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From Policy to Plant Shutdown: Procurement Governance and Refinery Operational Fragility in Ghana and Nigeria

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Abstract: Recurring refinery shutdowns in West Africa are frequently attributed to technical failures, aging infrastructure, or financing constraints. This article advances a governance-based explanation, arguing that procurement governance configurations rather than technical capacity alone systematically shape refinery operational fragility. Using an asymmetric comparative design, the study anchors empirical analysis in Ghana through survey-based Partial Least Squares Structural Equation Modeling (PLS-SEM) (n = 146) and extends interpretation to Nigeria through structured institutional analysis of publicly documented sector dynamics. Ghanaian results show that procurement challenges are strongly associated with refinery process disruptions ($\beta = 0.482$, $t = 6.284$, $p < .001$), while regulatory compliance has no statistically significant direct effect on refinery process outcomes ($\beta = 0.074$, $t = 0.775$, $p = .438$). Procurement processes, however, are strongly associated with sustainability outcomes ($\beta = 0.555$, $p < .001$). The model explains substantial variance in procurement's operational role ($R^2 = .467$). The Nigerian case reveals a different institutional pathology politicized governance and policy volatility producing historically similar outcomes, although recent large-scale refining investments have begun to alter the landscape. Drawing on transaction cost economics and institutional theory, the article conceptualizes "compliance without performance" as a recurring governance failure mode and proposes procurement-centered reforms for capital-intensive industries.

Keywords: procurement governance; refinery shutdowns; institutional weakness; regulatory compliance; Ghana; Nigeria; downstream petroleum

I. INTRODUCTION

Refinery shutdowns are often explained as technical breakdowns: faulty equipment, maintenance lapses, or power instability. While such factors are visible and measurable, they obscure a less visible but equally decisive determinant of refinery performance procurement governance. In continuous-process industries such as crude oil refining, operational continuity depends on the timely availability of non-substitutable inputs: spare parts, catalysts, process chemicals, and specialized maintenance services. When procurement systems fail to deliver these inputs predictably, refinery operations stall regardless of technical readiness.

Ghana and Nigeria illustrate this paradox. Both countries possess crude oil resources, refinery infrastructure, and formal procurement and petroleum regulatory frameworks. Yet each has experienced prolonged periods of refinery underperformance and import dependence. In Ghana, refinery utilization has fluctuated despite established procurement laws. In Nigeria, decades of refinery underperformance persisted alongside extensive regulation, only recently challenged by the emergence of large-scale private refining capacity.

This article advances a governance-centered explanation of refinery fragility. It argues that refinery shutdowns are not merely technical events, but institutional outcomes shaped by procurement governance configurations that prioritize procedural legitimacy over operational capability. Two questions guide the analysis:

1. Are procurement challenges systematically associated with refinery process disruptions?
2. Does regulatory compliance independently improve refinery operational outcomes?

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Procurement Governance as Operational Capability

Procurement governance encompasses sourcing strategy, supplier coordination, contract execution, inventory planning, and performance monitoring. In capital-intensive industries, procurement functions as an operational capability rather

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than a transactional support activity. Delays, supplier unreliability, and emergency sourcing inflate transaction costs and translate directly into downtime risk.

Empirical supply chain research increasingly recognizes procurement as central to operational resilience. Where procurement systems are reactive and fragmented, organizations face chronic instability regardless of engineering competence.

2.2 Transaction Cost Economics

Transaction Cost Economics (TCE) emphasizes that organizational performance depends on minimizing the full costs of transacting, including delay, failure, and disruption costs (Williamson, 1985). In refining, emergency procurement raises transaction costs through premium pricing, expedited logistics, and contractual frictions, while simultaneously prolonging downtime. Procurement systems that reduce uncertainty and lead-time volatility therefore function as cost-avoidance mechanisms at the system level.

2.3 Institutional Theory and Compliance Decoupling

Institutional theory explains why formal rules do not always translate into performance. Organizations may adopt regulatory and compliance structures to secure legitimacy while decoupling those structures from operational routines (Meyer & Rowan, 1977; DiMaggio & Powell, 1983). In procurement, compliance may be enacted as documentation, approvals, and audits without improving supplier responsiveness or material availability. Under such conditions, compliance becomes procedurally correct yet operationally inert—what this study terms **compliance without performance**.

III. RESEARCH DESIGN AND METHODS

3.1 Asymmetric Comparative Design

The study adopts an asymmetric comparative design. Ghana serves as the data-rich empirical anchor using survey-based PLS-SEM, while Nigeria is examined through structured institutional analysis drawing on publicly documented evidence. The objective is not coefficient-level comparability but mechanism-level explanation.

3.2 Ghana: Quantitative Analysis

Sample and Data Collection

Out of 150 questionnaires administered to professionals across procurement, operations, maintenance, engineering, and regulatory roles, 146 were returned completed (97.33% response rate).

Measures

Key constructs include procurement challenges (lead-time volatility, supplier unreliability, emergency sourcing pressure), regulatory compliance orientation, procurement processes and practices, refinery process disruptions, and sustainability outcomes.

Analysis

PLS-SEM was employed to estimate structural paths, effect sizes (f^2), explained variance (R^2), and model fit, consistent with best practice for explanatory modeling with latent constructs (Hair et al., 2017).

3.3 Nigeria: Institutional Analysis

Nigeria's component synthesizes policy documents, regulatory reports, and credible industry reporting to examine how procurement and regulatory institutions shape refinery outcomes. The analysis focuses on institutional capacity, incentive structures, and coordination rather than firm-level coefficients.

IV. RESULTS

4.1 Ghana: Structural Model Results

Table 1
Explained Variance (R^2)

Endogenous Construct	R^2	Adjusted R^2
Sustainability of crude oil refining	0.232	0.217
Role of procurement	0.467	0.456

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Table 2
Effect Sizes (f^2)

Relationship	f^2	Interpretation
Procurement challenges → refinery process disruption	0.364	Large
Procurement processes → refinery process	0.151	Medium
Procurement processes → sustainability	0.001	Negligible
Interaction effect	0.003	Negligible

Table3
Structural Path Coefficients

Path	β	t	p
Procurement challenges → refinery process disruption	0.482	6.284	< .001
Regulatory compliance → refinery process disruption	0.074	0.775	.438
Procurement processes → sustainability outcomes	0.555	6.257	< .001
Procurement practices → sustainability outcomes	0.259	3.526	< .001

Table4
Model Fit Indices

Index	Saturated	Estimated
SRMR	0.125	0.115
NFI	0.654	0.694

V. COMPARATIVE INSTITUTIONAL ANALYSIS: GHANA AND NIGERIA

Ghana's results indicate that procurement challenges are a dominant driver of refinery process disruptions, while regulatory compliance does not independently improve operational outcomes. This pattern is consistent with institutional decoupling: compliance exists as a legitimacy mechanism without being translated into operational capability.

Nigeria exhibits a different institutional configuration. Historically, refinery operations were undermined by politicized governance, regulatory contestation, and distorted incentives. Although recent large-scale private refining investments have begun to shift import dependence patterns, governance tensions around regulation, market power, and policy stability remain salient. Despite institutional differences, both contexts demonstrate how formal rules alone fail to ensure operational performance when procurement capability and coordination are weak.

Table 5
Institutional Typology of Refinery Governance

Dimension	Ghana	Nigeria
Dominant weakness	Capacity constraints; procedural rigidity	Politicized governance; policy volatility
Compliance orientation	Audit-driven	Politically mediated
Operational consequence	Approval delays; emergency reluctance	Distorted incentives; coordination failures
Outcome tendency	Intermittent shutdown cycles	Chronic underperformance; evolving with new capacity

VI. DISCUSSION

Across both cases, refinery shutdowns emerge as governance outcomes rather than purely technical failures. Ghana's empirical evidence shows that procurement challenges exert a large and statistically significant effect on refinery process disruptions, while compliance does not independently improve operations. Nigeria's institutional history demonstrates that extensive regulation without capability and coordination produces similar fragility.

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The findings support a reframing of refinery reliability: performance depends less on the existence of rules than on whether procurement systems reduce uncertainty, stabilize lead times, and enable rapid, accountable response. Compliance becomes effective only when embedded in operational routines that prioritize continuity.

VII. MANAGERIAL IMPLICATIONS

For refinery managers and operators:

- Treat critical spares and services as **reliability assets**, not transactional purchases.
- Integrate procurement planning with maintenance scheduling and operations forecasting.
- Institutionalize supplier performance governance focused on lead-time reliability and recovery speed.
- Reduce emergency procurement through predictive sourcing and framework agreements.

VIII. POLICY IMPLICATIONS

For policymakers and regulators:

- Shift from rule-centric oversight to **outcome-enabled compliance** that allows operational flexibility with traceability.
- Invest in procurement capability building, including digitization and supplier development.
- Align procurement regulation with the realities of capital-intensive, continuous-process industries.

IX. LIMITATIONS AND FUTURE RESEARCH

The Ghanaian component relies on cross-sectional perceptual data, limiting causal inference. Future research should incorporate objective downtime and inventory data, adopt longitudinal designs, and extend comparative analysis across additional refining contexts.

X. CONCLUSION

Refinery shutdowns are not merely mechanical failures; they are institutional outcomes. Evidence from Ghana and Nigeria demonstrates that procurement governance configurations—particularly the management of procurement challenges and the translation of compliance into capability—shape operational fragility. Reframing procurement as an operational capability rather than an administrative function offers a more effective pathway to refinery reliability in capital-intensive industries.

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