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The Relationship Between Policy Implementation and Environmental Sustainability in The Oil and Gas Industry

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Abstract

Despite extensive global efforts to promote sustainable development, the oil and gas industry continues to face significant environmental challenges. Numerous strategies and regulatory frameworks have been introduced over the years, yet their effectiveness in curbing environmental degradation remains limited, particularly in resource-rich but ecologically fragile regions. This study investigates the relationship between policy implementation and environmental sustainability within the upstream oil and gas sector in Turkana County, Kenya. Using a mixed-methods approach and empirical data analysis, the study reveals a statistically significant but modest positive correlation ($r = 0.292^{**}$) between policy implementation and environmental sustainability. Regression analysis further indicates that a unit increase in policy implementation leads to a 0.228-unit increase in environmental sustainability ($p < 0.001$). The findings highlight the importance of translating sound policy into actionable implementation, especially in sectors with high environmental stakes. While many governments have demonstrated the capacity to formulate sound policies, the persistent gap lies in the translation of these policies into tangible environmental outcomes. The findings from Turkana County, Kenya, reveal a statistically significant relationship between policy implementation and environmental sustainability, affirming that successful implementation directly contributes to improved ecological outcomes. Conversely, the modest strength of the correlation suggests that policy implementation alone is not sufficient and must be reinforced by complementary institutional and operational mechanisms.

Keywords: Policy Implementation, Environmental Sustainability, Oil and Gas Sector, Upstream Projects, Regulatory Frameworks, Turkana County Kenya.

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I. Introduction

Recent years have witnessed the enactment of comprehensive laws governing the extraction and production of oil and gas as governments worldwide intensify efforts to advance environmental sustainability in the sector. These legislative measures are primarily aimed at mitigating environmental degradation and reducing greenhouse gas emissions. Countries such as the USA, UK, Switzerland, Germany, and Australia have introduced robust regulatory frameworks that compel firms to participate in carbon reduction agreements and adhere to stricter environmental standards (Kolk & Pinkse, 2024). Participation in these initiatives often requires companies to operate within jurisdictions that maintain established emission credit markets. However, the availability of such markets remains limited, as only a handful of countries have fully operationalized emission trading schemes to date (Mansur, 2025).

Upstream regulations can significantly reduce environmental degradation and greenhouse gas emissions by lowering transaction costs and focusing compliance on a small number of fossil fuel producers, potentially achieving reductions of up to 80 percent (Mansur, 2025). However, without synchronized carbon pricing across nations, regulatory gaps may distort global production and trade patterns, leading to emissions leakage (Agyekum, Botwe, & Afrane, 2024). While upstream regulations often incentivize companies to adopt downstream alternatives for emission abatement, these measures can sometimes yield unintended consequences that diminish the overall effectiveness of mitigation efforts.

Environmental issues in the Niger Delta have not been resolved by legal frameworks, and it seems that many of their rules are merely theoretical and not effectively implemented in practice (Emodi & Boo, 2025). It is commonly recognized that hundreds of cubic feet of gas are being flared While Nigeria has numerous environmental laws and frameworks on paper, enforcement remains severely weak—especially within the oil-rich Niger Delta, where political dependencies and regulatory capture undermine effectiveness (Osuyi et al., 2024). Nigeria enforces laws and regulations mandating firms to adhere to internationally accepted standards of exemplary oilfield practices. These rules and regulations aim to safeguard the environment; nevertheless, their enforcement is inadequate. Edo, Fajimbola, and Braimah (2024) highlight that despite Nigeria's extensive environmental legislation, enforcement in the Niger Delta is compromised by political dependencies and regulatory capture**,** leading to continued ecological degradation.

A robust legal and regulatory framework is pivotal to the sustainability of the petroleum sector and the diversification of a country's economic resources (Adekola & Mitchell, 2023; Emodi & Boo, 2025). In this context, laws and regulations are established according to the specific characteristics of each country, aimed at enhancing resource development and management while balancing economic and environmental objectives (Emodi & Boo, 2025). Many governments enact legislation to create a conducive environment for foreign direct investment (FDI) across different sectors, including oil and gas, often linking these policies to environmental protection and sustainable growth (Olalekan, Dodeye, & Abiodun, 2022). It is widely acknowledged, however, that while regulatory frameworks are essential, they should not become detrimental or obstructive. Instead, such policies must be designed to facilitate the achievement of national objectives rather than obscure the institutional vision or stifle sectoral progress (UNEP, 2023).

The Constitution typically serves as the foundational legal framework for governing the exploitation, development, and production of natural resources in many resource-abundant countries, with further laws enacted to address specific requirements within different resources and industries (Emodi & Boo, 2025; UNEP, 2023). Comparative analyses have demonstrated that countries implementing objective-oriented regulatory policies achieve superior petroleum sector performance and sustainability compared to those relying solely on rigid, rule-based regulations (Adekola & Mitchell, 2023).

Effective governments recognize not only the necessity of developing sound policies but also the importance of committing substantial time, effort, and resources to successful policy implementation (Okpara, Stringer, & Dougill, 2021). The true worth of policy can only be discerned through its effective execution; in fact, the capacity to implement policy is often more consequential than the quality of the policy itself (Adekola & Mitchell, 2023). While most nations possess the expertise to formulate appropriate policies, actual implementation remains a distinct challenge, with evidence showing that a significant percentage of government programs are never effectively executed (Emodi & Boo, 2025; Okpara, Stringer, & Dougill, 2021). Public policy processes thus encompass not only formulation but also execution, oversight, assessment, and, where necessary, modification, with implementation prioritized as the central element in determining the efficacy and significance of the entire public policy framework (UNEP, 2023).

In Kenya, the policy and legislative framework for oil and gas continues to face challenges in effective implementation. The intrinsically profitable and controversial character of the oil sector complicates the realization of established policies and frameworks. Despite significant emphasis on environmental concerns, translating policy choices into practice remains one of the most difficult issues confronting the oil and gas sector globally (Olalekan, Dodeye, & Abiodun, 2022; Emodi & Boo, 2025). This study, therefore, seeks to investigate

the impact of policy implementation on environmental sustainability in oil and gas upstream operations in Turkana County, Kenya.

Statement of the Problem

Researchers, non-governmental organizations (NGOs), and environmentalists have consistently attributed the petroleum industry's disproportionately harmful impacts on both human and environmental health to ineffective sustainability management and weak operational practices (Adekola & Mitchell, 2023; Emodi & Boo, 2025). Central to sustainable oil and gas development are improvements in operational practices, emissions reductions of CO_2, CH_4, NO_x, and the creation of social, economic, and environmental benefits (Olalekan, Dodeye, & Abiodun, 2022).

Despite advancements in extraction technology and increased production efficiency, recent scholarship argues that environmental sustainability has often remained a secondary consideration within the sector (Adekola & Mitchell, 2023). Since the onset of industrial-scale oil extraction, issues such as oil spills, land degradation, and persistent air and water pollution have plagued the industry globally (UNEP, 2023). Comparative studies between regions such as Nigeria and the United Kingdom highlight marked differences in the management of environmental risks, with deficiencies in capacity building, community engagement, and environmental impact assessment particularly evident in the Niger Delta (Adekola & Mitchell, 2023; UNEP, 2023).

Upstream oil and gas operations thus remain significant contributors to greenhouse gas emissions, methane release, and habitat disturbance, underscoring the need for robust regulation and industry accountability (Emodi & Boo, 2025). Governments worldwide have responded with increasingly stringent regulations designed to limit emissions and environmental harm; however, the effectiveness of these measures ultimately depends on the translation of policy into practical action. The present study, therefore, seeks to provide evidence on the effect of policy implementation on environmental sustainability in the oil and gas sector in Turkana County.

Literature Review

Environmental sustainability efforts in the oil and gas sector hinge not only on policy formulation but, critically, on the capacity of institutions to implement such policies. Recent studies suggest that weak institutional structures, a lack of political will, and resource constraints hinder the operationalization of environmental regulations (Agyekum et al., 2024). In many Sub-Saharan African contexts, including Kenya, environmental regulatory bodies often operate under limited budgets and with insufficient technical expertise, leading to inconsistent enforcement of environmental standards. This directly affects the ability to monitor upstream oil operations and enforce compliance, thereby weakening the impact of environmental policies.

Ganda and Milondzo (2025) argue that participatory governance mechanisms enhance environmental accountability by increasing public oversight and reducing elite capture in policy processes. In contexts where upstream oil projects are located in marginalized communities, such as Turkana, the absence of community involvement in policy implementation exacerbates ecological degradation. Inclusive frameworks that empower communities to monitor compliance and participate in environmental assessments have been linked to improved sustainability outcomes, demonstrating the relational impact between inclusive implementation and environmental health.

In decentralized governance settings, environmental responsibilities are often split between agencies with overlapping or poorly defined mandates, leading to regulatory fragmentation. According to Wekesa et al. (2021), fragmented policy environments often result in duplicated efforts or enforcement gaps, which undermine sustainability initiatives. In the context of Kenya, the overlap between the Ministry of Petroleum and Mining and the National Environment Management Authority (NEMA) has been identified as a barrier to streamlined implementation of environmental laws in the oil and gas sector.

Emerging tools such as satellite monitoring, environmental sensors, and digital compliance dashboards have been used successfully in countries like Brazil and Canada to monitor oil field emissions and illegal flaring in real-time (Lopez et al., 2023). However, in Kenya, such technologies are underutilized, and enforcement continues to rely heavily on manual audits and infrequent inspections. The lack of investment in regulatory technology weakens the feedback loop necessary for adaptive policy implementation and timely environmental intervention.

Cross-national studies further show that implementation models grounded in adaptive management principles are more successful in promoting environmental sustainability. Adaptive management allows for iterative learning, flexible enforcement, and the integration of real-time data into policy processes. In Uganda and Ghana, for instance, this approach has improved enforcement outcomes in extractive sectors through periodic review of implementation strategies (Nsereko & Boateng, 2022). Kenya's upstream petroleum sector would benefit from embedding such models into its environmental governance architecture, thus making implementation more responsive to on-the-ground realities.

Similarly, multilateral organizations such as the World Bank and UNEP have played a significant role in influencing environmental frameworks in oil-producing countries through funding, technical support, and

performance-based conditionalities. While this external support can be beneficial, studies such as that by Muriithi and Chege (2023) warn that externally driven policies may face local resistance or implementation fatigue if not aligned with domestic priorities. Therefore, for environmental sustainability to be achieved through policy implementation, national governments must domesticate international standards while ensuring local ownership of both policy and practice.

In many developing countries, including Kenya, there is often a policy tension between economic growth imperatives and environmental protection. According to Research indicates that in many contexts, environmental policies are frequently deprioritized in favor of resource extraction agendas, resulting in symbolic or inconsistent implementation especially where long-term ecological preservation is not politically prioritized (Kweyu & Oyugi, 2020). In upstream oil and gas projects, this misalignment contributes to regulatory leniency, especially when oil exploration is framed as a strategic development objective. Therefore, aligning environmental implementation efforts with national planning frameworks can improve coherence, funding allocation, and enforcement.

According to Kweyu and Oyugi (2020) observe that environmental policies are often subordinated to national economic agendas**,** leading to weak enforcement and symbolic implementation particularly across decentralized governance structures in Kenya and Uganda.. Countries that embed environmental sustainability in their political manifestos tend to institutionalize stronger enforcement regimes. In Kenya, leadership changes and shifts in ministerial priorities have resulted in fluctuating commitment to enforcing upstream environmental standards. This political inconsistency undermines regulatory continuity and weakens institutional learning within implementing agencies.

Furthermore, we can't overlook the role of corporate environmental responsibility (CER) in policy implementation. While government-led implementation is crucial, private actors in the oil and gas industry also influence sustainability outcomes through their compliance behavior and voluntary standards. Evans (2023) noted that oil firms in Kenya tended to implement environmental practices more rigorously when facing strong regulatory enforcement, public accountability, or litigation risk. Therefore, integrating CER frameworks into national policy implementation strategies can strengthen accountability and extend enforcement reach beyond government capacity.

Kalua and Muthoni (2023) asserted that environmental sustainability outcomes are also closely tied to the quality of capacity development programs for implementers. Capacity gaps including lack of training, technical tools, and institutional knowledge remain a major constraint in effectively implementing environmental policies (Kalua & Muthoni, 2023). For example, environmental officers in Turkana County report limited access to operational vehicles and testing equipment to conduct field assessments. Addressing these capacity gaps through targeted training, institutional support, and local partnerships is essential for empowering frontline implementers to act effectively in remote oil exploration areas.

Another emerging theme in recent literature is the role of environmental impact assessments (EIAs) in bridging the gap between policy and practice. Although EIAs are legally required before upstream operations commence, their implementation is often reduced to a "box-ticking" exercise, lacking post-approval follow-up. According to Barasa and Chebet (2021), many EIAs in Kenya aren't monitored or enforced after approval, and project proponents frequently ignore or downplay mitigation measures. Strengthening the implementation of EIA recommendations through post-project audits and independent oversight can significantly enhance environmental outcomes in the oil and gas sector.

Studies indicate that even though Kenya has committed to international climate goals, national climate change plans frequently remain disconnected from sectoral frameworks governing petroleum development driven by prioritization of extractive revenues over ecological preservation (Bertzky et al., 2021). Integrating climate resilience and low-carbon development goals into environmental policy implementation can help align upstream operations with both domestic and international sustainability targets.

II. Theoretical Framework

The Ladder of Participation Theory, developed by Arnstein is a foundational model for understanding community involvement in public decision-making processes. The theory illustrates a continuum of citizen participation across eight hierarchical levels. These levels range from non-participation (e.g., manipulation and therapy) to varying degrees of tokenism (informing, consultation, and placation), and finally to genuine citizen power (partnership, delegated power, and citizen control). Arnstein posits that true public participation occurs only at the higher levels, where citizens can negotiate with decision-makers, share planning responsibilities, and influence outcomes. This theory critiques superficial involvement and underscores the necessity for empowering communities in governance processes.

Scholars like Biggs (1989) and May (2006) have built on Arnstein's framework, proposing variations such as consultative, collaborative, and collegiate participation to adapt to practical needs. While the ladder metaphor suggests that higher rungs are inherently better, critiques by Wilcox (1994) and May (2006) caution against a linear view of participation. They argue that the appropriate level of participation should depend on context-

specific needs, suggesting more flexible models like the "five-pointed star" to capture this variation. Practically, the ladder serves as a guide for policymakers and practitioners to select appropriate tools and set realistic expectations for participation, minimizing mismatched perceptions between authorities and communities.
In the context of environmental sustainability, particularly in the upstream oil and gas sector, this theory highlights the importance of involving communities not only in consultation but also in decision-making and monitoring. Engaging local populations in developing sustainability indicators, evaluating environmental impacts, and participating in policy review processes can foster ownership, enhance policy relevance, and improve implementation outcomes. This theory aligns well with the objectives of this study, which emphasizes participatory mechanisms in policy implementation as a pathway to achieving environmental sustainability. By grounding the research in the Ladder of Participation Theory, the study affirms that institutional accountability, stakeholder empowerment, and inclusive governance are essential for successful environmental policy execution.
The study sought to test the following research hypothesis.

H0: There is no significant relationship between policy implementation and environmental sustainability.
H1: There is a significant relationship between policy implementation and environmental sustainability.

III. Methodology

This study was anchored on a positivist research philosophy and employed a quantitative research design to examine the relationship between policy implementation and environmental sustainability in the upstream oil and gas sector in Turkana County, Kenya. The quantitative approach was selected because it enables the objective measurement of relationships between variables, enhancing the reliability and replicability of findings (Kothari, 2014).
The target population comprised professionals from the National Environmental Management Authority (NEMA), Ministry of Petroleum and Mining, Kenya Wildlife Service (KWS), Energy and Petroleum Regulatory Authority (EPRA), Turkana County Government, and environmental officers from oil companies operating in Turkana. These respondents were selected based on their direct involvement in environmental policy implementation, oversight, or compliance roles. A census approach was adopted, targeting all 210 eligible study participants. Of these, 186 valid responses were received, representing an 88.57% response rate. The eligibility criteria required respondents to have current employment in a relevant agency or company and direct engagement with upstream oil and gas projects. Participation was voluntary, and clearance was obtained from relevant authorities. Informed consent and confidentiality were assured throughout the data collection process.
A structured questionnaire was used as the primary data collection instrument. The instrument consisted of closed-ended items rated on a five-point Likert scale, designed to measure key constructs of policy implementation and environmental sustainability. Questionnaire items were adapted from validated scales and previous research (Cooper & Schindler, 2021; Bryman & Bell, 2021), ensuring theoretical grounding and comparability with prior studies. The instrument was reviewed by a panel of three subject matter experts and pre-tested with 20 professionals from various sectors, including 16 households in Elgeyo Marakwet, one from Elgeyo Marakwet County Leadership, one from National Oil Corporation, and three from NGOs.
Feedback from the pilot informed minor revisions to item wording and sequencing to enhance clarity and contextual relevance. Reliability was confirmed with Cronbach's alpha coefficients above 0.7 for all constructs, meeting recommended thresholds for internal consistency.
To assess representativeness and minimize bias, demographic data were collected and compared to known characteristics of the broader target population. Non-response bias was checked by comparing early and late respondents on key items; this revealed no significant differences ($p>0.05$). Common method bias was addressed through respondent anonymity, counterbalancing question order, and conducting Harman's single-factor test, which showed that no single factor explained the majority of variance. The adequacy of the sample for analysis was supported by the high response rate and alignment of respondent profiles with the population of interest.
Data were coded and analyzed using SPSS Version 28. Descriptive statistics (means, standard deviations) summarized respondent characteristics and variable distributions. Inferential analysis, including Pearson correlation and multiple linear regression, was employed to determine the strength and significance of the relationship between policy implementation and environmental sustainability. All statistical procedures adhered to standard assumptions of normality, linearity, and homoscedasticity, ensuring the robustness of the findings.

IV. Analysis Findings and Discussion

Research aimed to examine how policies were put into action throughout Kenya's upstream oil and gas projects. Take a look at Table 1 below, which shows the outcomes collected from the participants.

Table 1. Policy Implementation

	N	Minimum	Maximum	Mean	Std. Deviation
Successful governments understand the need for sound government policies and invest significant time, effort, and money in sustainability of projects	186	3.00	5.00	4.0699	.79216
Most countries have know-how and insight to create the right policies	186	3.00	5.00	4.1290	.78121
Execution of government policies is a hurdle for most governments	186	3.00	5.00	3.9785	.81842
Nearly 70% of the government policies are never successfully implemented	186	3.00	5.00	3.9785	.85713
Policies and legislative framework for oil is still in a rudimentary phase of conceptualization and formulation	186	3.00	5.00	4.0108	.82521
Despite heavy focus placed on the environment, the troublesome implementation of policy decisions remains one of the most contentious issues	186	3.00	5.00	3.9301	.81900
Composite or condensed mean					
Valid N (listwise)	186				

Note: Author's own work

The SPSS analysis reveals several key insights regarding policy implementation in Kenya's upstream oil and gas sector.

The results show that most respondents strongly agreed (M=4.07, SD=0.79) that effective governments recognize the importance of sound policies and allocate substantial resources to ensure project longevity. Furthermore, the survey found that most respondents believed (M=4.13, SD=0.78) that the majority of nations possess the necessary knowledge and understanding to formulate appropriate policies.

However, a significant challenge identified from the data is that most governments find it difficult to translate their programs into action. This was clearly evident with a mean of 3.98 (SD=0.82). Responses were quite consistent on this point. According to the survey, most respondents perceive that approximately 70% of government initiatives are never effectively implemented (M=3.98, SD=0.86). The results also indicate that despite a strong emphasis on environmental concerns, the complex process of putting policies into action remains one of the most controversial topics (M=3.93, SD=0.82). Policy implementation revealed that evaluation and monitoring had a major effect on the upstream oil and gas project's sustainability in Kenya.

These findings corroborate the observations of Owolabi (2012), who stated that the environmental problems plaguing the Niger Delta have not been adequately addressed by existing legal frameworks, and that many laws appear to exist "only in theory and not in practice." The common knowledge of hundreds of cubic feet of gas being flared further supports this. Owolabi argued that the Niger Delta's regulatory framework is "severely defective," partly due to inadequate enforcement of environmental rules and regulations. To address contemporary issues in the Niger Delta, it is suggested that the Nigerian government needs to amend some of its environmental regulations.

Aigbedion and Iyayi (2007) assert that a country's legal and regulatory frameworks in the petroleum sector are only as effective as its capacity to diversify economic resources and pursue sustainable development beyond extractive rent**.** Consequently, rules and regulations are established in accordance with each nation's specific characteristics to facilitate necessary resource growth and management. As noted in critical literature, governments worldwide often enact targeted policies and incentives to attract FDI in specific sectors such as oil and infrastructure (Nyuur, Amankwah-Amoah, & Wanjiru, 2018).

The study employed bivariate correlation analysis to establish the link between policy implementation and environmental sustainability. A two-tailed Pearson correlation (R) was used, with findings assessed at the 95% confidence level. The results are presented in Table 2.

Table 2. Bivariate Correlation Analysis

		Policy Implementation	Environmental Sustainability
Policy Implementation	Pearson Correlation	1	.292**
	Sig. (2-tailed)		.000
	N	186	186
Environmental Sustainability	Pearson Correlation	.292**	1
	Sig. (2-tailed)	.000	
	N	186	186

**. Correlation is significant at the 0.01 level (2-tailed).

Note: Author's own work

To determine the link between policy implementation and ecological sustainability, the research employed bivariate correlation analysis. We utilized a two-tailed Pearson correlation (R) to confirm this with a 95% degree of certainty. Table 2 displays the outcomes.

Participatory action research X1 = 0.292**

In the case study of the oil and gas upstream project in Turkana County, Kenya, the study reveals a small but notable positive correlation ($r = 0.292$, $p < 0.01$) between policy implementation and environmental sustainability. Finding links between policy implementation and environmental sustainability was the driving force for the research.

This regression model was utilized:

$Y = \beta_0 + \beta_4 X_4 + \acute{\varepsilon}$

Where;

α = Constant

Y = Environmental sustainability

X_4 = Policy Implementation

ε = Stochastic disturbance error term

This research set out to identify the ANOVA that was utilized to demonstrate the relevance of the regression model. Table 3 displays the results.

Table 3. Model's Validity on the Relationship Between Policy Implementation and Environmental Sustainability

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.918	1	1.918	17.165	.000[b]
	Residual	20.566	184	.112		
	Total	22.484	185			

a. Dependent Variable: Environmental Sustainability

b. Predictors: (Constant), Policy Implementation

Note: Author's own work

The main objective of the research was to determine whether the multiple regression model was valid. The F statistics were used to evaluate the model's validity. The research validated the model with a p-value of 0.000 and an F-value of 17.165 (n=185). The results of the regression model were deemed statistically significant ($p<0.05$) due to the F-statistic value that was less than 0.001. Finding the model's goodness-of-fit numbers sparked the investigation. Table 4 displays the results.

Table 4. Model's Goodness of Fit Statistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.292[a]	.085	.080	.33432

a. Predictors: (Constant), Policy Implementation

Note: Author's own work

The case study of an oil and gas upstream project in Turkana County, Kenya, reveals that policy implementation accounts for 8.5% of the variance in environmental sustainability, as indicated by the coefficient of determination ($R^2 = 0.085$). The likelihood of the stochastic disturbance error component (ϵ) accounting for 91.5% is therefore supported.

Empirical findings indicate that in Ghana, environmental outcomes in extractive sectors are shaped more by institutional effectiveness, governance mechanisms such as voice and accountability, and economic pressures than by policy intentions alone (Manu et al., 2024). Similarly, Ganda and Milondzo (2025) reported that in the South African energy sector, robust policy frameworks had a positive but limited direct impact on sustainability metrics, with broader outcomes influenced by enforcement mechanisms and stakeholder engagement.

Kalua and Muthoni (2023) highlighted that while improved policy implementation enhances environmental performance in the oil and gas sector, its influence is often constrained by challenges in inter-agency coordination, technological adoption, and local capacity. These findings echo the results from Turkana County, reinforcing the perspective that although policy implementation is a critical driver of sustainability, a substantial portion of environmental variance is shaped by a complex interplay of contextual and operational factors.

Achieving a better understanding of the multiple regression model's variables was the driving force for this study. In Table 5 you can see the outcomes.

Table 5. Multiple Regression Variable Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.058	.192		15.914	.000
	Policy Implementation	.228	.055	.292	4.143	.000
a. Dependent Variable: Environmental Sustainability						

Note: Author's own work

Environmental sustainability = 3.058 + 0.228* Policy Implementation

For a policy implementation level of zero, the study found that environmental sustainability would be 0.896. Moreover, the analysis demonstrated that, holding all other factors constant, environmental sustainability would improve by 0.228 units for every unit increase in policy implementation. Based on these results, the oil and gas upstream project in Turkana County, Kenya, exhibited a notable and beneficial effect on the environment through adherence to sustainability-oriented regulations.These findings align with Lopez et al. (2023), who demonstrated that in Brazil and Canada, each unit increase in policy compliance was linked to a significant rise in sustainability performance, particularly where clear monitoring frameworks were established. Similarly, Barasa and Chebet (2021) found that effective enforcement of environmental policies in Kenya's extractive sector corresponded with notable improvements in ecological indicators, consistent with the observed positive regression coefficient in the present study.Goal number four was to learn how changes in legislation impacted the oil and gas industry's capacity to be ecologically sustainable. Policy implementation and environmental sustainability had the lowest recorded association (correlation coefficient $r=0.292$, $p<0.01$), according to the descriptive statistics of the research. Research found that 8.5% of the total variance in environmental sustainability could be explained by one upstream oil and gas project in Turkana County, Kenya. The R-squared value ($R2=0.085$) for the coefficient of determination indicates this. The stochastic disturbance error term (ϵ) accounts for 91.5%, if this is pronounced. Conversely, $F(3, 185) = 80.478$, $p = 0.000$, showed that the model was valid according to the analysis of variance. Aigbedion and Iyayi (2007) assert that a country's legal and regulatory frameworks in the petroleum sector are only as effective as its capacity to diversify economic resources and pursue sustainable development beyond extractive rent To that end, governments worldwide enact rules tailored to their own unique situations in an effort to facilitate better resource development and management. As noted in critical literature, governments worldwide often enact targeted policies and incentives to attract FDI in specific sectors such as oil and infrastructure (Nyuur, Amankwah-Amoah, & Wanjiru, 2018).While regulations are essential in many parts of the economy, Onyeaso (2012) argues that they shouldn't be limiting or negative. Instead of making institutions less effective, they should be designed to help achieve national goals.

Conclusions

This study affirms that the success and sustainability of upstream oil and gas projects are fundamentally shaped by how effectively environmental policies are implemented. While Kenya has established frameworks to regulate its extractive sector, the findings reveal that enforcement gaps, weak institutional coordination, and limited stakeholder involvement continue to hinder environmental progress. The evidence suggests that even well-intentioned policies will fall short if they are not accompanied by strong mechanisms for execution, monitoring, and local participation.

By anchoring the investigation within the upstream oil and gas sector in Turkana County, the study highlights a crucial link between policy implementation and ecological outcomes in resource-rich but environmentally fragile regions. These findings extend existing theoretical understandings by reinforcing the argument that implementation, not just formulation, is where policies gain or lose their impact. This perspective adds to emerging discourse in public administration and sustainability research that emphasizes governance capacity and accountability as key drivers of long-term environmental resilience.

The study also provides practical insights for institutional actors tasked with managing Kenya's petroleum resources. Strengthening environmental governance will require not only policy reform but also enhanced technical capacity, community engagement, and accountability structures at both local and national levels. Institutions such as NEMA and EPRA must invest in real-time monitoring tools, improve inter-agency collaboration, and increase transparency in how policies are enforced on the ground. Equally, oil firms must move beyond compliance checklists and commit to continuous environmental performance improvement through innovation and responsible operational practices.These findings have wider relevance for economic and societal stability. Ensuring environmental safeguards in the petroleum sector isn't just about ecological ethics; it's also critical for protecting livelihoods, public health, and the social license to operate. In contexts like Turkana, where communities live in close proximity to oil installations, the quality of policy implementation directly affects local trust and conflict dynamics. By embedding environmental accountability in practice, stakeholders can foster a more inclusive and sustainable model of resource development.

Nonetheless, this study faced certain limitations. Its geographical focus on Turkana County may limit the generalizability of results to other oil-producing regions with different institutional dynamics. The use of a cross-sectional design also means the study captures a snapshot rather than the evolution of implementation practices over time.

Future research could adopt a longitudinal approach, expand to other petroleum zones, or investigate the role of digital technologies and public-private partnerships in strengthening policy implementation frameworks. This research highlights that bridging the gap between policy and practice is essential for realizing Kenya's environmental sustainability goals in the oil and gas sector. Regulatory success lies not merely in drafting rules, but in the commitment to enforce them with transparency, adaptability, and collaboration among all stakeholders.

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Author(s) Contribution Statement

Each author reviewed, approved, and helped revise the article before it was submitted. In particular, Richard Too developed and edited the primary document, made revisions, and ensured it adhered to the suggested standards. The manuscript was reviewed and approved for academic structure by Dr. Christopher Gakuu, then it was restructured and approved for submission by Prof. Harriet Kidombo.

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