Socioeconomic and environmental determinants of Sustainable Development Goals performance in Africa

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ABSTRACT

Africa faces complex, interrelated socioeconomic and environmental challenges, resulting in uneven progress toward achieving the Sustainable Development Goals. Empirical evidence on how socioeconomic and environmental factors jointly influence SDG performance across African countries is limited. This study examines the determinants of SDG Dashboard performance using cross-country data from 54 African countries drawn from the 2025 Sustainable Development Report and the World Bank's World Development Indicators, applying descriptive statistics and ordered logistic regression, grounded in sustainable development theory. Descriptively, Central Africa shows high poverty and low female labor participation, while Eastern and Western Africa display moderate but variable poverty and employment. Regression results indicate several socioeconomic and environmental factors are significant ($p < 0.05$ and $p < 0.10$), with model fit $R^2 = 0.33$ to 0.70. Social vulnerabilities, including poverty and child mortality, are positively associated with performance in several goals, notably SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 6 (Clean Water and Sanitation), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 17 (Partnership for Goals), reflecting the effects of targeted social interventions. Service-sector expansion and employment growth support performance in education, gender equality, energy access, decent work, and sustainable cities, aligning with SDG 4, SDG 5, SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), and SDG 11 (Sustainable Cities and Communities). In contrast, rapid financial expansion, industrial activity, energy inefficiency, and biodiversity loss constrain performance in goals where inclusiveness and environmental safeguards are weak, particularly SDG 5, SDG 10 (Reduced Inequalities), and SDG 13 (Climate Action). Overall, the results underscore that sustained SDG performance in Africa depends on a balanced integration of social inclusion, economic development, and environmental protection. The study highlights the need for strengthening social investments, including cash and food transfers; awareness campaigns, including financial and labor market participation inclusivity; and closer alignment of industrialization with environmental standards through integrated SDG planning and monitoring frameworks.

Keywords: Africa, Environmental Factors, SDG Dashboard, Socioeconomic Factors, Sustainable Development Goals

I. INTRODUCTION

The African continent is known for several complex and interrelated economic, social, and environmental challenges, such as poverty, inequality, social exclusion, sustainable infrastructure development, and climate-related challenges, making it dangerous to leave the continent to these development challenges, requiring coordinated and sustained policy responses (Akanle *et al*., 2022). In response, the United Nations introduced the Sustainable Development Goals (SDGs) in 2015 as a comprehensive framework aimed at addressing these African challenges and advancing a more inclusive and sustainable development path by 2030 (Guillamón *et al*., 2025; United Nations, 2023). The SDGs constitute a universal call to action to eradicate poverty, protect the environment, and promote shared prosperity, encompassing 17 interconnected goals and 169 targets that span economic development, social inclusion, environmental sustainability, and institutional governance (Guillamón et al., 2025), where Sustainable development

hinges on economic growth, social inclusion, and environmental sustainability as the three major development pillars of SDGs (Akanle *et al*., 2022).

Unlike earlier development agendas, the SDGs explicitly recognize the interdependence between economic growth, social equity, and environmental protection, emphasizing that progress in one dimension is often conditional on outcomes in others (Griggs *et al*., 2013; Sachs, 2012; Ali *et al*., 2025). As a result, achieving the SDGs requires not only financial and technological resources but also effective coordination among governments, private actors, civil society, and international organizations (Musah, 2024). A robust empirical understanding of the socioeconomic and environmental factors that drive SDG performance in Africa is, therefore, essential for designing policies that can generate sustained and balanced development outcomes (Ali *et al*., 2025).

Despite strong global commitment, progress toward the SDGs has been slower than anticipated. Sachs et al.(2025) indicate that only 18 percent of SDG targets are currently on track, while nearly half exhibit insufficient progress, and a substantial share has regressed below 2015 baseline levels. The situation is particularly critical in Africa, where fewer than 6 percent of targets are projected to be achieved by 2030 (African Union Commission *et al*., 2024). Moreover, SDG performance across the continent is highly uneven. Northern Africa has recorded relatively stronger outcomes in goals related to infrastructure, water and sanitation, and urban development, including SDG 2, SDG 6, SDG 9, and SDG 11. Eastern and Western Africa show mixed performance, with progress in SDG 12 and SDG 13 but persistent challenges in poverty reduction, health, and urban sustainability. Central and Southern Africa continue to lag across most goals, reflecting deep structural and institutional constraints (United Nations Development Program (UNDP), 2023; African Union, 2024).

These disparities underscore that no African country is currently on track to achieve all SDGs, while performance varies substantially across goals and regions. Despite growing descriptive evidence, there remains a limited empirical understanding of the factors that systematically drive SDG performance across African countries. In particular, how socioeconomic conditions and environmental pressures jointly shape development outcomes remains insufficiently explored in a comparative cross-country context. Addressing this gap is critical for informing policy choices and prioritizing interventions that can accelerate SDG achievement on the continent.

Monitoring SDGs achievements relies on tracking SDGs performance through measurable indicators and targets. Visualization tools such as the SDG Dashboard and SDG Trends provide a simplified overview of countries' performance across the 17 goals. The SDG Dashboard, developed as part of the global SDG monitoring framework, offers a useful tool for examining these dynamics. By classifying country performance on each goal into ordered categories ranging from major challenges to goal achievement, the dashboard captures both performance and persistent constraints in SDG implementation. This structure enables assessment of how variations in socioeconomic and environmental factors are associated with differences in SDG performance across countries.

Existing studies examining the drivers of SDG performance report mixed findings (Sachs *et al*., 2022). While some emphasize the role of financial resources, technological capacity, and human capital in facilitating SDG achievement (Shuai *et al*., 2021), others highlight governance quality, institutional stability, and civic engagement as central determinants, particularly in developing regions (Lella *et al*., 2024). Conversely, conflict, economic instability, and weak institutional frameworks are frequently cited as barriers to performance. These divergent perspectives suggest that the determinants of SDG performance may not be uniform across countries or goals, reinforcing the need for context-specific empirical analysis focused on Africa. This study assesses how socioeconomic and environmental factors jointly shape SDG Dashboard performance across African countries, where the empirical analysis identifies synergies and trade-offs by examining whether the same factors generate reinforcing or opposing effects across different SDGs.

1.1 Statement of the Problem

Despite the global commitment to the SDGs, progress toward their achievement remains slow and uneven, particularly across African countries (African Union Commission *et al*., 2024; Leal-Filho et al., 2020). Yet existing assessments of SDG performance have largely remained descriptive, offering limited insight into the underlying socioeconomic factors and environmental factors, including poverty rates, health outcomes, labor participation, financial depth, energy intensity use, forest cover, and emissions that drive or constrain performance across countries and goals (UNDP, 2023; African Union, 2024). As a result, policymakers often lack clear empirical guidance on which factors matter most for improving SDG outcomes in the African context (Ali et *al*., 2025). However, SDG outcomes may also be influenced by institutional and governance conditions, which are not explicitly included in this study.

The SDGs are designed as an integrated framework linking social inclusion, economic development, and environmental sustainability (Griggs *et al*., 2013; Ali *et al*., 2025). However, much of the existing literature examines these dimensions in isolation or focuses on individual goals, thereby overlooking potential interactions and trade-offs among the three pillars of sustainability (Musah, 2024; Shuai *et al*., 2021). This fragmented approach limits understanding of how improvements in one dimension may reinforce or undermine performance in others, particularly

in regions characterized by resource constraints and structural vulnerabilities such as Africa (Akanle *et al*., 2022; Lella *et al*., 2024).

Moreover, cross-country comparative studies that systematically assess SDG performance across African nations remain scarce. Where such studies exist, they often rely on aggregate indices or binary measures of achievement that fail to capture the gradation of performance across different SDG categories (Guillamón *et al*., 2025; UNDP, 2023). The SDG Dashboard, which classifies countries into ordered performance categories ranging from major challenges to goal achievement, provides a more nuanced representation of SDG performance (Sachs *et al*., 2022). However, this tool remains underutilized in empirical analyses examining the determinants of SDG outcomes in Africa due to technical challenges associated with incorporating ordered categorical outcomes into panel-data framework studies, as its structure is suited for cross-sectional analysis

Consequently, there is a clear empirical gap in understanding how socioeconomic and environmental factors such as poverty rates, health outcomes, labor participation, financial depth, energy intensity use, forest cover, and emissions jointly influence movement across SDG Dashboard categories among African countries (Ali *et al*., 2025; Musah, 2024). Without such evidence, efforts to design targeted, integrated, and context-appropriate policies risk being ineffective or misaligned with the realities faced by countries at different stages of SDG implementation. Addressing this gap is essential for informing policy strategies that can accelerate progress, reduce trade-offs, and support balanced and sustainable development across the continent (Guillamón *et al*., 2025; African Union Commission *et al*., 2024).

1.2 Research Objective

i) To examine the influence of social development indicators on SDG Dashboard performance across African countries.
ii) To determine the influence of economic indicators on SDG Dashboard performance across African countries.
iii) To assess the influence of environmental sustainability indicators on SDG Dashboard performance across African countries.

1.3 Research Hypothesis

Null Hypothesis (Ho):
i) Social indicators do not exert a statistically significant influence on SDG Dashboard performance across African countries. ii) Economic indicators do not exert a statistically significant influence on SDG Dashboard performance across African countries.
iii) Environmental sustainability indicators do not exert a statistically significant influence on SDG Dashboard performance across African countries.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1. Sustainable Development Theory

This study is anchored in Sustainable Development Theory (SDT), which emphasizes that development should meet present needs without compromising the ability of future generations to meet theirs (World Commission on Environment and Development [WCED] 1987; Sachs, 2012; Griggs *et al*., 2013). SDT highlights the interdependence of economic growth, social inclusion, and environmental protection, asserting that performance in one dimension can reinforce or, if unmanaged, undermine outcomes in others. The SDGs operationalize this principle by promoting balanced and integrated development across social, economic, and environmental domains (Ali *et al*., 2025). In the African context, SDT provides a framework to examine how socioeconomic and environmental factors jointly shape SDG outcomes. Social factors such as education, health, and poverty reduction are crucial for building human capital and promoting equity. Economic factors, including industrialization, financial expansion, and employment, drive growth and generate resources to support social programs. Environmental factors such as energy efficiency, biodiversity conservation, and climate adaptation sustain the natural resource base essential for long-term development (Musah, 2024; UNDP, 2023). The SDG Dashboard operationalizes SDT by categorizing countries' performance, reflecting the balance among the three pillars. Using this framework, the study examines the combined influence of socioeconomic, economic, and environmental determinants on SDG performance in Africa, highlighting that sustainable development is achieved through integrated and mutually reinforcing policies rather than isolated interventions.

2.2 Empirical Review

Empirical research on the determinants of Sustainable Development Goal performance in African countries has provided valuable insights, yet the existing literature remains fragmented and limited in scope. Ikram and Boudraa (2025) investigated the role of governance quality in advancing SDG achievement in North Africa using an integrated Grey Relational Analysis model. Their findings revealed a significant and nuanced relationship between governance effectiveness and sustainable development outcomes, with North African countries performing particularly well in goals

related to education, infrastructure, reduced inequalities, sustainable cities, responsible consumption, and institutional strength. The study highlights the importance of effective governance in channeling resources toward development priorities. However, its focus was restricted to institutional factors within a single region, overlooking the contributions of socioeconomic and environmental determinants and limiting the generalizability of the findings to the broader African context.

Similarly, Fang (2021) examined the impact of Chinese foreign direct investment on SDG outcomes across African countries using random effects and ordered probit models. The study found that FDI positively influenced performance in several goals, including affordable energy, economic growth, innovation, responsible consumption, climate action, and life on land. While these results underscore the economic dimension of SDG advancement, the analysis was limited to FDI as a single determinant, neglecting the interactive effects of social and environmental factors that are critical for sustainable development. Bajja et al. (2025) also explored the effects of transport energy consumption, trade openness, and financial development on SDG outcomes in selected African countries using the Augmented Mean Group method. Their findings demonstrated considerable heterogeneity in economic and environmental influences on SDG performance, yet the study overlooked social determinants and was confined to a subset of countries, restricting the broader applicability of the conclusions.

Collectively, these studies indicate that while governance, FDI, and selected economic and environmental factors can influence SDG outcomes, single-dimension analyses fail to capture the integrated and multidimensional nature of sustainable development. Furthermore, most studies rely on SDG Index scores or individual SDG indicators rather than the SDG Dashboard, which provides a more comprehensive and policy-relevant classification by categorizing countries according to levels of performance and remaining challenges. This study, therefore, aims to examine the economic, social, and environmental determinants of SDG Dashboard performance across African countries. Unlike prior studies that focus on single determinants or specific countries and regions, this research adopts a cross-country and multidimensional approach consistent with Sustainable Development Theory, which emphasizes the interdependence of development pillars.

2.3 Conceptual Framework

This study's conceptual framework is grounded in sustainable development, integrating economic, social, and environmental dimensions to assess SDG Dashboard performance and guide policy. Sustainable development emphasizes equitable resilience and long-term viability, employing indicators that capture performance across sectors while remaining locally relevant. The framework serves both as a diagnostic tool and a strategic guide for promoting balanced and sustainable outcomes. Economic sustainability focuses on inclusive growth, structural reforms, and resilience, providing resources for social programs. Social sustainability emphasizes equity, inclusion, and access to education, healthcare, and decent living standards. Environmental sustainability ensures the conservation of resources, protection of biodiversity, and reduction of ecological impacts. The Food and Agriculture Organization's systemic sustainability framework underpins this approach, highlighting the synergies among the three pillars, where performance in one dimension reinforces gains in others. By situating SDG Dashboard performance within this framework, the study emphasizes how socioeconomic and environmental factors jointly influence SDG attainment and underscores the need for integrated policies that balance social, economic, and environmental objectives to achieve sustainable development outcomes in African countries, addressing the gaps identified in the empirical literature by moving beyond single-factor and goal-specific, integrating all the three dimensions to capture their joint influence on a particular SDG Dashboard outcome.

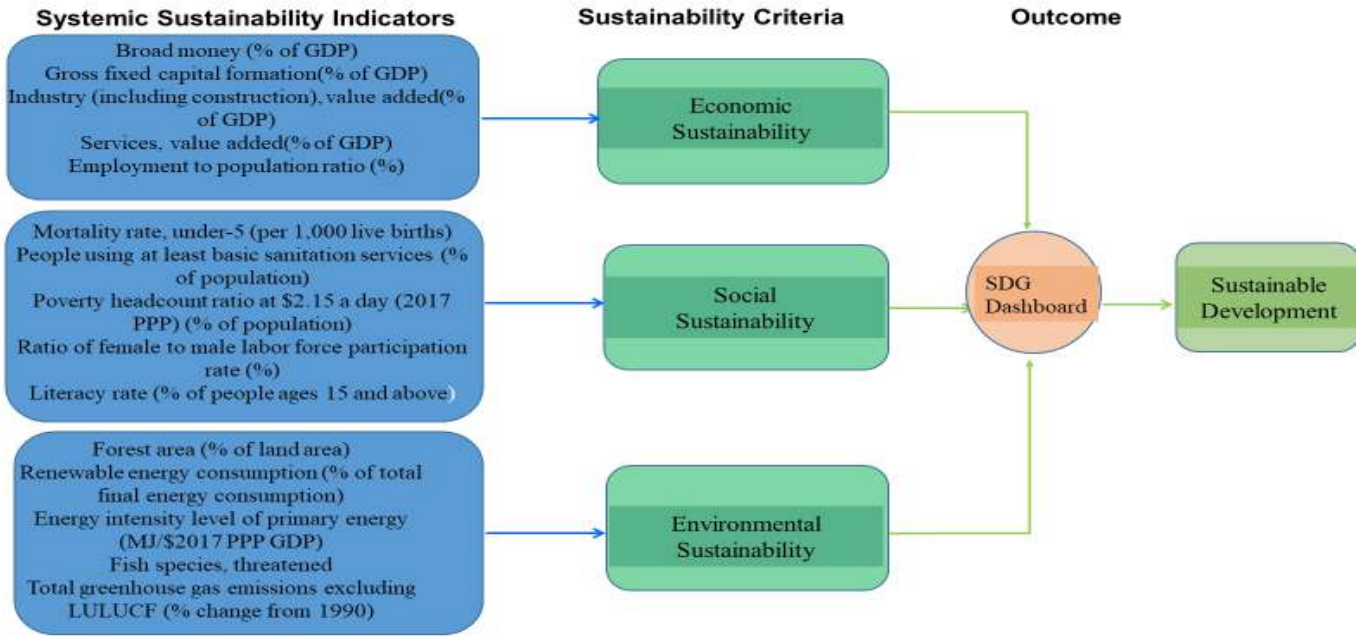

Figure 1
Conceptual Framework Based on the Notion of Sustainable Development Theory

III. METHODOLOGY

3.1 Research Design and Approach

This study employed a quantitative research design to examine the factors influencing performance on the SDGs Dashboard across African countries. The approach is explanatory, integrating descriptive and inferential statistical techniques to analyze the impact of socioeconomic and environmental determinants on SDG outcomes. Ordered logistic regression was used to accommodate the ordinal nature of the SDG Dashboard categories and to evaluate the relative contributions of the explanatory variables.

3.2 Data Sources

Data were obtained from the Sustainable Development Report 2025, which provides SDG Dashboard ratings, and the World Bank Indicator database, which offers comprehensive socioeconomic and environmental data for all UN member states. The datasets include index scores, goal-specific dashboards, trends for all 17 SDGs, and detailed metadata including units, bounds, thresholds, and indicator definitions. This study focused on the SDG Dashboard ratings and selected socioeconomic and environmental indicators for the 54 African countries. Data were accessed in Excel format, cleaned in SPSS, and analyzed using STATA version 17

3.3 Data Preparation

Data cleaning and pre-processing for data quality were conducted to ensure reliability, accuracy, and consistency. All variables were sourced from internationally recognized databases that apply standardized data collection and validation procedures across countries. The dataset was screened for inconsistencies, implausible values, and extreme observations to account for potential reporting differences arising from variations in national statistical capacity. Missing values at the country level were imputed using the overall mean for each variable, as the proportion of missing data was low, ensuring sample size preservation. Independent variables were standardized using a z-score transformation to ensure comparability across differing scales and prevent variables with larger ranges from disproportionately influencing regression results. Potential outlier effects were examined through standardized values, and no extreme observations were identified that warranted exclusion.

The SDG Dashboard variable was recoded numerically for analysis, reflecting ordinal performance: Goal Achievement = 4, Challenges Remain = 3, Significant Challenges = 2, and Major Challenges = 1. This coding preserves the ordinal nature of the data and aligns higher values with better SDG performance and facilitates the use of ordered

logistic regression, which does not assume equal distances between outcome categories but instead estimates threshold parameters separating adjacent levels of achievement.

3.4 Sampling Technique

A census approach was employed, including all 54 African countries with available data. Countries were classified by region according to African Union and United Nations standards, which consider geographical, economic, and historical contexts. This ensures full continental coverage and allows for meaningful regional comparisons of SDG Dashboard performance.

Table 1

Classification of African Countries by Region

REGION	COUNTRY
Northern Africa	Algeria, Morocco, Libya, Tunisia, Egypt, and Sudan
Eastern Africa	South Sudan, Ethiopia, Kenya, Tanzania, Mozambique, Zambia, Somalia, Rwanda, Malawi, Seychelles, Eritrea, Djibouti, Comoros, Mauritius, Madagascar, Uganda, Burundi, and Zimbabwe
Central Africa	Chad, Cameroon, Central African Republic, Equatorial Guinea, Sao Tome and Principe, Gabon, Congo, Democratic Republic of Congo, Angola, and Congo
Western Africa	Burkina Faso, Benin, Togo, Ghana, Ivory Coast, Liberia, Sierra Leone, Guinea, Guinea-Bissau, Senegal, Nigeria, Niger, Mali, Mauritania, Cape Verde, and Gambia
Southern Africa	Namibia, Botswana, South Africa, Eswatini, and Lesotho

3.5 Variable Selection and Description

3.5.1 SDG Dashboard

The SDG dashboard was used as a dependent variable to assess countries' performance in achieving the SDGs. It provides a visual summary of performance across all 17 SDGs using a traffic light scheme: green, yellow, orange, and red (Sachs *et al*., 2024). Green indicates goal achievement, yellow signals challenges remain, orange denotes significant challenges, and red reflects major challenges (Lafortune *et al*., 2018). The dashboard assumes equal weighting across indicators and relies on data availability and quality.

Table 2

Sustainable Development Goals (SDGs) and their Descriptions

SDG Number Goal	Description
SDG 1	No Poverty
SDG 2	Zero Hunger
SDG 3	Good Health and Well-being
SDG 4	Quality Education
SDG 5	Gender Equality
SDG 6	Clean Water and Sanitation
SDG 7	Affordable and Clean Energy
SDG 8	Decent Work and Economic Growth
SDG 9	Industry, Innovation, and Infrastructure
SDG 10	Reduced Inequalities
SDG 11	Sustainable Cities and Communities
SDG 12	Responsible Consumption and Production
SDG 13	Climate Action
SDG 14	Life Below Water
SDG 15	Life on Land
SDG 16	Peace, Justice, and Strong Institutions
SDG 17	Partnerships for the Goals

3.5.2 Socioeconomic and Environmental Factor Selection

To account for the extensive set of 59 socioeconomic and environmental indicators available as independent variables, exploratory factor analysis (EFA) was employed to reduce dimensionality and guide variable selection. Indicators were categorized into social, economic, and environmental constructs based on theoretical considerations. The appropriateness of the dataset for factor analysis was evaluated using Bartlett's Test of Sphericity and the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy. Bartlett's Test was statistically significant across all constructs ($p < 0.001$), indicating sufficient inter-variable correlations, while KMO values ranged from 0.51 to 0.77, satisfying conventional thresholds for factorability. For each construct, the five indicators with the highest factor loadings were

retained, ensuring that the selected variables captured the maximum systematic variance and minimized multicollinearity, thereby providing robust predictors for subsequent econometric modeling.

3.6 Variables and Measurement

The study examines the SDG Dashboard classification as a dependent variable, with socio-economic and environmental factors as independent variables. Below (Table 3) is the summary list of the variables and the units of measurement

Table 3

Description of Dependent and Independent Variables

Category	Variable Name	Measurement / Source
Dependent Variable (SDG Achievement)	SDG Dashboard Performance	Ordinal (1-4)
	Social Factors	
Independent variables	Mortality rate, under-5 (per 1,000 live births)	Country-level under-five mortality rate (WBI)
	People using at least basic sanitation services (% of population)	Country-level percentage (WBI)
	Poverty headcount ratio at $2.15 a day (2017 PPP) (% of population)	Country-level percentage (WBI)
	Ratio of female to male labor force participation rate (%)	Country-level ratio(WBI)
	Literacy rate (% of people ages 15 and above)	Country-level percentage (WBI)
	Economic Factors	
	Broad money (% of GDP)	Country-level percentage(WBI)
	Gross fixed capital formation(% of GDP)	Country-level percentage(WBI)
	Industry (including construction), value added(% of GDP)	Country-level percentage of industry value addition(WBI)
	Services, value added(% of GDP)	Country-level percentage (WBI)
	Employment to population ratio (%)	Country-level employment percentage (WBI)
	Environmental Factors	
	Forest area (% of land area)	Country-level percentage (WBI)
	Renewable energy consumption (% of total final energy consumption)	Country-level percentage (WBI)
	Energy intensity level of primary energy (MJ/$2017 PPP GDP)	Country-level ratio (WBI)
	Fish species, threatened	Country-level count (WBI)
	Total greenhouse gas emissions excluding LULUCF (% change from 1990)	Country-level percentage change(WBI)

3.7 Analytical Techniques

The study employed both descriptive and inferential statistical techniques. Descriptive statistics were used to summarize and compare the distribution of socioeconomic and environmental factors. For this purpose, regional aggregation was applied, where means and standard deviations were computed to capture central tendencies and variability across countries.

For inferential analysis, an Ordered Logistic Regression (OLR) model was estimated using country-level data to test the primary hypotheses: that the selected socioeconomic and environmental factors do not significantly influence SDG dashboard performance across African countries. The OLR model is appropriate given that the proportional odds assumption holds and the ordinal nature of the dependent variable, which captures a ranked classification of SDG performance without assuming equal intervals between categories. The model specification is presented in Equation (1), where the log-odds of achieving higher SDG performance levels are modeled as a function of the selected independent variables.

The relationship between socioeconomic and environmental factors and SDG dashboard performance is modeled using an OLR, specified as follows:

$$\text{Logit}[P(\text{Dashboard Score}_i \leq j)] = \alpha_j + \beta_1 \text{U5MR}_i + \beta_2 \text{Sanit}_i + \beta_3 \text{Pov}_i + \beta_4 \text{Flfp}_i + \beta_5 \text{Lit}_i + \beta_6 \text{BM}_i + \beta_7 \text{Gfcf}_i + \beta_8 \text{IndVA}_i + \beta_9 \text{ServVA}_i + \beta_{10} \text{EmpPop}_i + \beta_{11} \text{ForArea}_i + \beta_{12} \text{RenEn}_i + \beta_{13} \text{EnerInt}_i + \beta_{14} \text{FishThr}_i + \beta_{15} \text{Ghg}_i + \epsilon_i$$

where:

Logit$[P(\text{Dashboard Score}_i \leq j)]$denotes the log-odds of a country having an SDG dashboard score at or below category j. Since the dashboard is coded from 1 (lowest performance) to 4 (highest), $j = 1,2,3$. The logit transformation is defined as $\text{Logit}(p) = \ln\frac{p}{1-p}$.

$\alpha_j$are the cut-points (thresholds) separating the latent continuous SDG performance variable into ordered categories. There are $j-1$thresholds estimated, with $\alpha_1 < \alpha_2 < \alpha_3$.

$\beta_1, \ldots, \beta_{15}$are the coefficients of interest, capturing the effect of a one-unit increase in the respective independent variable on the log-odds of being in a lower SDG dashboard category.

Independent Variables:

U5MR_i: Under-5 mortality rate (%), country i

Sanit_i: Population using at least basic sanitation services (%)

Pov_i: Poverty headcount at $2.15/day (2017 PPP) (%)

Flfp_i: Female-to-male labor force participation ratio (%)

Lit_i: Literacy rate (% of population aged 15+)

BM_i: Broad money (% of GDP)

Gfcf_i: Gross fixed capital formation (% of GDP)

IndVA_i: Industry value added, including construction (% of GDP)

ServVA_i: Services value added (% of GDP)

EmpPop_i: Employment-to-population ratio (%)

ForArea_i: Forest area (% of land area)

RenEn_i: Renewable energy consumption (% of total final energy consumption)

EnerInt_i: Energy intensity of primary energy (MJ/$2017 PPP GDP)

FishThr_i: Number of threatened fish species

Ghg_i: Total greenhouse gas emissions excluding LULUCF (% change from 1990)

$\epsilon_i$is the error term, capturing unobserved factors influencing the SDG dashboard score

The use of this selected listed independent variables are grounded by the SDT which is explained by Hanna and Cesaretti (2019) that balancing the human population of the world to support the reduction of degrading or damaging of the global environment; use of efficient energy; decreasing poverty, improve quality of life, supporting healthy people and systems, support quality of education and support providing jobs to the youth to get equal opportunities. This will lead to eliminate unuseful ideologies and improving sustainability.

3.7.1 Model Diagnostics and Fit Tests

To ensure the robustness and validity of the OLR models, several diagnostic tests were performed. Multicollinearity among the independent variables was assessed using the Variance Inflation Factor (VIF). The average VIF was 2.37, indicating that multicollinearity was within acceptable limits and not a concern for the analysis. The goodness-of-fit of the models was evaluated using McFadden's pseudo R^2, which measures the proportion of variation in the dependent variable explained by the model. Across the estimated specifications, pseudo R^2values ranged from 0.33 to 0.70, reflecting moderate to strong model fit, with variation depending on the SDG under consideration. The proportional odds assumption for the ordered logistic regression models was assessed using the Brant test were the results indicated no violation of the assumption (all p-values > 0.05, equal to 1.000), confirming that the use of ordered logistic regression was appropriate. These diagnostics suggest that the selected independent variables collectively provide meaningful explanatory power for the ordinal SDG dashboard outcomes. Coefficient significance was assessed using the Wald Chi-square statistic, computed as the squared ratio of the estimated coefficient to its standard error. A p-value less than the 5 percent significance level led to the rejection of the null hypothesis. In addition, the overall model significance was evaluated using the Likelihood Ratio test, which compared the −2 Log Likelihood of the restricted model (excluding predictors) with that of the full model (including all socio-economic and environmental determinants). A statistically significant LR Chi-square statistic indicated that the included determinants jointly explain variations in SDG Dashboard performance.

Accordingly, hypothesis testing in this study relied on maximum likelihood estimation, Wald tests for individual predictors, and likelihood ratio tests for joint model significance, thereby ensuring robust inferential assessment of the determinants of SDG Dashboard performance.

IV. FINDINGS & DISCUSSION

4.1 Descriptive Statistics

Table 4 presents the descriptive statistics of socioeconomic, economic, and environmental indicators across African regions, highlighting substantial regional heterogeneity in factors influencing SDG achievement. Central Africa exhibits marked development imbalances, characterized by the highest poverty headcount (64.80%) and the lowest female-to-male labor force participation (45.46%), despite high access to basic sanitation services (82.88%). These disparities suggest that, while some social infrastructure targets SDG 6 may be relatively advanced, persistent poverty and low female participation hinder broader SDG attainment, particularly in SDG 1, SDG 5, and SDG 8.

Southern Africa demonstrates relatively balanced social and environmental performance, with higher sanitation coverage (61.75%), strong adult literacy rates (90.00%), the highest female-to-male labor force participation (84.87%), and the lowest share of threatened fish species (2.20%). This indicates that several SDGs, including SDG 4, SDG 6, SDG 14, and SDG 15, are performing more favorably in this region.

Eastern and Western Africa show moderate performance across most indicators, although Eastern Africa exhibits higher variability in poverty and employment metrics, reflecting heterogeneous development paths that may limit consistent performance across multiple SDGs. Northern Africa records moderate socioeconomic outcomes, accompanied by stronger environmental performance, including higher renewable energy consumption (65.73%) and forest area coverage (52.31%), suggesting relative advancement in SDG 7, SDG 13, and SDG 15.

At the continental level, large standard deviations across indicators reflect significant cross-country heterogeneity, highlighting the uneven nature of SDG performance in Africa. The observed patterns underscore that disparities in health, education, labor participation, investment, and environmental sustainability are likely key determinants of overall SDG achievement, providing the rationale for their inclusion in the subsequent Ordered Logistic Regression analysis.

Table 4

Descriptive Statistics of Socioeconomic and Environmental Indicators across African Regions

Indicator (Description)	Northern Africa		Eastern Africa		Southern Africa		Western Africa		Central Africa		Total (Africa)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Under-five mortality rate	61.77	28.01	48.04	23.06	40.00	3.67	68.26	28.65	24.98	13.75	53.01	27.14
People using at least basic sanitation services	35.87	20.06	43.78	25.55	61.75	18.81	37.10	18.60	82.88	23.05	46.49	25.79
Poverty headcount ratio at $2.15/day	42.11	9.03	47.06	11.55	59.60	7.40	43.56	8.37	64.80	10.65	48.33	12.10
Female-to-male labor force participation ratio	80.67	7.48	80.56	12.4	84.87	5.27	80.01	16.53	45.46	25.11	76.92	17.95
Adult literacy rate	64.60	18.77	74.92	9.88	90.00	1.38	58.49	17.42	82.85	2.15	70.61	16.74
Forest area	52.31	26.75	21.48	16.28	13.74	13.47	26.91	24.95	12.51	19.27	26.51	24.03
Energy intensity	6.11	2.94	5.95	3.02	5.33	2.40	5.02	2.79	5.54	2.52	5.60	2.77
Renewable energy consumption	65.73	30.26	58.71	26.31	47.80	23.00	56.20	29.88	31.57	41.43	55.11	30.11
Fish species, threatened	79.22	49.35	53.82	39.63	2.20	1.92	62.94	35.43	95.17	62.35	60.57	46.12
CO_2 emissions	4.79	1.80	4.62	0.83	3.55	1.82	4.97	0.89	4.60	1.17	4.65	1.22
Broad money	24.48	12.31	47.66	29.49	32.31	10.58	42.83	22.87	65.24	38.61	42.90	27.04
Gross fixed capital formation	21.66	8.17	18.92	6.38	22.90	5.59	23.78	7.36	25.05	11.54	21.87	7.66
Industry value added	36.23	11.73	20.05	7.79	28.24	6.32	21.87	6.25	36.09	16.54	25.83	11.27
Services value added	41.90	7.27	55.53	10.13	52.14	6.92	48.95	9.80	42.38	9.42	49.53	10.43
Employment-to-population ratio	58.34	6.62	53.36	15.65	54.54	16.30	55.34	13.95	55.14	19.61	55.08	14.12

Table 5

Ordered Logistic Regression Coefficient Results of Social, Economic, and Environmental Indicators Across SDGs.

Factor	SDG1	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG 12	SDG13	SDG1 4	SDG15	SDG17
Under-5 mortality rate	-0.024	-0.125	0.202***	-0.064	-0.093	-0.063	-0.045	-0.051	-0.014	0.001	0.057	0.104	-0.124	0.062*
Population using at least basic sanitation services	0.015	-0.130*	-0.093**	0.020	-0.123	-0.034	-0.026	0.000	-0.071**	-0.069**	-0.031	-0.193*	-0.152*	0.089***
Poverty headcount ratio at $2.15/day	0.002	0.660***	0.352***	0.150*	-0.102	0.044	0.559**	-0.031	-0.081	-0.087	-0.140*	0.110	0.038	0.151**
Ratio of female to male labor force participation rate	-0.062	0.059	0.064	-0.007	-	-0.121*	-0.120	-0.080*	-	0.042	-0.059	0.119	-0.129	0.002
Literacy rate	0.269*	0.222	-0.018	0.142	1.629*	-0.294	0.359	0.054	0.083	0.133	-0.004	1.025*	0.189	-0.221*
Energy intensity of primary energy	-0.268	-1.032*	-0.199	-0.442	-2.046*	-0.602**	-0.737	-0.169	0.120	-0.136	0.741***	-1.922*	-1.588*	0.179
Renewable energy consumption	0.039	0.009	0.002	0.049	0.030	0.037	-0.053	-0.004	-0.001	-0.001	-0.012	0.206	0.078	-0.054
CO_2 emissions	0.001	-0.011	0.001	0.000	-0.011	0.001	-0.002	-0.002	0.000	-0.001	-0.001	0.000	-0.042	0.012
Forest area	-0.005	-0.013	-0.038	0.005	-0.053	0.032	0.148**	-0.007	-0.020	-0.023	0.006	0.028	-0.074**	-0.023**
Fish species, threatened	0.002	0.032	-0.015	-0.003	0.061*	0.010	-0.054	0.002	0.014*	0.014	0.006	0.028	-0.074**	-0.023**
Broad money	0.022	-0.019	-0.078**	-0.014	-0.032	0.018	0.016	0.010	0.014*	0.025	0.014	-0.137	-0.007	-0.022
Gross fixed capital formation	0.023	-0.200	0.028	-0.093	-	-0.096	0.094	0.094	-	0.042	-0.084	0.030	-0.042	0.012
Industry value added	-0.028	0.046	0.093	0.020	0.227	0.041	0.103	-0.140**	0.000	0.014	-0.354***	0.539*	0.070	-0.060
Services value added	-0.062	0.451**	0.148*	0.029	0.290	0.207***	0.378	-0.218***	0.091*	0.093*	-0.183*	0.206	0.078	-0.054
Employment-to-population ratio	-0.047	0.242**	0.037	-0.078	0.221	0.088**	0.074	-0.047	0.057*	0.062**	-0.115*	0.030	-0.042	0.012

*, **, *** indicate significance at 10%, 5%, and 1% levels, respectively. Dash (–) indicates variable not applicable for that SDG

2.2 Empirical Findings

The results presented in this section are from the ordered logistic regression models, which estimate the relationship between explanatory variables and the likelihood of a country achieving a higher level of the SDG Dashboard performance. It is important to note that the coefficients present the change in the log-odds of being in a higher SDG dashboard category for a one unit increase in the independent variable, holding other factors constant, where a positive coefficient indicates that higher values of the independent variable are associated with higher odds of a greater SDG dashboard category, while a negative coefficient indicates lower odds.

4.2.1 The Influence of Social Factors on the SDG Dashboard Performance

The analysis indicates that social indicators exert significant and heterogeneous influences on the likelihood of SDG dashboard performance across African countries (Table 5). The under-five mortality rate (U5MR) shows a positive and statistically significant relationship with SDG 5 and SDG 17 ($p < 0.01$ and $p < 0.10$, respectively). This implies that an increase in U5MR raises the log-odds of the goals being classified in a higher dashboard category, suggesting that higher child mortality attracts more international aid and the adoption of gender-focused reforms in maternal health, girls' education, legal protection, and social interventions, which in turn raises the likelihood the SDG 5 and SDG 17 dashboard will move from lower to higher dashboard categories.

Access to basic sanitation services exhibits a mixed pattern. It is negatively and significantly associated with SDG 4 ($p < 0.10$), SDG 5 ($p < 0.05$), SDG 11 ($p < 0.05$), SDG 14 ($p < 0.10$), and SDG 15 ($p < 0.10$), indicating a reduced probability of upward movement in these SDGs dashboard categories for SDGs 4, 5, 11, 14, and 15. This finding suggests that sanitation alone has a limited marginal contribution to advancing these goals, highlighting the need for complementary interventions in hygiene education, menstrual hygiene management, safe and gender-responsive facilities, adequate water supply, sewerage networks, solid waste systems, effective wastewater treatment, and pollution control. Conversely, sanitation shows a positive and highly significant association with SDG 17 ($p < 0.01$), indicating that higher sanitation access increases the likelihood that the goal dashboard will move into a higher category, thereby contributing to the performance on partnership-oriented goals.

The poverty headcount ratio is positively and significantly associated with SDG 4 and SDG 5 ($p < 0.01$), SDG 6 ($p < 0.10$), and SDG 9 ($p < 0.05$). The results indicate that higher poverty levels increase the log-odds of a country being classified in a higher SDG dashboard category for goals 4, 5, 6, and 9. This may reflect that countries with higher poverty levels tend to attract targeted investments in education, gender inclusion, water and sanitation, and industrial development, thereby supporting the upward movement of the SDGs dashboard. In contrast, poverty is negatively associated with SDG 13 ($p < 0.10$), indicating that high-poverty countries reduce the likelihood of the SDG dashboard into a higher category, limiting performance in climate-related SDG.

The female-to-male labor force participation ratio is negatively associated with SDG 8 and SDG 10 ($p < 0.10$), implying that persistent gender gaps in labor market participation reduce the log-odds of being in a higher category, limiting performance in decent work and reduced inequality.

Finally, the adult literacy rate shows a positive and significant association with SDG 1, SDG 7, and SDG 14 ($p < 0.10$), reflecting that higher literacy increases the likelihood of the SDGs dashboard reaching a higher category, supporting the performance in poverty reduction, energy access, and environmental sustainability. However, literacy is negatively associated with SDG 17 ($p < 0.10$), implying the likelihood reduction of the goal dashboard into a higher category suggesting that countries with higher literacy levels may rely relatively less on aid- and assistance-based partnership indicators emphasized within SDG 17, such as finance, trade, technology transfer, policy coordination, and partnership, reducing the likelihood of upward movement in SDG 17 dashboard categories.

4.2.2 The Influence of Economic Factors on the SDG Dashboard Performance

Economic structure and labor market indicators significantly influence the likelihood of African countries' SDGs dashboard performance. The Ordered Logistic Regression results (Table 5) show that broad money has a negative and statistically significant association with SDG 5 ($p < 0.05$), This implies that an increase in broad money reduces the log-odds of SDG 5 advancing from lower to higher dashboard category, suggesting that financial deepening without gender-inclusive access may limit performance in gender equality resulting to inequality in terms of asset and collateral constraints and male biased Labour market.

Industry value added displays heterogeneous effects. It is negatively associated with SDG 10 ($p < 0.05$) and SDG 13 ($p < 0.10$), indicating that higher industrial activity reduces the likelihood of the SDG 10 and SDG 13 dashboard to higher categories, constraining performance in reducing inequality and climate-related outcomes. Conversely, industry value added is positively associated with SDG 14 ($p < 0.10$), reflecting that industrial activity increases the log-odds of the goal advancing from the lower category to a higher category, supporting performance toward higher levels of marine sustainability. These findings underscore the variable impact of industrialization across different SDG

domains through funding sustainable technologies, driving circular economy practices, and enforcing environmental standards in the marine sectors.

Services value-added exhibits predominantly positive effects. It is positively and significantly associated with SDG 4 ($p < 0.05$), SDG 5 ($p < 0.10$), SDG 7 ($p < 0.10$), SDG 8 ($p < 0.01$), and SDG 11 ($p < 0.10$), indicating that countries with stronger service sectors are more likely to advance from lower to higher SDG dashboard categories. However, service value added is negatively associated with SDG 10 ($p < 0.01$) and SDG 13 ($p < 0.10$), implying the reduction of the goals advancing to a higher category, suggesting that a dominant service sector without effective adjustment does not automatically improve outcomes related to inequality and climate sustainability.

The employment-to-population ratio is positively associated with SDG 4 ($p < 0.05$), SDG 7 ($p < 0.10$), SDG 8 ($p < 0.05$), and SDG 11 ($p < 0.05$), indicating that higher employment levels enhance the likelihood of the goals moving into a higher category making good performance in education, energy access, economic growth, and urban development. In contrast, it is negatively associated with SDG 13 ($p < 0.10$), suggesting that expanding employment may increase pressures on climate performance, reducing the probability of the goal dashboard performing at a higher level.

4.2.3 The Influence of Environmental Factors on the SDG Dashboard Performance

Environmental indicators are shown to have important and heterogeneous effects on SDG dashboard outcomes that significantly influence the likelihood of the SDGs dashboard categories (Table 5). The energy intensity of primary energy use is negatively associated with SDG 4 ($p < 0.10$), SDG 7 ($p < 0.10$), SDG 8 ($p < 0.05$), SDG 14 ($p < 0.10$), and SDG 15 ($p < 0.10$), indicating that higher energy inefficiency reduces the log-odds of the goals dashboard advancing from lower to higher categories limiting performance in education, clean energy access, economic growth, and ecosystem-related SDGs. Conversely, energy intensity exhibits a positive and statistically significant association with SDG 13 ($p < 0.10$), suggesting that energy-intensive economies increase the log-odds of the goal being more likely to achieve higher categories. This likely reflects stronger policy responses and mitigation efforts driven by elevated climate pressures.

The number of threatened fish species is negatively and significantly associated with SDG 15 and SDG 17 ($p < 0.05$), indicating lower probabilities of the goals dashboard advancing into higher categories when marine ecosystems are under threat. This highlights the direct impact of ecological degradation on SDG performance in environmental and collaborative domains.

Forest area shows a positive and statistically significant association with SDG 9 ($p < 0.05$), suggesting that countries that conserve and manage forest resources increase the log-odds to achieve higher dashboard levels of sustainable industrialization and infrastructure development through the long-term supply of raw materials. This finding indicates that strong environmental stewardship supports long-term planning, sustainable investment, and resilient industrial development aligned with SDG principles.

4.3 Discussion

4.3.1 The Influence of Social Factors on the SDG Dashboard Performance

These findings corroborate that social factors are fundamental drivers of SDG dashboard performance across African regions, although their influence varies by goal. High poverty headcount ratios and elevated under-five mortality rates are positively associated with a higher likelihood of countries being classified in a higher SDG 4, SDG 5, SDG 6, SDG 9, and SDG 17 dashboard categories, suggesting that acute social deprivation acts as a policy signal, attracting targeted public spending and donor-supported interventions in education, health, gender inclusion, water, and industrial infrastructure. These results are in line with Ndirangu (2024), who reported that increased government and international commitment to equitable health care funding, coupled with integrated social support programs, strengthens developmental outcomes and facilitates SDG achievement with a clear example of the Ethiopia's Productive Safety Net Program which combines food and cash transfers with public works to stabilize households consumption, improve access to basic services, and protect human capital, thereby supporting upward movement across the ordered SDG dashboard classifications. Regionally, Central, Southern, and West Africa, despite high poverty and child mortality rates, exhibit moderately stronger SDG dashboard performance. In Southern Africa, programs such as South Africa's Expanded Public Works Programme and Botswana's Poverty Eradication Programme link income support to labour-intensive public works and training for skill development, supporting good performance in education, employment, and gender-related issues. In West and Central Africa, initiatives such as Nigeria's National Poverty Eradication Programme, alongside donor -supported partnerships, focus on income generation, youth employment, and basic services provision, which may result in improving the SDGs performance, particularly those related to partnerships and social inclusion, translating into upward movements of SDG dashboard categories.

However, social influences on SDG dashboard performance are uneven across goals, reflecting critical sustainability trade-offs. Persistent poverty and gender disparities reduce performance in SDG 8, SDG 10, and SDG 13, lowering the likelihood of countries achieving higher dashboard categories for these goals. This aligns with the African

Development Bank Group (2016), showing that over the past years, Africa is the only region where the number of poor people has increased, with the majority living on less than $1.25 per day, and women representing the largest share of the poor. Recent economic growth has largely failed to benefit these populations, reflecting persistent exclusion from education, decent jobs, and social services. This underscores that African countries prioritize immediate social welfare and human development needs over long-term structural and environmental investments due to resource constraints. Additionally, regions with high poverty and low female labor participation, such as the Central African Republic, continue to record weaker outcomes in inequality reduction and economic growth. These findings align with the report of the United Nations High Commissioner for Refugees (2025), which documents that the socioeconomic fragility in the Central African Republic, including widespread displacement, limited access to education and health services, and systemic gender inequalities, negatively impacts performance toward inclusive economic growth and SDG achievement.

Adult literacy emerges as a significant positive factor for SDG 1, SDG 7, and SDG 14, increasing the likelihood of countries being classified in higher dashboard categories for these goals, reflecting that higher literacy improves awareness, capacity building, and informed decision-making. These findings are consistent with Abera (2023), who argues that enhanced literacy facilitates a contextualized comprehension of the SDGs, stimulates collective and institutional action toward their realization, and supports the formation of human capital capable of sustaining long-term development interventions. Interestingly, adult literacy negatively influences SDG 17, reducing the probability of upward classification within the dashboard categories. The findings should not be interpreted as higher literacy undermines international cooperation, rather than suggesting that countries with higher literacy levels often possess stronger administrative capacity, domestic human capital, and resource mobilization systems, which may reduce reliance on traditional aid-based partnerships and shift cooperation toward self-financed development, regional integration, trade, and South–South collaboration indicating a transition away from aid dependent partnership frameworks, technology transfers and capacity buildings among countries thereby reducing upward movement in global partnership indicators.

Access to basic sanitation plays a nuanced role in SDG performance. It is negatively associated with SDG 4, SDG 5, SDG 11, SDG 14, and SDG 15 but positively associated with SDG 17, indicating differentiated effects on the likelihood of being classified in a higher SDG dashboard category. The pattern suggests that while sanitation is a foundational development input, its expansion alone is insufficient to drive broad SDG performance without complementary investments in governance, institutional capacity, gender-responsive infrastructure, urban planning, and environmental management. These findings corroborate the observations of Okesanya et al. (2024), who reported that WASH interventions yield the greatest impact on multiple SDGs when implemented in conjunction with strong institutional and governance frameworks. Their study emphasizes that effective WASH strategies in the African context require prioritization of robust financial structures, equitable allocation of funding, capacity building through targeted training across public and private sectors, and the establishment of clear regulatory and administrative frameworks with well-defined roles and responsibilities at all levels of government.

Additionally, the results align with the findings of Werku and Woldeamanuel (2025), who demonstrated that countries such as Kenya, Sao Tome and Principe, and Djibouti achieve significant SDG advancement by combining high sanitation coverage with effective governance and public health initiatives. Conversely, nations including the Central African Republic, Chad, Ethiopia, and Madagascar experience limited performance due to low sanitation access, stemming from political instability, insufficient funding, and inadequate infrastructure. These constraints particularly impede advancement toward SDG 17, which is heavily dependent on international cooperation and effective institutional mechanisms.

4.3.2 The Influence of Economic Factors on the SDG Dashboard Performance

Economic structure and labor market dynamics exhibit heterogeneous effects on SDG performance across African countries. Expansion of the services sector and higher employment-to-population ratios are positively associated with SDG 4, SDG 5, SDG 7, SDG 8, and SDG 11, increasing the likelihood of countries being classified in higher dashboard categories for these goals. This pattern suggests that service-led growth and employment creation generate income opportunities, enhance access to essential services, and strengthen urban systems, thereby facilitating multidimensional development outcomes and supporting upward movement across the ordered SDG dashboard classifications. These findings are consistent with Subramony and Rosenbaum (2024), who emphasize that service-sector expansion promotes inclusive economic growth and employment, contributing to multiple SDG targets. Similarly, the results align with Chisika and Yeom (2024), who report that investments in research and development, human capital, and infrastructure increase service value added and employment, particularly advancing social, economic, and education-related SDGs in East and Southern Africa, thereby improving the probability of being in a higher SDG dashboard category in these domains.

In contrast, financial expansion and industrialization show mixed and context-dependent effects. Broad money exhibits a negative relationship with SDG 5, reducing the likelihood of countries achieving a higher SDG 5 dashboard

category, indicating that financial deepening without gender-inclusive mechanisms may exacerbate existing inequalities. This observation corroborates Chundakkadan (2023), who argues that financial sector expansion in African contexts must be accompanied by gender-responsive policies to avoid reinforcing disparities. Likewise, industrial value added is negatively associated with SDG 10 and SDG 13, lowering the probability of upward classification in inequality reduction and climate action dashboard categories, reflecting the distributional and environmental costs of industrial growth, as noted by Ngangnchi et al. (2024), who highlight that industrialization and natural resource exploitation can undermine equitable and sustainable development outcomes. However, industrial development positively affects SDG 14, increasing the likelihood of higher classification within SDG 14 dashboard categories, indicating that a productive industrial base can support marine conservation initiatives, as evidenced in Namibia through community-managed fisheries and marine protected areas (Zhang *et al*., 2023). Collectively, these findings highlight that economic growth alone does not guarantee balanced SDG performance and must be paired with inclusivity and environmental sensitivity.

4.3.3 The Influence of Environmental Factors on the SDG Dashboard Performance

Environmental conditions play a critical role in shaping SDG outcomes by influencing resource efficiency and ecological management. High energy intensity exhibits a negative association with SDG 4, SDG 7, SDG 8, SDG 14, and SDG 15, reducing the likelihood of countries being classified in higher dashboard categories for these goals, indicating that inefficient energy utilization constrains human capital development, economic productivity, and ecosystem sustainability. These results are consistent with Wijayarathne et al. (2016), who demonstrate that energy-efficient strategies enable simultaneous performance in clean energy provision, educational outcomes, and water access. Conversely, energy intensity is positively associated with SDG 13, increasing the probability of upward classification in the SDG 13 dashboard category, suggesting that countries with high energy consumption experience increased climate-related pressures, which in turn stimulate the implementation of stronger mitigation and adaptation policies. This observation aligns with Drakenberg et al. (2016), who report that Tanzania's adoption of climate adaptation measures and renewable energy strategies has reinforced national climate action outcomes.

Biodiversity pressures, particularly threatened fish species, negatively affect SDG 15 and SDG 17, lowering the likelihood of upward movement across these SDG dashboard classifications, indicating that biodiversity loss undermines ecosystem sustainability and the capacity for international cooperation. These findings corroborate the work of Libala et al. (2020) and Báldi & Vári (2022), who emphasize that the conservation of freshwater and marine ecosystems is essential for achieving biodiversity-related SDGs. In contrast, larger forest areas positively influence SDG 9, increasing the likelihood of being classified in higher SDG 9 dashboard categories, suggesting that sustainable natural resource management underpins industrialization and infrastructure development. This observation is in line with the Programme for the Endorsement of Forest Certification (n.d), which highlights that certified forest operations contribute to long-term economic planning and the welfare of dependent communities.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This study examined the socioeconomic and environmental determinants of SDG Dashboard performance across African countries using an ordered logistic regression framework. The findings demonstrate that SDG performance in Africa is shaped by the intricate interplay of social, economic, and environmental factors, rather than being driven by any single determinant. Social vulnerabilities, such as high poverty levels and elevated under-five mortality rates, were paradoxically associated with improved performance in several SDGs, including SDG 4, SDG 5, SDG 6, SDG 9, and SDG 17. This reflects the role of targeted public interventions and external support in catalyzing performance in education, health, gender equality, industrial development, and international partnerships.

Economic factors exhibited heterogeneous effects. Service-led growth and higher employment-to-population ratios facilitated upward movements in SDG dashboards related to social and economic development, notably SDG 4, SDG 5, SDG 7, SDG 8, and SDG 11. Conversely, broad financial expansion and industrialization constrained SDG performance when inclusivity measures and environmental safeguards were weak, particularly for SDG 5, SDG 10, and SDG 13. Environmental factors further highlighted the importance of resource efficiency and conservation. High energy intensity and biodiversity loss impeded performance in SDG 7, SDG 8, SDG 14, and SDG 15, whereas effective forest management supported sustainable industrialization and infrastructure development (SDG 9).

Collectively, these results validate the Sustainable Development Theory, underscoring that balanced integration of social inclusion, economic development, and environmental protection is essential for sustained SDG performance. Imbalances among these pillars generate trade-offs, limiting advancement in interconnected SDGs, and highlight the importance of multi-dimensional and coordinated policy interventions, while also aligning with complementary perspectives from Institutional, Stakeholder, and Resource-Based theories, which do emphasize the roles of governance capacity, stakeholder coordination, and socioeconomic factors in shaping SDG outcomes.

This study faces several limitations, where some goal models did not achieve model convergence due to limited cross-country variation and the threshold-based nature of the SDG Dashboard, while the cross-sectional ordered logistic framework captures associations rather than causal pathways. Additionally, potential endogeneity arising from reverse causality between selected indicators cannot be fully addressed within the ordered logistic framework, and does not model institutional and governance effects due to the availability of data. Future results should employ the use of SDG Index score analysis and mixed methods approaches, including instrumental variables, with explicitly incorporating governance, institutional quality, and stakeholder engagement variables to better capture the dynamics and mediating mechanisms shaping SDG performance in Africa.

5.2 Recommendations

Based on the findings, the following policy recommendations are proposed: Strengthen targeted social investments, cash and food transfers, and awareness campaigns. African governments should continue prioritizing programs aimed at poverty reduction, health, education, and gender inclusion, ensuring that these interventions are strategically linked to long-term economic and environmental objectives.

Promote sustainable industrialization and environmental management: Industrial growth must be coupled with environmental safeguards, such as emission standards, to avoid undermining climate and biodiversity goals. Investments in energy efficiency and renewable energy, as exemplified by Morocco's Noor Solar Program, illustrate how energy-intensive economies can advance climate action while supporting broader development outcomes, including cutting emissions and improving energy intensity. Ensure economic inclusivity: Policies aimed at expanding financial and labor market participation must be inclusive, particularly to reduce gender disparities and income inequality. Unchecked financial deepening or sectoral growth without equity considerations can weaken performance toward SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities). Adopt integrated SDG planning and monitoring frameworks: Policymakers should move beyond sector-specific approaches and implement integrated planning mechanisms that explicitly account for trade-offs and synergies among SDGs. This ensures that performance in one dimension does not inadvertently impede outcomes in others, fostering holistic and sustainable development.

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