ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 13, Issue 2, pp: (35-48), Month: April 2025 - June 2025, Available at: www.researchpublish.com

The Influence of Effective Governance, Environmental Stewardship and Economic Growth on Human Development in Tanzania

VC Kyara

(Centre for Leadership and Management, Tangaza University – 00509 Nairobi, Kenya)

DOI: https://doi.org/10.5281/zenodo.15479028

Published Date: 21-May-2025

Abstract: **In the development discourse, there has been a debate on whether development classification should priorities human development outcomes such as health, education and dignity, instead of just economic growth averages. For instance, the World Bank, on the basis of economic growth, officially classify some of the developing nations as low-middle-income countries, and others as upper-middle-income. However, this raises a critical question: Is the economic progress of these countries commensurate with advancement in human development? Why does a substantial part of the population of low-middle-income economies, e.g., Tanzania, continue to languish in poverty and experience low human development? This paper used a nonlinear autoregressive distributed lag (NARDL) model and Bounds testing approach to examine the influence of economic growth, effective governance and environmental stewardship on human development in Tanzania using annual time series data on human development index, GDP per capita, government effectiveness, and ecological footprint for the period 2000 – 2022. To explore the causality among the variables, the study employed the Granger causality approach. The findings confirm the presence of long-run cointegration among the variables. The pairwise Granger causality supported strong unidirectional causality from government effectiveness to human development. The NARDL test confirmed the significant influence of GDP per capita, lagged values of human development, government effectiveness, and ecological footprint on human development outcomes. The study concludes that for improved human development outcomes, Tanzania needs to priorities policies that enhance government performance and sustainable environmental practices.**

Keywords: **Ecological footprint; Government effectiveness; Human development; Tanzania.**

I. INTRODUCTION

Many developing economies have seen considerable economic growth, but this has not been matched by significant improvements in human development. For instance, from the year 2000, Tanzania has reported consistent GDP growth ranging from 4.5% to 6.5%, leading to an average annual growth rate of 6.4% [1]. Despite such consistent growth, the country is still experiencing elevated levels of poverty, limited access to quality education and health services, unemployment, and an overall low standard of living. For instance, a recent study by United Nations agencies reported an increased poverty rate from 26.1% in 2019 to 27.7% in 2020 [2]. The healthcare spending per capita in 2021 is reported at US$ 37, a decline from US$ 41 in 2017[3]. The percentage of the population with durable access to clean water in 2022 was 11.34%, an increase from 10.09% in 2018 [4]. Similarly, 92.3% of the population in 2018 were living below US$ 5.5 a day, an improvement from 98.3% in 1991.

As is the case for most developing nations, Tanzania is targeting to improve government effectiveness and environmental quality as among the important ways of addressing some of the socio-economic challenges facing the country – poverty, corruption, low literacy rates, unsustainable foreign debt, etc., - to experience a higher level of overall human development.

Improved government effectiveness is thought to be an important instrument for delivering human development because it is associated with major human development attributes such as better policy formulation and implementation, rule of law, governance quality, and institutional strength.

Besides, Tanzania is putting some effort into improving the quality of the environment by taking strategies, e.g., to mitigate the consequences of climate change, contain the air pollution crisis, make sustainable use of natural resources, etc. Also, these efforts will generate a more supportive and healthier environment. Access to better health and education is among the key enabling factors for economic well-being and human development.

The current study seeks to examine the impact of government effectiveness and environmental quality in Tanzania in order to generate empirical evidence to validate the claim that the consistent annual economic growth experienced by the country is being inspired by the quality of governance and improved environmental quality indicators, which in turn translates to higher levels of human development. The literature on human development in Tanzania is dominated by qualitative studies; there is extremely limited empirical research to add voice to the qualitative scholarly works in this area. Specifically, the implication of weak governance in Tanzania, as well as most of the sub-Saharan African countries, has not received systematic and empirical assessment [5]. Therefore, the current study is of utmost importance because it will generate necessary data for assessing the nature and extent to which government effectiveness and environmental quality are shaping human development in Tanzania and pave the way for the realisation of the universal priorities, such as the United Nations Sustainable Development Goals (SDGs).

Therefore, this research seeks to narrow the knowledge gap on how the environmental quality and effectiveness of the government jointly shape human development in Tanzania. The research is guided by three research questions: First, how does the government's effectiveness in Tanzania influence human development? Second, what is the environmental impact on human development in Tanzania? Third, what is the nature of causality, if any, between human development, environmental quality, and effectiveness of the government in Tanzania? With this regard, the overall aim of this study is to assess the influence of government effectiveness and environmental quality on the human development process in Tanzania.

The study focuses on Tanzania, using data for the period 2000 – 2022. The main reason for choosing this period is because of a limitation on the availability of reliable data. Specifically, there is no reliable empirical data on government effectiveness for the period before 2000. The period is characterised by the transition process in governance and economy, transiting from *Ujamaa*[1] Socioeconomic and governance style to a more liberal governance and openness to global economic and political influences.

The current study is quite significant because it shows the individual and combined effect of good governance and environmental quality on various aspects of human development - health, education, economic growth, and overall quality of life. In this case, the study delivers significant insights for policy making and implementation in Tanzania, specifically on how the improvement of environmental and governance quality can significantly enhance human development and overall well-being.

The subsequent section after this introduction presents a theoretical and empirical review of the literature on the influence of the quality of governance and environment on human development. This will be followed by the methodology and results section. The last two sections of the study will focus on a discussion of study findings, policy implications, and conclusion, respectively.

II. BRIEF LITERATURE REVIEW

A. Human development and government effectiveness:

To assess the effect of government performance and corruption on human development, Akinbode et al. (2020) employed the Generalised Method of Moment (GMM) to assess the triparty relationship among 37 sub-Saharan countries from 2005 – 2018. The study revealed that the lagged value of human development, government effectiveness, and health budgetary spending significantly and positively affect human development, while corruption doesn't influence human development. The study further recommended retraining government employees towards a mindset of effectiveness and political will to achieve it.

[1] Ujamaa refers to a concept of collective social and economic development based on communal sharing and cooperation. It was most notably implemented as a key part of the socialist-oriented policies in Tanzania.

Ganyaupfu (2014) assessed the influence of government effectiveness using panel data from 11 Southern African countries during 2005 – 2012. The Random Effect Model revealed that out of the six indicators of governance, only voice accountability and political stability have a significant influence on human development.

To assess the influence of good governance on human development in Vietnam, Quang (2017) employed a system of spatial equations and a cross-province dataset for the period 2001 -2010. The study revealed that for sustainable human development and adequate targets in spatially difficult areas, it is necessary to include good governance as a countrywide policy variable. Further, the research established that good governance has a more significant effect on human development aspects such as political freedom and political participation, while less impact is experienced on the traditional human development components such as education, health, and income. With this, the study affirmed that to sustain development, governments must pay adequate attention to the traditional human development components without undermining political freedom and participation.

Kadarisman et al., (2022) conducted a case study of the Depute for Human Resources of the Indonesian Ministry of Empowerment of the State Apparatus and Bureaucratic Reform focusing on industry 4.0 i.e., the influence of the current industrial revolution (which is characterised by automated manufacturing process) in addressing societal challenges (society 5.0). The findings from the mixed method (interview, focus group discussion, and path analysis) revealed that entrepreneurial and bureaucratic government, whose quality is largely determined by industry 4.0, have a significant bearing on addressing societal challenges, and hence determine the overall human development in Indonesia. Besides, the study emphasised the strategic value of data-centred policies.

Naskar et al., (2023) examined the influence of good governance on human development in 164 selected countries across the world for the period of 2002 – 2019. The principal component analysis revealed a significant relationship between good governance and human development, and that among the other components, government effectiveness is the most effective in inducing good governance.

B. Human development and environmental quality:

The impacts of environmental quality on human development are mediated by human health and economic growth. That is, human health and economic growth act as middle steps in the causal relationship between environmental quality and human development. When economic growth and or human health are affected by the quality of the environment, the ultimate effect is on human development and overall well-being. For instance, using time series data on carbon dioxide, Sulphur dioxide, and GDP for the period 1961 – 2004, Fodha & Zaghdoud (2010) investigated the relationship between economic growth and environmental pollutants in Tunisia. The cointegration analysis revealed the long-run relationship between per capita emissions and per capita GDP, which has a significant bearing on human development. Further, the study confirms a unidirectional causality with income causing environmental changes.

To analyse the association between human development and environmental quality in China, Li & Xu (2021) carried empirical study using provincial data on human development, environmental quality and economic growth for the span of 2004 – 2017. The simultaneous equation model delivered evidence of an inverted U-shaped relationship between environmental degradation and human development. Further, the study revealed that environmental degradation tends to undermine the rate of growth of GDP per capita.

Bouzid et al. (2014) designed a study to estimate the risk of re-emergence of dengue fever under the climatic variability scenarios, and its impact on human development. Using the Generalised Additive Model, the researchers estimated dengue fever risk as a function of climatic variables (maximum and minimum temperature, humidity) and socioeconomic factors (population density, GDP per capita, urbanisation) for Mexico during 1985–2007. It was established that the coastal areas of the Mediterranean, Adriatic seas, and Po Valley in northern Italy are more prone to dengue fever re-emergence, which its actualisation will undermine human development significantly.

Using the ordinary least squares (OLS) method, Porreca (2020) examined the relationship between emissions, air pollution, renewable energy reliance, land and water conservation, development status, and human capital levels among 101 nations from Africa, Asia, Europe, North and South America. The results confirmed that carbon emissions and particulate matter air pollution are the most significant environmental factors influencing human capital index scores. Besides, the positive correlation between carbon emissions and human capital levels nearly vanishes in developed countries.

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 13, Issue 2, pp: (35-48), Month: April 2025 - June 2025, Available at: www.researchpublish.com

It has been further affirmed that climatic variabilities – climate change – which is highly associated with unsustainable environmental practices, affect people disproportionately; the poor population/regions being the most affected, and worsen the already existing inequality [14]. As such, the authors argue that climate changes lengthen the disease transmission period and increases the spread of many infectious diseases, thereby bringing health issues which in turn undermine the whole human development process.

Omri et al. (2015) examined the causal relationship between environmental quality, openness to international trade, economic growth, and financial development in 12 Middle East and North African countries for the period 1990 – 2011. The simultaneous equation panel data model shows bidirectional causality between environmental quality and economic growth, and interrelation between trade openness and economic growth. Economic growth being a mediating variable between environmental practices and human development, these findings therefore point to a significant impact of environmental quality on human development.

III. MATERIALS AND METHODS

A. Data, variables and conceptual approach

This study seeks to assess the influence of government effectiveness and environmental quality on human development. From the political economy point of view, human development is shaped by economic, social, environmental, and political factors [16], [17], [18]. The current study will therefore use the human development index as a proxy for human development, the government effectiveness index as a proxy for governance quality, and the ecological footprint as a comprehensive indicator of environmental quality. Besides, to model the socioeconomic influence on human development, the study employs GDP per capita as an intervening variable.

In addition to the description of variables captured in Table 1, the chosen variables for this study are also validated by some relevant past studies such as Kyara, (2022b); Akinbode et al., (2020), and Omri et al., (2015), which utilized some or combination of the chosen variables. Table 1 summarises the type and source of data used in this study.

TABLE 1: DESCRIPTION OF VARIABLES AND DATA SOURCES

Variable	Description	Data Source
Human Development Index (HDI): Proxy for human development.	HDI is a composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.	[19]
Government Effectiveness Index (GE): Proxy for governance quality/performance.	The GE index measures the quality of public services, the quality of the civil service, and the degree of its independence from political pressures, among other factors.	[20]
Ecological Footprint (EF): Proxy for environmental damage.	EP is a comprehensive measure of the environmental impact of human activities, quantifying the amount of natural resources and ecosystems required to produce the goods and services consumed and absorb the waste and carbon emissions generated.	[21]
GDP per capita (GDP): an indicator of a country's economic performance or standard of living.	GDP per capita measures the average income or economic production per person and is often used as an indicator of a country's standard of living or economic performance.	[22]

The theoretical understanding of the nature of the relationship between the dependent variable, i.e., human development, and the explanatory variables, i.e., governance effectiveness, environmental integrity, and per capita GDP, suggest a non-linear relationship. This is so because the effect of independent variables on the dependent variable differs depending on whether the independent variable is increasing or decreasing. Besides, we suppose that the rate of change of the dependent variable due to changes in the independent variable is subject to the economic threshold aspect. To vindicate this idea, the study first carried out the Ramsey test, and the results are summarised in Table 2.

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 13, Issue 2, pp: (35-48), Month: April 2025 - June 2025, Available at: www.researchpublish.com

TABLE 2: RAMSEY RESET TEST

Specification:	LNHDI C LNGE LNEFP LNGDPPC		
	Value	df	Probability
F-statistic	46.66176	(2, 17)	0.0000
Likelihood ratio	43.01469	2	0.0000

The Ramsey finding shows that the calculated F-statistic is 46.66, and the corresponding p-value is 0.00. Since the F-statistic > p-value, it indicates that the relationship among the variables is better captured using a non-linear model. This finding is consistent with the expected findings.

Following the findings in Table 2, the current study employs a non-linear Autoregressive Distributed Lag (NARDL) model to examine the influence of independent variables on the dependent variable. The NARDL model, which is an extension of the Autoregressive Distributed Lag (ARDL) model, incorporates non-linear relationships between variables [17]. It is used in time series analysis to capture both short-run and long-run dynamics, while also accounting for asymmetries since the impact of positive or negative changes in explanatory variables can differ.

The NARDL model, which contains both lagged values of the explained variable, the current and lagged values of explanatory variables as regressors, is superior to other similar models, e.g., VAR models, because it uses both exogenous and endogenous variables. The model is best suited for small data [17], [23], [24], and it captures the dynamic effects from the lagged independent and dependent variables. Since the model includes an adequate number of lags of dependent and independent variables, the problem of serial correlation in the errors is effectively eliminated. Besides, the study will employ a pairwise Granger causality approach [25], [26] to explore the causal relationship, if any, among the variables.

B. Model specification

Following some earlier empirical studies [27], [28], [29], the relationship among the variables is construed as follows:

$$HD_t = \beta_o + \beta_1 GE_t + \beta_2 EF_t + \beta_3 GDP_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where HD is an index of human development, measuring the rate of overall human development; EF is ecological footprint, measuring the extent of environmental damage; GE is the government effectiveness index, measuring the quality of governance; GDP is per capita GDP, measuring the country's economic performance; ε is error term, and βi are vectors of long-run coefficients to be estimated.

Considering the works of [29], [30], equation (1) can be transformed as follows to account for asymmetries among the variables:

$$LNHD_t = \theta_0 + \theta_1 LNGE_t^+ + \theta_2 LNGE_t^- + \beta_3 LNEF_t + \beta_4 LNGDP_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where θ_i is a vector for long-run coefficients and LN denotes natural log. All the data enters the model in log form to be able to obtain elasticities directly. It is expected that $\theta_1 > 0$ and $\theta_1 > \theta_2$ because an increase in government effectiveness will have a higher effect on human development than a decline in government effectiveness. To account for the asymmetry impacts of government effectiveness on human development, we have included GE_t^+ and GE_t^- in equation 2 to represent the positive changes and negative changes in government effectiveness, respectively. In this case, GE_t^+ and GE_t^- represent the partial sum of the changes in GE_t.

Following equation 2, the unrestricted error correction model can be derived in the light of some foundational works [27], [30], [31] as follows:

$$\Delta LNHD_t = \alpha_0 + \alpha_1 LNHD_{t-1} + \alpha_2 POS(LNGE)_{t-1} + \alpha_3 NEG(LNGE)_{t-1} + \alpha_4 LNEF_{t-1} + \alpha_5 LNGDP_{t-1} + \sum_{i=1}^{n} \beta_1 \Delta LNHD_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta POS(LNGE)_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta NEG(LNGE)_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta LNEF_{t-i} + \sum_{i=0}^{n} \beta_5 \Delta LNGDP_{t-i} + \mu_t \ldots\ldots\ldots\ldots (3)$$

C. Non-linear Autoregressive Distributed Lag (NARDL) Model estimation process:

Since the NARDL model is an extension of the ARDL model to take care of non-linear relationships for a given dataset, to estimate NARD, we first estimate the ARDL model. So, first, we employ the ADF unit root test to examine the order of cointegration among the variables. For NARDL findings to be reliable, all the series must be stationary at the level I(0) or at the first difference I(1). Second, we determine the appropriate lag length with the aid of the Schwarz Information Criterion

(SIC). Thirdly, with the aid of the Bound testing cointegration method [32], we test for the existence of a long-run relationship among the variables in equation 3. Finally, we use the Granger causality technique [25] to explore the causal relationship among the variables. The literature attests that this technique is robust and is considered one of the best tests for causal relationship in time series data [33], [34].

IV. RESULTS

A. Stationarity test

The first step in estimating the ARDL model involves testing for the stationarity of the time series data. To effectively handle serial correlation and accommodate trends, the Augmented Dickey-Fuller (ADF) test is considered one of the best tests for unit roots. Besides, the test is flexible with respect to the structure of the time series. In this case, ADF is a widely-accepted and robust tool that provides reliable results, and has it has been comprehensively tested and validated across different types of time series data [35], [36], [37]. In our case, this step will involve step-wise testing by making each variable independent variable and checking the stationarity one at a time. All the variable enters the model in natural log form so that it is possible to derive elasticities directly. We note here that to perform stationarity and other subsequent tests, the indices for government effectiveness are centred to make them positive to allow for log transformation. The interpretation of our subsequent final finding will take the centring effect – change of scale – into consideration. The results of the unit root test are summarised in Table 3.

TABLE 3: UNIT ROOT TEST

Time series/Null hypothesis (Ho)	**At the level form**				**At first differences form**			
	ADF	**P-value**	**P-value vs. crit. value**	**Decision**	**ADF**	**P-value**	**P-value vs. crit value**	**Decision**
LNHD *H0: LNHD has a unit root and is not stationary*	-3.15	0.04	0.04<0.05 Reject Ho	LNHD has no unit root and is stationary at level form.	N/A	N/A	N/A	N/A
LNEF *H0: LNEF has a unit root and is not stationary*	-0.73	0.82	0.82>0.05	LNEF has the unit root and it's not stationary at the level form	-3.16	0.04	0.04<0.05	LNEF has no unit root and it is stationary at first difference
LNGE *H0: LNGE has a unit root and is not stationary*	-4.19	0.004	0.004<0.05	LNGE has no unit root and is stationary at level form.	N/A	N/A	N/A	N/A
LNGDP *H0: LNGDP has a unit root and is not stationary*	-3.89	0.01	0.01<0.05	LNGDP has no unit root and is stationary at level form.	N/A	N/A	N/A	N/A

From Table 3 we deduce that LNHD, LNGE, and LNGDP are stationary at level form, i.e., I(0); and LNEF are stationary at first difference. Therefore, since the variables are integrated at different orders i.e., I(0) and I(1), and there is no variable which is integrated of order 2, then the NARDL model is the appropriate model.

Optimal lag determination: Since our primary focus is to estimate the extent to which government effectiveness and environmental quality shape human development, we use the Schwarz information criterion (SC) to determine the appropriate lag length when LNHD is the dependent variable. With the aid of Eviews, the SC confirms 2 as an optimal lag.

Estimation of Linear Autoregressive Distributed Lag (ARDL) model: To estimate a non-linear ARDL model, first we estimate linear ARDL [38], see if the overall model holds, and check for co-integration since we need to determine if there is a long-run association among the variables. The results of linear ARDL are summarised in Table 4. The results show that the R-square is quite high – the regressors explain about 99% of the changes in the dependent variable. Also, most coefficients are significant, and the overall model is statistically significant as implied by the F-statistic. Based on liner ARDL findings, we carry out the Bounds test for cointegration because we are interested in finding if the long-run relationship among the variables exists - and estimate a non-linear ARDL model.

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 13, Issue 2, pp: (35-48), Month: April 2025 - June 2025, Available at: www.researchpublish.com

TABLE 4: ESTIMATION RESULTS OF THE LINEAR ARDL MODEL

Dependent Variable: LNHD				
Dynamic regressors (2 lags, automatic): LNGE LNEF LNGDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNHD(-1)	1.417983	0.143495	9.881764	0.0000
LNHD(-2)	-0.510518	0.147803	-3.454041	0.0043
LNGE	8.88E-06	0.000245	0.036229	0.9716
LNGE(-1)	0.000637	0.000240	2.655933	0.0198
LNGE(-2)	0.001263	0.000230	5.503696	0.0001
LNEF	-0.050442	0.017661	-2.856092	0.0135
LNGDP	0.023752	0.029647	0.801174	0.4374
C	-0.212488	0.240543	-0.883367	0.3931
R-squared	0.998793	Mean dependent var		-0.717082
Adjusted R-squared	0.998143	S.D. dependent var		0.078181
S.E. of regression	0.003369	Akaike info criterion		-8.265958
Sum squared resid	0.000148	Schwarz criterion		-7.868044
Log likelihood	94.79255	Hannan-Quinn criter.		-8.179600
F-statistic	1536.613	Durbin-Watson stat		2.245453
Prob(F-statistic)	0.000000			
*Note: p-values and any subsequent tests do not account for model selection				

B. Bounds test for co-integration:

Since the variables are integrated of I(0) and I(1), it is necessary to perform a co-integration test to find out if a long-run relationship exists or not. To this end, the study employs a bounds test (Pesaran, et. al., 2001). The results and interpretation of the bounds test are summarised in Table 5.

TABLE 5: BOUNDS TEST OF CO-INTEGRATION FOR THE LINEAR ARDL MODEL

Dependent variable	F-statistic	I(0) 5% crit.value	I(1) 5% crit.value	Cointeg-ration	Interpretations
LNHD	13.54	3.23	4.35	Yes	Long-run associations among the variables exist
LNGE	6.68	3.23	4.35	Yes	Long-run associations among the variables exist
LNGDP	7.496	3.23	4.35	Yes	Long-run associations among the variables exist
LNEF	1.83	3.23	4.35	No	No longrun relationship among the variables

From the Bounds test results, when LNHD is the dependent variable, which is the main series of interest, the calculated F-statistic (i.e., 13.54) is greater than the I(1) critical values. This affirms that the variables in this series are co-integrated and they have a long run-relationship.

C. Estimating the non-linear Autoregressive Distributed Lag (NARDL) model:

The results for the non-linear ARDL model are summarized in Table 6.

TABLE 6: ESTIMATION RESULTS OF THE NARDL MODEL

Dynamic regressors (2 lags, automatic): LNGE_POS LNGE_NEG LNEF_POS LNEF_NEG LNGDP				
Fixed regressors: C				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNHD(-1)	0.751047	0.064398	11.66265	0
LNGE_POS	-0.020531	0.00544	-3.774365	0.0054
LNGE_POS(-1)	-0.000176	0.000276	-0.636648	0.5421
LNGE_POS(-2)	0.00156	0.000278	5.602713	0.0005
LNGE_NEG	0.001144	0.000385	2.974887	0.0177
LNGE_NEG(-1)	-0.021026	0.005706	-3.684683	0.0062
LNEF_POS	-0.320232	0.083537	-3.833398	0.005
LNEF_POS(-1)	0.038858	0.087741	0.442866	0.6696

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 13, Issue 2, pp: (35-48), Month: April 2025 - June 2025, Available at: www.researchpublish.com

LNEF_POS(-2)	-0.214153	0.070971	-3.017479	0.0166
LNEF_NEG	0.113587	0.052069	2.181456	0.0607
LNGDP	0.259667	0.059173	4.388264	0.0023
C	-1.844939	0.425271	-4.338264	0.0025
R-squared	0.999524	Mean dependent var		-0.708842
Adjusted R-squared	0.99887	S.D. dependent var		0.070236
S.E. of regression	0.002361	Akaike info criterion		-8.975742
Sum squared resid	0.0000446	Schwarz criterion		-8.378303
Log likelihood	101.7574	Hannan-Quinn criter.		-8.859116
F-statistic	1527.816	Durbin-Watson stat		2.9381
Prob(F-statistic)	0			
*Note: p-values and any subsequent tests do not account for model selection.				

Analysis of NARDL results:

The sign of the coefficient of LNHD (-1) is positive and significant as expected. This means that the past values of human development significantly explain the current period of human development. A 1% increase in LNHD in the previous period accounts for a 0.75% improvement in human development in the current period. This finding also implies that human development in the context of Tanzania is persistent over time.

The positive government effectiveness, i.e., LNGE_POS, exhibits a negative relationship with LNHD. Specifically, a 1% increase in LNGE_POS significantly reduces LNHD by 0.02%. This finding is different from the expected direct relationship between LNGE and LNHD. While there could be underlying factors for the inverse relationship, it is possible that there is a diminishing impact of government effectiveness on the overall human development in Tanzania.

The coefficient of LNGE_POS(-2) is statistically significant. A 1% increase in the government effectiveness in its second lag leads to a 0.0016% increase in LNHD. The coefficient of LNGE_POS(-1) is approximately zero, causing an insignificant change in LNHD. The positive coefficient associated with LNGE_NEG suggests a significant impact on LNHD, such that a 1% decrease in government effectiveness is associated with a 0.0011% increase in human development. Besides, the coefficient of LNGE_NEG(-1) is negative and significant. This implies that every 1% decrease in LNGE_NEG(-1) leads to a 0.021% decrease in LNHD.

With regards to ecological footprints, the negative coefficient for LNEF_Pos indicates that a 1% positive increase in LNEF contributes to a 0.32% decrease in LNHD. While the positive influence of LNEF_POS(-1) on LNHD is negligible and insignificant, the second lag of positive ecological footprints, i.e., LNEF_POS(-2), shows a negative relationship with LNHD. Specifically, a 1% increase in LNEF_POS(-2) leads to a 0.21% decrease in LNHD. This means that in the case of Tanzania, increased ecological footprints in the current period will have a multiplying severe negative effect on the overall human development process in the subsequent periods. This underscores the rising socio-environmental costs associated with unsustainable utilization of natural resources at the present period. Moreover, a 1% increase in LNEF_NEG generates only a marginal effect of 0.11% increase in LNHD. The findings confirm a significant positive impact of LNGDP on LNHD. A 1% increase in LNGDP leads to a 0.26% increase in LNHD.

Finally, the R-square and adjusted R-square both attest that the model is quite fit and parsimonious. Likewise, the F-statistic confirms the overall significance of the model - the model offers a good fit for the data. The WD statistics, which are close to 3, also corroborate these results by showing that the model is free from significant autocorrelation issues; the residuals are independent.

In sum, the model has generated evidence of the importance of ecological footprints, government effectiveness, and GDP per capita in shaping human development in Tanzania. Specifically, although GDP per capita positively influences human development as anticipated, both positive government effectiveness and ecological footprints generally reduce human development in the short term. Meanwhile, a decline in government effectiveness negatively affects human development in the second lag.

D. Bounds test for cointegration in the NARDL model.

From Table 5 results we need to test for cointegration using Bounds testing. This test is necessary because it generates long-run coefficients and short-run dynamics, necessary for interpreting the effects of both the negative and positive components of repressors. The Bounds test for cointegration in the NARDL model is presented in Table 6.

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 13, Issue 2, pp: (35-48), Month: April 2025 - June 2025, Available at: www.researchpublish.com

Interpretation of the results of Bound test for cointegration in the NARDL model - Table 7:

In the bounds test for cointegration, the calculated F-statistic is compared with the I(1) bound critical value, which assumes that the variables are cointegrated and that a long-run relationship among them exists. Since the calculated F-statistic (14.24) is greater than the I(1) critical bound value at 5% (3.79), the null hypothesis is rejected and we affirm the existence of a long-run cointegration relationship among the variables. Thus, the model affirms the long-run relationship between human development (LNHD), government effectiveness (LNGE), environmental quality (LNEF), and GDP per capita (GDP) at a 5% critical value level. In particular, the lagged value of LNGE significantly influences the changes in LNHD, while the influence of EFP and LNGDP on LNHD is relatively weaker and in some cases statistically insignificant.

TABLE 7: BOUNDS TEST FOR COINTEGRATION IN THE NARDL MODEL

Null Hypothesis: No long-run relationships exist				
Test Statistic	Value	K		
F-statistic	14.24274	5		
Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
0.1	2.26	3.35		
0.05	2.62	3.79		
0.025	2.96	4.18		
0.01	3.41	4.68		
Test Equation:				
Dependent Variable: D(LNHD)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGE_POS)	-0.010818	0.006018	-1.797506	0.11
D(LNGE_POS(-1))	-0.001186	0.000334	-3.546476	0.0075
D(LNGE_NEG)	0.000603	0.000458	1.316082	0.2246
D(LNEF_POS)	-0.154314	0.100126	-1.541201	0.1618
D(LNEF_POS(-1))	0.102919	0.081935	1.256117	0.2445
C	-0.795172	0.466496	-1.704565	0.1267
LNGE_POS(-1)	-0.010097	0.005579	-1.809871	0.1079
LNGE_NEG(-1)	-0.009736	0.005794	-1.68031	0.1314
LNEF_POS(-1)	-0.313907	0.080739	-3.887913	0.0046
LNEF_NEG(-1)	-0.025693	0.061371	-0.41865	0.6865
LNGDP(-1)	0.109176	0.063877	1.709147	0.1258
LNHD(-1)	-0.144317	0.081954	-1.760957	0.1163
R-squared	0.954528	Mean dependent var		0.012539
Adjusted R-squared	0.892004	S.D. dependent var		0.009757
S.E. of regression	0.003206	Akaike info criterion		-8.363693
Sum squared resid	0.0000822	Schwarz criterion		-7.766253
Log likelihood	95.63693	Hannan-Quinn criter.		-8.247066
F-statistic	15.26651	Durbin-Watson stat		2.284439
Prob(F-statistic)	0.000344			

From Table 6, the calculated F-statistic, i.e., 9.41 is greater than the 1%, 5% and 10% I(1) critical values. This implies that the variables are cointegrated; there is a long run relationship.

Diagnostic tests:

Figure 1represent the CUSUM test for the NARDL model stability. Since the graph lies within the 5% significance boundary, it implies that the model is stable.

ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 13, Issue 2, pp: (35-48), Month: April 2025 - June 2025, Available at: www.researchpublish.com

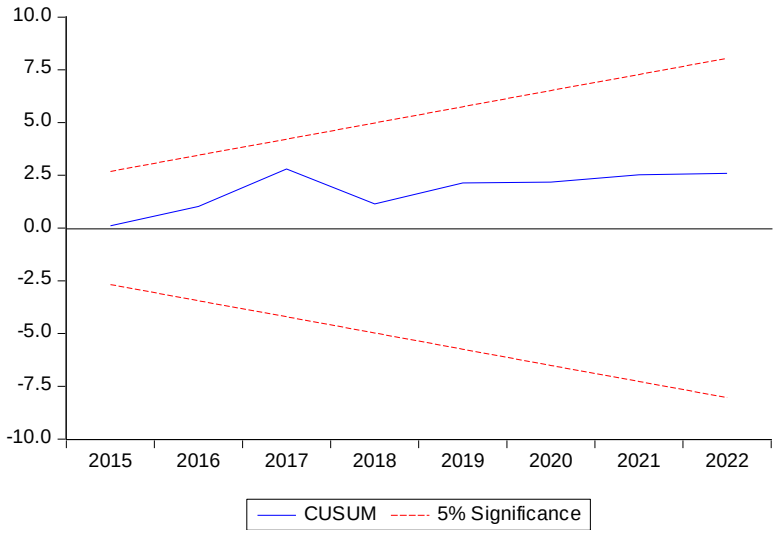

Fig.1: CUSUM Test

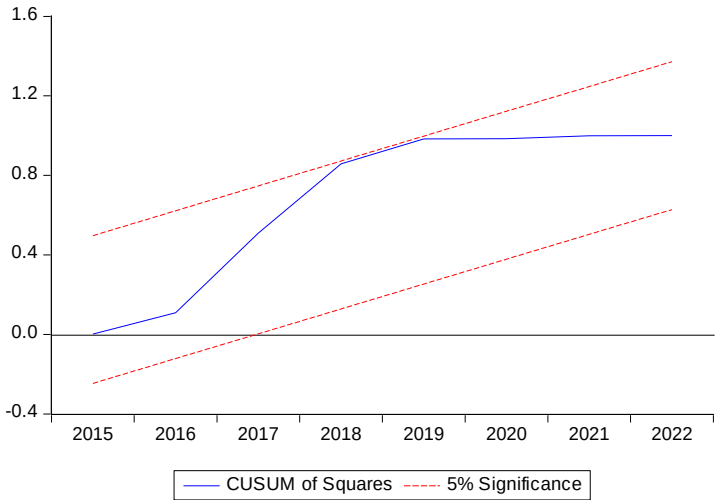

Fig.2: CUSUM of Square

Like the CUSUM test, the graph for CUSUM of Squares lies within the 5% critical boundaries implying that the model is not explosive, but stable.

E. Pairwise Granger causality test

Appendix 1 shows significant Granger causality, at 5% critical value as follows: LNGE Granger causes LNHD; LNGE_NEG Granger causes LNGDP; and LNGE_POS Granger causes LNHD. These implies that first, the fact that changes in government effectiveness, i.e., LNGE and LNGE_POS, have a significant bearing on the environment suggest that government performance in the current period significantly influences human development outcomes in the current period. Therefore, to accelerate human development outcomes for the current period, Tanzania needs to emphasise policy strategies targeting strengthening government performance. These may include training of public servants in effective decision-making and optimal resource allocation, accelerating the fight against corruption, and reinforcing consistent accountability and robust monitoring and evaluation practices. Second, a decline in government performance is shown to cause changes in economic growth, meaning that the quality of governance matters for greater economic outcomes. In this

case, policy actions focusing on enhancing government performance are necessary for continued economic growth and human development in Tanzania.

At a 10% critical value, the causality test also ascertained a unidirectional causality from positive and negative changes in ecological footprint to the current ecological footprint outcomes. Likewise, negative changes in government effectiveness are shown to cause a higher ecological footprint. These causal findings imply that, first, current efforts to control unsustainable environmental practices have immediate significant bearing on environmental stewardship outcomes. It follows, therefore, that for Tanzania to experience better environmental outcomes, and thereby improved human development outcomes, the country should foster best environmental practices, which may include strategies to raise public awareness and knowledge, imposing stricter measures for improved compliance with environmental control and safeguards, etc. Second, the fact that a decline in government effectiveness causes ecological footprint, it means that improving the quality of governance in Tanzania will deliver improvement in environmental stewardship practice. Among other measures, the quality of governance may be improved, as already stated above, by targeting efficiency and strengthening of service delivery systems in the country, especially in health, education and transport, and energy infrastructures.

In sum, the casualty findings are consistent with the NARDL model findings presented and discussed in Tables 6 and 7 in this research.

V. DISCUSSIONS AND POLICY IMPLICATIONS

First, the positive and significant relationship between current human development outcomes and their lagged value in Tanzania underscores the importance of building on past successes. This finding is also validated by some past similar studies [39], [40]. Therefore, if Tanzania opt to focus on long-term policies, which are both sustainable and inclusive, the country can experience a virtuous cycle of human development for the benefit of the current and future generations. In particular, policies that target sustainable improvement in healthcare, education, infrastructure, and poverty alleviation can generate long-term benefits which compound themselves for improved human development. Enhancing access and quality of education (primary, secondary, and tertiary level) prepares a future generation with the ability to contribute better to economic growth for human development. Likewise, strengthening the healthcare system, e.g., by improving inclusive access to quality medical services, focusing on preventive care and improving investment in healthcare facilities, could create increased life expectancy and reduced mortality, which jointly led to overall human development. As well, infrastructure improvement, e.g., roads, water and sanitation, electricity, etc., especially in rural and underserved areas where most of the population resides, will in the long run yield higher levels of human development. Other policy strategies implied by the positive association between lagged human development outcomes and current outcomes include developing programs to reduce regional disparities and decentralise the development process, empowering local governments, ensuring policy continuity, and building a robust culture of consistent and critical monitoring and evaluation.

Second, the findings attest that an improvement in government effectiveness in its second lag has a significant positive impact on human development. This implies that it takes time to experience human development as a result of improved government effectiveness. Moreover, the study revealed that a decrease in government effectiveness in its first lag has a significant negative impact on current human development outcomes. This suggests that while it takes a longer time to experience the fruits of effective government, the negative consequences of inefficient government are more readily apparent. The significant positive relationship between the lag value of government effectiveness and human development outcome has been vindicated by related works done elsewhere [41], [42], [43]. Thus, policymakers should target long-term strategies to enhance government performance while being aware of the fact that such efforts will begin to yield some fruits in human development at least in two years. Policy strategies to enhance government effectiveness must primarily aim at institutional strengthening, e.g., through capacity-building training, tackling corruption, heightening administrative efficiency to improve public service delivery, etc. Other strategies may include fostering evidence-based decisions and data-based policies, and nurturing partnerships between the private and public sectors, especially in service provision sectors – health, education, and infrastructure.

Third, with regard to environmental stewardship, the research revealed a significant negative association between human development and ecological footprint in Tanzania, pointing to the fact that heightened ecological footprints in the current period and with a two-period lag led to a decrease in human development outcomes. Specifically, unsustainable environmental practices in the current period have a greater negative impact on human development (i.e., for every 1% increase in EF reduce HD by 0.32%) as compared with a 0.21% decrease in the two periods later. This finding is akin to

the study carried out by [44], [45], [46]**.** The policy must favour strategies that promote environmental sustainability and economic growth initiatives. Such strategies may include bolstering the use of renewable energy and green technologies, and promoting resource-efficient industries to reduce dependence on nature and enhance sustainable human development.

Likewise, strengthening environmental regulations and control is necessary for improved human development in Tanzania. Such measures may involve stricter regulation and control of carbon emissions and deforestation by imposing industrial pollution limits, increasing funding for conservation activities, and providing incentives for innovative eco-friendly activities. Other policies may include investing in education and public awareness for behaviour change and focusing on long-run ecological sustainability and promotion of climate resilient initiatives, e.g., water conservation technology and energy-efficient and resource-efficient buildings.

VI. CONCLUSION

Overall, this research has explored the influence of environmental quality and government performance on human development in Tanzania. Our empirical assessment verified the existence of a long-run relationship among the variables and that human development in Tanzania is significantly explained by the extent of environmental quality and government performance. Moreover, the study revealed a significant unidirectional causal relationship from quality of government performance to human development and environmental stewardship, from positive and negative changes in environmental quality to the current environmental quality outcomes, and from decline in government performance to environmental quality.

The study encountered one key limitation, i.e., the availability of reliable data for the period preceding the year 2000. To surmount this limitation, the researchers made a careful choice of method by specifying NARDL, which, among other qualities, is suitable for analysing time series data covering a short span. Despite the limitation, the findings are reliably informative, with adequate insights for guiding policy formulation and implementation.

REFERENCES

[1] "World Development Indicators | DataBank." Accessed: April. 25, 2025. [Online]. Available: https://databank.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators#

[2] A. D. Bank, "Tanzania Economic Outlook," African Development Bank Group. Accessed: April. 25, 2025. [Online]. Available: https://www.afdb.org/en/countries-east-africa-united-republic-tanzania/tanzania-economic-outlook

[3] "Tanzania Healthcare Spending 2000-2024." Accessed: April. 25, 2025. [Online]. Available: https://www.macrotrends.net/global-metrics/countries/TZA/tanzania/healthcare-spending

[4] "Tanzania Clean Water Access 2000-2024." Accessed: April. 25, 2025. [Online]. Available: https://www.macrotrends.net/global-metrics/countries/TZA/tanzania/clean-water-access-statistics

[5] S. Akinbode, J. Olabisi, R. Adegbite, T. Aderemi, and A. Alawode, "Corruption, Government Effectiveness and Human Development in Sub-Saharan Africa," *J. Adv. Dev. Econ.*, Jan. 2020, [Online]. Available: https://digitalcommons.unl.edu/jade/44

[6] E. M. Ganyaupfu, "Governance and human development: a cross-country analysis of Southern Africa," *Int. J. Res.*, vol. 1, no. 7, pp. 608–618, 2014.

[7] N. Quang, "Good Governance and Human Development in Vietnam: Spatial Empirical Evidence," *Int. J. Econ. Financ. Issues*, vol. 7, no. 5, p. 93, 2017.

[8] M. Kadarisman, A. W. Wijayanto, and A. D. Sakti, "Government agencies' readiness evaluation towards industry 4.0 and society 5.0 in Indonesia," *Soc. Sci.*, vol. 11, no. 8, p. 331, 2022.

[9] K. Naskar, S. K. Das, and T. Chatterjee, "Effectiveness of Good Governance on Human Development: Empirical Evidence from Selected Countries in the World," in *Social Sector Spending, Governance and Economic Development*, Routledge India, 2023.

[10] M. Fodha and O. Zaghdoud, "Economic growth and pollutant emissions in Tunisia: An empirical analysis of the environmental Kuznets curve," *Energy Policy*, vol. 38, no. 2, pp. 1150–1156, Feb. 2010, doi: 10.1016/j.enpol.2009.11.002.

[11] X. Li and L. Xu, "Human development associated with environmental quality in China," *PLOS ONE*, vol. 16, no. 2, p. e0246677, Feb. 2021, doi: 10.1371/journal.pone.0246677.

[12] M. Bouzid, F. J. Colón-González, T. Lung, I. R. Lake, and P. R. Hunter, "Climate change and the emergence of vector-borne diseases in Europe: case study of dengue fever," *BMC Public Health*, vol. 14, no. 1, p. 781, Aug. 2014, doi: 10.1186/1471-2458-14-781.

[13] Z. Porreca, "Environmental Sustainability and Human Capital Development," *Consilience*, no. 22, pp. 48–57, 2020.

[14] K. van Laarhoven, "The impact of environmental changes on human health," in *Human and Planetary Health*, in The urgency to integrate into One Health. , Radboud University Press, 2023, pp. 64–79. Accessed: April. 26, 2025. [Online]. Available: https://www.jstor.org/stable/jj.7616625.9

[15] A. Omri, S. Daly, C. Rault, and A. Chaibi, "Financial development, environmental quality, trade and economic growth: What causes what in MENA countries," *Energy Econ.*, vol. 48, pp. 242–252, Mar. 2015, doi: 10.1016/ j.eneco.2015.01.008.

[16] V. Costantini and S. Monni, "Environment, human development and economic growth," *Ecol. Econ.*, vol. 64, no. 4, pp. 867–880, Feb. 2008, doi: 10.1016/j.ecolecon.2007.05.011.

[17] V. C. Kyara, M. M. Rahman, and R. Khanam, "Is Tanzania's economic growth leaving the poor behind? A nonlinear autoregressive distributed lag assessment," *Plos One*, vol. 17, no. 7, p. e0270036, 2022.

[18] M. Storper, *Keys to the City: How Economics, Institutions, Social Interaction, and Politics Shape Development*. Princeton University Press, 2013.

[19] U. Nations, "Specific country data," United Nations. Accessed: April. 29, 2025. [Online]. Available: https://hdr.undp.org/data-center/specific-country-data

[20] "World Development Indicators | DataBank." Accessed: Dec. 29, 2025. [Online]. Available: https://databank.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators#

[21] "Open Data Platform." Accessed: April. 29, 2025. [Online]. Available: https://data.footprintnetwork.org/?_ga=2.216312022.1322571755.1735456471-645651019.1735456471#/

[22] "World Development Indicators | DataBank." Accessed: April. 29, 2025. [Online]. Available: https://databank.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators#

[23] A. C. Marques, J. A. Fuinhas, and C. Tomás, "Energy efficiency and sustainable growth in industrial sectors in European Union countries: A nonlinear ARDL approach," *J. Clean. Prod.*, vol. 239, p. 118045, 2019.

[24] R. Nsor-Ambala and G. Amewu, "Linear and non-linear ARDL estimation of financial innovation and economic growth in Ghana," *J. Bus. Socio-Econ. Dev.*, vol. 3, no. 1, pp. 36–49, 2023.

[25] C. W. Granger, "Causality, cointegration, and control," *J. Econ. Dyn. Control*, vol. 12, no. 2–3, pp. 551–559, 1988.

[26] S. Guo, C. Ladroue, and J. Feng, "Granger Causality: Theory and Applications," in *Frontiers in Computational and Systems Biology*, J. Feng, W. Fu, and F. Sun, Eds., London: Springer, 2010, pp. 83–111. doi: 10.1007/978-1-84996-196-7_5.

[27] M. H. Ibrahim, "Oil and food prices in Malaysia: a nonlinear ARDL analysis," *Agric. Food Econ.*, vol. 3, no. 1, p. 2, Jan. 2015, doi: 10.1186/s40100-014-0020-3.

[28] V. C. Kyara, M. M. Rahman, and R. Khanam, "Investigating the environmental externalities of tourism development: evidence from Tanzania," *Heliyon*, vol. 8, no. 6, 2022, Accessed: April. 29, 2025. [Online]. Available: https://www.cell.com/heliyon/fulltext/S2405-8440(22)00905-7

[29] M. Lacheheb and A. Sirag, "Oil price and inflation in Algeria: A nonlinear ARDL approach," *Q. Rev. Econ. Finance*, vol. 73, pp. 217–222, 2019.

[30] C. C. Liang, C. Troy, and E. Rouyer, "U.S. uncertainty and Asian stock prices: Evidence from the asymmetric NARDL model," *North Am. J. Econ. Finance*, vol. 51, p. 101046, Jan. 2020, doi: 10.1016/j.najef.2019.101046.

[31] C. C. Liang, C. Troy, and E. Rouyer, "US uncertainty and Asian stock prices: Evidence from the asymmetric NARDL model," *North Am. J. Econ. Finance*, vol. 51, p. 101046, 2020.

[32] M. H. Pesaran, Y. Shin, and R. J. Smith, "Bounds testing approaches to the analysis of level relationships," *J. Appl. Econom.*, vol. 16, no. 3, pp. 289–326, May 2001, doi: 10.1002/jae.616.

[33] R. C. Das and I. Hussain, "Relationships between Military Spending and Green Capital Formation: Complementary or Substitutes?," *Soc. Sci.*, vol. 12, no. 10, Art. no. 10, Oct. 2023, doi: 10.3390/socsci12100571.

[34] J. Garza-Rodriguez, "Poverty and Economic Growth in Mexico," *Soc. Sci.*, vol. 7, no. 10, Art. no. 10, Oct. 2018, doi: 10.3390/socsci7100183.

[35] C. W. Angba, R. N. Baines, and A. J. Butler, "Examining Yam Production in Response to Climate Change in Nigeria: A Co-Integration Model Approach," *Soc. Sci.*, vol. 9, no. 4, Art. no. 4, Apr. 2020, doi: 10.3390/socsci9040042.

[36] N. Chalmers, C. Revoredo-Giha, and C. Jumbe, "Measuring the Degree of Integration in the Dairy Products Market in Malawi," *Soc. Sci.*, vol. 8, no. 2, Art. no. 2, Feb. 2019, doi: 10.3390/socsci8020066.

[37] T. Habanabakize, D. F. Meyer, and J. Oláh, "The Impact of Productivity, Investment and Real Wages on Employment Absorption Rate in South Africa," *Soc. Sci.*, vol. 8, no. 12, Art. no. 12, Dec. 2019, doi: 10.3390/socsci8120330.

[38] T. Habanabakize, D. F. Meyer, and J. Oláh, "The Impact of Productivity, Investment and Real Wages on Employment Absorption Rate in South Africa," *Soc. Sci.*, vol. 8, no. 12, Art. no. 12, Dec. 2019, doi: 10.3390/socsci8120330.

[39] M. Ausloos, A. Eskandary, P. Kaur, and G. Dhesi, "Evidence for Gross Domestic Product growth time delay dependence over Foreign Direct Investment. A time-lag dependent correlation study," *Phys. Stat. Mech. Its Appl.*, vol. 527, p. 121181, 2019.

[40] Y. Cheng and C. Hung, "Exploring the Moderators of the Relationship Between Nonprofit Sector Size and Its Societal Impact: A Meta-Analysis," *Volunt. Int. J. Volunt. Nonprofit Organ.*, vol. 35, no. 2, pp. 397–410, Apr. 2024, doi: 10.1007/s11266-023-00604-9.

[41] T. Güney, "Governance and sustainable development: How effective is governance?," *J. Int. Trade Econ. Dev.*, vol. 26, no. 3, pp. 316–335, Apr. 2017, doi: 10.1080/09638199.2016.1249391.

[42] S. Safdar, A. Khan, and Z. Andlib, "Impact of good governance and natural resource rent on economic and environmental sustainability: an empirical analysis for South Asian economies," *Environ. Sci. Pollut. Res.*, vol. 29, no. 55, pp. 82948–82965, Nov. 2022, doi: 10.1007/s11356-022-21401-9.

[43] S. Y. Sarpong and M. A. Bein, "Effects of good governance, sustainable development and aid on quality of life: Evidence from sub-saharan Africa," *Afr. Dev. Rev.*, vol. 33, no. 1, pp. 25–37, Mar. 2021, doi: 10.1111/1467-8268.12488.

[44] S. A. Aladejare, "The human well-being and environmental degradation nexus in Africa," *Environ. Sci. Pollut. Res.*, vol. 30, no. 5, pp. 12098–12113, Sep. 2022, doi: 10.1007/s11356-022-22911-2.

[45] S. A. Asongu and N. M. Odhiambo, "Environmental degradation and inclusive human development in sub-Saharan Africa," *Sustain. Dev.*, vol. 27, no. 1, pp. 25–34, Jan. 2019, doi: 10.1002/sd.1858.

[46] Z. K. Dijoo and R. Khurshid, "Environmental degradation as a multifaceted consequence of human development," in *Environmental Biotechnology*, Apple Academic Press, 2022, pp. 39–56. Accessed: Jan. 07, 2025. [Online]. Available: https://www.taylorfrancis.com/chapters/edit/10.1201/9781003277279-2/environmental-degradation-multifaceted-consequence-human-development-zulaykha-khurshid-dijoo-rizwana-khurshid