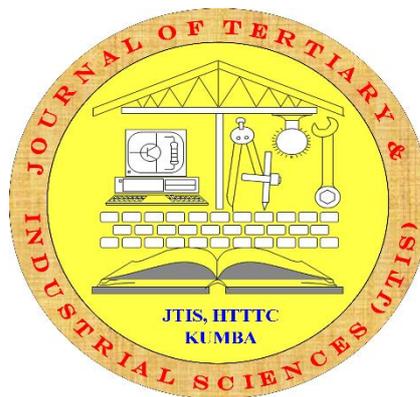


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## Domestic Resource Mobilisation and Sustainable Development in Africa: Do Institutions and Regulatory Frameworks Really Matter?

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### Abstract

The COVID-19 pandemic has devastated economies across the continent, highlighting the urgent need for resource mobilization to reconstruct development programs. As such, this study examines the effects of domestic resource mobilization on sustainable development in Africa within the context of changing institutional frameworks, using panel data for 37 African countries from 2005 to 2023, sourced from the World Development Indicators, World Governance Indicators, World Economic Freedom Database, and the African Infrastructure Development Database, and implementing a two-step system generalized method of moments estimator. The findings emphasized that a country's past achievements significantly influence its present outcomes. The study noted that effective mobilization of natural resources rents is essential for improving sustainable development in Africa, while higher levels of corruption weaken governance and hinder resource rent allocation. We note from the findings that effective governance, political stability, and strong regulatory frameworks positively impact sustainable development in Africa, whereas larger government sizes and rigid legal structures tend to impede progress and create bureaucratic inefficiencies. The analysis also reveals significant interactions between resource mobilization and both regulatory and economic institutional factors, indicating that effective corruption control can enhance the benefits of resource mobilization, while excessive bureaucracy may dampen these effects. Freedom to trade is noted as a positive force for resource mobilization, while stringent monetary policies can restrict economic activity. Policymakers are urged to strengthen anti-corruption measures through transparency initiatives and whistleblower protections, streamline government structures via administrative reforms, and invest in clear, enforceable regulatory frameworks. Additionally, enhancing legal protections for property rights, promoting trade liberalization by reducing tariffs and improving market access, maintaining sound monetary policies that support growth, and adhering to international regulations are all recommended strategies to maximize the benefits of natural resource extraction for sustainable development across the African continent.

*Key Words: Domestic Resource Mobilisation; Regulatory Institutions; Economic Institutions; Sustainable Development*

### 1 Introduction

Globally, domestic resource mobilization (DRM) is increasingly recognized as a cornerstone of sustainable development, particularly in the context of achieving the Sustainable Development Goals (SDGs). The ability of a state to raise its own revenues

through natural resource rents and other sources is central to funding essential services and public investments (Feulefack & Ngassam, 2020). Prospects for increased public and private financing from developed to developing countries have been muted, making DRM a key driver of sustainable human and infrastructure investment (Watkins *et al.*, 2024), as many developing countries still need to reach the minimum 15% tax-to-GDP ratio required to adequately finance the SDGs (AfDB, 2024). For instance, the 2015 Addis Ababa Action Agenda emphasised the importance of mobilising domestic resources from natural resource extraction in low-income and lower-middle-income countries (LICs/LMICs) to finance SDGs (Watkins *et al.*, 2024; Njimanted *et al.*, 2019).

In the African continent, Wujung & Fozoh, (2016) and Nnadozie *et al.*, (2017) had noted that DRM is critical for financing structural transformation and reducing reliance on external aid. This is justified by the recent wave by African governments to mobilized domestic resources to finance development priorities, with government revenues increasing by almost 40% from approximately US\$435 billion in 2015 to US\$604 billion in 2022 (AfDB, 2024). Nevertheless, the continent's revenue ratio remains below that of other regions, with an average general government revenue declining from 23.5% of GDP in 2010 to 19.3% of GDP in 2021 (AfDB, 2024) due to DRM challenges such as high levels of informality, weak tax administration, complex tax laws, low domestic savings, corruption, and illicit financial flows (AfDB, 2024). As such, strengthening DRM is necessary in Africa to improve on public expenditure efficiency (Sembene, 2021; Arogundade *et al.*, 2024; UN, 2024).

The role of regulatory institutions in fostering sustainable development has also been emphasized in recent literature. Studies have shown that effective governance, particularly through corruption control and the rule of law, promotes SDG performance (Rahmani & Kooohshahi, 2013; Ahmed & Anifowose, 2024; Marie, 2025; Hoffiani, 2019). This has been justified by the fact that enhancing regulatory frameworks promotes transparency, accountability, and integrity in both public and private sectors, thereby creating an environment conducive to fair competition and sustainable economic development (Lemos, 2024; Agu *et al.*, 2024; Mehmood, 2023; Mahmutovic & Alhamoudi, 2024).

In the same line of thought, economic institutions such as government size, legal systems and property rights, sound money, freedom to trade, and regulatory quality have been emphasized as critical to sustainable development within institutional theory and new institutional economics, which argue that strong institutions shape long-term development outcomes (North, 1990; Acemoglu, Johnson, & Robinson, 2005), as well as endogenous growth theory, which links institutional quality to sustained economic and social progress (Romer, 1990), and the sustainable development framework advanced by the Brundtland Commission, which underscores the role of effective governance in balancing economic, social, and environmental objectives (World Commission on Environment and Development, 1987). Prasad (2003) and North (1997) noted that economic institutions have a positive and significant effect on economic growth. Property rights and legal systems are crucial in driving for encouraging development, innovation,

conservation, and discovery of new resources, leading to sustainable development (Coombe, 2005; Henry & Stiglitz, 2010). Sound monetary policies, which maintain price stability and currency predictability, are seen to correlate with high levels of sustainable development (Dinh *et al.*, 2025; Korauš *et al.*, 2017; Jothr *et al.*, 2023). Freedom to trade can promote competition and motivate enterprises to innovate and develop more efficient and environmentally friendly clean energy technologies (Ahmed *et al.*, 2022; Lei & Xie, 2024). International regulations support the rule of law by promoting transparency and accountability, though challenges remain in integrating them with the SDGs (Mahmutovic & Alhamoudi, 2024; Khan, 2016).

Despite the growing recognition of domestic resource mobilization as a critical pathway in achieving the Sustainable Development Goals (SDGs), many African countries continue to face significant challenges in effectively harnessing their domestic resources (AfDB, 2024). While African governments have made strides in increasing government revenues, the continent's revenue ratio remains below that of other regions, with an average general government revenue declining from 23.5% of GDP in 2010 to 19.3% of GDP in 2021 (AfDB, 2024). This shortfall hinders the ability of African nations to finance essential public services, invest in infrastructure, and reduce reliance on external aid, thereby impeding progress towards sustainable development (Arogundade *et al.*, 2024). These challenges are further magnified by high levels of informality, weak tax administration, complex tax laws, low domestic savings, corruption, and illicit financial flows in the African continent (AfDB, 2024). From a theoretical perspective, while Resource Mobilization Theory (RMT) emphasizes the importance of a country's assets and capacities in driving development, the persistent challenges in DRM suggest that other factors, such as institutional quality and regulatory frameworks, may play a more critical role than currently understood (Nnadozie *et al.*, 2017; Hujo & Bangura, 2020).

The effectiveness of DRM in fostering sustainable development is intrinsically linked to the quality of economic and regulatory institutional frameworks (Bang, 2024). Weak regulatory institutions, characterized by corruption, ineffective governance, political instability, and a lack of rule of law, undermine the ability of African countries to create an environment conducive to sustainable economic growth and social development (Asongu & Odhiambo, 2021). Similarly, deficiencies in economic institutions, such as insecure property rights, unstable monetary policies, and restrictions on trade, can stifle investment, hinder innovation, and impede the efficient allocation of domestic resources for sustainable development (Okegbemi, 2024).

This study contributes to the extant literature in at least three important ways. First, whereas many earlier papers in Africa have examined domestic resource mobilization (DRM) using fairly aggregate measures of revenue or tax-to-GDP ratios (AfDB, 2024; Nnadozie *et al.*, 2017), our study enriches this by incorporating not only traditional institutional quality variables such as regulatory quality, control of corruption, and rule of law (Asongu & Odhiambo, 2021; Rahmani & Koohshahi, 2013), but also economic institutional variables—including government size, legal systems and property rights, sound money, freedom to trade, and international regulations (North, 1997; Prasad, 2003).

This dual approach allows us to capture a broader spectrum of institutional effects on DRM and sustainable development. Second, while prior works such as Asongu (2017) Tchamyou et al. (2019), and Nchofoung & Asongu, (2022) have emphasized the inequality-adjusted human development index (IHDI) in relation to globalization, finance, or ICT, they do not explicitly link IHDI to DRM under the moderating role of both regulatory and economic institutions. Third, by using the IHDI as our multidimensional measure of sustainable development, rather than relying solely on GDP growth or the HDI, we capture inequality-adjusted outcomes in health, education, and income, which better reflect inclusive development (Asongu & Nwachukwu, 2017). Therefore, this study does not only address persistent gaps in the DRM and institutional quality literature, the study also extends the frontier by integrating regulatory and economic institutional dimensions into a unified framework for explaining how DRM fosters sustainable development in Africa. The remaining sections of this paper will be as follows; section 2 will review relevant literature, section 3 will contain the methodology, section 4 will present and discuss the findings, and finally, section 5 will present a summary of the findings and policy recommendations.

## 2 Literature Review

On a theoretical front, this study is grounded in several interconnected theoretical frameworks. First, the Resource Mobilization Theory (RMT) provides a leeway to understand how countries acquire and utilize resources for development. It emphasizes that the success of any endeavour depends on access to and effective utilization of resources, including financial, human, and social capital resources (McCarthy & Zald, 1977). In the context of DRM, this translates to a focus on how nations mobilize internal resources to fund sustainable development initiatives (Jenkins, 1983; Oberschall, 1973). The RMT alone is insufficient, as it does not fully address the institutional and regulatory factors that shape resource mobilization processes for sustainable development. Therefore, the study also draws upon New Institutional Economics (NIE), pioneered by Coase (1937), North (1981), and Williamson (1975), which posits that institutions play a critical role in shaping economic behavior and outcomes. NIE highlights the importance of property rights, contract enforcement, and regulatory frameworks in fostering efficient resource allocation and economic growth (North, 1981). Concepts from NIE, such as transaction cost economics and agency theory (Williamson, 1975), help explain how institutional weaknesses, such as corruption and inefficient bureaucracy, can impede DRM efforts. Specifically, the quality of institutions influences transaction costs, investment, innovation, and entrepreneurship, all of which are vital for sustainable development (Acemoglu & Robinson, 2012).

Furthermore, theories of regulation, as explored by Baldwin *et al.* (2011) provide insights into the design and implementation of effective regulatory frameworks for DRM. These theories distinguish between positive theories, which explain why regulation occurs (to correct market failures or protect interest groups), and normative theories, which prescribe how regulation should be designed to promote economic efficiency and social

welfare (Ogus, 2004). The study also considers theories of sustainable development which emphasize the need to balance economic growth with social equity and environmental protection (Brundtland, 1987). The concept of sustainable development, as defined by the Brundtland Report (1987), stresses meeting the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987).

On an empirical front, a growing body of literature emphasizes that domestic resource mobilization (DRM) contributes positively to inclusive growth when coupled with a sound financial sector (Wujung & Fozoh, 2016; Nnadozie *et al.*, 2017), underscoring the importance of expanding the tax base and enhancing the effectiveness of public spending (Oyinlola *et al.*, 2020). While increased DRM strengthens governments' capacity to finance budgets and drive growth, its short-run effects may be negative due to distortionary taxation (Chimilila, 2021). Studies further suggest that DRM is indispensable for African nations to finance economic stimulus packages and achieve progress toward the Sustainable Development Goals (SDGs), given the need to raise revenues domestically while protecting vulnerable populations (Amoako-Tuffour, 2015; Lustig, 2016). Empirical evidence from Feulefack and Ngassam (2020) demonstrates the positive impact of DRM on sustainable development, while Watkins *et al.* (2024) highlight the muted prospects of external financing, thus positioning DRM, particularly from natural resource rents, as a crucial driver of sustainable development in Africa.

Regarding the regulatory institutions–sustainable development nexus, evidence shows that effective governance, particularly through corruption control, regulatory quality, and the rule of law, enhances SDG performance (Nguyen *et al.*, 2018; Salman *et al.*, 2019; Azam *et al.*, 2021). Good governance exerts significant influence on growth and development (Omri & Mabrouk, 2020), with institutional quality demonstrating considerable positive effects on economic performance (Azam *et al.*, 2021). Dimensions such as political stability, government effectiveness, control of corruption, and voice and accountability are also positively associated with sustainable development indicators (Azam *et al.*, 2021). Yet, counter evidence suggests that institutional quality may not always exert direct or indirect effects on growth and development (Singh *et al.*, 2022), pointing to the nuanced role of institutions in Africa's development trajectory.

Equally, the literature on economic institutions and sustainable development highlights the role of property rights and legal systems in fostering innovation, conservation, and new resource discovery, thereby driving growth and sustainability (Polasky *et al.*, 2019). Sound money policies, by ensuring price stability and currency predictability, are associated with high sustainable development outcomes (Gambetta *et al.*, 2019). Similarly, trade freedom fosters competition, encourages technological innovation, and stimulates the development of environmentally friendly energy systems (Yan *et al.*, 2022). Complementarily, stringent environmental policies boost financial development by stimulating green investment and supporting institutional development (Sarangi & Taghizadeh, 2019).

Notably, recent African-focused studies using the Inequality-adjusted Human Development Index (IHDI) provide deeper insights into the DRM-institutions-sustainable development nexus. Asongu (2017) surveys IHDI-related studies across Africa, linking aid, globalization, ICT, and finance to inclusive development. Asongu and Odhiambo (2018) further demonstrate that environmental degradation undermines inclusive human development (proxied by IHDI) in Sub-Saharan Africa. Relatedly, Nchofoung *et al.* (2021) reveal the linear and non-linear effects of infrastructure on IHDI, while Nchofoung *et al.* (2024) highlight the role of women's political inclusion in improving infrastructure and sustainable outcomes. Tchamyou (2019) extends this literature by linking financial access, ICT, and inequality to inclusive development in Africa, thereby reinforcing the centrality of institutional and economic structures in shaping sustainable development trajectories. These works collectively expand the scope of DRM and institutional research by integrating multidimensional well-being measures such as IHDI, moving beyond growth-centric indicators that dominate earlier studies.

### 3 Methodology

#### 3.1 Empirical model specification

Motivated by a good number of studies such as that of Asongu (2017), Asongu and Odhiambo (2018), Nchofoung *et al.* (2021), Watkins *et al.*, (2024), Kauffman & Kraay (2021), Abubakar & Yusof (2021), Feulefack & Ngassam, (2020), and Wujung & Fozoh, (2016), the econometric model that examines the effects of domestic resource mobilization (DRM) on sustainable development while considering its transmission effects through regulatory and economic institutions on sustainable development in Africa is modelled as follows:

$$HDI_{it} = \beta + \alpha DRM_{it} + \rho_i INSTITUTIONS_{it} + \gamma_i \chi_{it} + \varphi_i (DRM_{it} * INSTITUTIONS_{it}) + \xi_{it} \dots \dots \dots (1)$$

Where:  $\beta$  is the constant term,  $\alpha$  is the coefficient of domestic resource mobilisation to be estimated,  $\rho_i$  is vector of parameters for the institutional variables,  $\gamma_i$  is vector of parameters for the control variables  $\xi$  = Error term,  $\varphi_i$  is a vector of coefficients for the impact of the interactions between the various regulatory and economic institutional variables with the DRM on sustainable development in Africa.

Differentiating equation (1) with respect to DRM, we obtain;

$$\frac{dHDI_{it}}{dDRM_{it}} = \rho_i + \varphi_i INSTITUTIONS_{it} \dots \dots \dots (2)$$

Considering the signs and statistical significance of the direct effect ( $\alpha$ ) and the indirect coefficients ( $\varphi_i$ ), it is possible to derive the overall net effect. Accordingly, Equation (1) is reformulated as follows:

$$HDI_{it} = \beta + \alpha DRM_{it} + \rho_i INSTITUTIONS_{it} + \gamma_i \chi_{it} + \varphi_i (DRM_{it} * INSTITUTIONS_{it}) + (\alpha + (\varphi * \emptyset)) + \xi_{it} \dots \dots \dots (3)$$

Here,  $\emptyset$  represents the average of the moderating variable (institutional frameworks).  $(\alpha + (\varphi * \emptyset))$  is the net effect. Equation (3) is valid only when  $\alpha$  and  $\varphi$  exhibit opposite signs and are both statistically significant. Under these conditions, a threshold effect emerges

for the moderating variable, at which point the net effect is neutralized. This threshold is determined by setting Equation (2) equal to zero, yielding:

$$\text{Threshold} \xrightarrow{\text{INSTITUTIONS}} = \frac{\alpha}{\varphi} \dots \dots \dots (4)$$

If the values obtained from Equation (4) fall outside the feasible range of the moderating variables, the threshold does not exist, and computing it becomes unnecessary.

### **Dependent Variable**

The dependent variable in this analysis is the Human Development Index (HDI), which serves as a comprehensive measure of sustainable development. HDI combines indicators of health (life expectancy at birth), education (mean years of schooling and expected years of schooling), and standard of living (gross national income per capita) into a single composite index. Recent studies emphasize the importance of HDI as a key indicator for assessing sustainable development and the quality of life across different countries (Mishra & Kumar, 2021; UNDP, 2020).

### **Domestic Resource Mobilisation (DRM)**

Domestic Resource Mobilization (DRM) is measured in terms of total natural resource rents as a percentage of GDP. This approach is due to the fact that many African economies are heavily reliant on natural resources, and these resources constitute a significant portion of their potential domestic revenue base (Feulefack & Ngassam, 2020; Wujung & Fozoh, 2016; UNCTAD, 2007). Using tax revenues as a sole measure of DRM in the African context can be misleading due to several challenges. These challenges include a narrow tax base, a large informal sector, weak tax administration capacity, tax evasion and avoidance, and the presence of numerous tax exemptions (Mukumba, 2025; ACBF Africa Capacity Report, 2015; Haus, 2024). As noted by the European Court of Auditors (2016), the effectiveness of national tax systems in Africa is often undermined by these factors, leading to tax-to-GDP ratios that are lower compared to developed countries. Several scholars have argued that resource-rich governments have less of an incentive to mobilize revenue from domestic sources (Collier, 2007; Moore, 2007).

### **Economic Institutional Variables**

The economic institutional variables in this study are represented by a vector that includes Government Size (GOVSIZE), Legal Systems and Property Rights (LSPR), Sound Money (SM), Freedom to Trade (FT), and International Regulations (INTERR). Government Size is measured by total government expenditure as a percentage of GDP, reflecting the role of government in economic management. Legal Systems and Property Rights are assessed using indices that evaluate the effectiveness of legal frameworks and the protection of property rights. Sound Money is often quantified through measures of inflation stability and currency predictability, while Freedom to Trade is gauged using trade ratios. Finally, International Regulations are evaluated by indices that capture the robustness of international agreements and compliance with global standards. These variables are crucial for understanding how institutional quality influences sustainable development in Africa (Abubakar & Yusof, 2021; Tchamyou, 2020).

### **Regulatory Institutional Variables**

The regulatory institutional variables include Control of Corruption (CC), Government Effectiveness (GE), Political Instability and Absence of Violence (PV), Regulatory Quality (RQ), Rule of Law (RL), and Voice and Accountability (VA). These variables are typically measured using perceptions-based indices derived from surveys conducted by organizations such as the World Bank and Transparency International. Control of Corruption is assessed through corruption perception scores, while Government Effectiveness is measured by indicators of service delivery and bureaucratic quality. Political Instability and Absence of Violence reflect country risk assessments, and Regulatory Quality is evaluated through measures of regulatory governance effectiveness. The Rule of Law is gauged by the degree to which laws are applied fairly, and Voice and Accountability assess the extent to which citizens can participate in political processes. These regulatory dimensions are essential for understanding governance dynamics and their impact on sustainable development (Kauffman et al., 2020; Kaufmann et al., 2021).

### **Control Variables**

The control variables in this analysis consist of Inflation Rate (INFLA), Population Growth (POP GROWTH), Logarithm of Foreign Direct Investment (LOGFDI), Gross Domestic Fixed Capital Formation (LOGGFKF), and Aggregate Infrastructural Development Index (AIDI). Inflation Rate is typically measured as the annual percentage change in consumer prices, capturing the stability of the economic environment. Population Growth is assessed as the annual percentage increase in population, indicating demographic pressures. Logarithm of Foreign Direct Investment is used to represent the inflow of foreign capital, taking into account its logarithmic transformation for normalization. These control variables are crucial for providing context to the economic and social conditions that may influence sustainable development outcomes (UNCTAD, 2021; World Bank, 2021).

### **3.2 Data Description**

The data was collected for 37 African countries spanning from 2005 to 2023. The countries include; Angola, Benin, Botswana, Burkina Faso, Burundi, Côte d'Ivoire, Eswatini, Gambia, Guinea-Bissau, Kenya, Lesotho, Liberia, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Tanzania, Togo, Uganda, Zambia, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Rep., Ethiopia, Gabon, Ghana, Guinea, Madagascar.

### **3.3 Data Presentation and Description**

**Table 1: Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
HDI	570	.511	.106	.294	.804
TNRR	680	9.422	8.516	-1.2	55.852
CC	646	-.536	.627	-1.573	1.23
GE	646	-.648	.59	-1.878	1.057
PV	646	-.463	.834	-2.699	1.2
RQ	646	-.538	.501	-1.577	1.127
RL	646	-.576	.585	-1.884	1.029

VA	646	-.431	.66	-1.896	.979
GOVSIZE	613	6.727	1.024	3.716	8.879
LSPR	613	3.98	1.232	1.861	7.077
SM	613	7.315	1.222	1.27	9.759
FT	606	6.188	.872	2.353	8.86
INTERR	613	5.68	.89	3.261	7.803
INFLA	664	5.994	5.952	-8.975	44.391
POP GROWTH	684	4.841	16.533	-2.629	167.442
LOGFDI	655	19.608	1.69	10.361	23.026
LOGGFKF	668	21.702	1.489	17.876	25.511
AIDI	684	20.614	17.55	1.12	98.88

**Note:** HDI = Inequality Adjusted Human Development Index; TNRR = Total Natural Resource Rent; INFLA = Inflation rate; POPGROWTH = Population growth rate; LOGFDI = Log of Foreign Direct Investment; LOGGFKF = Log of Gross Fixed Capital Formation; AIDI = Aggregate Infrastructural Development Index; CC = Control of Corruption; GE = Government Effectiveness; PV = Political Stability and Absence of Violence; RQ = Regulatory Quality; RL = Rule of Law; VA = Voice and Accountability; GOVSIZE = Government Size; LSPR = Legal Systems and Property Rights; SM = Sound Money; FT = Freedom to Trade; INTERR = International Regulations.

Table 1 presents descriptive statistics for various variables related to domestic resource mobilization (DRM) and sustainable development. The Human Development Index (HDI) has a mean of 0.511, indicating moderate development levels across observations. Total Natural Resource Rents (TNRR) shows substantial variation, with a mean of 9.422, indicating diverse capabilities in revenue generation among countries. Other variables, such as Control of Corruption (CC) and Government Effectiveness (GE), exhibit negative means, suggesting challenges in governance quality that may hinder sustainable development efforts.

**Table 2: Pairwise correlations**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) HDI	1.000														
(2) TNRR	-0.303	1.000													
(3) CC	0.584	-0.515	1.000												
(4) GE	0.711	-0.505	0.867	1.000											
(5) PV	0.603	-0.299	0.705	0.672	1.000										
(6) RQ	0.615	-0.470	0.776	0.896	0.633	1.000									
(7) RL	0.673	-0.511	0.896	0.922	0.749	0.883	1.000								
(8) VA	0.506	-0.422	0.703	0.701	0.635	0.713	0.766	1.000							
(9) GOVSIZE	0.130	-0.131	-0.056	0.054	0.025	0.146	0.086	0.270	1.000						
(10) LSPR	0.595	-0.476	0.837	0.855	0.620	0.813	0.863	0.728	0.129	1.000					
(11) SM	0.412	-0.473	0.445	0.482	0.298	0.544	0.506	0.384	0.238	0.534	1.000				
(12) FT	0.558	-0.339	0.518	0.587	0.508	0.658	0.603	0.530	0.202	0.554	0.483	1.000			
(13) INTERR	0.510	-0.466	0.563	0.678	0.205	0.664	0.619	0.423	0.151	0.641	0.584	0.512	1.000		
(14) INFLA	-0.086	0.260	-0.099	-0.072	-0.122	-0.139	-0.124	-0.092	0.089	0.019	-0.129	-0.152	-0.121	1.000	
(15) POPGROWTH	-0.216	-0.052	-0.184	-0.282	-0.304	-0.267	-0.296	-0.191	-0.070	-0.260	-0.129	-0.223	-0.166	0.058	1.000
(16) LOGFDI	0.199	-0.024	0.023	0.138	-0.051	0.164	0.100	0.154	0.230	0.173	-0.078	0.149	0.129	0.073	0.078
(17) LOGGFKF	0.239	-0.003	-0.042	0.169	-0.170	0.196	0.083	0.095	0.111	0.149	-0.071	-0.022	0.201	0.112	-0.017
(18) AIDI	0.834	-0.394	0.601	0.709	0.504	0.592	0.629	0.521	0.062	0.626	0.458	0.549	0.546	-0.161	-0.107

Table 2 illustrates the pairwise correlation coefficients among the variables. Notably, HDI is positively correlated with CC (0.584) and GE (0.711), indicating that better governance is associated with higher human development. Conversely, TNRR shows a negative correlation with HDI (-0.303), suggesting that higher tax ratios on natural resource extraction may not directly translate into better development outcomes in these contexts. The strong positive correlations between various regulatory indicators (Rule of Law and Regulatory Quality) highlight the interconnectedness of governance structures in promoting sustainable development.

**Table 4.3: Pesaran's Unit Root and Cross-Sectional Dependency tests**

Variable	Unit Root test				Cross-Sectional Dependency		
	Z	P-value	Z	P-value	Order	CD-test	P-value
HDI	-2.717	0.003	--	--	I (0)	99.60	0.000
TNRR	-3.488	0.000	--	--	I (0)	27.84	0.000
CC	1.897	0.971	-7.465	0.000	I (1)	-0.23	0.817
GE	1.719	0.957	-6.781	0.000	I (1)	-0.98	0.326
PV	-4.733	0.000	--	--	I (0)	0.67	0.503
RQ	-1.286	0.099	--	--	I (0)	5.77	0.000
RL	1.544	0.939	-5.065	0.000	I (1)	2.79	0.005
VA	0.867	0.807	-5.491	0.000	I (1)	2.02	0.044
GOVSIZE	-1.971	0.024	--	--	I (0)	-0.96	0.338
LSPR	-3.139	0.001	--	--	I (0)	17.33	0.000
SM	-0.568	0.285	-4.294	0.000	I (1)	36.45	0.000
FT	1.033	0.849	-2.379	0.009	I (1)	18.99	0.000
INTERR	-2.124	0.017	--	--	I (0)	14.39	0.000
INFLA	-7.861	0.000	--	--	I (0)	34.31	0.000
	-3.424	0.000	--	--	I (0)	4.46	0.000
POPGROWTH							
LOGFDI	-0.033	0.487	-8.069	0.000	I (1)	13.07	0.000
LOGGFKF	-2.567	0.005	--	--	I (0)	58.74	0.000
AIDI	0.394	0.653	-8.890	0.000	I (1)	108.30	0.000

*Source: Author(s), 2025*

Table 4.3 summarizes the results of unit root and cross-sectional dependency tests for the variables. Many variables, including HDI, TNRR, and POPGROWTH, are stationary at level I(0), indicating their suitability for regression analysis. However, variables like CC and GE are non-stationary at levels but stationary at first differences (I(1)), suggesting potential issues with spurious regression if not properly differentiated. The significant cross-sectional dependency indicates that observations may be influenced by common shocks, necessitating careful consideration for the methodology for econometric analysis.

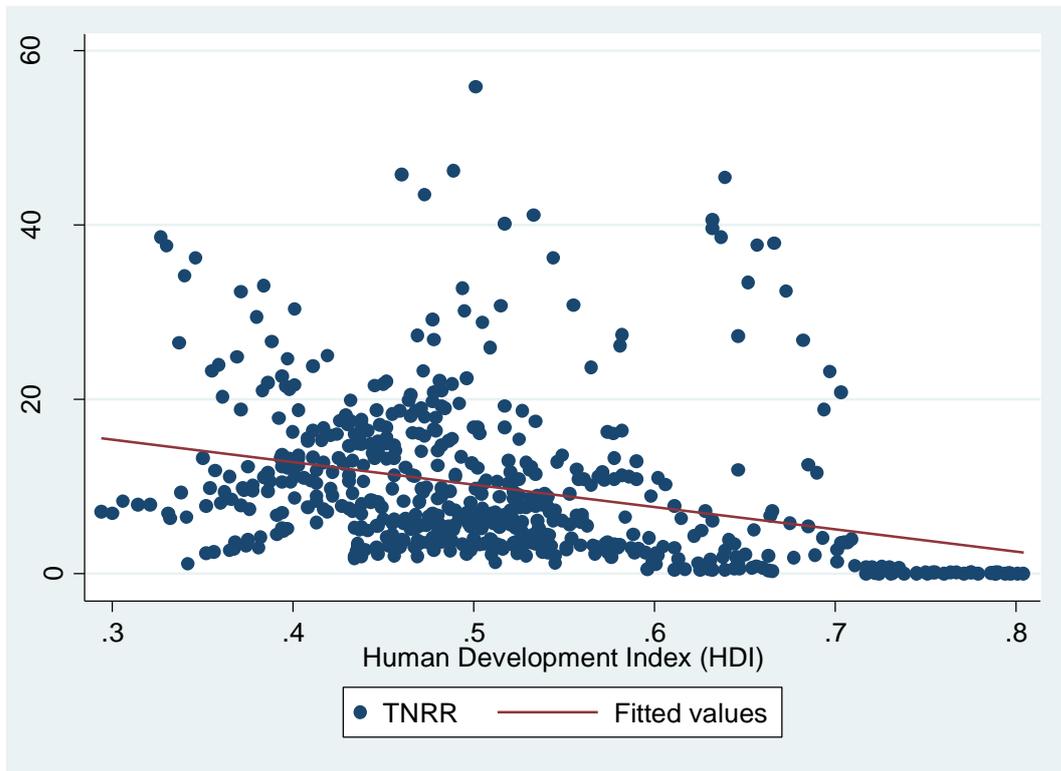


Figure 1: Fitted Scatter Plot (DMR and Sustainable Development)

Figure 1 depicts the relationship between Domestic Resource Mobilization (DMR) and sustainable development. The fitted scatter plot suggests a negative correlation, indicating that higher levels of DRM are associated with improved sustainable development outcomes. This visualization emphasizes the importance of effective resource mobilization as a crucial factor in achieving sustainable development goals.

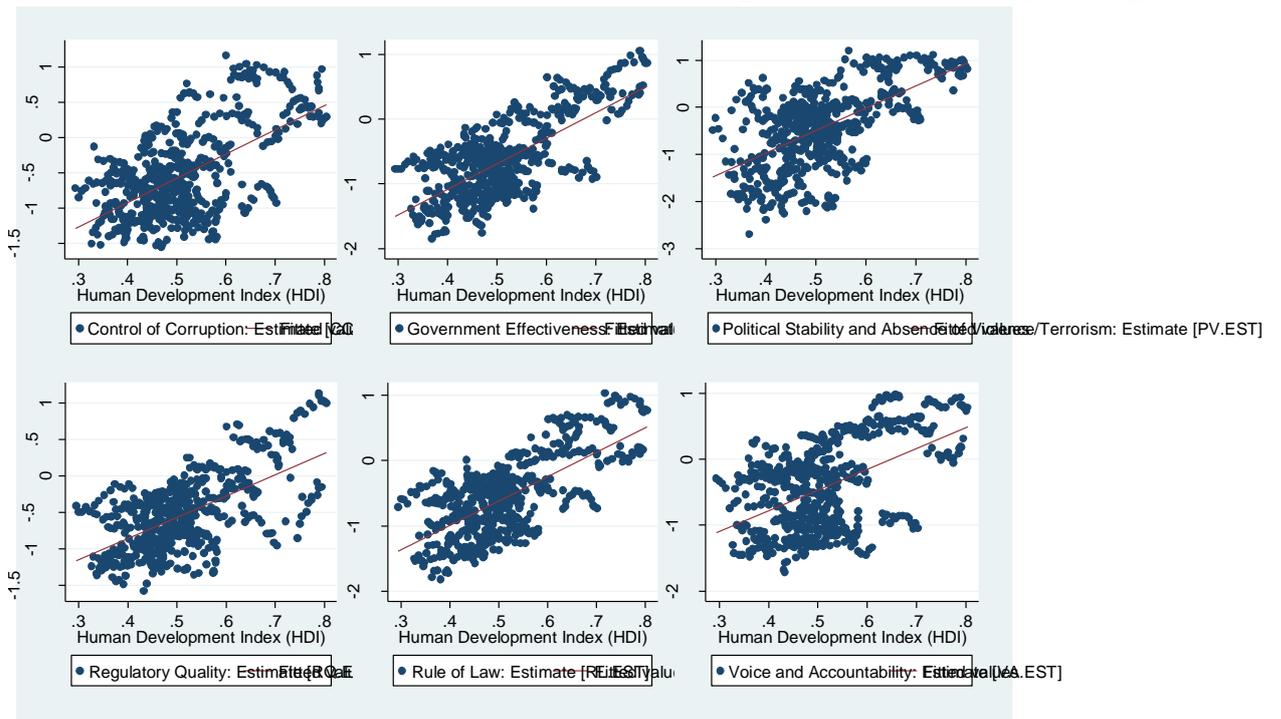
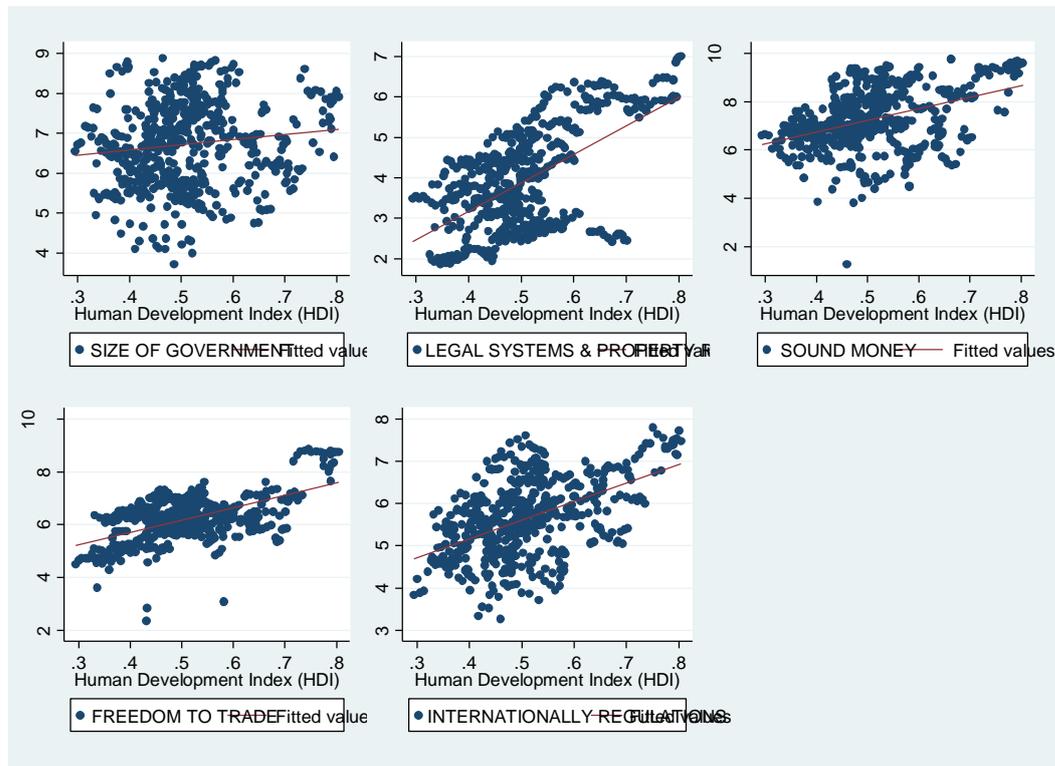


Figure 2: Fitted Scatter Plot (Regulatory Institutions and Sustainable Development)

Figure 2 illustrates the relationship between regulatory institutions and sustainable development. The fitted trend line indicates a positive relationship, suggesting that better governance quality, as represented by regulatory institutions, leads to enhanced sustainable development outcomes. This reinforces the idea that strong regulatory frameworks are vital for promoting sustainable practices and policies.



**Figure 3: Fitted Scatter Plot (Economic Institutions and Sustainable Development)**

Figure 3 presents the correlation between economic institutions and sustainable development. The fitted scatter plot shows a positive trend, indicating that stronger economic institutions correlate with improved sustainable development outcomes. This emphasizes the critical role that sound economic policies and structures play in facilitating sustainable growth and development in the context of DRM.

### 3.4 Estimation Method

In this study, we employ the Feasible Generalized Least Squares, Driscoll-Kraay and System GMM estimators. The FGLS estimator, originally developed by Parks (1967) and further refined by Zellner & Theil (1962), is employed because it corrects for potential issues of heteroskedasticity and autocorrelation in the error terms, which are common in macro-panel data and may otherwise bias the standard errors of the estimates. The Driscoll-Kraay approach, on the other hand, provides heteroskedasticity-consistent and autocorrelation-consistent standard errors that are also robust to cross-sectional dependence (Driscoll & Kraay, 1998), which is particularly relevant in the African context where countries are economically interlinked and shocks can spill over across borders. The main estimation method adopted for this study is the Two-Step System GMM procedure which have been simplified as follows:

$$HDI_{it} = n_i + \tau + \alpha HDI_{it-1} + \alpha DRM_{it} + \rho_i INSTITUTIONS_{it} + \gamma_i \chi_{it} + \varphi_i (DRM_{it} * INSTITUTIONS_{it}) + \xi_{it} \dots \dots \dots (5)$$

To eliminate the country specific effect  $n$ , we take a first difference transformation of equation (5) and omit the time trend ( $\tau$ ) for notational convenience. Before getting to this, let  $DRM_{it} * INSTITUTIONS_{it} = INTERACTIONS$ . As such, the econometric specification for this study is as follows:

$$HDI_{it} = \alpha (HDI_{it-1} - HDI_{it-2}) + \beta (DRM_{it} - DRM_{it-1}) + \rho_i (INSTITUTIONS_{it} - \rho_i INSTITUTIONS_{it-1}) + \gamma (\chi_{it} - \chi_{it-1}) + \varphi_i (INTERACTIONS_{it} - INTERACTIONS_{it-1}) + (\xi_{it} - \xi_{it-1}) \dots \dots \dots (6)$$

The selection of this regression procedure was influenced by a number of factors: (1) there is a strong correlation between the dependent variable and its first period lag and (2) the cross-sectional dimension is larger than the time dimension. According to Roodman (2009), the cross-sectional dimension must be bigger than the time dimension for a GMM to be utilized in a regression, a condition fulfilled with the dataset under use. (3) When the lagged dependent variable is included in the model, it correlates with the fixed effects in the error term. When this correlation is estimated using techniques like OLS, it results in a dynamic panel bias (Nickell, 1981). This bias is eliminated by the GMM estimation approach, which also controls for cross-country dependence across panels in an equitable manner (Nchofoung *et al.*, 2021).

The issue of having too many instruments is typically the biggest problem with GMM estimates. Although the exact number of instruments that are deemed excessive is unknown, Roodman (2009) adopted the forward orthogonal deviation as a continuation of Arellano and Bover (1995) in order to curtail the proliferation of instruments and increase sample size. Instead of removing earlier data from the subsequent ones, this method's computational methodology subtracts the average of all upcoming measurements of a variable that are currently accessible. As a result, the number of delays that may continue to be orthogonal to the error and useful as instruments in the regression is constrained. To prevent the proliferation of instruments, this study adopted the aforementioned forward orthogonal deviation methodology. The two-step technique was used to control for heteroscedasticity because the one-step procedure is consistent with homoscedasticity.

At the same time, the issues of identification, simultaneity and constraints are potential problems with the GMM estimation. All the explanatory factors are assumed to be sources of endogeneity in this regard (Asongu and Nwachukwu, 2016; Asongu and Leke, 2019; Nchofoung *et al.*, 2021). Additionally, both the level and difference equations employ period dummies as instruments.

#### 4 Empirical Findings and Discussions

The Hansen test for over-identifying restrictions (validity of our instruments) yields a p-value of 0.555, suggesting that the instruments used in the Two-Step System GMM are valid and do not suffer from over-identification bias (Roodman, 2009). The focus on the Hansen test is because Sargan is not robust and its power is not weakened by instrument proliferations. The significance of AR1 in the models indicate the presence of first order autocorrelation which is obvious in a dynamic analysis where the lag of the dependent variable has been included. The absence of second-order autocorrelation (AR2p=0.492)

supports the model's appropriateness of the results. Since AR1 is significant and AR2 is not significant, it indicates that the models capture the dynamics correctly without higher order autocorrelation (Baltagi, 2021). Confirming the validity of the results the null hypothesis of the Fisher statistics for the overall significance of the models is rejected (that is P-value <10%). Given the above tests that validates the findings, the regression coefficients can therefore be used for statistical inference.

**Table 4: Direct Effects of DRM on Sustainable Development in Africa**

VARIABLES	(FGLS)	(Drisc/Kraay )	(Two-Step System GMM)
	Inequality	Adjusted Human	Development
		Index	
L.HDI			0.928*** (0.0101)
TNRR	0.000667** (0.000336)	0.000667* (0.000344)	0.000205*** (4.20e-05)
INFLA	-0.000354 (0.000429)	-0.000354 (0.000319)	-3.47e-05 (3.87e-05)
POPGROWTH	-0.0243*** (0.00374)	-0.0243*** (0.00372)	-0.000700 (0.00109)
LOGFDI	0.00522*** (0.00193)	0.00522** (0.00235)	0.000708 (0.000568)
LOGGFKF	0.00918*** (0.00233)	0.00918*** (0.00195)	-0.00127** (0.000584)
AIDI	0.00433*** (0.000174)	0.00433*** (0.000353)	5.86e-05 (5.41e-05)
Constant	0.185*** (0.0338)	0.185*** (0.0219)	0.0552*** (0.00806)
Observations	511	511	484
R-squared		0.753	
chi2	1560***		
N_g	37	37	37
F		5473***	650239***
hansenp			0.555
sarganp			0
ar2p			0.492
ar1p			0.00791

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4 presents the results of estimating the direct effects of DRM on sustainable development in Africa using three different estimators: Feasible Generalized Least Squares (FGLS), Driscoll-Kraay standard errors, and Two-Step System GMM. FGLS is employed to address potential issues of heteroscedasticity and autocorrelation in the data, providing more efficient estimates compared to Ordinary Least Squares (OLS) (Studenmund, 2021; Aptech, 2024; Ontosight, 2024). Driscoll-Kraay standard errors are

used to account for cross-sectional dependence, which is common in panel data where observations may be influenced by common shocks (Eberhardt et al., 2023; Vincent, 2024; Hoechle, 2007). The Two-Step System GMM estimator is used to address potential endogeneity issues by using lagged levels and differences of the variables as instruments (Roodman, 2009; Arellano and Bover, 1995).

The Two-Step System GMM estimation includes a lagged human development, which has a positive and statistically significant coefficient of 0.928 ( $p < 0.01$ ). This indicates a strong path dependency in human development, meaning that a country's current level of human development is highly influenced by its past levels. This finding is consistent with the notion that human development is a cumulative process, where progress in one period builds upon the achievements of previous periods (Tavares & Wacziarg, 2001; Adkins et al., 2012).

The coefficient for total natural resource rent is positive and statistically significant in all three models, although the magnitude varies. In the FGLS and Driscoll-Kraay models, total natural resource rent has a coefficient of 0.000667 ( $p < 0.05$  and  $p < 0.1$ , respectively), while in the Two-Step System GMM model, it is 0.000205 ( $p < 0.01$ ). This suggests that higher natural resource revenues mobilisation, are associated with higher levels of human development (Ike et al., 2024; Zgheib et al., 2006; Sinha & Sengupta, 2019).

The coefficient for inflation is negative in all three models, but it is not statistically significant. This suggests that while inflation may have a slight negative impact on human development, the effect is not strong enough to be statistically significant in this sample. High inflation can disrupt efforts to improve people's lives, while the long-run coefficient estimation findings reveal that there is a negative statistically significant relationship between inflation and human development (Bitadze, 2022; Koyuncu and Koyuncu, 2022). The coefficient for population growth is also negative and statistically significant in the FGLS and Driscoll-Kraay models (-0.0243,  $p < 0.01$ ), but it is not significant in the Two-Step System GMM model. This indicates that higher population growth rates are associated with lower levels of human development (Bloom & Williamson, 1998; Zgheib et al., 2006). As the population increases, challenges such as resource allocation, education, and healthcare become more pronounced, negatively affecting the sustainable development in Africa (Zgheib et al., 2006).

The coefficients for both FDI and gross fixed capital formation are statistically significant in the FGLS and Driscoll-Kraay models, but their signs differ in the Two-Step System GMM model. LOGFDI has a positive and significant impact on sustainable development, indicating that FDI inflows contribute to human development by increasing employment opportunities and improving living standards (Herzer et al., 2008; Jocu, 2019). Gross fixed capital formation has a positive and significant impact on sustainable development in the FGLS and Driscoll-Kraay models, but it has a negative and significant impact in the Two-Step System GMM model. This mixed result suggests that the relationship between investment in fixed capital and human development may be complex and depend on other factors (Ramirez & Nazmi, 2003; Jocu, 2019).

The coefficient for aggregate infrastructural development index is positive and statistically significant in the FGLS and Driscoll-Kraay models, indicating that improvements in infrastructure development are associated with higher levels of human development. This suggests that investments in infrastructure, such as transportation,

energy, and communication, are crucial for improving the quality of life and promoting sustainable development in Africa (Calderón & Servén, 2004).

**Table 5: Direct Effects of Regulatory Institutions on Sustainable Development in Africa**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Inequality Adjusted Human Development Index					
L.HDI	0.919*** (0.00719)	0.911*** (0.0106)	0.910*** (0.00802)	0.922*** (0.0105)	0.906*** (0.00794)	0.940*** (0.00735)
INFLA	2.65e-05 (4.77e-05)	-0.000149*** (5.25e-05)	2.97e-05 (4.04e-05)	-9.56e-05** (4.33e-05)	-8.40e-06 (4.70e-05)	2.14e-05 (4.41e-05)
POPGROWTH	-0.00132 (0.00129)	0.00201* (0.00104)	0.00120 (0.00101)	-0.000240 (0.000880)	0.00105 (0.00123)	-0.000299 (0.00135)
LOGFDI	0.000537 (0.000424)	0.00151*** (0.000391)	0.000309 (0.000284)	0.000291 (0.000467)	0.00132*** (0.000191)	0.000863** (0.000354)
LOGGFKF	-0.00124 (0.000738)	-0.00180* (0.000985)	-9.80e-05 (0.000493)	0.000903 (0.000730)	-0.00193*** (0.000596)	-0.00259*** (0.000825)
AIDI	5.60e-05 (4.60e-05)	1.17e-05 (3.82e-05)	0.000101* (5.43e-05)	-0.000139* (7.57e-05)	9.67e-05** (3.65e-05)	2.31e-05 (4.31e-05)
CC	-0.00333** (0.00153)					
GE		0.00751** (0.00312)				
PV			0.00308*** (0.000620)			
RQ				0.0127*** (0.00221)		
RL					0.00162 (0.00147)	
VA						-0.00306** (0.00125)
Constant	0.0648*** (0.00975)	0.0615*** (0.0125)	0.0447*** (0.00716)	0.0312*** (0.00941)	0.0670*** (0.00889)	0.0756*** (0.0113)
Observations	484	484	484	484	484	484
Number of id	37	37	37	37	37	37
F	974320***	5.520e+07***	1.840e+08***	1.050e+07***	1.539e+06***	1.770e+07***
hansenp	0.423	0.423	0.507	0.517	0.400	0.452
sarganp	0	0	0	0	0	0
ar2p	0.651	0.215	0.368	0.327	0.276	0.469
ar1p	0.0105	0.0122	0.0143	0.00688	0.0131	0.0112

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5 examines the direct effects of various regulatory institutions on sustainable development in Africa. The results indicate that control of corruption is negative and statistically significant, suggesting that higher corruption levels hinder human development by undermining governance and resource allocation (Azwardi *et al.*, 2025; Linhartova & Pucek, 2024;). In contrast, government effectiveness is positive, indicating

that more effective governments enhance human development through improved service delivery (Saleem & Khan, 2025; UNDP, 2014). Political stability and absence of violence also show a positive effect, emphasizing the importance of stability for implementing sustainable policies (Perlikowski, 2021). Regulatory quality has a significant positive impact, reinforcing the fact that better regulatory frameworks promote development (Brafu-Insaidoo *et al.*, 2024). While rule of law is positively correlated, it is not statistically significant, suggesting its complex role in development (Baciu, 2023; Vanhala, 2022). Interestingly, voice and accountability exhibit a negative effect, indicating that increased accountability may not always translate into higher human development in Africa (Menocal & Sharma, 2008).

**Table 6: Direct Effects of Economic Institutions on Sustainable Development in Africa**

VARIABLES	(1)	(2)	(3)	(4)	(5)
	Inequality Adjusted Human Development Index				
L.HDI	0.954*** (0.0163)	0.911*** (0.00696)	0.968*** (0.0105)	0.906*** (0.00450)	0.905*** (0.0101)
INFLA	-0.000115** (5.22e-05)	0.000114** (5.02e-05)	-0.000100 (7.23e-05)	8.64e-05 (6.29e-05)	0.000108** (5.13e-05)
POPGROWTH	0.00394* (0.00205)	0.00445*** (0.00117)	0.00274 (0.00166)	0.00173* (0.000878)	0.00299*** (0.000773)
LOGFDI	-8.47e-05 (0.000549)	0.000380 (0.000348)	-0.00119** (0.000545)	0.000635** (0.000308)	0.000382 (0.000422)
LOGGFKF	-0.00184 (0.00124)	-0.000532 (0.000824)	-0.00151 (0.00117)	-0.000478* (0.000266)	-0.000718 (0.000857)
AIDI	-4.31e-05 (9.77e-05)	5.70e-05* (3.17e-05)	7.48e-05 (5.02e-05)	0.000186*** (1.81e-05)	0.000136*** (3.87e-05)
GOVSIZE	-0.00527*** (0.000875)				
LSPR		0.00213*** (0.000574)			
SM			-0.00360*** (0.000519)		
FT				0.00324*** (0.000360)	
INTERR					0.00112* (0.000600)
Constant	0.0987*** (0.0141)	0.0346*** (0.0108)	0.0977*** (0.0158)	0.0237*** (0.00790)	0.0461*** (0.0117)
Observations	458	458	458	451	458
Number of id F	37	37	37	37	37
hansenp	368622***	1.336e+06***	5.625e+06***	3.055e+06***	3.314e+06***
sarganp	0.347	0.506	0.427	0.469	0.465
ar2p	0	0	0	0	0
ar1p	0.558	0.393	0.556	0.721	0.416
	0.00403	0.00817	0.00333	0.00150	0.00799

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6 analyzes the direct effects of economic institutions on sustainable development in Africa. The coefficient for government size is negative and statistically significant (-0.00527,  $p < 0.01$ ), indicating that larger government sizes may be associated with lower levels of human development, potentially due to inefficiencies in public spending. Legal systems and property rights shows a positive and significant effect (0.00213,  $p < 0.01$ ), suggesting that stronger legal systems and property rights promote human development by enhancing investment security and economic stability (North, 1990). The negative coefficient of sound money (-0.00360,  $p < 0.01$ ) implies that sound money policies, while generally favorable, may have short-term trade-offs impacting development levels, possibly due to tight monetary conditions hindering growth. Freedom to trade has a positive and significant coefficient (0.00324,  $p < 0.01$ ), indicating that greater freedom to trade supports human development by facilitating market access and economic diversification (Bhagwati, 2004). Lastly, international regulations positively affect human development in Africa (0.00112,  $p < 0.1$ ), highlighting the importance of international regulations in fostering trade and investment, which in turn contribute to sustainable development (Rodrik, 2011).

**Table 7: Indirect Effects of DRM on Sustainable Development Through Regulatory Institutions in Africa**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Inequality Adjusted Human Development Index					
L.HDI	0.951*** (0.0115)	0.965*** (0.0159)	0.893*** (0.0133)	0.955*** (0.0173)	0.965*** (0.00972)	0.948*** (0.00994)
INFLA	-0.000180*** (6.72e-05)	-0.000188** (7.04e-05)	0.000108* (5.49e-05)	-7.37e-05 (4.95e-05)	-0.000146** (6.80e-05)	-0.000159*** (4.58e-05)
POPGROWTH	-0.00640*** (0.00125)	0.000944 (0.00163)	-0.000108 (0.00146)	-0.00192* (0.00110)	-0.00580*** (0.000910)	-0.00302* (0.00162)
LOGFDI	-0.000842 (0.000657)	0.000332 (0.000803)	-0.000940 (0.000623)	-0.000979* (0.000560)	-0.00147* (0.000739)	0.000183 (0.000696)
LOGGFKF	0.000931 (0.000952)	0.000117 (0.000931)	0.00447*** (0.00160)	0.00327*** (0.000681)	0.00127 (0.00109)	-0.000824 (0.00122)
AIDI	-5.43e-05 (7.36e-05)	-0.000312*** (8.01e-05)	0.000175** (6.70e-05)	-0.000357*** (0.000103)	-3.67e-05 (6.99e-05)	-4.96e-05 (5.12e-05)
TNRR	0.00123*** (0.000201)	-0.000821*** (0.000223)	0.000360* (0.000183)	-0.000363* (0.000204)	0.00151*** (0.000194)	0.000577*** (0.000132)
CC	-0.0136*** (0.00218)					
TNRR*CC	0.000894*** (0.000153)					
GE		0.0264*** (0.00372)				
TNRR*GE		-0.00110*** (0.000179)				
PV			0.00894*** (0.00225)			
TNRR*PV			0.000396** (0.000156)			
RQ				0.0255*** (0.00392)		
TNRR*RQ				-0.000679***		

RL				(0.000162)	-0.0208*** (0.00295)	
TNRR*RL					0.00120*** (0.000154)	
VA						-0.00566*** (0.00168)
TNRR*VA						0.000371*** (0.000118)
Net Effect	--	--	--	--	--	--
Threshold	--	--	--	--	--	--
Constant	0.0329** (0.0127)	0.0347** (0.0132)	-0.0183 (0.0215)	0.00124 (0.00931)	0.0247* (0.0140)	0.0507*** (0.0151)
Observations	484	484	484	484	484	484
Number of id	37	37	37	37	37	37
F	1.391e+06***	504098***	1.160e+07***	256682***	2.050e+07***	234141***
hansenp	0.487	0.555	0.753	0.278	0.448	0.380
sarganp	9.02e-11	0	0	0.00204	3.66e-10	0
ar2p	0.719	0.259	0.675	0.985	0.313	0.972
ar1p	0.0223	0.00393	0.00667	0.00400	0.00983	0.00723

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

We note from the findings on Table 7 that the positive coefficient for the interaction between resource mobilization and control of corruption (0.000894, p<0.01) suggests that effective corruption control enhances the positive impact of resource mobilization on human development, reinforcing that reducing corruption can facilitate better resource allocation (Tawiah et al., 2024; Mavindidze et al., 2025). Similarly, the interaction term between resource mobilization and government effectiveness is negative (-0.00110, p<0.01), indicating that while effective governance is crucial, excessive bureaucracy may dampen the benefits of resource mobilization on human development (Abdulkarim & Mahmood, 2019). The interaction with political stability and absence of violence shows a positive effect (0.000396, p<0.05), highlighting that a stable political environment amplifies the benefits of resource mobilization (Hesselbein, 2024). Regulatory quality also exhibits a significant positive interaction (0.0255, p<0.01), emphasizing that strong regulatory frameworks can enhance the effectiveness of resource mobilization in promoting sustainable development (Odhiambo, 2024). In contrast, the negative coefficient for the interaction between resource mobilization and rule of law (-0.0208, p<0.01) suggests complexities in how legal frameworks may influence the outcomes of resource mobilization, potentially indicating that rigid legal structures could hinder the flexibility needed for effective resource use (Vanhala, 2022). Lastly, the negative interaction with voice and accountability (-0.00566, p<0.01) suggests that increased accountability may not always positively correlate with human development in this context, pointing to the nuanced role that civic engagement plays in resource mobilization efforts (Rotimi et al., 2021).

**Table 8: Indirect Effects of DRM on Sustainable Development Through Economic Institutions in Africa**

VARIABLES	(1)	(2)	(3)	(4)	(5)
			Inequality Adjusted	Human Development	Index

L.HDI	0.947*** (0.0267)	0.905*** (0.0126)	0.964*** (0.0121)	0.924*** (0.0105)	0.957*** (0.00998)
INFLA	-6.54e-05 (7.75e-05)	-2.86e-06 (5.04e-05)	-0.000201*** (5.49e-05)	6.11e-05 (4.05e-05)	9.34e-06 (6.13e-05)
POPGROWTH	0.00425 (0.00295)	0.00434*** (0.00111)	0.00144 (0.00181)	9.12e-05 (0.00104)	0.00194* (0.00115)
LOGFDI	0.000461 (0.000710)	0.000497 (0.000554)	-0.000662 (0.000659)	0.000401 (0.000545)	0.000997 (0.000636)
LOGGFKF	-0.00230 (0.00168)	0.000558 (0.00115)	-0.00146 (0.00140)	5.51e-05 (0.000699)	-0.00181* (0.00102)
AIDI	3.98e-07 (0.000139)	0.000102 (6.34e-05)	9.14e-05 (9.07e-05)	0.000212** (8.78e-05)	8.33e-05 (7.10e-05)
TNRR	-0.000587 (0.000442)	-0.000633*** (0.000177)	-0.000312 (0.000301)	-0.00174*** (0.000540)	-0.00192*** (0.000612)
GOVSIZE	-0.00858*** (0.00171)				
TNRR*GOVSIZE	6.67e-05 (7.36e-05)				
LSPR		-0.000276 (0.000574)			
TNRR*LSPR		0.000228*** (6.70e-05)			
SM			-0.00463*** (0.00121)		
TNRR*SM			3.69e-05 (4.97e-05)		
FT				-4.70e-05 (0.000857)	
TNRR*FT				0.000319*** (9.32e-05)	
INTERR					-0.00531*** (0.00117)
TNRR*INTERR					0.000398*** (0.000107)
Net Effect	--	0.000274	--	0.000234	0.000341
Threshold	--	2.776	--	5.454	4.824
Constant	0.124*** (0.0229)	0.0193 (0.0160)	0.100*** (0.0202)	0.0307** (0.0116)	0.0696*** (0.0172)
Observations	458	458	458	451	458
Number of id	37	37	37	37	37
F	47760***	501644***	3.940e+07***	5.732e+06***	443819***
hansenp	0.284	0.529	0.406	0.449	0.435
sarganp	3.71e-07	0	0	0	0
ar2p	0.833	0.425	0.593	0.911	0.359
ar1p	0.00454	0.0114	0.00427	0.00196	0.0101

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The findings on table 8 suggests that the positive coefficient for the lagged human development index (0.947,  $p < 0.01$ ) reinforces the importance of past development levels in shaping current outcomes, indicating a path-dependent process (Adkins *et al.*, 2012). The negative coefficient for resource mobilisation across several models within the ambits of weak economic institutions (-0.000633,  $p < 0.05$ ) suggests that a higher reliance on resource mobilisation may be associated with lower human development if institutions are not functioning properly, potentially due to the inefficiencies associated with revenue mobilisation and allocation (Zgheib *et al.*, 2006). Government size shows a significant negative effect (-0.00858,  $p < 0.01$ ), indicating that larger governmental structures may hinder development by creating bureaucratic inefficiencies (North, 1990). The interaction between resource mobilisation and legal systems and property Rights (LSPR) is positive and significant (0.000228,  $p < 0.01$ ), suggesting that stronger legal protections enhance the efficacy of resource mobilisation in promoting human development (Acemoglu and Robinson, 2012). Similarly, the interaction of resource mobilisation with freedom to trade shows a positive effect (0.000319,  $p < 0.01$ ), emphasizing that trade liberalization can amplify the benefits of resource mobilization (Bhagwati, 2004). Conversely, the interaction with sound money is negative (-0.00463,  $p < 0.01$ ), indicating that stringent monetary policies may limit the positive impacts of resource mobilisation on development by restricting economic activity (Rodrik, 2011). Finally, the interaction with international regulations shows a positive effect (0.000398,  $p < 0.01$ ), highlighting that adherence to international standards can enhance the effectiveness of resource mobilisation efforts (Scholz, 1984).

The net effects, calculated as the sum of the direct effect of DRM and the interaction effect with these institutions ( $\alpha + \varphi * \emptyset$ ), are positive in the models where the interaction terms are significant, indicating that DRM's contribution to human development is strengthened in the presence of favorable economic institutions. For example, in model 2, the net effect of 0.000274 shows that DRM positively influences sustainable development when moderated by the institutional framework, highlighting the complementarity between resource mobilization and strong institutions (North, 1990; Bhagwati, 2004; Rodrik, 2011). The associated thresholds quantify the level of institutional quality at which the net effect of DRM becomes neutral: 2.776 in model 2, 5.454 in model 4, and 4.824 in model 5. These thresholds suggest that below these levels, DRM alone may not significantly enhance human development, whereas above them, DRM's impact is amplified, consistent with findings that robust institutions condition the effectiveness of economic policies (Asongu & Odhiambo, 2021; Tchamyu, 2019; Nchofoung *et al.*, 2020). Specifically, positive interactions with LSPR, FT, and INTERR indicate that secure property rights, open trade, and international regulatory alignment enhance the developmental returns to DRM, while the negative interaction of GOVSIZE and SM in some models suggests that larger government size or overly restrictive monetary policies may dampen the effect of DRM on development (Acemoglu *et al.*, 2005; North, 1990).

## 5 Summary of Findings and Policy Suggestions

The findings reveal a significant relationship between various factors and human development in Africa, particularly highlighting the importance of historical

development levels. The analysis shows that a country's current state of human development is closely tied to its past achievements, emphasizing a cumulative process where previous progress lays the foundation for future advancements. Additionally, the positive association between total natural resource rent and human development indicates that effective management and mobilization of natural resources can contribute to improved societal well-being. In contrast, higher levels of corruption negatively impact human development by undermining governance and resource allocation. The results further demonstrate that effective governance, political stability, and strong regulatory frameworks positively influence sustainable development, while larger government sizes and rigid legal structures tend to impede progress. Moreover, the analysis of economic institutions reveals that government size plays a critical role, with larger structures potentially leading to inefficiencies that detract from human development. Legal systems and property rights are identified as vital components that promote development by enhancing investment security and stability. The findings also highlight the importance of trade freedom and international regulations in fostering sustainable development by attracting economic growth and investment.

The findings highlight the significant influence of interactions between resource mobilization and both regulatory and economic institutional factors on human development outcomes. Effective corruption control is shown to enhance the benefits of resource mobilization, while excessive bureaucracy associated with government effectiveness can dampen these benefits. Political stability and strong regulatory frameworks positively amplify the impact of resource mobilization, reinforcing the importance of a conducive environment for development. Conversely, rigid legal structures may hinder effective resource utilization, and increased civic engagement does not always lead to improved human development. On the economic side, stronger legal protections enhance the effectiveness of resource mobilization, while larger government sizes can create bureaucratic inefficiencies. Additionally, trade liberalization positively impacts resource mobilization, whereas stringent monetary policies may restrict economic activity. Finally, adherence to international regulations is noted to bolster resource mobilization efforts, contributing to sustainable development.

To enhance sustainable development in Africa, policymakers should prioritize strengthening anti-corruption measures by implementing comprehensive transparency initiatives, such as open budgeting and public procurement systems, alongside whistleblower protections to encourage reporting of corrupt practices. Streamlining government structures is essential to reduce bureaucratic inefficiencies; this can be achieved through administrative reforms that include simplifying regulatory processes, enhancing inter-agency coordination, and establishing performance metrics to promote efficiency and accountability. Investing in robust regulatory frameworks entails developing clear, enforceable regulations that govern resource management and environmental protection, ensuring that stakeholders are held accountable for their actions.

To enhance legal protections for property rights, Africa should establish and enforce land tenure laws that protect individual and communal property rights, create accessible dispute resolution mechanisms, and increase public awareness of legal rights related to property ownership. Promoting trade liberalization can be achieved by reducing tariffs

and non-tariff barriers, facilitating trade agreements that encourage regional integration, and investing in infrastructure that improves market access. Policymakers should focus on maintaining sound monetary policies by adopting inflation-targeting frameworks, ensuring fiscal discipline, and promoting financial inclusion to support economic activities without restricting growth. Lastly, to adhere to international regulations and standards, Africa should implement compliance mechanisms that align local laws with global best practices, engage in capacity-building initiatives to strengthen regulatory institutions, and foster partnerships with international organizations to facilitate knowledge exchange and technical assistance.

Further research could examine country-specific differences to provide a more comprehensive understanding of sustainable development in Africa.

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