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## **MARKET COMPETITION AND OPERATIONAL EFFICIENCY IN NIGERIA'S DEREGULATED PETROLEUM DOWNSTREAM SECTOR**

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### **Abstract**

This study examines the relationship between market competition and operational efficiency in Nigeria's deregulated petroleum downstream sector. Drawing on the Structure–Conduct–Performance (SCP) paradigm and the theory of contestable markets, the study conceptualizes market competition as the principal structural driver of efficiency outcomes in a liberalized downstream environment. Operational efficiency is measured through two key dimensions: product availability and cost efficiency. A cross-sectional survey research design was adopted, and data were collected from 279 managers, marketers, distributors, depot operators, and regulatory officials in Rivers State, Nigeria. Data were analyzed using descriptive statistics and the Pearson Product–Moment Correlation Coefficient (PPMCC) at a 0.05 level of significance. The findings reveal strong and statistically significant positive relationships between market competition and product availability ( $r = 0.695$ ,  $p < 0.05$ ) as well as between market competition and cost efficiency ( $r = 0.712$ ,  $p < 0.05$ ). The results indicate that increased competitive dynamics in the deregulated downstream sector enhance supply reliability and promote cost minimization practices among operators. The study concludes that market competition is a critical determinant of operational efficiency in Nigeria's petroleum downstream industry and recommends sustained competitive reforms supported by transparent regulatory frameworks to consolidate efficiency gains.

### **Keywords:**

*Cost Efficiency; Deregulation; Market Competition; Operational Efficiency; Petroleum Downstream Sector; Product Availability.*

### **Introduction**

The petroleum industry remains a cornerstone of global economic activity, underpinning industrial production, transportation systems, and national energy security. Globally, downstream petroleum markets, comprising refining, storage, transportation, distribution, and retail, play a critical role in ensuring the steady and affordable supply of refined products to households and businesses. Efficient downstream operations reduce transaction costs, stabilize energy prices, and support macroeconomic productivity. However, the performance of downstream petroleum systems is heavily influenced by market structure and regulatory frameworks. In many developing economies, state dominance, price controls, and high entry barriers have historically

constrained competition, often resulting in inefficiencies, supply bottlenecks, and fiscal burdens (IMF, 2022; Livingstone, 2023).

In Nigeria, the downstream petroleum sector has long operated under a regulated structure characterized by government-administered pricing, fuel subsidy regimes, and the dominance of the Nigerian National Petroleum Company. While these mechanisms were originally intended to shield consumers from global price volatility, they gradually created market distortions, discouraged private investment, and weakened operational incentives across the supply chain (Olujobi, 2021; Ozili, 2023). Persistent fuel shortages, regional supply disparities, inflated logistics costs, and heavy fiscal outlays became defining features of the regulated regime. In response to these structural challenges, Nigeria has embarked on a transition toward downstream deregulation, emphasizing market-based pricing, expanded private participation, and competitive restructuring.

The transition to deregulation represents a fundamental shift in market structure, thereby positioning market competition as a central mechanism for improving downstream performance. Under the Structure–Conduct–Performance (SCP) paradigm advanced by Bain (1956), market structure determines firm conduct, which in turn shapes performance outcomes. Historically, Nigeria's downstream structure, characterized by limited entry, price regulation, and state control, constrained competitive conduct such as cost optimization, logistics innovation, and service differentiation. The emerging deregulated framework, however, has introduced new private refiners, independent marketers, and distributors, including large-scale investments such as the Dangote Refinery, thereby altering competitive dynamics. According to SCP logic, increased market competition should stimulate strategic conduct. Through improved distribution networks, optimized inventory systems, competitive pricing strategies, which ultimately enhances operational efficiency.

Supporting this perspective is the Contestable Market Theory proposed by Baumol (1986), which posits that even the threat of potential entry can discipline incumbent firms, compelling them to operate efficiently where entry barriers are low and regulatory conditions are transparent. Applied to Nigeria's downstream reforms, deregulation reduces structural barriers and increases contestability, theoretically limiting monopolistic behavior and encouraging cost-efficient operations.

Within the downstream petroleum context, operational efficiency can be conceptualized along two primary dimensions: product availability and cost efficiency. Product availability refers to the reliability and consistency of petroleum product supply across retail outlets and geographic regions, reflected in reduced stockouts and shorter distribution lead times. Cost efficiency, on the other hand, relates to the minimization of operational and logistics costs in sourcing, storage, transportation, and retailing fuel products. Together, these dimensions determine the effectiveness of the downstream supply chain in meeting national demand. In a deregulated and competitive environment, firms are expected to adopt innovative logistics strategies, expand storage capacity, and optimize procurement schedules in order to gain market advantage and reduce operational waste (Lima et al., 2016; Ojuekaiye, 2024).

A growing body of literature has examined the fiscal and macroeconomic implications of subsidy removal and deregulation in Nigeria. Empirical discussions frequently emphasize inflationary

pressures, exchange-rate volatility, and distributional consequences of price liberalization (Nwachukwu & Egwuon, 2020; Usman et al., 2024). However, relatively limited scholarly attention has been devoted to isolating market competition itself as a structural determinant of operational efficiency in the downstream sector. Existing analyses often treat deregulation as a broad policy shift without disaggregating its competitive mechanisms or empirically linking competition to measurable efficiency outcomes such as product availability and cost reduction. This reveals a gap in the literature concerning how competitive restructuring translates into performance improvements within Nigeria's petroleum supply chain (IMF, 2022; Ozili, 2023).

Inefficient downstream operations have far-reaching economic consequences. Persistent stockouts disrupt transportation and commercial activities; high distribution costs transmit inflationary pressures across sectors; and uneven regional access exacerbates spatial inequalities (Olujobi, 2021). Despite the theoretical promise that competition enhances efficiency, structural constraints may moderate its effectiveness. These constraints include infrastructure deficits, foreign exchange instability, and governance weaknesses. Understanding whether increased market competition has meaningfully improved product availability and cost efficiency is therefore critical for evaluating the success of Nigeria's deregulation reforms (Rashied et al., 2024).

Therefore, this study seeks to examine the influence of market competition on operational efficiency in Nigeria's deregulated petroleum downstream sector. Specifically, it investigates how competitive restructuring affects product availability and cost efficiency within the petroleum supply chain. By focusing on competition as the principal explanatory variable, the study aims to provide empirical insight into whether structural transformation of the downstream market has translated into measurable performance gains. Ultimately, the research intends to inform policymakers and industry stakeholders on how competitive frameworks can be strengthened to enhance supply reliability, reduce operational costs, and ensure sustainable efficiency in Nigeria's petroleum sector.

### **Purpose of the Study**

The purpose of this study is to examine how market competition influences operational efficiency in Nigeria's deregulated petroleum downstream sector. It aims to explore the relationship between competitive market structures and two key performance indicators: product availability and cost efficiency. Special emphasis will be placed on assessing whether increased market entry and reduced monopoly power have improved supply reliability and reduced operational costs within the downstream petroleum supply chain.

### **Literature Review**

#### **Theoretical Framework**

This study is anchored primarily on the Structure-Conduct-Performance (SCP) paradigm (Bain, 1956) and supported by the theory of contestable markets (Baumol, 1986) to provide a coherent analytical lens for examining how structural transformation in Nigeria's deregulated petroleum downstream sector influences operational efficiency outcomes, particularly product availability and cost efficiency. The Structure-Conduct-Performance paradigm, originally developed by Joe S. Bain (1956), posits that the structure of a market determines the conduct of firms operating

within it, and that such conduct ultimately shapes industry performance. Market structure refers to characteristics such as the number of firms, degree of concentration, entry barriers, and regulatory conditions. Conduct encompasses firm behavior, including pricing strategies, output decisions, investment in infrastructure, and competitive tactics. Performance reflects outcomes such as efficiency, consumer welfare, innovation, and supply reliability. Although the SCP framework has undergone refinement and critique over time, it remains a foundational model in industrial organization for explaining how changes in competitive structure influence market outcomes (Panhans, 2024).

Applied to Nigeria's petroleum downstream sector, the SCP paradigm provides a structured explanation of how deregulation may influence operational efficiency. Historically, the downstream market operated under a concentrated structure characterized by state dominance, administered pricing, and high barriers to entry. The Nigerian National Petroleum Company (NNPC) played a central role in refining, importation, and distribution, while fuel subsidies and regulatory controls shaped price determination and supply allocation (Olujobi, 2021; Ozili, 2023). This structural configuration limited competitive entry and weakened incentives for cost minimization, logistics optimization, and service differentiation. Under such conditions, firm conduct was largely constrained by regulatory directives rather than market rivalry, and performance outcomes were frequently characterized by supply shortages, regional disparities in product availability, and fiscal distortions.

Deregulation reforms have altered this structural landscape by encouraging private sector participation, liberalizing pricing mechanisms, and facilitating investment in refining and distribution infrastructure. The emergence of new private refiners and marketers, including large-scale facilities such as the Dangote Refinery, signals a transition toward a more competitive market environment. Within the logic of SCP, this structural shift is expected to reshape firm conduct. Increased market competition compels firms to adopt cost-efficient procurement strategies, invest in storage and transportation networks, optimize inventory management systems, and improve service reliability in order to retain market share. Competitive pressures also discourage practices such as hoarding and artificial scarcity, as firms risk losing customers to rivals in an open market (Olujobi, 2021).

Consequently, performance outcomes, measured in this study as product availability and cost efficiency, should improve under a more competitive structure. Greater rivalry encourages continuous supply to retail outlets in order to avoid stockouts that may shift demand to competitors. Similarly, cost efficiency becomes imperative as firms streamline logistics operations and reduce wastage to maintain profitability in a market where prices increasingly reflect real economic costs (Ozili, 2023). In this way, the SCP paradigm directly links deregulation-induced structural transformation to measurable operational efficiency within Nigeria's downstream petroleum supply chain.

However, while SCP explains how market structure influences conduct and performance, it does not fully address the dynamic effects of potential entry. To complement this perspective, the theory of contestable markets advanced by William Baumol provides an additional explanatory layer. Contestable Market Theory argues that even in markets with few firms, efficiency can emerge if entry and exit barriers are sufficiently low and regulatory frameworks are transparent

and fair (Bailey & Baumol, 1983; Baumol, 1986). The mere threat of new entrants disciplines incumbent firms, compelling them to price competitively and operate efficiently to deter entry.

In the Nigerian context, deregulation reduces formal entry barriers by liberalizing importation, refining, and retail participation. Where licensing procedures are transparent and infrastructure access is non-discriminatory, existing firms face competitive pressure not only from actual rivals but also from potential entrants. Empirical analyses of deregulated petroleum markets suggest that such contestability can stimulate efficiency improvements, provided that regulatory oversight prevents collusion and abuse of dominant positions (Pickford & Wheeler, 2001). Nonetheless, deregulation does not imply the absence of regulation; rather, it often represents what Aalbers (2016) describes as “regulated deregulation,” where market liberalization is accompanied by institutional frameworks designed to maintain fairness and stability.

Within this theoretical synthesis, market competition becomes the central explanatory variable of this study. The SCP paradigm explains how structural changes, specifically increased market entry and reduced concentration, reshape firm behavior and generate efficiency outcomes. Contestable Market Theory further clarifies that sustained efficiency depends not only on the number of firms but also on the credibility of potential entry and the fairness of regulatory governance. Together, these theories underpin the study's expectation that Nigeria's downstream deregulation, by fostering competitive market conditions and lowering entry barriers, should enhance operational efficiency through improved product availability and reduced operational costs. At the same time, they recognize that efficiency gains depend on the degree to which competition is genuine, contestable, and supported by transparent institutional arrangements.

### **Market Competition**

Market competition occupies a central position in the discourse on downstream petroleum sector reforms, particularly in economies transitioning from state dominance to market-oriented systems. In industrial organization theory, competition refers to the rivalry among firms seeking to attract customers, increase market share, and maximize profitability within a given industry structure. Classical and contemporary economic literature consistently associates competitive markets with improved allocative and productive efficiency, innovation, and consumer welfare (Porter, 1980; Stiglitz, 2015). Within the petroleum downstream sector, competition becomes especially significant because petroleum products constitute strategic inputs for transportation, industry, and household consumption. Consequently, the degree of rivalry among marketers, refiners, and distributors directly influences supply stability, pricing behavior, and operational performance.

In Nigeria, the downstream petroleum market historically operated under a highly concentrated structure dominated by the state-owned Nigerian National Petroleum Company Limited, combined with regulated pricing and substantial entry barriers. Scholars argue that such monopoly-like conditions weakened incentives for efficiency, encouraged rent-seeking, and contributed to persistent supply shortages (Olujobi, 2021). Empirical analyses further suggest that limited competition in the pre-deregulation era fostered artificial scarcity, hoarding, and distribution bottlenecks, as market outcomes were shaped more by administrative allocation than by competitive discipline (Akinyemi & Adegbite, 2021; Ozili, 2023). Deregulation reforms, particularly price liberalization and licensing of private importers and refiners, were therefore

introduced to stimulate competitive entry and reduce structural concentration in the sector (IMF, 2022).

The literature consistently maintains that competition enhances efficiency by compelling firms to minimize operational costs, optimize logistics, and improve service delivery in order to retain customers (Stiglitz, 2015; Olujobi, 2021). In a deregulated downstream environment, firms compete not only on price but also on distribution reliability, infrastructure investment, and customer service innovations. Studies on petroleum market reforms indicate that the presence of multiple active marketers reduces the probability of supply disruptions because firms respond swiftly to demand fluctuations to avoid losing market share (Akinyemi & Adegbite, 2021). However, scholars also caution that competition must be supported by strong regulatory oversight to prevent cartelization and collusion, particularly in markets with infrastructural constraints (Adelabu, 2022; Olujobi, 2021). Thus, market competition in Nigeria's deregulated petroleum downstream sector is conceptualized as the degree of rivalry and openness that shapes firm behavior and ultimately determines efficiency outcomes.

### **Operational Efficiency in Nigeria's Deregulated Petroleum Downstream Sector**

Operational efficiency in the petroleum downstream sector refers to the ability of firms and the industry as a whole to deliver refined petroleum products at minimal cost and with minimal disruption while meeting consumer demand. In supply chain management literature, efficiency is commonly defined as the optimal utilization of resources to achieve desired output levels with reduced waste and delays (Christopher, 2016; Mentzer et al., 2001). Within deregulated energy markets, operational efficiency becomes a critical performance indicator because firms can no longer rely on government subsidies or price controls to offset inefficiencies. Instead, survival depends on effective cost management, infrastructure optimization, and responsiveness to market signals (Adelabu, 2022).

In the Nigerian context, operational efficiency has historically been undermined by subsidy distortions, infrastructural deficits, pipeline vandalism, port congestion, and foreign exchange instability (Olujobi, 2021; Ozili, 2023). The World Bank (2022) observes that inefficiencies in refining capacity and distribution networks contributed significantly to recurring fuel scarcity and fiscal strain. Empirical studies argue that deregulation seeks to correct these distortions by aligning prices with actual costs and encouraging private investment in logistics infrastructure, storage facilities, and refining capacity (Akinyemi & Adegbite, 2021; IMF, 2022). Operational efficiency in this study is therefore conceptualized through two primary dimensions, product availability and cost efficiency, which reflect the extent to which deregulation improves supply consistency and reduces operational waste.

Scholars emphasize that efficiency in deregulated petroleum markets is contingent upon both market structure and firm-level capabilities (Adelabu, 2022; Ozili, 2023). Where competition is genuine and regulatory institutions function effectively, firms are incentivized to streamline procurement, distribution, and inventory management processes. Conversely, weak institutional oversight may limit efficiency gains despite formal liberalization (Olujobi, 2021). Thus, operational efficiency in Nigeria's downstream petroleum sector represents the measurable outcome of competitive dynamics, infrastructural investment, and effective market governance.

## Product Availability

Product availability constitutes a fundamental indicator of supply chain performance in the petroleum downstream sector. In logistics and operations management literature, availability refers to the ability of a supply system to consistently provide goods in the right quantity, at the right time, and in the right location to meet consumer demand (Christopher, 2016; Lambert, 2014). In resource-dependent economies such as Nigeria, stable access to petroleum products is essential for transportation, power generation, manufacturing, and household consumption. Consequently, recurrent shortages disrupt economic stability and erode public confidence in sectoral reforms (World Bank, 2022).

Empirical literature attributes Nigeria's historical fuel scarcity to regulated pricing, subsidy arrears, refinery underperformance, and weak distribution infrastructure (Olujobi, 2021; Ozili, 2023). Studies indicate that artificial price controls discouraged timely importation and created arbitrage opportunities, leading to hoarding and cross-border smuggling (IMF, 2022). Evidence from deregulation episodes suggests that when prices reflect market realities and private operators are allowed to compete freely, product supply tends to stabilize because firms have financial incentives to maintain consistent stock levels (Akinyemi & Adegbite, 2021; Adelabu, 2022).

Scholars further argue that product availability is closely linked to infrastructure investment and supply chain coordination (Mentzer et al., 2001; Lambert, 2014). Increased participation of private refiners and depot owners is expected to enhance storage capacity and reduce dependence on a single dominant supplier. However, literature also cautions that infrastructural bottlenecks and foreign exchange volatility may constrain supply even under deregulated regimes (Ozili, 2023; World Bank, 2022). Within this study, product availability is conceptualized as the consistent physical and market presence of petroleum products across retail outlets, reflecting the effectiveness of competition and price liberalization in stabilizing supply.

## Cost Efficiency

Cost efficiency represents the second core dimension of operational efficiency in the deregulated downstream petroleum sector. Economic theory defines cost efficiency as the ability to produce a given level of output at the lowest possible cost without compromising quality (Farrell, 1957; Coelli et al., 2005). In supply chain contexts, cost efficiency involves minimizing procurement, transportation, storage, and distribution expenses while maintaining service standards (Christopher, 2016). For Nigeria's petroleum industry, cost efficiency is particularly significant because fuel prices exert substantial influence on inflation, household welfare, and industrial productivity (World Bank, 2022).

The literature indicates that subsidy regimes often mask inefficiencies by transferring financial burdens to government budgets rather than encouraging operational improvements (Ozili, 2023; IMF, 2022). Empirical analyses demonstrate that deregulation reduces fiscal leakages and compels firms to adopt lean operational practices, optimize logistics networks, and eliminate wasteful expenditures (Adelabu, 2022; Akinyemi & Adegbite, 2021). Studies further reveal that competitive markets encourage economies of scale and technological adoption, which contribute to lower per-unit distribution costs over time (Olujobi, 2021).

However, scholars caution that cost efficiency gains may be undermined by exchange rate volatility, port inefficiencies, and high transportation costs resulting from poor road and pipeline infrastructure (World Bank, 2022; Ozili, 2023). Thus, while deregulation creates incentives for cost minimization, actual efficiency outcomes depend on broader macroeconomic stability and infrastructural reform. In this study, cost efficiency is conceptualized as the extent to which downstream operators minimize operational and transactional costs in a competitive, price-liberalized environment.

### **Empirical Review**

Empirical studies across developing and emerging economies provide mixed but largely supportive evidence regarding the relationship between deregulation, competition, and operational efficiency in petroleum markets. Time-series analyses of Nigeria's downstream reforms reveal that periods of partial liberalization were associated with improved supply consistency and reduced queue incidence compared to heavily subsidized periods (Olayiwola & Osisanwo, 2017). Similarly, Ayodele (2019) found that subsidy removal enhanced private sector participation and strengthened distribution networks, thereby improving product availability.

Comparative studies reinforce these findings. Nwaoha and Wood (2020) report that markets with cost-reflective pricing frameworks attract infrastructure investment, which directly improves supply reliability. Adelabu (2022) demonstrates that subsidy removal significantly reduced fiscal inefficiencies and incentivized leaner operational models among marketers. Cross-country panel analyses further show that deregulated petroleum markets often experience improved cost efficiency due to increased competition and technology adoption (Agyemang et al., 2021; AlKhars & AlKhalifah, 2020).

Nigeria-specific research also highlights the importance of competitive dynamics. Olujobi (2021) finds that increased entry of independent marketers improved distribution coverage, although weak regulatory oversight occasionally enabled collusion. Ozili (2023) concludes that subsidy removal and competitive pricing enhance efficiency incentives but must be complemented by macroeconomic stability to achieve sustainable outcomes. The World Bank (2022) similarly notes that structural concentration in the pre-deregulation era contributed significantly to supply disruptions, whereas competitive reforms encourage investment in refining and storage infrastructure.

Overall, the empirical literature converges on the view that price liberalization and market competition positively influence product availability and cost efficiency, provided that institutional and infrastructural conditions support effective market functioning. Nevertheless, the magnitude of these effects remains context-specific, underscoring the need for continued empirical assessment of Nigeria's deregulated downstream petroleum sector.

### **Research Methodology**

This study adopted a cross-sectional survey research design to examine the relationship between market competition and operational efficiency in Nigeria's deregulated petroleum downstream sector. The cross-sectional design was considered appropriate because it enables the collection of quantitative data from relevant industry stakeholders at a single point in time, thereby facilitating the empirical assessment of associations between the independent variable (market competition)

and the dependent variable (operational efficiency), measured through product availability and cost efficiency.

The population of the study comprised managers, marketers, distributors, depot operators, and regulatory officials operating within Nigeria's downstream petroleum sector, with particular focus on Rivers State due to its strategic role as a major petroleum distribution hub in the country. According to records from the Department of Petroleum Resources (2022), approximately 1,200 licensed marketers operate within the study area. Using the Krejcie and Morgan (1970) sample size determination table, a sample size of 291 respondents was derived to ensure statistical adequacy and representativeness. A stratified random sampling technique was employed to categorize respondents into independent marketers, major marketers, and regulatory officials. Thereafter, simple random sampling was applied within each stratum to enhance representativeness and minimize sampling bias.

Data were obtained from both primary and secondary sources. Primary data were collected using a structured questionnaire designed in line with the study variables. The instrument was structured using a five-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1). The questionnaire consisted of two major sections: the first captured respondents' demographic characteristics, while the second measured market competition and operational efficiency indicators (product availability and cost efficiency). The instrument was administered physically at depots and retail outlets and electronically to corporate and regulatory personnel to improve coverage and response rate. Secondary data were sourced from scholarly journal articles, industry reports, and official regulatory publications to provide theoretical grounding and contextual support for the study.

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic data and assess the distribution of study variables. Inferential analysis was performed using the Pearson Product-Moment Correlation Coefficient (PPMCC) to determine the strength and direction of the relationship between market competition and operational efficiency indicators (product availability and cost efficiency). All hypotheses were tested at a 0.05 level of significance.

To ensure the rigor of the instrument, validity and reliability procedures were undertaken. Content validity was established through expert review by scholars and industry professionals to ensure adequate coverage of the constructs. Construct validity was further assessed using factor analysis. A pilot study involving 30 respondents outside the main sample was conducted to refine the questionnaire. Reliability was evaluated using Cronbach's Alpha, with coefficients exceeding the 0.70 benchmark recommended by Nunnally (1978), thereby confirming the internal consistency and stability of the measurement scales.

## **Results**

### **Demographics of Respondents**

A total of 291 questionnaires were distributed to employees in the downstream petroleum sector, of which 279 were duly completed and returned, representing a response rate of 96%. All retrieved questionnaires were valid for analysis. The high response rate enhances the reliability

and representativeness of the findings. Data were analyzed using the Statistical Package for the Social Sciences (SPSS), employing descriptive statistics and Pearson Product–Moment Correlation Coefficient (PPMCC).

The demographic profile of respondents indicates that 59.9% were male, while 40.1% were female, suggesting male dominance in the sector. In terms of age distribution, the majority (34.1%) were between 30–39 years, followed by 40–49 years (25.8%) and 20–29 years (25.4%). Only 14.7% were aged 50 years and above. This reflects a relatively youthful and economically active workforce. Regarding educational qualifications, most respondents possessed B.Sc/HND degrees (45.9%), followed by M.Sc/MBA (24.0%) and OND/NCE (22.2%). A smaller proportion held PhD qualifications (4.3%), while 3.6% indicated other qualifications. This suggests that respondents were academically equipped to provide informed responses. Concerning years of experience, 34.4% had between 5–10 years of experience, 30.1% had less than 5 years, 21.9% had 11–15 years, and 13.6% had over 15 years of experience. This indicates that a substantial proportion of respondents possessed adequate industry experience.

### **Descriptive Statistics of Study Variables**

The study examined market competition as the independent variable and operational efficiency as the dependent variable, measured through product availability and cost efficiency. Descriptive statistics revealed that respondents reported a high level of agreement regarding the presence of market competition (Mean = 4.11; SD = 0.694).

For operational efficiency indicators, Product availability recorded a mean score of 4.06 (SD = 0.731), indicating high agreement that competition enhances availability of petroleum products. Cost efficiency had a mean score of 3.92 (SD = 0.758), reflecting moderately high agreement that competitive forces improve cost management and reduce operational inefficiencies. Overall, the descriptive findings suggest that market competition is perceived to positively influence operational efficiency in the downstream petroleum sector.

### **Test of Hypotheses**

The hypotheses were tested using Pearson Product–Moment Correlation Coefficient (PPMCC) at a 0.05 level of significance.

#### *Hypothesis One*

H<sub>01</sub>: There is no significant relationship between market competition and product availability in the downstream petroleum sector. The analysis revealed a strong positive correlation between market competition and product availability ( $r = 0.695$ ,  $p < 0.05$ ,  $N = 279$ ). Since the p-value is less than 0.05, the null hypothesis was rejected. This indicates that increased market competition significantly improves product availability. The finding implies that competitive pressures encourage efficient distribution systems and minimize supply shortages.

#### *Hypothesis Two*

H<sub>02</sub>: There is no significant relationship between market competition and cost efficiency in the downstream petroleum sector. The result showed a strong positive relationship between market competition and cost efficiency ( $r = 0.712$ ,  $p < 0.05$ ,  $N = 279$ ). The null hypothesis was rejected because the p-value was less than 0.05. This suggests that heightened competition significantly

enhances cost efficiency, likely due to firms striving to minimize waste, reduce operational costs, and improve internal processes to remain competitive.

### **Summary of Findings**

The results demonstrate that:

1. Market competition is significantly and positively related to product availability.
2. Market competition is significantly and positively related to cost efficiency.

These findings collectively indicate that market competition significantly enhances operational efficiency in the downstream petroleum sector. The strength of the correlation coefficients further suggests that competition plays a critical role in driving improvements in distribution effectiveness and cost management practices.

### **Implications of The Study**

The findings of this study have important theoretical, managerial, and policy implications for Nigeria's deregulated petroleum downstream sector. The significant positive relationship between market competition and operational efficiency—measured through product availability and cost efficiency—reinforces the proposition that competitive market structures enhance firm-level performance and sectoral outcomes. For policymakers and regulators, the results provide empirical support for sustaining and strengthening deregulation policies that promote fair competition, transparency, and open market participation. For industry operators, the findings suggest that competitive pressure can serve as a catalyst for improving distribution systems, minimizing operational waste, optimizing logistics, and ensuring consistent product supply. The study therefore contributes to the broader discourse on market reforms in developing economies by demonstrating that effective competition mechanisms can translate into tangible efficiency gains in strategic sectors such as petroleum distribution.

### **Conclusion**

This study examined the relationship between market competition and operational efficiency in Nigeria's deregulated petroleum downstream sector, with operational efficiency measured through product availability and cost efficiency. The empirical results revealed strong and statistically significant positive relationships between market competition and both indicators of operational efficiency. These findings suggest that increased competition within the downstream sector enhances the availability of petroleum products and improves cost management practices among operators. Consequently, the study concludes that market competition is a critical driver of operational efficiency in Nigeria's deregulated petroleum downstream sector and plays a pivotal role in improving overall sector performance.

### **Recommendations**

Based on the findings, the study recommends that government and regulatory authorities should continue to strengthen competitive frameworks within the downstream petroleum sector by eliminating entry barriers, promoting transparency in licensing processes, and enforcing anti-monopoly regulations. Regulatory agencies should also enhance monitoring mechanisms to ensure fair competition and prevent anti-competitive practices that could undermine efficiency gains. Furthermore, downstream operators should invest in modern distribution infrastructure,

supply chain optimization technologies, and cost-control systems to leverage the benefits of competitive pressures. Industry stakeholders are also encouraged to adopt best-practice operational strategies that enhance responsiveness, reduce inefficiencies, and ensure consistent product availability across distribution channels.

### Suggestions for Future Studies

Future research may expand the scope of this study by incorporating additional dimensions of operational efficiency, such as service quality, customer satisfaction, and profitability, to provide a more comprehensive evaluation of performance outcomes. Longitudinal studies could also be conducted to assess the long-term effects of market competition on sector stability and sustainability. In addition, comparative studies across different states or regions in Nigeria—or across other deregulated sectors—would provide broader generalizability of findings. Future researchers may also employ advanced analytical techniques such as structural equation modeling to examine causal relationships and mediating variables within the competition–efficiency nexus.

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