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Anti-Money Laundering Regulation and Operational Efficiency of Deposit Money Banks in Nigeria

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Abstract: *Given the high cost of operation faced by banks in Nigeria despite years of enforcement by regulators, the need to ascertain whether anti-money laundering rules add to or alleviate the burden becomes very essential. On the basis of this, this study examined the effect of anti-money laundering (AML) regulations on the operational efficiency of Deposit Money Banks in Nigeria. An ex-post facto research design was employed with a comprehensive secondary data gotten from the CBN Statistical Bulletin, NDIC Annual Reports, and Basel Institute on Governance Reports for 2012–2024. The Seemingly Unrelated Regression (SUR) technique was used to capture the multidimensional nature of the dependent variables: cost-to-income ratio (CIR), operating expense ratio (OER), asset turnover ratio (ATR), and return on assets (ROA). Preliminary analyses, descriptive statistics, as well as Augmented Dickey-Fuller unit root tests, and normality tests, were carried out using E-Views 10. The results showed no significant effect of AML regulations on CIR, OER, and ROA, but a significant positive relationship was found with ATR. While the research concluded that compliance with AML regulations is important, banks should further enhance digital banking adoption, investment strategies, and revenue-generating initiatives to achieve sustainable operational efficiency improvements.*

Keywords: Anti-money laundering, Asset Turnover, Cost to Income, Deposit Money Banks, Operational Efficiency,

INTRODUCTION

In contemporary banking system, operational efficiency is an important measure of institutional performance in modern banking systems, particularly at a time when competition, technological innovation, and regulatory compliance are all driving changes in the financial sector (Al-Tawil, 2023). In the global banking business, operational efficiency is defined as banks' capacity to optimise their input-output ratio, reduce transaction costs, streamline internal processes, and deliver high-quality financial services with minimal waste or redundancy (Gaviyau & Sibindi, 2023). Global trends, however, show that operational efficiency is increasingly being impacted by regulatory duties, especially those pertaining to anti-money laundering (AML). Nowadays, banks are obliged to include compliance structures into the matrix of their operations; this often involves investment in expensive

digital compliance technology, trained staff, and systems of risk control (Kokkinis & Sergakis, 2020).

In Africa, however, there are structural limitations to banking operations, which include a lack of financial literacy among people and unstable institutions with a generally inadequate technology infrastructure. Banks in Sub-Saharan Africa face peculiar challenges in balancing efficient service delivery with regulatory adherence. For instance, Mutsonziwa and Gachoka (2022) emphasised that most African banks operate within delicate regulatory frameworks that have restricted capacity for real-time oversight and implementation.

The Nigerian Deposit Money Banks (DMBs) have had several phases of technological transformation, regulatory reform, and consolidation with a view to increasing their operational resilience and competitiveness (Ichide et al., 2022). However, Nigeria's adherence to international financial standards and its local vulnerabilities to illicit money flows have resulted in a rise in AML-related compliance requirements, which has put pressure on bank operations (Onaolapo & Odetayo, 2021).

Anti-money laundering (AML) is a very critical concern for preserving the integrity of the financial system at the global scene (Mekpor, 2019). In a constantly changing world, financial management methods enhance economic stability, national security and overall well-being in many nations.

Unfortunately, technological advancements will escalate the possibility of money laundering. Moreover, new payment methods and expedited fund transfers may elevate dangers for financial institutions (Jaffery & Mughal, 2020). Leuprecht et al. (2023) unveiled that cryptocurrency launderers typically utilise Bitcoin. Money laundering is the act of converting “dirty money” into “clean money” to enhance its appearance (Mekpor, 2019). In view of the above, the broad objective of this research examined the relationship between anti-money laundering regulations and operational efficiency of Deposit Money Banks in Nigeria.

LITERATURE REVIEW

Conceptual Review

Anti-Money Laundering (AML) Regulations

Ajayi and Abdulkarim, (2022) defined money laundering as the process through which proceeds of illegal activities-such as fraud, rustling, drug trafficking, gambling, and other criminal activities-are hidden or camouflaged in such a way that these are depicted to appear as initiating from legitimate sources. In that respect, illicit funds are camouflaged and presented as lawful earnings. Typically, people get involved in money laundering to evade prosecution by law enforcement or tax authorities and to safeguard the illicit gains from potential confiscation (Al-Nuemat & Ahmed, 2023).

Anti-money laundering, therefore, is a set of standards, laws, and procedures that define how a nation tries to deter, detect and mitigate such activities from happening. As argued by Amrani (2024), international conventions provide an AML framework globally while guaranteeing coordination across nations.

Basically, AML hopes to combat criminal activities that facilitate money laundering, like corruption, terrorism financing, and drug trade, while keeping financial institutions safe from such illicit penetration. Ofoeda (2022) further revealed that AML regulations are important in

safeguarding the stability and integrity of the financial system through the taming of organised crime.

Basel AML index

Basel AML Index is a globally recognised composite index that assesses the risk regarding ML/TF for each country. It is developed and published annually by the Basel Institute for Governance, while it is produced with a country-level assessment based on a range of indicators, such as the effectiveness of AML/CFT regimes, political risk, transparency in the financial system, corruption level of a country, and judiciary quality. It provides an in-depth valuation of a country's susceptibility to money laundering by participating data from reliable sources such as the World Bank, Transparency International, and the FATF (Al-Tawil, 2023). The ratings range from 0 (low risk) to 10 (high risk), with higher values conforming to lower ranked AML settings.

Operational Efficiency

Operational efficiency remains one of the key performance measures within the banking industry, describing the organisation's ability to maximise production and value creation while utilising minimal inputs to provide financial services. Efficient banks tend to have very minimal operational costs, strong profitability ratios, and equally strong service delivery mechanisms (Animasaun et al. 2024). In the post-global financial crisis period, the level of competitiveness increased amidst changes in regulatory requirements and the influence of digitisation.

i. Cost to Income Ratio

The cost-to-income ratio, or CIR, is one of the commonly used measures that are associated with the bank's operational efficiency and cost-controlling ability. It shows the share of a bank's operating income used to cover operating expenses; the smaller, the better.

CIR is calculated by dividing entire operating expenses by total operating earnings (Ozili, 2023). Sometimes due to structural inefficiencies or regulatory pressures, top-performing banks worldwide often keep their CIRs between 40 and 50 percent (Afolabi et al., 2020).

ii. Operating Expense Ratio

Operating Expenditure Ratio calculates the percentage of the bank's income that is employed to meet non-interest operating expenses. Better operational performance and cost control are indicated by a lower OER, whereas inefficiencies, a poor cost structure, or excessive administrative overhead may be indicated by a higher ratio (Cuestas et al., 2022). OER is frequently high in emerging economies as a result of inadequate resource allocation, human compliance procedures, and little automation.

According to Ozili (2023), regulatory requirements have a major impact on OER for Nigerian banks, particularly the expense of recruiting compliance officials, maintaining AML-compliant systems, and providing employee training.

iii. Asset Turnover Ratio

The Asset Turnover Ratio (ATR) measures how well a bank or business makes use of its resources to produce income. It gives information about asset efficiency, resource use and capital allocation strategy. It is computed by dividing total revenue by total assets. While a low ratio indicates idle or underutilised resources, a high ATR shows efficient utilisation of

assets (Ozili, 2023). Because banks mostly rely on asset-driven revenue streams such loans, investments and interbank placements, ATR is especially significant in the banking industry. Nigerian DMBs have substantial asset bases, but many find it difficult to effectively turn these assets into instruments that generate income (Kokkinis and Sergakis 2020).

iv. Return on Assets

One important number that shows a company's profitability is return on assets. According to Cuestas et al., (2022), it is a ratio of income to total assets. It gauges how well the management of the organization can use the resources available to them to create revenue. Additionally, it shows how well a company's management generates net income using all of the institution's resources (Laeven & Levine, 2022). According to Ozili (2023), a greater ROA indicates that the business is employing its resources more effectively, providing shareholders with good value for their money.

THEORETICAL REVIEW

Situational Crime Prevention Theory

This Theory was formally propounded by Ronald V. Clarke in 1980. As such, the theory was more practical and policy-oriented than many criminological theories at that time, since it focused attention on the immediate circumstances and environmental conditions facilitating or thwarting the criminal act, rather than on offender motivation alone. Clarke, portrayal on work by scholars like Marcus Felson and Lawrence Cohen, specifically their Routine Activity Theory, suggested that not only could crime be prevented through reformist measures aimed at rectifying offenders' socio-psychological attributes but also through action that alters situational factors providing opportunities for criminal conduct.

The theory has come into heightened application in recent years, especially in financial and cyber-crime regulation. For example, in 2023, Utkina used the principles of SCP to prevent corporate fraud by identifying the critical points of vulnerability in the corporate process.In the field of AML, Gilmour and Charles in 2022 employed SCP to design the framework for minimizing illicit financial flows through transaction structuring and strengthening compliance.

Rational Choice Theory

This Theory was formally introduced to criminological discourse by Gary Becker in 1968 through his seminal work "Crime and Punishment: An Economic Approach." Becker, an economist, proposed that criminal behaviour could be examined using the same economic ideologies that govern decision-making in other areas of life.

He postulated that individuals commit crimes after a rational calculation of the potential benefits against the expected cost or punishments. The theory was extended in the field of criminology later by scholars such as Usman (2023) for application in criminal decision-making and environmental crime prevention. RCT is built on a number of key assumptions.

Recently, Rational Choice Theory has been supported and further developed by researchers such as Hendriyetty and Grewal (2023) and Isaac et al., (2022), using the theory to explain white-collar and organised crime. Guermann et al. explain that, overall, the theory has been of particular relevance to the regulation of financial crimes, cybercrimes, and corporate misconduct. In the banking sector, Levi and Reuter (2020) used RCT principles to analyse how regulatory policies affect the cost-benefit analyses of money launderers and fraudsters.

Various regulatory bodies, including the Financial Action Task Force and Basel Committee, have covertly adopted the molds of RCT in crafting AML frameworks that raise the cost of obligating financial crimes through acquiescence obligations, penalties and surveillance systems.

EMPIRICAL REVIEW

Various studies have been conducted regarding the association of AML frameworks and banking performance. The findings, however, vary. For example, Ahiauzu (2022) examines the adequacy and effectiveness of the domestic AML measures applied in Nigeria's financial institutions against the backdrop of its critical economic standing in Africa and vulnerability to financial crimes. The study adopted qualitative approaches such as interviews and focus groups.

The study found that despite sound legislation, enforcement remains poor due to weak technology, lack of human capacity, and socio-cultural features. Recommendations were towards better infrastructure, training, grass-roots education, and innovative compliance beyond mere tick-box regulation. A more contextual study, therefore, by Andesikuteb (2023) examined the efficacy of AML/CFT measures in large financial institutions within Jos, Nigeria, using a mixed-methods design.

Data from 127 participants across commercial, development and microfinance banks, as well as insurance firms and the Central Bank, indicated that AML/CFT controls were only moderately effective in practice. This presents a situation where amenability structures exist but their enactment remains uneven.

In contrast, Antwi et al. (2023) gave a more divergent outlook in their study of the relationship between AML regulations and FSD for 51 African countries from 2012 to 2019. Using two-step system GMM and dynamic panel threshold regression, the authors estimated nonlinear relationships that indicate while AML regulations may facilitate development in some economies, overregulation could hamper the same growth.

Similarly, Animasaun et al. (2024) reported that the legal provisions guiding money laundering regulation substantially enhanced the operational efficiency of Nigerian deposit money banks. Using a survey of 900 employees selected through stratified sampling, their results showed that AML legal structures significantly shaped the efficiency outcome ($t = 9.59$; $p < 0.05$). These studies go to suggest that AML measures, either through training or legal frameworks, are capable of influencing banking performance.

Terer et al. (2025) investigated the impact of AML training on the profitability of commercial banks in Kenya while adopting an explanatory design. Using data from 35 licensed banks between the years 2014 and 2021, compounding questionnaire responses with Central Bank of Kenya supervision reports, the study found that AML training wits were significantly substantial on bank profitability.

METHODOLOGY

The research design adopted in this study is the ex-post facto. According to Osuala and Ogbonna (2021), the ex-post facto research design is a structured empirical investigation in which the researcher has no control over the independent variables because they have already taken place or are naturally beyond control.

The hypothesis suggesting relationships between the variables can be tested using existing data. In this light, the study was based on secondary data collected from the Central Bank of Nigeria's Statistical Bulletin, Annual Reports from the Nigeria Deposit Insurance Corporation, and Basel Institute on Governance Reports spanning 2012 to 2024.

The period chosen was influenced by the fact that the Basel AML Index, being one of the key measures for the study, was first introduced in 2012. Analysis of data was done by means of the seemingly unrelated regression (SUR) technique. It is most appropriate for this study, given the multidimensional nature of the dependent variables: cost-to-income ratio, operating expense ratio, asset turnover ratio, and return on assets. Estimation of the model was done in E-Views 10, with complementary diagnostic tests such as the Augmented Dickey-Fuller unit root test and normality test.

Model Specification

This study adopted existing regression model from Antwi et al., (2023) and Issah et al., (2022). The mathematical form of the model is specified in a functional relationship as follows;

OR = f(AML)

Where;
OR = Operational Efficiency (proxied by CIR, OER, ATR and ROA)
AML = Anti-Money Laundering (proxied by Basel AML Index

The above can be rewritten implicitly as:

$CIR = \beta_{01} + \beta_1 AMLI + U_t$ ..... (1)
$OER = \beta_{02} + \beta_2 AMLI + U_t$ ..... (2)
$ATR = \beta_{03} + \beta_3 AMLI + U_t$ ..... (3)
$ROA = \beta_{04} + \beta_4 AMLI + U_t$ ..... (4)

Where: CIR = Cost to Income Ratio:

OER = Operating Expense Ratio;
ATR = Asset Turnover Ratio;
ROA = Return on Assets;
$\beta_{01\text{-}4}$ = autonomous intercept;
$\beta_{1.4}$ = Coefficients of the independent variables;
U_t = Disturbance term.

DATA PRESENTATION AND ANALYSIS

Data Presentation

The Data used in this study were collected from the Central Bank of Nigeria (CBN) Annual Statistical Bulletin, Nigeria Deposit Insurance Corporation (NDIC) Annual Report and Basel Institute on Governance Reports for the periods 2012-2024.

These data consist of the following variables; Basel AML Index, Cost to Income Ratio, Operating Expense Ratio, Asset Turnover Ratio and Return on Assets.

Results

Descriptive Statistics

Table 1: Summary of Descriptive Statistics
Sample: 2012-2024

	AML	CIR	OER	ATR	ROA
Mean	6.938462	60.40692	1.326923	45.74077	2.046923
Median	6.890000	61.37000	0.590000	44.12000	2.200000
Maximum	7.180000	65.04000	4.540000	68.01000	3.150000
Minimum	6.720000	51.15000	0.370000	25.30000	0.480000
Std. Dev.	0.142995	4.251301	1.291894	9.396426	0.651350
Skewness	0.347865	-1.368285	1.459914	0.309989	-0.844402
Kurtosis	1.999108	3.675131	4.076476	4.930070	3.971190
Jarque-Bera	0.804822	4.303333	5.245605	2.226002	2.055769
Probability	0.668706	0.116290	0.072599	0.328571	0.357763
Sum	90.20000	785.2900	17.25000	594.6300	26.61000
Sum Sq. Dev.	0.245369	216.8827	20.02788	1059.514	5.091077
Observations	13	13	13	13	13

***Source**: Researcher's computation with the aid of E-Views 10*

From the table above, the descriptive statistic result indicates a total of 13 observations.

The table showed the mean, standard deviation, minimum, maximum, Skewness and Kurtosis values of the dependent and independent variables. The result revealed that the mean value of AML used in the study is 6.94 with standard deviation of 0.14. The mean of CIR is 60.41 with standard deviation of 4.25. The mean value of OER is 1.33 with standard deviation of 1.29. The mean value of ATR is 45.74 with standard deviation of 9.40 while the mean value of ROA is 2.04 with standard deviation of 0.65.

Seemingly Unrelated Regression (SUR)

Table 2: Summary of Seemingly Unrelated Regression Test
Sample: 2012-2024

Dependent Variable	**AML** Coefficient	**P-value**	**R-squared**	**Adjusted** R^2	**Durbin-** Watson
CIR	-1.77	0.8311	0.0035	-0.0871	0.7822
OER	-3.62	0.1216	0.1608	0.0846	2.4403
ATR	+42.58	0.0037	0.4198	0.3671	1.4512
ROA	+0.46	0.7152	0.0103	-0.0797	1.6216

***Source**: Researcher's computation with the aid of E-Views 10*

Model 1

First, the model considers the effect that AML has on the cost-income ratio of deposit money banks in Nigeria. The estimated coefficient of AML is -1.77. This suggests that AML is

negatively related to CIR. In this regard, one might say that increased compliance with AML regulations could slightly reduce the cost-income ratio, which normally is interpreted as improved cost efficiency.

However, this relationship is not statistically significant since the p-value stands at 0.8311, which is way above the cut-off level of 0.05. The Durbin-Watson statistic of 0.782 suggests positive autocorrelation in the residuals.

Model 2

The second model examines how AML influences the Operating Efficiency Ratio. The coefficient of AML is -3.62. This corresponds to a negative relationship, which might suggest that increased compliance with AML tends to increase operational efficiency because it works to minimise waste in operations. Even though this is directionally positive, it is not statistically significant at a p-value of 0.1216. The Durbin-Watson statistic is 2.44, which is somewhat above 2, indicating low likelihoods of autocorrelation.

Model 3

The third model estimates the impact of AML on the Asset Turnover Ratio (ATR). The coefficient estimate for AML is 42.58 and significant at a 1% level with a p-value of 0.0037. What this suggests is that for every one-unit increase in compliance with AML, there is a very significant rise in ATR; thus, AML regulations should significantly enhance the way Nigerian banks use their assets to create revenues. The Durbin-Watson statistic of 1.45 suggests a slight positive autocorrelation but within an acceptable range.

Model 4

The fourth model examines the relationship between AML and ROA, a measure of profitability. The coefficient on AML is 0.46, indicating a weak positive relationship.

However, the effect is not statistically significant since the p-value is 0.7152, well above the acceptable threshold. Durbin-Watson statistic of 1.62 suggests mild positive autocorrelation.

TEST OF HYPOTHESES

The first null hypothesis, H_{01}, was that AML regulations are not significantly related to the cost-to-income ratio of Deposit Money Banks in Nigeria.

SUR results in Table 3 indicate the probability value was 0.8311, which is above the 5% significance level. Therefore, the null hypothesis was retained, which means AML regulations do not have any significant statistical effect on the banks' CIR within the study period.

The second hypothesis tested whether the AML regulations significantly influence the OER of Nigerian banks. The SUR estimate had a probability value of 0.1216, also greater than 0.05.

On the basis of that evidence, the null hypothesis was accepted; that is, compliance with AML requirements did not significantly affect banks' OERs.

Under the third hypothesis (H_2), the research investigated the relationship between AML regulations and asset turnover ratio (ATR). The SUR output provided a probability value of 0.0037, less than the 5% significance level. This therefore led to the rejection of the null

hypothesis and consequently established that there exists a statistically significant relationship between AML compliance and ATR. It would follow that regulatory enforcement could have enhanced the bank's capabilities to realize revenues in relation to their assets.

The fourth hypothesis, H_{04}, tested for the relationship between AML regulations and ROA.

From the SUR analysis, with a p-value of 0.7152, it is not statistically significant; that is, the value is greater than the 0.05 benchmark. Hence, the null hypothesis was accepted, implying that AML regulations did not significantly influence banks' profitability based on ROA.

DISCUSSION OF FINDINGS

This study investigated the relationship between AML regulations and the operational efficiency of DMBs in Nigeria, applying the Basel AML Index to proxy regulatory stringency and using four indicators of efficiency: CIR, OER, ATR, and ROA. The empirical results have been mixed. First, AML regulations do not significantly influence CIR ($p = 0.8311$). Such a result or finding confirms the position by Terer et al. (2025) that generally, the cost of compliance is included in existing bank structures and thus weakens any direct regulatory shock on cost efficiency.

The results also revealed that there is no significant relationship between AML regulations and OER; that is, $p = 0.1216$. This supports Animasaun et al. (2024) in finding that the bigger banks exhibit "cost stickiness," meaning their operating expenses are quite insensitive to changes in regulations, implying that AML costs could be absorbed under wider administrative overheads.

In contrast, the results indicated that there was a significant positive association between AML regulations and ATR, at $p = 0.0037$, which supports Andesikuteb (2023), who argued that efficient AML frameworks decrease illicit activities, enhance due diligence, and improve asset quality, hence improving asset utilisation.

Lastly, AML regulations did not have any significant influence on ROA, with a p-value of 0.7152. This agrees with Antwi et al. (2023), who stressed that such regulatory regimes, including AML policies, often nurture financial stability and may not necessarily flow to the bottom line as short-run profitability. Taken together, these findings suggest that even as AML regulations do not strongly affect cost-based efficiency measures, they can be important in enhancing the quality and turnover of bank assets.

CONCLUSION AND RECOMMENDATION

Conclusion

This study examined the impact of anti-money laundering guidelines on the operational efficiency of Deposit Money Banks in Nigeria between 2012 and 2024, representing acquiescence with the Basel AML Index and proxies for efficiency that include cost-to-income ratio, operating expense ratio, asset turnover ratio, and return on assets. The findings have shown that AML regulations have no significant impact on cost-to-income, operating expense, or return on assets but are significantly positively correlated with asset turnover ratio.

These findings suggest that even though AML frameworks may enhance asset utilization and productivity, they are not directly translated into cost efficiency or profitability.

This means that acquiescence alone cannot guarantee enhancements in operating outcomes and should be perfected by broader strategic initiatives.

Recommendations

These findings should present a case for banks to proactively develop efficiency beyond regulatory imperatives.

There is a need for periodic review and streamlining of internal cost structures with the view of reducing inefficiencies to the barest minimum, as well as the implementation of digital banking technologies that could reduce costs and improve services.

In addition, banks can use AML frameworks particularly customer due diligence and monitoring systems to support safer lending and optimise asset performance. More attention needs to be paid to investment strategies and other diversified revenue-generating activities, with any plans for boosting operational efficiency and profitability derived from innovation and strategic management instead of relying on obligations for compliance alone. The insinuation for policymakers is that AML enforcement should aim at a balanced approach that allows banks to comply without conciliating their efficiency and competitiveness.

COMPETING INTERESTS

The authors have declared that they have no known conflicting financial interests, non-financial interests, or personal ties that could have influenced the work presented in this study.

DISCLOSURE OF AUTHORS' CONTRIBUTION

The individual contribution from each author towards the completion of this study is stated as follows: particularly in areas of conception, design, execution and interpretation of the research. In the area of conception and overall coordination of the research endeavor, Solomon R. Irmiya, as the lead author, was the driving force. He also partnered with Godwin Winner Ihotu, Haruna Judith Bana, Izang Gladys John, Dau Justin John, and Daboer Dominic Dadee in the area of data sourcing, analysis, interpretation and conclusion.

In the area of Literature Review and Methodology Design, it was the combined collaboration of Onu Goma Carol Alfred, Adi Donatus Dongnda, John Seun Ajani, Magunni Beatrice Watitik, and Rwang Joy Dung.

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