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Monitoring Operations and Uganda's Mineral Resources Management

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Abstract

Purpose: This study investigates the moderating role of Monitoring Operations of Institutional Policy Implementation in Uganda's Mineral Resources Management.

Methodology: A cross-sectional design has been used in this study to collect data. In order to find the patterns across variables, this strategy entails data gathering at a specific point in time. The study population consists of 39 institutions and 2 ministries; that is Ministry of Energy and Mineral Development and National Environmental Management Authority-(NEMA) and 37 district local governments with mining operations. Districts were chosen in this study based on stratified random selection technique. Ministry of Energy and Mineral Resources and NEMA were picked for this study based on the strata. To guarantee that each group of the institutions have an equitable opportunity to engage in the study, a stratified random sampling technique has been adapted by the study.

Findings: The results in this study rejects the null hypothesis and accepts alternative hypothesis that Monitoring Operation is a

significant moderating effect on Institutional Policy Implementation in Mineral Resource Management. This result implies that at different levels of Monitoring Operations, the effect of Institutional Policy Implementation varies significantly. Particularly, when managers do proper Monitoring Operations, it enhances the effect of Institutional Policy Implementation on Mineral Resource Management.

Recommendations: The policy implication in this study is that policymakers should enhance Monitoring and Accountability Mechanisms through regular audits and inspections, ensuring compliance with regulations and ethical mining practices. Thus; investing in educational initiatives and awareness programs will raise public awareness of the benefits of sustainable mining practices, empowering local communities to actively engage in decisionmaking to protect the natural resources.

Keywords: *Institutional Policy Implementation, Monitoring Operations, Mineral Resource Management*

1.0 INTRODUCTION Empirical Background

The importance of robust monitoring mechanisms in ensuring compliance with environmental regulations and also promoting sustainable mining practices cannot be underestimated as it promotes a good practice in the mineral resource management in developing countries Smith *et al.* (2020).

Nevertheless, Brown and Johnson (2019) explore the moderating role of monitoring operations on the relationship between institutional policy and social responsibility in the mining industry in Germany. This study found out that effective monitoring systems ensure adherence to social responsibility standards and also enhances stakeholder engagement.

On the other hand, Jones et al. (2018) focus on the moderating effect of monitoring operations on the relationship between institutional policy and economic value creation in the mining sector in the United Kingdom. This study found out that monitoring mechanism is important in optimizing economic benefits and at the same time promoting responsible mineral resource management practices. Chen and Davis (2020) while examining the moderating effect of monitoring operations on the relationship between institutional policy and environmental stewardship in the mining industry in Canada found out that monitoring programs are important in mitigating environmental impacts and ensuring compliance with sustainability standards. Nonetheless, Wilson et al. (2019) while investigate the moderating role of monitoring operations on institutional policy and community engagement in the mining sector in the United States found out that effective monitoring systems foster positive relationships between mining companies and local communities.

Thompson and Garcia (2018) while investigating the effect of monitoring operation on mineral resource management in Mexico, focus on the moderating effect of monitoring operations on technological innovation in the mining sector. This study further highlights the role of monitoring mechanisms in promoting innovation and technological advancements for sustainable resource extraction. The finding in the study is that monitoring mechanisms is important in promoting innovation and technological advancements for sustainable resource extraction in Mexico.

A similar study was also conducted by Rodriguez and Martinez (2017) that examined the moderating effect of monitoring operations on health and safety practices in the mining sector in Canada. This study further underscores the importance of monitoring systems in ensuring the well-being of workers and minimizing occupational hazards. The finding in the study is that monitoring systems is significant in ensuring the well-being of workers and minimizing occupational hazards in Canada. A similar study was also carried out by Gupta et al. (2016) but on corporate governance in the United States. The study found out that effective monitoring mechanisms ensure transparency, accountability and ethical practices in corporate governance.

Further study was also carried out by Park et al. (2021) which investigates the moderating effect of monitoring operations on environmental performance in the mining sector in Mongolia. This study basically emphasizes on the importance of robust monitoring systems in enhancing environmental sustainability and ensuring compliance with regulatory standards. The study found out that robust monitoring systems is important in enhancing environmental sustainability and ensuring compliance with regulatory standards in Mongolia. Other scholars such as Wu and Liu (2020) carried out a similar study in China but on corporate social responsibility (CSR) and found consistent result.

Several studies such as Tran et al. (2018), Rahim and Ismail (2019), Sutrisna et al. (2017), Kim et al. (2016), Ofori et al. (2021), Tadesse and Wondimu (2020), Amponsah-Tawiah et al. (2019), Musiwini et al. (2017) and Mutamba et al. (2016) have carried out similar studies in counties like Malaysia, Vietnam, Indonesia, South Korea, Ghana, Ethiopia, South Africa, Zimbabwe, Tanzania respectively none of them has been carried out in Uganda.

Although Tumwebaze et al. (2020) and Namaganda et al. (2018) investigated the effect of monitoring operations on the sustainability in the mining sector and moderating effect of monitoring operations on engagement in the mining industry in Uganda respectively such attempts are too narrow and lack focus on specific details regarding the role of Monitoring Operations on Uganda's Mineral Resource Management.

Secondly, there is a clear gap in the literature concerning the specific context of Uganda's mining sector. Most of the existing studies have been carried in other countries, which may not fully capture the unique challenges, opportunities, and socio-economic dynamics present in Uganda's mining sector.

This study is therefore important as it seeks to fill the gap by motivating policy makers to a re-thinking about the role of monitoring operations in Uganda's mineral sector.

Theoretical Background Contingency Theory

Contingency Theory was developed by Lawrence and Lorsch in 1967. The theory proposes that the effectiveness of organizational practices is contingent upon the fit between the internal and external factors in a given context. In our case, the context of moderating effect of monitoring operations in mineral resource management is important.

This theory suggests that the impact of institutional policies on resource management outcomes may vary based on the level of monitoring operations within mining companies. According to this theory, organizations need to align their structures, processes, and practices with the demands of the external environment to achieve optimal performance.

In the context of the mining industry, this implies that the effectiveness of institutional policies, such as environmental regulations, community engagement guidelines, and safety standards, in shaping mineral resource management practices may depend entirely on the presence and the effectiveness of monitoring operations within mining companies.

Monitoring operations encompass the systems, processes, and mechanisms through which companies supervise, evaluate, and enforce compliance with institutional policies and resource management practices.

The theory posits that mining companies with robust monitoring operations are better equipped to ensure adherence to institutional policies and foster compliance with resource management guidelines. Thus, effective monitoring can help identify deviations, assess performance, and facilitate corrective actions, ensuring that institutional policies are implemented more consistently and effectively.

Nevertheless, mining companies with weak or inadequate monitoring operations might struggle to enforce policy compliance, leading to potential gaps in resource management practices despite the presence of institutional policies.

Thus, contingency theory suggests that monitoring operations act as a moderating variable that can strengthen or weaken the relationship between institutional policies and mineral resource management outcomes. The effectiveness of institutional policies in shaping mineral resource management practices may be amplified in companies with strong monitoring operations, while it may be diminished in companies with inadequate monitoring mechanisms.

3.0 METHODOLOGY Research Design

Following Bell et al., 2018, a cross-sectional design has been used in this study. In order to find patterns across variables, this strategy entails data gathering at a specific point in time (Taris and Kompier, 2014). These need a lot of resources, take a lot of time, and are vulnerable to issues with participant retention or interest waning over time (Spector, 2019).

Population

The study population consists of 39 institutions and 2 ministries; that is Ministry of Energy and Mineral Development and National Environmental Management Authority-(NEMA) and 37 district local governments with mining operations. Since it formally registers mining businesses that adhere to the

legal requirements for operating in Uganda, the Ministry of Energy and Mineral Development is a crucial regulatory body and a trustworthy source of information.

Environmental Impact Assessment is a crucial requirement before any business is awarded exploration contract. The study target is the sample size, which has been established using the sample determination method developed by Krejcie and Morgan (1970).

Sampling Design and Procedure

In this study, districts were chosen in this study using a stratified random selection technique. Ministry of Energy and Mineral Resources and NEMA were picked for this study based on strata. To guarantee that each group of the institutions have an equitable opportunity to engage in the study, stratified random sampling has been used (Sharma, 2017).

Factor Analysis

Table 1 reveals factor structure of external environment that consists of all its three constructs as significant factors. In their order of importance, these constructs include; Munificence, Complexity and Dynamism with variances of 16.626 percent, 14.700 percent and 10.270 percent respectively. The items under each factor with ratings above 0.50 percent are retained (Hair et al, 2010) and those below 0.50 percent are deleted because their importance in explaining the factors is low.

Table 1: Factor Analysis for Mineral Resource Management

Variance (%)	16.626	14.700	10.270
Cumulative variance (5)	16.626	31.326	41.596
Eigen values	4.615	4.170	2.030
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.726	Bartlett's Test of	
Sphericity	Approx. Chi-Square 856.297	df 55	
		Sig.	0.000

Source: Primary Data

Variance (%)	30.48	15.84
	6	4
Cumulative Variance	30.48	46.33
	6	0
<u>Eigen values</u>	<u>3.658</u>	<u>1.901</u>
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.705	

Bartlett's Test of Sphericity	Approx. Square df	Chi- 840.457 66
	Sig.	0.000

Table 2: Factor Analysis for Institutional Policy Implementation

Source: Primary Data

The cumulative variance percentages demonstrate that the two factors account for a substantial portion of the total variance, with the "Policy Independence" factor explaining 30.486 percent and the "Policy Commitment" factor explaining 15.844 percent of the variance. This suggests that the identified factors capture significant dimensions in the context of institutional policy implementation.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy, with a value of 0.705 percent, indicates that the dataset is suitable for factor analysis, as the value exceeds the recommended threshold of 0.5 percent. Additionally, Bartlett's Test of Sphericity yields a statistically significant result ($p < 0.001$), indicating that the correlations among the variables are suitable for factor extraction.

4.0 FINDINGS Demographic Characteristics of the Respondents

The results in this section present analyses of the respondents' varied characteristics. In terms of gender, there were 168 responders overall, with 55.5 percent men and 44.5 percent women. Regarding age, the distribution is; 4.8 percent under the age of 30, 41 percent between the ages of 31 and 40, 51.2 percent are between the ages of 41 and 50 and 3 percent beyond age of 50.

In terms of educational qualifications, 60.1 percent have a bachelor's, 38.1 percent have masters, and 1.8 percent have PhD degree. 1.8 percent of employees have 0–5 years of service, 79.1 percent have 6–10 years of service, 14.9 percent have 11–20 years of service, 3.6 percent have 21–30 years of service, and 0.6 percent have 31 years or more years of service. 84.5 percent of respondents are from the District Natural Resource Committee, 11.3 percent of respondents are MEMD employees, and 4.2 percent are NEMA employees.

Sample Characteristics of the Institutions

The results below show how different institutions are distributed according to their size and employee count. 87.5 percent of the institutions in the survey are older than 10 years, while 12.5 percent are between 5 and 10 years old. In terms of staff numbers, 84.4 percent of institutions have 20 or more workers, 12.5 percent have 10–20 workers, and just 3.1 percent have less than 10 workers. 32 institutions in all are included in the dataset. The details are indicated below.

Table 3: Moderating Effect of Monitoring Operation, Management Competence and Mineral Resource Management

Dependent Variable: Mineral Resource Management												
Model 1							Model 2					
<u>Predictors</u>	<u>Coeff</u>	<u>se</u>	<u>t</u>	<u>p</u>	<u>LLCI</u>	<u>ULCI</u>	<u>Coeff</u>	<u>se</u>	<u>t</u>	<u>p</u>	<u>LLCI</u>	<u>ULCI</u>
constant	0.35	0.38	0.93	0.35	-0.40	1.10	0.84	0.56	1.50	0.14	-0.26	1.94
Age of institution	-0.05	0.06	-0.97	0.33	-0.17	0.06	-0.01	0.03	-0.34	0.74	-0.07	0.05
Number of employees	0.03	0.09	0.38	0.70	-0.15	0.21	0.03	0.02	1.69	0.09	-0.01	0.07
Institutional policy implementation (IPI)	0.10	0.05	1.87	0.06	-0.01	0.20	1.09	0.04	30.55	0.00	1.02	1.16
Monitoring operation (MO)	0.13	0.04	3.05	0.00	0.04	0.21	0.14	0.04	3.24	0.00	0.06	0.02
Int_1 (IPI*MO)							0.13	0.06	2.18			
	0.03	0.01	0.24									
R2 Change									0.02			R2
F			41.8						31.91			
Sig			.000						0.00			
			0.541						0.56			

Source: Primary Data

This study test Hypothesis that Monitoring Operations have no significant Moderating effect on Institutional Policy Implementation and Mineral Resource Management. To test this hypothesis the following steps as suggested in Aiken and West (1991) are followed;

Step 1: Centered the mean values of the variables of interest (Institutional Policy Implementation and Monitoring Operations). This mitigated the secondary multicollinearity effects that could emerge in regression analysis (Lacobucci et al, 2017).

Step 2: Established whether the moderator variable (Monitoring Operations) has a significant effect on the dependent variable (Mineral Resource Management) where the results show; $Coeff. = .13$, $S.E = .04$, $t = 3.05$, $P < .01$.

Step 3: Computed the products of the independence variable and the moderator variables to generate the interaction term. The value obtained for interaction term was different from zero.

Step 4: the study then tests the moderating effect of monitoring effect to change on the relationship between Institutional Policy Implementation and Mineral Resource Management in the presence of control variables, through a moderated hierarchical regression model.

Step 5: For the moderation effect to exist, the number of variables (R^2) accounted for in the dependent variable should significantly be higher with the interaction of the independent and moderator variable compared to the direct effect without interaction (Preacher, Curran and Bauer, 2006).

The moderated regression results summarized in table 3 shows that monitoring operations has a positive significant moderating effect on Institutional Policy Implementation and Mineral Resource Management (Coeff. = .13, S.E = .06, $t = 2.18$, CI = .01, .24).

The interaction effect of Institutional Policy Implementation and Monitoring Operations to change in Model 2 and has a slightly higher contribution to variations in Mineral Resource Management ($R^2=56$) compared to the direct individual effect of each variable in Model 1 ($R^2=54$). None of the control variables included in the model had a statistically significant effect on Mineral Resource Management. The significance of moderating effect of monitoring operations was further probed with the shape of the moderation graph suggested by Jose (2013) and Hayes (2005). The Mod-graph presented in Figure 1 below shows that the simple slope lines are not parallel to each other, confirming the presence of moderation effect

The upward sloping shape of the curves/lines from left to right imply that mineral resource management is higher in the context of high levels of Institutional Policy Implementation and high levels of Monitoring Operation.

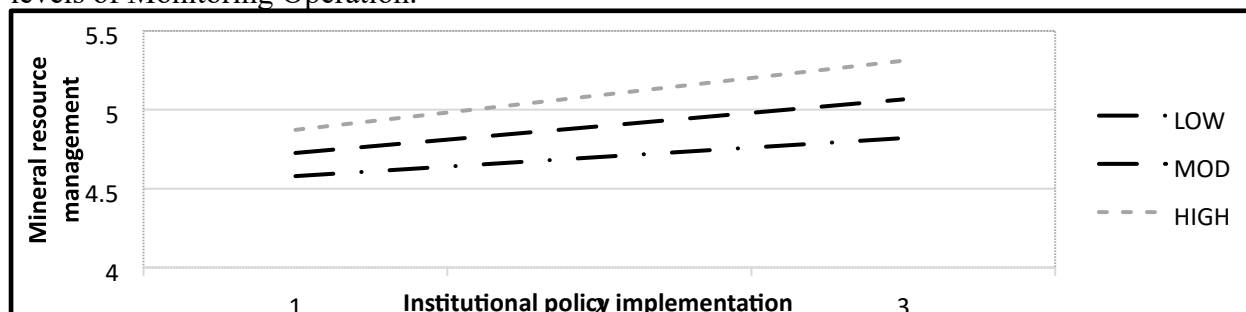


Figure 1: Moderating Effect of Monitoring Operation, Institutional Policy Implementation and Mineral Resource Management

Source: Primary Data

5.0 CONCLUSION AND POLICY IMPLICATIONS Conclusion

Based on the results above; the null hypothesis has been rejected and the alternative hypothesis suggesting that Monitoring Operation is a significant moderating effect on Institutional Policy Implementation and Mineral Resource Management is supported. This result implies that at different levels of Monitoring Operation, the effect of Institutional Policy Implementation on Mineral Resource Management varies significantly. Particularly, when managers do proper Monitoring Operations, it enhances the effect of Institutional Policy Implementation on Mineral Resource Management.

Policy Implication

Polymakers should enhance Monitoring and Accountability Mechanisms through regular audits and inspections, ensuring compliance with regulations and ethical mining practices. Investing in

educational initiatives and awareness programs will raise public awareness of the benefits of sustainable mining practices, empowering local communities to actively engage in decision-making and protect their natural resources.

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