FISCAL DISCIPLINE, INSTITUTIONAL QUALITY AND ENVIRONMENTAL QUALITY

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Abstract

The quality of a country's environment has become an important issue in recent time this is because massive economic activities which is the goal of various government in West Africa countries produces anthropogenic greenhouse gases which affect the environment. Hence, the study examined the impact of fiscal discipline, institutional quality and environmental quality in West Africa. While, the specific objectives are to examine the: (i) impact of fiscal discipline on environmental quality in West Africa; (ii) effect of institutional quality on environmental quality in West Africa; and (iii) interactive effect of fiscal discipline and institutional quality on environmental quality in West Africa. The study employed Static panel technique and Generalized Method of Moments (GMM) to analyzed the data gathered from World Development Indicator and World Governance Indicator. From the findings of the study, it was shown that the p-value of first lag of the environmental quality is 0.063, while the coefficient is .990. Therefore, it was revealed that institutional quality is a significant determinant of environmental quality. The result of the study also revealed that fiscal discipline is a significant determinant of environmental quality. Also, the coefficient value of the institutional quality is 0.131, depicting that a unit increase in first lag of environmental quality will lead to .131. The result of the study further revealed that interaction between institutional quality and fiscal discipline is a significant determinant of environmental quality. The study concluded that institutional quality and fiscal discipline have significant impact on environmental quality in West African countries. It was recommended that African governments should promote fiscal discipline by implementing reforms aimed at developing their fiscal discipline because this has the potential to help reduce CO2 emissions or increase environmental quality.

Introduction

Advancing the quality of the environment has been a trending interest among governments, researchers and practitioners. These interests came from the growing environmental degradation that is affecting the climate which in-turn has fundamental effect on the quality of the environment. Climate change is now a hotly global issue because it poses threat to sustainable and human development (Danish et al., 2019). Climate change is likely to increase the incidence of environmental problems such as heatwaves, rising sea levels, floods (serious recent cases in parts of Europe and the United States), drought, and wildfires etc., which cause harm to the environment. The global environment has experienced changes over the years due to human activities associated with farming, building, natural resources extraction, fossil fuel burning, solid waste generation and deforestation, and so forth. The Intergovernmental Panel on Climate Change predicts a rise between 1.8oC and 5.8oC for global average temperature and 9cm and 88cm for global average sea level during the 22nd century (Onifade & Alola, 2023). Against this backdrop, empirical studies on the factors responsible for improving the environmental have taken centre-stage at global discussions. This is because finding innovative ways of improving the quality of environment is first conditioned on the determination of the precise factors influencing environmental degradation.

According to Ajide et al., 2021 institutional quality is an important factor in enhancing the quality of environment. Moreover, as stated by Yushi and Borojo (2019), the quality of institutions can impact the global quality of environment. In their gravity model, Francois and Manchin (2013) posited that indices of institutional quality have an impact on the environment. This raises the topic of the strength of a nation's institutional attributes on quality of

the environment. Robust institutions are anticipated to restrict the incidence of misconduct and ensure a fair and equitable environment for all participants in economic transactions. This can also enhance the sustainability of the environment of any nation. Government discipline is as well important in achieving variety of purposes throughout history (Mutua & Ng'eno, 2016). These include prudent expenses for protecting private property, maintaining law and order, and developing public economic infrastructure, such as the achieving environmental quality (Kolawole et al., 2022).

Modern civilization emanates from the assumption that government is responsible for providing necessary funds to the populace in order to carry out developmental activities throughout any community. However, there has been continual rise in environmental pollution especially in developing countries because of improved energy generation and usage (Usman, Iorember, Ozturk & Bekun, 2022). Environmental degradation such as CO 2 emissions, deforestation, droughts, extreme temperature, and organic water pollutants poses a threat to the realization of Sustainable Development Goals (SDGs) in West African countries. The extraction of non-renewable resources such as crude oil, gold, coal, and diamond also serves as sources of environmental degradation in the region. For instance, abandoned mining sites in many states in West African countries are causes of high level of air and water pollution, which is hazardous to human health (Beretta, 2024). Similarly, the magnitude of government debt and its related contrary consequence has become a major worry to not only the government but the future generation. Notwithstanding the West African countries government sensible struggle in handling the debt by boarding on numerous processes such as debt rescheduling, debt conversion, etc. The problem of debt has been a drain in the West African countries; the associated problem of debt has been due to huge debt service payment requirements and debt burden which has been the major bottleneck to sustainable growth in the West African countries (Penzin & Akanegbu, 2024).

In addition, recent studies conducted by Olaniyi and Oladeji (2021), Dada and Fanowopo (2020), and Dada and Abanikanda (2021) found that West African countries is one of the countries with lowest level of Institutional quality when compared with other countries in the World. Specifically, the average value of institutional quality in West African countries is 4.32 when measured on an ordinary scale of 0–10, while the highest value of 4.73 was attained in 1999 (Olaniyi & Oladeji, 2021). Several studies (such as Claire et al., 2021; Usman et al., 2022; Albitar et al., 2023) considered institutional quality and environmental quality. However, previous researches have not achieved a consensus regarding the direction of the relationship between these factors, partly because they did not take into account the interaction between the institutional quality and fiscal discipline on environmental quality. This study therefore uniquely considered the interactive effect of these variables on environmental quality. Similarly, the previous studies did not consider the effect of fiscal discipline on environmental quality in West African countries. This study also uniquely created an institutional quality index using principal component analysis (PCA) unlike the few studies that considered institutional quality variables independently. Hence, this study examined the fiscal discipline, institutional quality and environmental quality in West African countries. The main objective is to examine the institutional quality and fiscal discipline on the environmental quality in West African countries.

Literature Review

Concept of Environmental Quality

Environmental quality refers to the condition of the natural environment and how it affects the health, well-being, and sustainability of ecosystems and human life. It reflects the cleanliness, safety, and sustainability of the air, water, land, and biodiversity in a given area. Since the 1960s, concerns about environmental quality and its desirable objective incorporated in the popular term "sustainable development" have become increasingly mainstream (Frankel, 2010). Indeed, with the contemporarily prominent emergence of global environmental problems not

simply limited in the climate change, biodiversity losses, or the depletion of the ozone-layer, the strategic agenda for environmental quality has inarguably been prioritized among environmentalists and policy makers across nations. Furthermore, those issues' causes and policy development call for thorough economics-related analyses. Aiming at sustainable and long-term economic growth which means promoting and ensuring adequate environmental equity financing, it is commonly suggested that countries should, in different phases of economic development, accordingly implement macroeconomic reforms and liberalization policies that attract foreign investment. In that sense, innovative sustainable policies accom-panied by integration of sustainable energy technologies to mitigate environmental costs (Vishvas, 2024). However, not as the economic growth which is commonly expressed by a single concept, the GDP, measurement of environmental quality is varied dependent on the aspect in question.

Concept of Institutional Quality

Institutional quality is a multidimensional concept that refers to the quality of a country's political and economic institutions, including the government effectiveness, control of corruption, regulatory quality, rule of law and political stability (Kaufmann, Kraay, & Mastruzzi, 2011). Institutional quality is a critical determinant of economic growth, as it affects the allocation of resources, the efficiency of markets, and the incentives for innovation and entrepreneurship (Acemoglu & Robinson, 2012). In addition, institutional quality is crucial for social development and political stability, as it promotes trust, accountability, and social cohesion (Joshua et al., 2023). In addition, political instability and weak democratic institutions can also undermine institutional quality. In many African countries, political power is concentrated in the hands of a small elite, and democratic institutions are weak and vulnerable to manipulation. This can lead to social unrest, civil conflict, and economic instability, as well as a lack of accountability and transparency in government (Acemoglu & Robinson, 2012). Overall, the quality of institutions is crucial for sustainable development and economic growth, as well as for maintaining political stability and social cohesion.

Concept of Fiscal Policy

Fiscal discipline refers to a government's ability to manage public finances responsibly by ensuring that expenditures do not consistently exceed revenues, thereby avoiding unsustainable budget deficits and debt accumulation. All of this makes fiscal policy one of the most important tools used by the government to influence economic conditions. Nevertheless, there is a lot of uncertainty about the effectiveness in terms of the domestic absorption of the benefits of discretionary fiscal policy, when used to stimulate the economy or stabilize the debt. The latter critically depends on the composition of fiscal policy and the reaction of the exchange rate and the trade balance to fiscal shocks (Lane & Perotti, 1998). Fiscal policy is one of the most vital mechanisms used by governments to pursue their goals for the economy. Therefore, the influence of governments within an economy is expressly visible via their fiscal policy initiatives. According to Dorinnie (2003), governments utilize fiscal policy as a tool to achieve short run efficiency in the form of stabilization, and long run effectiveness in the form of economic growth and development. In its most basic form, fiscal policy can be utilized to influence real Gross Domestic Product (GDP), inflation, the level of economic growth and employment through government taxation and expenditure (McConnell, Barbiero & Brue 1999).

Theoretical Review

Fiscal Federation Theory

The basic foundations for the initial theory of Fiscal Federalism were laid by Kenneth Arrow, Richard Musgrave and Paul Sadweh Samuelson. Samuelson's two important papers (1954, 1955) on the theory of public goods, Arrows discourse (1970) on the roles of the public and private sectors and Musgrave's book (1961) on public finance

provided the framework for what became accepted as the proper role of the state in the economy. The theoretical underpinning for fiscal federation theory is the theory of public goods that establishes the framework as well as explains the important role played state in the economy (Arrow, 1970 and Musgrave, 1959). This framework identifies three roles for the government sector. These are correcting various dimensions of market failure, maintaining macroeconomic stability, and redressing income inequality. The central government is responsible for the correction of market failure and maintenance of macroeconomic stability, while the subnational governments and the central government are jointly responsible for redressing income inequality (Ozon-Eson, 2005). Each tier of government is seen as seeking to maximize the social welfare of the citizens within its jurisdiction.

This multi-layered quest becomes very important where public goods exists, the consumption of which is not national in character, but localized. In such circumstances, local outputs targeted at local demands by respective local jurisdictions clearly provide higher social welfare than central provision. This principle, which Oates (1972) has formalized into the "Decentralization Theorem" constitutes the basic foundation for what may be referred to as the first generation theory of fiscal decentralization (Oates, 2006a; Bird, 2009). The theory focuses on situations where different levels of government provide efficient levels of outputs of public goods "for those goods whose special patterns of benefits are encompassed by the geographical scope of their jurisdictions" (Oates, 2006b). Such situation came to be known as "perfect mapping" or "fiscal equivalence" (Ma, 1995; Olson, 1996). Nevertheless, it was also recognized that, given the multiplicity of local goods with varying geographical patterns of consumption, there was hardly any level of government that could produce a perfecting mapping for all public goods. Thus, it is recognized that there would be local public goods with inter-jurisdictional spill-overs. For example, a road may confer public goods characteristics, the benefits of which are enjoyed beyond the local jurisdiction. The local authority may then under-provide for such a good. To avoid this, the theory then resorts to traditional Pigouvian subsidies, requiring the central government to provide matching grants to the lower level government so that it can internalize the full benefits. Based on the preceding, the role of government in maximizing social welfare through public goods provision is assigned to the lower tiers of government. The other two roles of income distribution and stabilization are regarded as suitable for the central government. From the foregoing, the role assignment which flows from the basic theory of fiscal federalism is summarized as follows: The central government is expected to ensure equitable distribution of income, maintain macroeconomic stability and provide public goods that are national in character.

Decentralized levels of government on the other hand are expected to concentrate on the provision of local public good with the central government providing targeted grants in cases where there are jurisdictional spill-overs associated with local public goods. Once the assignment of roles had been carried out, the next step in the theoretical framework is to determine the appropriate taxing framework. In addressing this tax assignment problem, attention is paid to the need to avoid distortions resulting from decentralized taxation of mobile tax bases. It is assumes that when the market fails to provide for some types of public goods, the government is required to step in. Since the private provider will under-invest in the supply of public goods since the advantages accruable to the firms would be significantly lower than the entire benefit to society. Economics teaches us that public goods will be underprovided if left to private market mechanisms. It was believed that governments and their officials would act as guardians of the public interest, prioritizing social welfare out of altruism or, in democracies, a desire to win votes. The underlying theory in question is a Keynesian one that argues for a more active state engagement in the economy and provision of social welfare.

Empirical Review

Dimnwobi et al., (2021) evaluated the nexus of population dynamics and environmental degradation has been discussed widely in the extant literature. Most related studies have utilized carbon emission as a proxy of environmental quality. However, carbon emission does not capture the multidimensional nature of environmental

degradation. To fill this gap, this seminar work utilized the ecological footprint to capture environmental degradation because it is a more dynamic environmental quality measure. The paper examines the population-environmental degradation hypothesis for five populous African countries (DR Congo, Ethiopia, Nigeria, South Africa and Tanzania) using panel information from 1990 to 2019. The Cross-sectionally Augmented autoregressive distributed lag (CS-ARDL) was employed to assess the relationship among the data – ecological footprint per capita (ECFP), population growth rate (POPG), population density (POPD), urban population growth rate (URBN), age structure of the population (AGES), per capita GDP growth rate (PGDP), energy consumption (ENEC), and trade openness (TRAD). The findings of the study revealed that POPG, POPD, AGES, PGDP, ENEC and TRAD increase environmental degradation. Urbanization (URBN) has no significant influence on environmental degradation in the selected African countries.

Adekunle, Bekoe, Badmus, Anagun and Alimi (2021) evaluated the nexus between fiscal discipline and the budget process in Nigeria over the period from 1990 to 2020. Findings showed that the level of fiscal discipline in Nigeria as measured by two proxies of fiscal deficit gap and public debt gap is more enhanced under zero based budgeting than under current incremental budgeting system. The study also established that civilian administrations are more prone to fiscal indiscipline relative to military dispensations. The paper also revealed the significant role of net foreign aid receipts in significantly narrowing fiscal deficit and public debt gaps in the short-run and long-run, as well as, the significant widening impact of an increasing government size on public debt in the long run. Yameogo, Omojolaibi and Dauda (2021) considered the relationship between economic globalisation and environmental quality by incorporating institutions as the determinant of this relationship for Sub-Saharan Africa (SSA). The study deploys the technique of generalised methods of moments to assess data spanning the period 2002–2017. Findings indicated that regulatory quality positively impact environmental degradation while economic globalisation and control of corruption negatively affects environmental degradation in SSA. Furthermore, the results show that economic growth and government effectiveness negatively affect the environment while the institution index positively affects the environment in the region. It was also found that the interaction between economic globalisation and institution has negative and significant effects on environmental pollution, thus contributing to environmental quality.

Usman, Iorember, Ozturk and Bekun (2022) considered the interaction effect of the control of corruption and income on environmental quality in Africa over the period from 1996 to 2017. Using a Method of Moments Quantile Regression (MMQR) with fixed effects, the results revealed that both the control of corruption and income level increase CO2 emissions while their interaction term reduces CO2 emissions. Madunezim et al., (2023) considered fiscal discipline and community development in Enugu State. Specifically, the determined the extent to which financial discipline affected affordable health care service delivery in Enugu State, Nigeria; to find out how which financial discipline affected rural road maintenance services in Enugu State, Nigeria and ascertain the implications of financial discipline on improved educational service delivery in Enugu State, Nigeria. To achieve these objectives, three research questions were raised while three hypotheses were formulated. The study adopted a descriptive survey research design. The population of the study was 644,670. Taro Yamani formula was employed in determining the sampling size of 400. Data collected for the study was formulated with descriptive statistics using tables and mean scores while Chi-square test Analysis was used to test the Hypotheses. The study found that financial discipline has not significantly improved educational service delivery in Enugu State, Nigeria, Financial discipline has negatively impacted rural road maintenance services in Enugu State, Nigeria.

Onifade and Alola (2023) considered the links between energy consumption and environmental quality in the wake of rapid urbanization in Africa with empirical insights from the cases of Libya, Morocco, Nigeria, Algeria, Angola, Egypt, and South Africa. These countries aside from being among the largest economies; are also among the leading energy producers and the most urbanized economies that emit the most carbon dioxide on the continent. Based on the Pooled Mean Group (PMG) panel ARDL estimator, the dynamics nexus between the variables was estimated

vis-a-vis the short-run and long-run coefficients using relevant sample data between 1990 and 2015. The study further examines the channels of causality between the variables while also testing for the validity of the popular Environmental Kuznets curve (EKC) hypothesis for the panel of countries. The results confirm that the rising level of energy use significantly exacerbates the level of carbon emission among the countries in the study while growing urbanization significantly creates a negative impact on carbon emission. In addition, an increase in per capita income improves the environmental quality but the doubling of income per capita triggers environmental degradation, thus invalidating the EKC hypothesis in the examined panel economies.

Borgi, Mabrouk, Bousrih and Mekni (2023) examined the effect of environmental change on inclusive finance in African countries during the period 1996–2020. It also investigates the moderating role of government quality on the association between environmental change and inclusive finance. Government quality is measured by six dimensions: political stability, voice and accountability, government effectiveness, regulation quality, the rule of law, and corruption control. Environmental change is measured by CO2 emissions. Inclusive finance is measured by the financial development index through depth, access, and efficiency ratios. These variables represent the most used in prior studies as they are published by international organizations such as the World Bank and the International Monetary Fund, which represent a reputable source of timely information related to the business environment in which business executives operate in several countries. The results show a significant impact of environmental change on inclusive finance. Including economic governance induces a significant and positive effect on financial inclusion in all instances. Our results also show that the coefficients of the interaction between environmental change and governance dimensions are positive and significant. The moderator role of governance is improved when taking into account political, institutional, and economic governance.

Beretta (2024) examined the relationship between the quality of institutions and the quality of the environment. Using systematic analysis of both international and local studies, the study revealed that democracy, corruption and the rule of law are determinant factor of the quality of the environment in different countries or regions of the world. Bambi, Batatana, Appiah and Tetteh (2024) considered governance, institutions, and climate change resilience in Sub-Saharan Africa. This study employed a robust dynamic panel data estimator to explore the relationships between institutions, governance, and environmental quality, focusing on the ecological footprint of 25 SSA nations from 1990 to 2020. The results reveal the threshold effects of the interaction between institutions and governance, following an inverted U-shape pattern. This suggests that beyond a certain ecological footprint, increased interaction between institutions and governance leads to a decrease in ecological footprint. Additionally, high institutional quality (IQ) is associated with a lower environmental impact, while improved governance contributes to mitigating the decline in institutional performance. The panel causality tests among the variables and control components indicate a one-way causal relationship from ecological footprint to governance, infrastructural development, and energy use.

Research Gaps and Contributions to Body of knowledge

Institutional and environmental quality were taken into consideration in a number of studies (e.g., Claire et al., 2021; Usman et al., 2022; Borgi et al., 2023). However, prior studies have failed to reach a consensus on the direction of the relationship between these elements, in part because they failed to consider the impact of fiscal discipline and institutional quality on environmental quality. Thus, this study took into account the interplay between these factors and environmental quality in a novel way. Similarly, the impact of fiscal discipline on environmental quality in West African countries was not taken into account in earlier research. Unlike the few research that took institutional quality characteristics into consideration separately, this study used principal component analysis (PCA) to build an institutional quality index in a new way. The interactive effect of fiscal discipline and institutional quality on environmental quality in West African countries was also uniquely considered in this study.

Methodology

This study adopted expost-facto method of research design and this is because investigation started after the fact has occurred without interference from the researcher and also for the fact that data needed for the study already exists. The secondary data used in this study was sourced from World Development Indicators and World Governance Indicators over a period of ten (10) years from 2014 to 2023. The choice of 2014 was because the completed data on institutional quality starts from 2014 while 2023 was also chosen because as at the time the study was carried out, the 2024 World Bank Indicators were yet to be released. The population of the study is West African countries. However, the sample size is selected based on the following criteria: the region (West African countries) is the largest of the developing world where issues of environmental pollution are at the forefront of the current debate in economic development. The countries were chosen based on the records of their populations, poor institutional quality and high level of environmental issues. Based on the criteria, sixteen (16) countries in West Africa countries were chosen. The countries are Nigeria, Niger, Ghana, Benin, The Gambia, Liberia, Burkina Faso, Mali, Côte d'Ivoire, Sierra Leone, Guinea, Senegal, Guinea-Bissau, Cabo Verde, Mauritania and Togo. The study employed static panel data technique and Generalized method of moments (GMM) to analyze the data obtained for the study.

Model Specification

The model adopted for this study is based on the econometric model of multiple regression approach in line with the one applied by Asongu et al., 2019; Borgi et al., 2023.

ENVQ = *f* (GDP, RE, FD, TRA, GEF, RQ)……..1

Econometrically equation 3.1 is expressed as:

$$ENVQ_t = \beta_0 + \beta_1 GDP_{it} + \beta_2 RE_{it} + \beta_3 FD_{it} + \beta_4 TRA_{it} + \beta_5 GEF_{it} + \beta_6 RQ_{it} + \varepsilon_{it} \ldots.2$$

Where:

ENVQ= Environmental Quality (Proxy with Log of CO2 emission)
GDP= Gross Domestic Investment
RE= Renewable Energy
FD= Financial Development
Tra= Trade
GEF= Government Effectiveness
RLL= Rule of Law

To address the objectives of this study which is to ascertain the effect of institutional quality and fiscal discipline on environmental quality in West African countries, the following model is specified:

ENVQ = *f* (INSQ, FSD, INSQ*FSD, GDP, INF, EXR)……..3
Econometrically equation 3.1 is expressed as:
$$ENVQ_t = \beta_0 + \beta_1 INSQ_{it} + \beta_2 FSD_{it} + \beta_3 INSQ * FSD_{it} + \beta_4 GDP_{it} + \beta_5 INF_{it} + \beta_6 EXR_{it} + \varepsilon_{it} \ldots 4$$
Where:
ENVQ= Environmental Quality (Proxy with Log of CO2 emission)
GDP= Gross Domestic Investment
FSD= Fiscal Discipline
INSQ= Institutional Quality

INF= Inflation
EXR= Exchange Rate

Data Presentation and Analysis

The summary data for the variables are presented in Table 1.

Table 1: Descriptive Statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
ENVQ	160	.467	.403	.092	1.99
INSQ	160	-1.068	1.000	-2.048	2.956
FSD	160	54.439	23.692	17.541	149.063
INSQ*FSD	160	13.206	85.591	-150.17	349.473
GDP	160	10.076	.625	9.055	11.759
INF	160	6.273	7.644	-3.233	47.642
EXR	160	681.748	1730.537	4.52	9565.082

Source: Author's Computation (2025).

The summary of the variables used are discussed in Table 1. It was shown that the average value of environmental quality over the period of 2014 to 2023 is .467 while the minimum and maximum values for the period are .092 and 1.99 respectively. Similarly, the average value of exchange rate during the period examined is 681.74 while the minimum and maximum values for exchange rate are 4.52 and 9565.08 respectively. For institutional quality, the average value is 1.06 while the minimum and maximum values are -2.04 and 2.95 respectively. In addition, the average value of fiscal discipline, gross domestic product and inflation during the period examined is 54.439, 10.076 and 6.273 while the minimum values are 17.541, 9.055 and -3.233 and maximum values are 149.063, 11.759 and 47.642 respectively Finally, the average value for interaction of institutional quality and fiscal discipline is 349.473 while the minimum and maximum values are -150.17 and 349.473 respectively. The huge variant in the minimum values and maximum values show that the variables can be used for a regression analysis.

Table 2: Correlation Matrix of Panel Analysis Variables

Variables	**INSQ**	**FSD**	**INSQ*FSD**	**GDP**	**INF**	**EXR**	**VIF**
INSQ	**1.000**						1.40
FSD	0.3609	1.					1.39
INSQ*FSD	**0.3303**	.6709	1.000				1.52
GDP	0.0308	-0.0650	-0.4712	1.000			1.71
INF	-.1022	-0.0794	-0.0167	0.2145	1.000		1.21
EXR	-0.3292	-0.2187	-0.1434	0.0131	0.0247	1.000	1.12

Source: Author's Computation (2025).

The presence of multicollinearity issue in a regression may render such regression spurious. Hence, this study conducted correlation analysis and Variance Inflation Factor (VIF) and it was revealed from correlation analysis that INF and INSQ, GDP and FSD, GDP and INSQ*FSD, INF and FSD, INF and INSQ*FSD. EXR and INSQ, INF and FSD as well as EXR and INSQ*FSD have negative relationship of -.1022, -0.0650, -0.4712, -0.0794, -0.3292, -0.2187 and -0.1434 respectively while other variables are positively related. These values are less than 0.5. In addition, from the VIF test it was revealed the variables have less 5 depicting the absence of multicollinearity problem. Hence, all the variables can be adopted for a regression analysis.

Table 3: Panel Regression Results for Environmental Quality

	Dependent Variable: Environmental Quality			
Independent Variables	**Pooled OLS**	**Fixed Effect**	**Random Effect**	**GMM**
ENVQ1				.990****** **(0.063)**
INSQ	-.284*** (.048)	-.139*** (.031)	-.120 (.033)	.131** (.015)
FSD	**-.006***** **(.000)**	-.0004 (.0006)	.001** (.000)	-.020** (.000)
INSQ*FSD	-.004*** (.0011)	-.001*** (.000)	.002*** (.000)	-.371*** (.000)
GDP	.170*** (.032)	.260*** (.079)	.134** (.061)	.011** (.001)
INF	.006*** (.002)	.000 (.001)	-.000 (.001)	-.000 (.000)
EXR	.000 (9.980)	4.160 (5.120)	1.180 (5.250)	1.600** (0.078)
-cons	-1.541*** (.363)	-2.209*** (.788)	-.997** (.318)	1.135** (.146)
Hausman Test Breusch-Pagan Sargan test statistic Hansen Test	80.60 (0.000) 1.06 (0.304) 99.825 (0.321) 9.47 (1.000)	Autocorrelation test (Arellano-Bond test) AR(2)	1.51 (0.131)	

Note: Standard errors in parentheses***, ** and * denotes 1%, 5% and 10% level of significance respectively
Source: Author's Computation (2025).

In selecting the most appropriate technique between pooled OLS and static panel regression, Breusch-pagan test is usually employed and from the result displayed in Table 3, the Breusch pagan test shows that static panel is the most appropriate. Similarly, to choose between fixed effect and random effect, hausman test is adopted and since the Hausman test finding was statistically significant, hence the fixed effect estimator, as displayed in Table 4, is the most acceptable technique. The variables used as dependent is environmental quality (ENVQ; proxy with Carbon monoxide emission) while those of independent variables are institutional quality (INSQ), fiscal discipline (FSD), interaction between institutional quality and fiscal discipline (INSQ*FSD), inflation (INF) and exchange rate (EXR). ENVQ has negative relationship with all the independent variables except inflation rate and exchange rate. This is confirmed by the work of Sakariyahu et al., (2023).

However, at the 1% and 5% level of significance, the INSQ also has a significant but negative effect on environmental quality, with a coefficient value of -.136. This suggests that for every unit increase in institutional

quality, Carbon monoxide emission reduces by .136. The interaction of institutional quality and fiscal discipline have a considerable negative relationship, as indicated by the coefficient value of -.001 at the 1% level of significance. demonstrating that for every unit increase in INSQ*FSD, Carbon monoxide emission decreases by .001. While GDP shows a positive relationship with Carbon monoxide emission showing that an increase in GDP leads to Carbon monoxide emission This is because half of coefficient value is higher than the error term. To confirm the accuracy of the results, diagnostic tests were conducted for the two-step GMM; the outcomes are displayed in table 3.

The diagnostic tests of Sargan test statistic and Arellano-Bond test for the study were conducted for the study. The Sargan test statistic has a value of 99.825 while the p-value is 0.321 therefore the hypothesis of over identifications restrictions of instruments cannot be rejected depicting that the instruments are valid. Finally, Arellano-Bond test shows a value of 1.51 and p-value of 0.131 therefore showing that the study does not suffer from autocorrelation problem. Hence, the tests shows that this regression can be used for policy inference. The dependent variable in the study is environmental quality (ENVQ) while those of independent variables are first lag of environmental quality, institutional quality (INSQ), fiscal discipline (FSD), interaction between institutional quality and fiscal discipline (INSQ*FSD), inflation (INF) and exchange rate (EXR). It was revealed that all the variables except inflation have significant effect on environmental quality in West Africa countries. The significances of these variables are shown from the p-values that are less than 5% level of significance. It was shown that all the variables except first lag of environmental quality and inflation have negative relationship with environmental quality. It was shown that the p-value of first lag of environmental quality is 0.063 while the coefficient is .990. Therefore, a unit increase in first lag of environmental quality will lead to .990 of current environmental quality and vice versa. Similarly, the coefficient value of institutional quality is 0.131 depicting that a unit increase in first lag of environmental quality will lead to .131 increase in environmental quality in West Africa and vice versa. In addition, the coefficient value of interaction between institutional quality and fiscal discipline .002 depicting that a unit increase in interaction of institutional quality and fiscal discipline will lead to .002 increase in environmental quality in West Africa and vice versa. However, the coefficient value of fiscal discipline is -0.020 depicting that a unit increase in fiscal discipline will lead to reduction in Carbon monoxide emission in West Africa and vice versa.

Discussion of Findings

Fixed and random effects models and generalized method of moments (GMM) were employed to examine Fiscal Discipline, Institutional Quality and Environmental Quality in Africa. The result of the study revealed that institutional quality is a significant determinant of environmental quality. This is in line with the work of Yameogo, Omojolaibi and Dauda (2021) and Amoaning, Obeng, Cantah and Vondolia (2023). Therefore, the null hypothesis of insignificance influence of institutional quality on environmental quality does not suffice hence the rejection of the hypothesis.

The result of the study revealed that fiscal discipline is a significant determinant of environmental quality. This is in line with the work of Usman, Iorember, Ozturk and Bekun (2022). Therefore, the null hypothesis of insignificance influence of fiscal discipline on environmental quality does not suffice hence the rejection of the hypothesis. This supports the theory of fiscal federation that states the development of a country depends on the actions of the government. The result of the study also revealed that interaction between institutional quality and fiscal discipline is a significant determinant of environmental quality. This is in line with the work of Madunezim et al., (2023). Therefore, the null hypothesis of insignificance influence of interaction of institutional quality and fiscal discipline on environmental quality does not suffice hence the rejection of the hypothesis.

Conclusion and Recommendations

Based on the findings of this study, it was concluded that there is a significant relationship between institutional quality and environmental quality in West African countries. It also concluded that there is a significant relationship between fiscal discipline and environmental quality in African countries. The study also concluded that there is bi-directional relationship between institutional quality, fiscal discipline and environmental quality to African countries. Finally, the study concluded that institutional quality and fiscal discipline affect environmental quality in African countries. In line with the findings of this study, the following recommendations were made:

From a policy perspective, there is need for African governments to promote fiscal discipline by implementing reforms aimed at developing their fiscal discipline because this has the potential to help reduce CO2 emissions or increase environmental quality. Carbon budgets and carbon restrictions are two measures that can be used in this direction in nations where there is high CO2 emissions. This regulates CO2 emissions and, consequently, the impact of CO2 emissions in the country. Better governance strengthens the action of institutional reforms in addressing environmental pollution. The World Bank's governance indicators are environmental anti-dumping measures in that they significantly curb the level of polluting emissions. In other words, better institutions would make Africa a pollution halo, not a pollution haven.

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