are already relatively weak, increasing misery helps to bring governance challenges, such as corruption, organizational incompetence, and poor decision-making, to light. For example, in countries like Senegal, a high misery index is an indication of the nation's economic difficulty and is associated with a high level of corruption, as well as the misappropriation and misuse of funds intended for the provision of health and education services. Furthermore, high inflation diminishes real wages, thus reducing purchasing power, and increases unemployment, which in turn decreases political stability and exacerbates poverty and disparity. This can result in more protests, strikes, and civil unrest, and lower the government's credibility and power. However, these results are similar to those of Effiong et al. (2023), who reported that inadequate governance and weak quality of institutions increase the economic pain.

Table 6. Empirical Results of RE and FE.

Variables	(SD) RE	(GOV) FE
SD		1.3624*** (0.000)
GOV	0.03545*** (0.000)	
PS	0.00116*** (0.000)	
TAX	-0.00072** (0.081)	
FD	0.16874*** (0.000)	
GFCF	-0.00007 (0.102)	
MI		-0.00301*** (0.000)
TRADE		-0.04021 (0.285)
LnPOP		-0.21693*** (0.000)
Constant	0.62095*** (0.000)	2.3101*** (0.007)
R-squared	0.1138	0.0990
Wald-Chi2/F-Stat	139.53***	25.83***
Hausman value		13.22**

*** indicates 'p<0.01', ** indicates 'p<0.05' and * indicates 'p<0.1'.

Trade openness has an insignificant impact on governance. When countries open to trade, they enter into contact with international organizations as well as foreign investors. This interaction provides them with the best governance practices

to change inefficient or corrupt institutions. Furthermore, trade openness requires improvements in the implementing institutions, such as property rights, legal bodies, and regulatory agencies, as well as combating corruption to ensure investor and market stability. However, trade openness puts external pressure on the nation to reform those institutions that facilitate economic activities. Where institutions are strong enough to enhance fair trade, settle disputes, and enforce contracts to support better governance, there is less corruption. These outcomes align with a previous study by Majeed (2014), which reported that trade openness policies mitigate corruption in countries.

Ultimately, the population is negatively correlated with governance. Population growth exacerbates the problems of unemployment and poverty when job creation fails to keep pace with it. High unemployment leads to social unrest, increased crime rates, and political instability. Furthermore, in developing countries, population growth increases the overload of public services. For this reason, shortages of necessities can occur, including housing, transportation, health services, and education. However, an increasing population puts pressure on governments, which often results in increasing economic inequality and lower governance quality. These results have been found in previous related studies, which have also found that a population boom lowers government efficiency and countries' well-being.

The Fixed Effect (FE) and Random Effect (RE) are used to evaluate the robustness of the results presented in Table 6. The Chi-square value at the 1% level of significance in the Hausman test proves that it is suitable for fixed effects estimation. The FE is suitable for the governance model because the evidence indicates that the P-value is significant at the 1% level. The Hausman test value is modest in the sustainable development model. Consequently, the RE approach is suitable for this model.

CONCLUSION

Our analysis results in two main findings. First, an adequate governance structure is important for sustainable development. A transparent, accountable, and well-controlled government helps a country achieve its development aims. Effective government laws in developing countries mean they are likely to do what is best for society, the economy, and the environment. Second, the analysis shows that sustainable development plays a positive role in guiding the governance process. Enhancing HD indicators, such as education, health, and income, encourages citizens to participate more actively and feel safer, which in turn creates a better and more trustworthy government.

Furthermore, our empirical findings may help formulate appropriate policies for the developing economy's government and policymakers. One of the primary policy implications of the nexus between governance and sustainable development in developing countries is the urgent need to build institutional capacity and foster transparent and accountable systems of governance. Good governance is crucial in ensuring that public resources, including tax revenues, are efficiently and equitably

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directed to priority development areas such as education, health, infrastructure, and environmental protection. Second, poor governance has been known to lead to corruption, ineffective management, and the poor delivery of public services, which in turn lower economic growth and social trust — both of which are fundamental pillars of sustainable development. Policymakers must therefore focus on reforms that strengthen the rule of law and fiscal transparency, as well as establish effective mechanisms for citizen participation and oversight. Third, the development strategies pursued by countries would be more resilient and effective if good governance principles were incorporated into these strategies and allowed for adjusting short-term political goals to long-term sustainability-related objectives.

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