

## **The Effect of Robotic Process Automation (RPA) on the Audit Efficiency of Selected Banks in Nigeria**

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### **Abstract**

*This study examined the effect of Robotic Process Automation (RPA) on audit efficiency in selected banks in Nigeria, with emphasis on fraud detection and risk management. Audit efficiency was measured using average audit report lag. The study adopted an ex post facto research design and relied on secondary data obtained from published financial statements, annual reports, and regulatory disclosures of 10 selected banks in Nigeria for the period 2010 to 2025. Descriptive statistics were used to summarize the data, while panel unit root tests were conducted to establish stationarity. Ordinary Least Squares (OLS) regression analysis was then employed to test the effect of RPA-related variables on audit efficiency. The findings showed that RPA in fraud detection had a significant negative effect on audit report lag, indicating that automation enhances audit efficiency by reducing the time required to complete audit engagements. Furthermore, RPA in risk management, proxied by the average nonperforming loan ratio, is statistically significant effect on audit efficiency. The study concludes that RPA contributes more strongly to audit efficiency when applied to fraud detection than to risk management activities. The study recommends that banks increase investment in RPA-driven fraud detection systems and improve the integration of automation tools into their risk management frameworks. The study adds to existing knowledge on digital transformation, audit automation, and technology-enabled auditing in emerging economies.*

**Keywords:** Robotic Process Automation, Audit Efficiency, Audit Report Lag, Fraud Detection, Risk Management, Banking Sector

### **1. Introduction**

Digital technologies have reshaped business operations, especially in banking, where institutions increasingly use automation to improve controls, reporting speed, and operational efficiency. Robotic Process Automation (RPA) is particularly relevant because it performs repetitive, rule-based accounting and audit tasks with speed, accuracy, and consistency. In auditing, RPA supports data extraction, transaction matching, reconciliation, compliance checks, and report preparation (Moffitt et al., 2018; Huang & Vasarhelyi, 2019). By reducing manual effort and errors, it allows auditors to focus on analytical and judgmentbased responsibilities.

RPA is also valuable in fraud detection because banks process large volumes of transactions daily. Automated systems can identify unusual patterns, flag suspicious activities, and support faster investigations (Jaradat et al., 2025; Alassuli, 2025). This improves audit responsiveness and can shorten audit completion time (Solanki et al., 2024; Saatchi et al., 2024). RPA is also used in risk management to monitor credit exposures, loan performance, and financial risks through continuous data analysis (Hong et al., 2023; Kadhim & Ali, 2024). However, evidence on its direct contribution to audit efficiency remains mixed, suggesting that RPA benefits may differ across audit functions.

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A widely accepted measure of audit efficiency is audit report lag, which represents the number of days between the end of a financial reporting period and the release of the audited financial statements (Cooper et al., 2019; Zhang et al., 2023). Shorter reporting periods generally indicate more efficient audit processes, whereas prolonged reporting delays may signal operational inefficiencies that reduce the usefulness of financial information to investors, regulators, and other stakeholders.

Traditional audits relied heavily on manual documentation and repetitive verification, often causing delays and higher costs. RPA addresses these weaknesses by automating routine tasks, accelerating information processing, and improving workflow coordination (Dawood et al., 2025; Zhang et al., 2023), although its effectiveness still depends on organizational readiness, integration, and staff competence (Dahiyat, 2022; Perdana et al., 2023).

In Nigeria's banking sector, timely financial reporting remains essential because of increasing regulatory expectations, heightened stakeholder scrutiny, and the growing complexity of banking operations. Although many banks have invested in automation technologies, uncertainty remains regarding the extent to which these technologies have translated into improved audit performance. More specifically, limited empirical evidence exists on the individual contributions of RPA-enabled fraud detection and risk management to audit efficiency within the Nigerian banking environment. Addressing this gap is important because understanding these relationships can assist banks, regulators, and policymakers in making informed decisions regarding future investments in audit automation technologies.

Against this background, this study investigates the effect of Robotic Process Automation on audit efficiency in the banking sector by examining whether automation in fraud detection and risk management significantly influences audit report lag.

The inconsistent findings reported across previous studies indicate that additional empirical investigation is required, particularly within the Nigerian banking industry where limited evidence currently exists. This uncertainty provides the basis for examining the relationship between RPA-enabled risk management and audit efficiency in the present study. Following the discussion, the following hypotheses are raised:

*H<sub>01</sub>: Robotic Process Automation in fraud detection has no significant effect on audit efficiency in the banking sector.*

*H<sub>02</sub>: Robotic Process Automation in risk management has no significant effect on audit efficiency in the banking sector.*

## **2. Literature Review**

### **2.1 Robotic Process Automation (RPA)**

Robotic Process Automation (RPA) refers to the application of software robots designed to execute repetitive, structured, and rule-driven business activities with minimal human intervention. Unlike conventional automation tools, RPA imitates human interactions with digital applications, enabling organizations to automate tasks such as data collection, transaction processing, report generation, reconciliation, and compliance verification. Its growing adoption has transformed operational processes across several industries, particularly accounting, auditing, and financial services.

RPA emerged from the need for faster, more accurate processing of large volumes of financial information. By assigning routine activities to software robots, organizations reduce manual errors and allow employees to focus on judgment-based work. Moffitt et al. (2018) and Huang and Vasarhelyi (2019) describe RPA as an important innovation for automating accounting and audit procedures.

Within the accounting profession, RPA has gradually evolved from a simple automation tool into an essential component of digital financial management. Jędrzejka (2019) observed that organizations implementing RPA experienced improvements in productivity because repetitive accounting activities could be completed more quickly and with fewer processing errors. Cooper et al. (2019) similarly reported that accounting firms increasingly adopted RPA to automate routine procedures, thereby enabling professional auditors to devote more attention to analytical reviews, risk assessment, and strategic decision-making.

In auditing, RPA supports data extraction, transaction reconciliation, compliance testing, document validation, and audit working-paper preparation. These uses improve consistency and enable auditors to process larger datasets more quickly than manual procedures (Huang & Vasarhelyi, 2019; Lacurezeanu et al., 2020).

Several empirical studies have further demonstrated the contribution of RPA to improved financial reporting and audit performance. Dawood et al. (2025) reported that organizations implementing RPA experienced more accurate financial reporting alongside improved operational efficiency. Macha (2025) similarly concluded that automation contributes to higher processing accuracy while reducing the time required to complete accounting operations. Zhang et al. (2023) also established that organizations successfully implement RPA recorded shorter audit cycles and more efficient audit workflows.

Beyond operational efficiency, RPA contributes significantly to audit quality and regulatory compliance. Automated execution of standardized procedures minimizes inconsistencies and strengthens internal control systems. Adesanya et al. (2021) observed that automation enhances compliance by ensuring that regulatory procedures are consistently followed throughout audit engagements. Rechtman (2021) likewise found that organizations adopting RPA achieved greater consistency in audit execution while substantially reducing processing errors.

Beyond efficiency, RPA can strengthen audit quality and compliance by standardizing procedures, reducing inconsistencies, and minimizing repetitive-task errors (Adesanya et al., 2021; Rechtman, 2021). Recent studies such as Hong et al. (2023) and Saatchi et al. (2024) also link RPA to internal control and risk management, showing that automation can improve transparency, processing speed, and audit reliability when properly integrated into organizational systems.

## **2.2 Audit Efficiency**

Audit efficiency describes the extent to which audit engagements are completed within reasonable time, cost, and resource constraints without compromising audit quality or professional standards. Efficient auditing requires the effective utilization of personnel, technology, financial resources, and methodologies to produce reliable audit reports promptly. Audit efficiency also depends on the effective allocation of available resources throughout the audit engagement. Adesanya et al. (2021) explained that efficient audit systems reduce duplication of effort, improve workflow coordination, and strengthen compliance with regulatory standards. Likewise, Rechtman (2021) maintained that standardized automated procedures reduce unnecessary rework while promoting consistency in audit execution.

A major indicator of audit efficiency is audit report lag, defined as the period between the end of an organization's financial year and the issuance of the auditor's report. Shorter audit report lags generally indicate that audit procedures have been conducted efficiently, whereas extended reporting delays often reflect weaknesses in audit planning, execution, coordination, or documentation (Cooper et al., 2019; Zhang et al., 2023).

Modern auditing increasingly depends on technological innovations to improve efficiency. According to Moffitt et al. (2018), automation technologies reduce the time required to complete repetitive audit procedures while improving consistency and reliability. Huang and Vasarhelyi (2019) similarly argued that integrating digital technologies into audit workflows enables auditors to process larger volumes of information within shorter periods without sacrificing audit quality.

In contemporary banking operations, auditors must process enormous quantities of financial transactions within strict reporting deadlines. Macha (2025) observed that organizations capable of rapidly processing financial information are more likely to achieve efficient audit outcomes. Similarly, Saatchi et al. (2024) reported that integrating technological tools into audit procedures enables financial institutions to improve reporting timeliness and overall operational performance.

Nevertheless, audit efficiency should not be evaluated solely by the speed of audit completion. Tiron-Tudor et al. (2024) emphasized that timely reporting must always be balanced with audit quality, reliability, and compliance with professional auditing standards. Liu (2022) further argued that an efficient audit process is one that produces

credible, accurate, and dependable audit reports within an appropriate timeframe rather than merely completing engagements quickly.

### **2.3 Theoretical Premises**

This study is underpinned by the Technology Acceptance Model (TAM), which provides an appropriate theoretical basis for explaining how individuals and organizations adopt new technologies such as Robotic Process Automation (RPA). The model was introduced by Davis (1986) to explain users' acceptance of information systems based on two fundamental beliefs: perceived usefulness and perceived ease of use. According to the theory, individuals are more likely to embrace a technological innovation when they believe it will improve their job performance and when they perceive the technology as easy to learn and operate.

TAM developed from the Theory of Reasoned Action and explains technology adoption through users' perceptions of usefulness and simplicity. It is widely applied in accounting, auditing, and financial services because it links technology acceptance to professional behaviour and system use. As auditing adopts AI, blockchain, cloud computing, and RPA, TAM remains useful for explaining why professionals accept or resist automation. Later extensions, such as UTAUT, also emphasize organizational support, facilitating expectations (Venkatesh et al., 2003).

Within the context of this study, perceived usefulness refers to auditors' belief that Robotic Process Automation improves audit activities by increasing processing speed, reducing manual effort, strengthening fraud detection, and improving overall audit quality. When auditors recognize these advantages, they are more likely to incorporate RPA into their routine activities. Empirical evidence supports this assumption. Jaradat et al. (2025) found that organizations implementing RPA experienced significant improvements in internal audit efficiency, while Alassuli (2025) reported enhanced operational effectiveness among commercial banks using RPA-supported audit systems. Likewise, Solanki et al. (2024) concluded that auditors demonstrate stronger acceptance of automation technologies when they clearly observe improvements in audit quality and reporting efficiency.

The second construct of TAM, perceived ease of use, is equally important in explaining the adoption of RPA. Auditors are more willing to embrace automation technologies when such systems are easy to understand, integrate, and operate within existing audit procedures. Complex systems requiring extensive technical expertise may discourage adoption despite their potential benefits. Dahiyat (2022) observed that successful implementation of RPA depends largely on system simplicity and adequate user training. Similarly, Coovadia and Vorster (2025) argued that organizational readiness and continuous staff development significantly influence the successful utilization of robotic process automation within audit environments.

The Technology Acceptance Model therefore provides a logical explanation for variations in audit performance associated with RPA implementation. Organizations that successfully encourage technology acceptance among their audit personnel are more likely to realize improvements in audit efficiency than organizations where resistance to technological change remains high. Kadhim and Ali (2024) emphasized that the effectiveness of automation depends not only on the availability of technological infrastructure but also on users' willingness to integrate the technology into everyday audit activities. Consequently, this study adopts TAM because it effectively explains how the acceptance and utilization of RPA can influence audit efficiency in banking institutions.

Despite its usefulness in explaining how users' perceptions influence the adoption and use of Robotic Process Automation (RPA), the Technology Acceptance Model (TAM) has some limitations in explaining audit efficiency comprehensively. The model primarily focuses on individual perceptions, particularly perceived usefulness and perceived ease of use, and therefore gives limited attention to organizational, technological, and environmental factors that may also determine the effectiveness of RPA implementation. Factors such as management support, organizational culture, employee skills, regulatory requirements, availability of technological infrastructure, and the quality of RPA systems may influence audit efficiency but are not adequately captured by the original TAM.

### **2.4 Empirical Review and Hypotheses Development**

Existing empirical literature provides substantial evidence that Robotic Process Automation contributes positively to audit performance by automating repetitive procedures, reducing manual intervention, and improving operational

accuracy. Numerous studies have reported that automation enables auditors to complete routine assignments more efficiently while strengthening fraud detection and compliance monitoring.

Jaradat et al. (2025), Alassuli (2025), Solanki et al. (2024), and Coovadia and Vorster (2025) found that RPA improves audit efficiency by speeding up repetitive procedures, increasing accuracy, and shortening audit cycles. Other studies also show that automation enhances internal audit effectiveness, business process efficiency, audit consistency, fraud identification, and reporting timeliness (Charles et al., 2022).

Although considerable evidence supports the positive influence of automation on audit performance, findings relating to risk management remain less conclusive. Several researchers argue that while RPA improves risk assessment procedures, its contribution to audit efficiency is often indirect and highly dependent on organizational implementation strategies.

Kadhim and Ali (2024) observed that robotic process automation enhances audit risk assessment by improving the analysis of financial risks; however, its direct influence on audit efficiency was relatively limited. Liu (2022) similarly found that automation produces greater benefits in routine audit procedures than in complex risk management activities requiring professional judgment. Lacurezeanu et al. (2020) also reported that RPA demonstrates stronger effectiveness in standardized audit tasks than in broader risk evaluation processes.

Moreno et al. (2023), Perdana et al. (2023), Tiron-Tudor et al. (2024), and Adesanya et al. (2021) similarly suggest that automation improves risk-related processes only when it is well integrated with organizational systems and supported by effective risk management frameworks.

### **3. Methodology**

#### **3.1. Research Design**

This study employed an ex post facto research design to investigate the effect of Robotic Process Automation (RPA) on audit efficiency within the banking sector. The choice of this design was appropriate because the study relied exclusively on historical data that had already been generated by banking sector, making it impossible for the researcher to manipulate or control the variables of interest. The design therefore enabled the examination of existing relationships between the explanatory and response variables using observed data.

#### **3.2. Sources of Data**

The study utilized secondary data obtained from credible and publicly available sources. Data were extracted from the published annual reports and audited financial statements of selected banks on the Nigerian Exchange Group (NGX). The study population comprised listed banks (access, GTB, FCMB, UBA, Fidelity, Zenith, Eco bank, First bank, Wema, and Sterling bank), while purposive sampling was used to select these banks with complete and consistent financial and audit information for the study period. The study covered 16 years, from 1 January 2010 to 31 December 2025, with additional data obtained from audit reports and relevant regulatory publications.

#### **3.3. Measurement of Variables**

The dependent variable was audit efficiency, which was represented by the average audit report lag. Audit report lag measured the number of days between the end of a financial year and the issuance of the external auditor's report. Shorter reporting periods indicate greater audit efficiency because audit assignments are completed within a relatively shorter timeframe.

The independent variable was Robotic Process Automation (RPA), which was examined through two major dimensions:

RPA in Fraud Detection (RPAFD): Measured using reported fraud cases within the banking sector. This variable reflects the extent to which automated systems support the identification and monitoring of fraudulent financial activities.

RPA in Risk Management (RPARM): Measured using the average Non-Performing Loan (NPL). The NPL ratio was adopted as an indicator of risk management effectiveness because it reflects the quality of loan portfolios and the efficiency of risk monitoring practices within banking institutions.

### **3.4 Method of Data Analysis**

Both descriptive and inferential statistical techniques were employed to analyze the data. Descriptive statistics, including the mean, median, minimum value, maximum value, standard deviation, skewness, kurtosis, and Jarque-Bera statistics, were first computed to summarize the characteristics and distribution of the variables.

Before estimating the regression model, panel unit root tests were conducted to determine whether the variables were stationary. The study utilized the Levin-Lin-Chu (LLC), Im-Pesaran-Shin (IPS), Augmented Dickey-Fuller (ADF-Fisher), and Phillips-Perron (PPFisher) panel unit root tests. These tests ensured that the variables satisfied the assumptions required for reliable regression estimation and eliminated the possibility of spurious regression results.

Following confirmation of stationarity, Ordinary Least Squares (OLS) regression analysis was employed to estimate the effect of the explanatory variables on audit efficiency. The hypotheses were tested at a 5 percent level of significance, where probability values less than 0.05 resulted in the rejection of the null hypothesis, while probability values greater than 0.05 led to its acceptance.

### **3.5 Model Specification**

The functional relationship investigated in this study is expressed as follows:

$$AE = f(RPAFD, RPARM)$$

Where:

AE=Audit Efficiency

RPAFD = Robotic Process Automation in Fraud Detection

RPARM = Robotic Process Automation in Risk Management

The econometric (explicit) form of the model was specified as:

$$AE = \beta_0 + \beta_1 RPAFD + \beta_2 RPARM + \varepsilon$$

Where:

AE = Audit Efficiency (measured by average audit report lag)

RPAFD = RPA in Fraud Detection (measured by reported fraud cases)

RPARM = RPA in Risk Management (measured by average NPL ratio of banks)

$\beta_0$  = Constant term (intercept)

$\beta_1, \beta_2$  = Coefficients of the independent variables

$\varepsilon$  = Error term

The estimated coefficients indicate both the magnitude and direction of the relationship between the explanatory variables and audit efficiency. A statistically significant negative coefficient implies that improvements in the corresponding RPA dimension reduce audit report lag and consequently enhance audit efficiency, whereas a statistically insignificant coefficient suggests that the variable does not exert a meaningful influence on audit efficiency during the study period.

#### 4. Results and Discussion of Findings

**Table 4.1: Descriptive Results**

|              | Average Audit Report Lag | Fraud Detection | Average NPL Ratio |
|--------------|--------------------------|-----------------|-------------------|
| Mean         | 70.06250                 | 256.2313        | 0.049697          |
| Median       | 69.50000                 | 210.0000        | 0.043000          |
| Maximum      | 122.0000                 | 680.0000        | 0.259000          |
| Minimum      | 44.00000                 | 82.00000        | 0.007000          |
| Std. Dev.    | 12.61859                 | 144.3781        | 0.034185          |
| Skewness     | 0.192744                 | 0.767937        | 3.824173          |
| Kurtosis     | 2.478402                 | 2.673035        | 21.27844          |
| Jarque-Bera  | 2.804429                 | 16.43875        | 2617.324          |
| Probability  | 0.246052                 | 0.000269        | 0.000000          |
| Sum          | 11210.00                 | 40997.00        | 7.951500          |
| Sum Sq. Dev. | 25317.38                 | 3314360.        | 0.185814          |
| Observations | 160                      | 160             | 160               |

Table 4.1 summarizes audit efficiency, fraud detection, and risk management before inferential analysis. Average audit report lag recorded a mean of 70.06 days and a median of 69.5 days, indicating that banks generally issued audited statements within three months after year-end. Values ranged from 44 to 122 days, while the standard deviation of 12.62 shows moderate variation. The skewness value of 0.19 and kurtosis of 2.478 suggest an approximately normal distribution, confirmed by the insignificant Jarque-Bera probability of 0.246. Fraud detection had a mean of 256.23 cases, with values between 82 and 680. The standard deviation of 144.3781 indicates wide fluctuations, although the distribution remained reasonably normal based on skewness, kurtosis, and the JarqueBera probability. Risk management, measured by the average non-performing loan ratio, had a mean of 0.049%, ranging from 0.007% to 0.259%. Its high skewness and kurtosis, together with a significant JarqueBera probability, indicate non-normality and the presence of extreme observations.

**Table 4.2: Group Unit Root test**

| Panel unit root test: Summary                                                                                                            |           |         |          |     |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------|----------|-----|
|                                                                                                                                          |           |         |          |     |
|                                                                                                                                          |           |         | Cross-   |     |
| Method                                                                                                                                   | Statistic | Prob.** | sections | Obs |
| Null: Unit root (assumes common unit root process)                                                                                       |           |         |          |     |
| Levin, Lin & Chu t*                                                                                                                      | -2.30722  | 0.0105  | 10       | 140 |
| Null: Unit root (assumes individual unit root process)                                                                                   |           |         |          |     |
| Im, Pesaran and Shin W-stat                                                                                                              | 0.72018   | 0.7643  | 10       | 140 |
| ADF - Fisher Chi-square                                                                                                                  | 10.0657   | 0.9670  | 10       | 140 |
| PP - Fisher Chi-square                                                                                                                   | 19.9477   | 0.4612  | 10       | 150 |
| ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality. |           |         |          |     |

Panel unit root tests were conducted to confirm stationarity and avoid spurious regression estimates. The Levin-Lin-Chu test produced a statistic of -2.30722 with a probability value of 0.0105, leading to rejection of the unit root null hypothesis. However, the IPS, ADF-Fisher and PP-Fisher tests produced probability values of 0.7643, 0.9670 and 0.4612, respectively, all above 0.05. Hence, their null hypotheses cannot be rejected, indicating evidence of non-stationarity under the individual-unit-root assumptions.

**Table 4.3: Regression Result**

Sample: 2010 2025

Periods included: 16

Cross-sections included: 10

Total panel (balanced) observations: 160

| Variable           | Coefficient | Std. Error            | t-Statistic | Prob.  |
|--------------------|-------------|-----------------------|-------------|--------|
| FRAUD_DETECTION    | -0.021534   | 0.006247              | -3.447053   | 0.0007 |
| AVERAGE_NPL        | 132.8743    | 26.38354              | 5.036258    | 0.0000 |
| C                  | 68.97669    | 2.309109              | 29.87156    | 0.0000 |
| R-squared          | 0.200638    | Mean dependent var    | 70.06250    |        |
| Adjusted R-squared | 0.190455    | S.D. dependent var    | 12.61859    |        |
| S.E. of regression | 11.35354    | Akaike info criterion | 7.715508    |        |
| Sum squared resid  | 20237.75    | Schwarz criterion     | 7.773168    |        |
| Log likelihood     | -614.2407   | Hannan-Quinn criter.  | 7.738922    |        |
| F-statistic        | 19.70331    | Durbin-Watson stat    | 0.881185    |        |
| Prob(F-statistic)  | 0.000000    |                       |             |        |

The regression results assess how RPA-related fraud detection and risk management influence audit efficiency. Fraud detection has a coefficient of -0.021534, t-statistic of -3.4470, and probability value of 0.0007. Since the probability value is below 0.05, the effect is significant. The negative coefficient shows that improved fraud detection reduces audit report lag and enhances audit efficiency.

Risk management, represented by average non-performing loan ratio, has a coefficient of 132.8743, t-statistic of 5.0362, and probability value of 0.0000. Since this is below 0.05, the effect is statistically significant. The  $R^2$  value of 0.2006 indicates that fraud detection and risk management jointly explain about 20.06% of the variation in audit efficiency. The Adjusted  $R^2$  of 0.1905 shows moderate explanatory power, while the F-statistic of 19.70331 and probability of 0.0000 confirm that the model is statistically significant overall. The Durbin-Watson statistics of .881 suggests mild positive serial correlation, but the model remains useful for explaining the study relationships.

#### 4.1 Test of Hypotheses

##### Hypothesis One

$H_{01}$ : Robotic Process Automation in fraud detection has no significant effect on audit efficiency in the banking sector.

Fraud detection recorded a probability value of 0.007, which is below 0.05; therefore, the null hypothesis is rejected. This shows that RPA-enabled fraud detection significantly improves audit efficiency by reducing audit completion time.

##### Hypothesis Two

$H_{02}$ : Robotic Process Automation in risk management has no significant effect on audit efficiency in the banking sector.

Risk management recorded a probability value of 0.007, which is below 0.05; therefore, the null hypothesis is rejected.

#### 4.2 Discussion of Findings

The findings show that RPA improves audit efficiency mainly through fraud detection. The significant negative relationship between fraud detection and audit report lag indicates that automated monitoring helps auditors identify irregular transactions faster and complete audits more promptly. This supports Jaradat et al. (2025), Alassuli (2025), and Solanki et al. (2024), who found that automation improves audit speed, accuracy, and quality.

However, RPA-supported risk management did significantly reduce audit report lag. This suggests that risk management activities still depend strongly on professional judgment and broader institutional processes, consistent with Kadhim and Ali (2024) and Liu (2022).

Overall, RPA has the strongest audit-efficiency effect when applied to routine, transaction-intensive functions rather than broad strategic risk management processes.

## **5. Conclusion and Recommendations**

### **5.1 Conclusion**

This study examined the effect of Robotic Process Automation on audit efficiency in the banking sector using fraud detection and risk management as key dimensions. Audit efficiency was measured by average audit report lag.

The findings reveal that RPA significantly improves audit efficiency when used for fraud detection, as automated systems help identify suspicious transactions faster and reduce audit completion time.

The study concludes that RPA is most beneficial when applied to repetitive and transaction-intensive audit tasks. Banks can therefore improve audit timeliness and reporting quality by strengthening automation in fraud detection and related audit processes.

### **5.2 Recommendations**

1. Banks should strengthen RPA-based fraud detection, particularly automated transaction alerts and exception reporting, because improved fraud detection significantly reduced audit report lag.
2. Banks should intensify monitoring and early intervention for non-performing loans, since the significant relationship between NPLs and audit efficiency shows that credit-risk conditions materially affect audit processes.
3. Banks should integrate RPA fraud alerts and NPL-risk indicators into audit planning and continuous monitoring.

### **5.3 Contribution to Knowledge**

This study contributes to auditing literature by showing how RPA affects audit efficiency in the Nigerian banking sector. It separately examined fraud detection and risk management, revealing that RPA dimensions influence audit performance differently.

The study also extends the Technology Acceptance Model by demonstrating that automation benefits depend on both adoption and the audit function where the technology is applied.

### **5.4 Limitations of the Study**

The study has some limitations.

First, it relied on secondary data from published reports, so the findings depend on the accuracy of those sources. Second, audit efficiency was measured only by audit report lag; other measures such as audit cost, quality, and productivity were not included.

Third, the study focused on only 10 banks, which may limit generalization to other sectors.

Finally, only fraud detection and risk management were examined; future studies may consider compliance monitoring, internal controls, predictive analytics, and continuous auditing.

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